(1) Sewage Collection System

The proposed sewer system includes the upgrading of the existing sewers and interceptors by installing manholes with weir structures that connect the sewers and interceptors. During dry weather conditions, sewage flows through the interceptors and trunk sewers to the STPs. This results in a reduced pollutant load and therefore an improvement in the water quality in the Lana and Tirana rivers. During wet weather conditions, the sewage and rainwater are separated by weir structures. The intercepted sewage flow (which is assumed to be equivalent to the dry weather flow) is directed though the interceptors and trunk sewers to the proposed STPs, while the remaining flow is directly discharged to the nearby river. To reduce wet weather pollution, it may be possible to introduce a separate sewer system and use existing sewers as dedicated drainage channels. This was proposed in the former JICA Study, published in 1998.

When new urban areas are being planned, separate sewer and drainage systems are proposed. New systems can collect sewage efficiently, with lower construction costs (as compared to a combined sewer/storm water system which requires a larger sewer). Both new branch and main sewers can be laid using local products, technology and human resources.

The proposed trunk sewer system connecting to the Kasha STP would consist of two different routes and systems: 1) gravity flow system (Trunk sewer No.3) to channel the sewage collected from the Lana basin; and 2) Pressurized flow system (pressurized by the Kashar Pumping Station) that conveys the sewage collected from the remaining service area. The proposed gravity sewer system has the low O&M costs and has the advantage that more than one third of the sewage generated in Tirana municipality can be conveyed by gravity. This is important considering the poor power supply situation in the Greater Tirana area.

The trunk sewer system connecting the Berxulle STP would be constructed using the open-cut method, (except at the Tirana River crossing) which would reduce the construction costs and using local technology and human resources.

In addition, the proposed sewage collection system will result in water quality improvements, especially in the upper and middle part of Lana and Tirana Rivers (these run through the urban center of Tirana municipality). This water quality would improve because less untreated sewage would be directly discharged into the water courses and rivers.

(2) Sewage Treatment Plant (STP)

The study proposes two STPs, one at Kashar and the other at Berxulle. Both plants use a trickling filter process which requires a larger site area but requires less sophisticated operation and maintenance

technology than the alternative activated sludge process. The trickling filter process has already been applied to the Kavaje STP. The Kavaje STP has been operating since May 2006. The O&M experience gained through the operation of this plant can be used to improve the implementation of the Kashar and Berxulle STPs.

Sewage treatment produces sludge on a daily basis. Sludge is removed from primary and secondary sedimentation tanks. It is then thickened and digested. This can be carried out by naturally drying the sludge or by undertaking mechanical dewatering. Natural drying (using drying beds) requires a large area, but the energy requirements are low. The study proposes that natural drying be implemented to the extent possible within site area constraints. This would result in less energy, and therefore a lower operational cost.

(3) River Water Quality Improvement

The future BOD concentrations, which are under low river flow conditions showing high concentration under such a drought period, are projected under available but very limited data and assumptions set forth. The simulation results show the followings:

- Water quality improvement is expected at F1 after the first stage project.
- Other reference points, the water quality improvement is expected after the second stage project.
- At the reference point F1 and R4, further water quality improvement may be expected if any measures are taken to reduce the unspecified pollution load may be caused by sludge dumping, industrial wastewater and other pollution sources.

1.6.2 Economic and Financial Evaluations

The economic evaluation compares the economic benefit and the economic cost of the sewerage M/P in terms of their monetary present value.

(1) Economic Evaluation

The expected economic benefits of the project are:

- the willingness of people to pay (WTP);
- savings in medical expenditure due to a reduced infection rates from water borne diseases; and
- savings in salaries/wages will be required to treat water borne diseases.

Table S1.6.1 shows a summary of the basic unit estimation for economic benefits.

Economic costs were estimated taking into account the followings:

- A Standard Conversion Factor (SCF) for tradable equipment and materials;
- The shadow price for land acquisition and/or housing costs;
- Labor associated with construction works; and

- The cost of transfer items such as personal income tax and corporate income tax.

The SCF is calculated at 0.9380. Shadow Wage Rate is estimated at 0.5971 based on the average income level in Tirana Municipality of 42,245 Leks/HH divided by number of workable persons per HH of 1.77 also divided by adopted wage rate for the Project of 40,000 Leks per person. The shadow price rate for land is estimated at 0.02115 for primary treatment plant and 0.01089 for secondary treatment plant.

Table S1.6.2 summarizes the project's financial and economic costs. *Table S1.6.3* shows the annual disbursement schedule, including the O&M cost and the replacement cost.

Table S1.6.1 Summary of Basic Unit of Economic Benefit

(As of 2005)

Benefit Items	Expected Willingness of People to Pay for the Whole Tageted Area by Means of Population-Weighted Average[1)] (Leks/HH per Year)	Saving Amount of Medical Expenditure[2)] (Leks/HH per Year)		Saving Amount of Income Decreasing[3)] (Leks/HH per Year)	
		Outpatient	Inpatient	Outpatient	Inpatient
Amount of Unit Benefit	4,193	244	660	4,885	15,368

Remarks & Sources

1. Estimated based on the result of the Public Awareness Survey made by JICA Study Team, January 2006.
2. Basic data and information for the nation and Tirana District are based on the information of the "Albania Poverty Assessment" Report No.26213-AL, November 5, 2003, the World Bank. The figures are the weighted average for the entire targeted areas. Details are shown in Annex.
3. Basic data and information for the nation and Tirana District are based on the information of the "Albania Poverty Assessment" Report No.26213-AL, November 5, 2003, the World Bank. The figures are the weighted average for the entire targeted areas. Details are shown in Annex in the Report.

Table S1.6.2 Summary of Project Cost of M/P (Case B-3d)

(Million Leks)

Description	FC	LC	Total
Direct Construction Cost	9,405	10,352	19,757
Trunk Sewer	2,208	2,132	4,340
Main anad Branch Sewers	0	3,420	3,420
Kashar PS	328	221	549
Kashar STP	5,242	3,494	8,736
Kamza PS	208	137	345
Burxulle STP	1,419	948	2,367
Indirect Construction Cost	2,113	7,772	9,885
Land acquisiotion and Conpensation	0	4,618	4,618
Administrative Expenses	0	988	988
Engineering Services	941	1,035	1,976
Physical Contigency	941	1,035	1,976
Capacity Building	231	96	327
Sub-Total of Financial Cost	11,518	18,124	29,642
Price Escalation	3,373	8,236	11,609
Total Financial Cost	14,891	26,360	41,251
Economic Cost Converted	10,364	8,696	19,060

Table S1.6.3 Annual Disbursement Schedule of M/P

(Million Leks)

Item	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Financial Cost (incl. Price Escalation)	3,986	1,513	2,099	2,865	2,975	4,842	4,236	5,417	4,151	2,179	2,553	2,148	2,286	41,251
Financial Cost (excl. Price Escalation)	3,415	1,273	1,704	2,335	2,360	3,407	2,957	3,819	2,844	1,316	1,535	1,321	1,356	29,642
Economic Cost Converted (excl. Price	402	903	1,215	1,973	1,999	1,245	2,044	3,008	2,288	830	1,052	1,041	1,061	19,059

The economic costs and benefits of the project throughout its life were analyzed in terms of present values. If the total present value of economic costs equals that of the economic benefit (i.e. B/C=1), the resulting discount rate is the "economic internal rate of return (EIRR)". This is the main measure used to evaluate the feasibility of the project. The other two indices are Net Present Value (NPV) and the B/C Ratio.

The economic evaluation is based on projected cash flows over the project's life of 35 years[1]. The results are summarized in *Table S1.6.4*:

Table S1.6.4 Result of Economic Evaluation of M/P

NPV	EIRR	B/C
-282 Million Leks	9.59 %	0.96

The above table indicates that the EIRR is 9.59%. This is slightly lower than the applied discount rate (the rate of the opportunity cost of capital of 10 %).

The economic internal rate of return (EIRR) changes its value depending upon the parameters employed for the calculation. Out of these parameters, the construction cost of the Project and its benefit are the most important determinants of the economic evaluation. The Sensitivity Test consisted of 49 combinations of the variables including:

- Cost increased by 30 %, 20% and 10%;
- Cost reduced by 10 %, 20% and 30%;
- Economic Benefit reduced by 30%, 20% and 10%; and
- Economic Benefit increased by 10 %, 20% and 30%.

The results are shown in *Table S1.6.5*. The World Bank[2] states that the discount rate reflects the rate of the reduction in the value of consumption over time. The World Bank recommends that, even in non-commercial projects, the EIRR should be kept at least 5 % above from the view points of basic human needs. The EIRR, for the M/P, which are higher the minimum recommended rate of 5 % except several cases when the benefit reduced by 20% and 30% and the cost increased by 20 and 30%.

[1] Details are shown in Appendix 12.11.2 in Appendix 12 of Volume III "Supporting Report" of this report.
[2] William A. Ward and Barry J. Deren with Emannuel H. D'Silva, 1991 "*The Economics of Project Analysis –A Practitioner's*

Table S1.6.5 Result of the Sensitivity Test for M/P

Cost	Benefit						
	+ 30 %	+ 20 %	+ 10 %	Base Case	- 10 %	- 20 %	- 30 %
+ 30 %	9.59%	8.70%	7.76%	6.77%	5.72%	4.57%	3.29%
+ 20 %	10.52%	9.59%	8.62%	7.60%	6.52%	5.34%	4.05%
+ 10 %	11.56%	10.60%	9.59%	8.53%	7.41%	6.21%	4.89%
Base Case	12.76%	11.75%	10.70%	**9.59%**	8.42%	7.18%	5.82%
- 10 %	14.15%	13.09%	11.98%	10.82%	9.59%	8.29%	6.89%
- 20 %	15.81%	14.67%	13.49%	12.26%	10.97%	9.59%	8.12%
- 30 %	17.80%	16.59%	15.33%	14.00%	12.62%	11.15%	9.59%

Therefore, it can be concluded that the M/P is economically viable and socially responsible.

(2) Financial Evaluation

The financial benefit, namely the expected revenue due to collection of charges for sewerage services and connection fees is estimated.

The JICA Study Team recommends that the tariff level for the sewerage services should be 1 % of the average household income. The affordability to pay level was used as a benchmark to set the tariff level. The current sewerage tariff payment is low when compared with average income. A tariff revision schedule is recommended to ensure that the proposed tariff level can be reached by the target year of 2022. *Table S1.6.6* shows the calculations used to determine the average tariff level of sewerage change to Household for each stage, based on the affordability to pay. Future income level was estimated based on wage and salary growth trends in Albania.

For commercial organizations (such as offices, shops, hotels, restaurants and factories) a tariff of Leks 7,339/annum per organization are applied.

In addition to the above base tariff, a Connection Fee, for the newly constructed sewerage facilities should be levied. This will apply to households once the charge equivalent to the average monthly income per customer. *Table S1.6.7* shows the connection fees to the household. For commercials, it will apply at the rate of Leks 200,000 per customer. This charge will apply to new customer as well as the customers living in Tirana municipality who have already connected to the existing sewer network. The first financial benefit will be realized in 2014 after the completion of the first stage project. The sewerage charges and connection fees will be collected from the users who live in the project area and connect to the sewerage system.

Guide –" EDI Technical Materials, the World Bank.

[4] Details are shown in Appendix 12.11.3 in Appendix 12 of Volume III "Supporting Report" of the report.

Table S1.6.6 Annual Revision Schedule for Tariff Level on Sewerage Service Charge based on the Affordability of People to Pay

Year	Average Annual Growth Rates of Income per House-hold	Annual Revised Schedule of Tariff Level Based on the Affordability of People to Pay														
		Tirana			Kamza			Kashar			Paskuqan			Berxull		
		Estimated Annual Average Income Level (Leks/HH)	Teriff per Year	Share Rate to Annual Income per HH	Estimated Annual Average Income Level (Leks/HH)	Teriff per Year	Share Rate to Annual Income per HH	Estimated Annual Average Income Level (Leks/HH)	Teriff per Year	Share Rate to Annual Income per HH	Estimated Annual Average Income Level (Leks/HH)	Teriff per Year	Share Rate to Annual Income per HH	Estimated Annual Average Income Level (Leks/HH)	Teriff per Year	Share Rate to Annual Income per HH
2005	5.43%	465,564	1,048	0.23%	420,240	167	0.04%	377,419	0	0.00%	348,800	0	0.00%	424,800	0	0.00%
2006	5.15%	489,535	1,048	0.21%	441,877	167	0.04%	396,851	0	0.00%	366,759	0	0.00%	446,672	0	0.00%
2007	4.89%	513,493	1,048	0.20%	463,503	167	0.04%	416,274	0	0.00%	384,708	0	0.00%	468,532	0	0.00%
2008	4.66%	537,439	1,048	0.19%	485,118	167	0.03%	435,686	0	0.00%	402,649	0	0.00%	490,382	0	0.00%
2009	4.45%	561,374	1,048	0.19%	506,722	167	0.03%	455,089	0	0.00%	420,580	0	0.00%	512,221	0	0.00%
2010	4.26%	585,297	1,048	0.18%	528,316	167	0.03%	474,483	0	0.00%	438,503	0	0.00%	534,049	0	0.00%
2011	4.09%	609,207	1,048	0.17%	549,899	167	0.03%	493,867	0	0.00%	456,417	0	0.00%	555,866	0	0.00%
2012	3.92%	633,106	1,048	0.17%	571,471	167	0.03%	513,241	0	0.00%	474,322	0	0.00%	577,672	0	0.00%
2013	3.77%	656,993	1,048	0.16%	593,033	167	0.03%	532,605	0	0.00%	492,218	0	0.00%	599,467	0	0.00%
2014	3.63%	680,868	4,267	0.63%	593,033	167	0.03%	551,960	2,922	0.53%	510,105	2,701	0.53%	621,252	0	0.00%
2015	3.50%	704,731	4,267	0.61%	636,123	3,849	0.61%	571,305	2,922	0.51%	527,984	2,701	0.51%	643,026	0	0.00%
2016	3.38%	728,583	4,267	0.59%	657,653	3,849	0.59%	590,641	2,922	0.49%	545,853	2,701	0.49%	664,789	0	0.00%
2017	3.27%	752,422	4,267	0.57%	679,171	3,849	0.57%	609,967	2,922	0.48%	563,714	2,701	0.48%	686,541	0	0.00%
2018	3.17%	776,250	6,314	0.81%	700,679	5,426	0.77%	629,283	4,812	0.76%	581,565	4,447	0.76%	708,282	0	0.00%
2019	3.07%	800,066	6,314	0.79%	722,177	5,426	0.75%	648,590	4,812	0.74%	599,408	4,447	0.74%	730,013	0	0.00%
2020	2.98%	823,870	6,314	0.77%	743,664	5,426	0.73%	667,887	4,812	0.72%	617,242	4,447	0.72%	751,733	0	0.00%
2021	2.89%	847,663	6,314	0.74%	765,140	5,426	0.71%	687,175	4,812	0.70%	635,067	4,447	0.70%	773,442	0	0.00%
2022	2.81%	871,443	8,714	1.00%	786,605	7,866	1.00%	706,453	7,065	1.00%	652,884	6,529	1.00%	795,141	7,951	1.00%

Note: Marked figures would be the service charge level to be collected from the customer connecting to the proposed sewerage system.

Table S1.6.7 Connection Fee for the Household

Year	Average Annual Growth Rates of Income per House-hold	Annual Revised Schedule of Tariff Level Based on the Affordability of People to Pay									
		Tirana		Kamza		Kashar		Paskuqan		Berxull	
		Estimated Annual Average Income Level (Leks/HH)	Estimated Monthly Average Income Level (Leks/HH)	Estimated Annual Average Income Level (Leks/HH)	Estimated Monthly Average Income Level (Leks/HH)	Estimated Annual Average Income Level (Leks/HH)	Estimated Monthly Average Income Level (Leks/HH)	Estimated Annual Average Income Level (Leks/HH)	Estimated Monthly Average Income Level (Leks/HH)	Estimated Annual Average Income Level (Leks/HH)	Estimated Monthly Average Income Level (Leks/HH)
2005	5.43%	465,564	38,797	420,240	35,020	377,419	31,452	348,800	29,067	424,800	35,400
2006	5.15%	489,535	40,795	441,877	36,823	396,851	33,071	366,759	30,563	446,672	37,223
2007	4.89%	513,493	42,791	463,503	38,625	416,274	34,689	384,708	32,059	468,532	39,044
2008	4.66%	537,439	44,787	485,118	40,426	435,686	36,307	402,649	33,554	490,382	40,865
2009	4.45%	561,374	46,781	506,722	42,227	455,089	37,924	420,580	35,048	512,221	42,685
2010	4.26%	585,297	48,775	528,316	44,026	474,483	39,540	438,503	36,542	534,049	44,504
2011	4.09%	609,207	50,767	549,899	45,825	493,867	41,156	456,417	38,035	555,866	46,322
2012	3.92%	633,106	52,759	571,471	47,623	513,241	42,770	474,322	39,527	577,672	48,139
2013	3.77%	656,993	54,749	593,033	49,419	532,605	44,384	492,218	41,018	599,467	49,956
2014	3.63%	680,868	56,739	614,583	51,215	551,960	45,997	510,105	42,509	621,252	51,771
2015	3.50%	704,731	58,728	636,123	53,010	571,305	47,609	527,984	43,999	643,026	53,585
2016	3.38%	728,583	60,715	657,653	54,804	590,641	49,220	545,853	45,488	664,789	55,399
2017	3.27%	752,422	62,702	679,171	56,598	609,967	50,831	563,714	46,976	686,541	57,212
2018	3.17%	776,250	64,688	700,679	58,390	629,283	52,440	581,565	48,464	708,282	59,024
2019	3.07%	800,066	66,672	722,177	60,181	648,590	54,049	599,408	49,951	730,013	60,834
2020	2.98%	823,870	68,656	743,664	61,972	667,887	55,657	617,242	51,437	751,733	62,644
2021	2.89%	847,663	70,639	765,140	63,762	687,175	57,265	635,067	52,922	773,442	64,454
2022	2.81%	871,443	72,620	786,605	65,550	706,453	58,871	652,884	54,407	795,141	66,262

The expected revenue from collecting sewerage service charges was estimated using the assumptions listed in *Table S1.6.8*:

Table S1.6.8 Assumptions on Connection Rate and Charge Collection Rate

Description	Current	As of 2022
Connection Rate		
Tirana Municipality	56.20%	90.00%
Kamza Municipality	30.00%	75.00%
Other Communes	0.00%	50.00%
Charge Collection Rate against Bills Sent		
Tirana Municipality	80.85%	95.00%
Kamza Municipality	67.14%	90.00%
Other Communes	0.00%	85.00%

These tariff settings and assumptions result in the following financial benefit:

Table S1.6.9 Expected Annual Financial Benefit for M/P (Unit: Million Leks)

Year	Sewerage Charge for Users Connected with Kashar STP				Sewerage Charge for Users Connected with Berxull STP			Total
	Tirana		Kashar	Paskuqan	Kamza	Kashar	Berxull	
	Domestic HHs	Offices, etc.	Domestic HHs	Domestic HHs	Domestic HHs	Domestic HHs	Domestic HHs	
2014	235	143	1					378
2015	246	149	1					396
2016	258	156	1					414
2017	270	162	1					433
2018	864	349	9	22				1,243
2019	904	363	10	26				1,303
2020	946	376	12	31				1,365
2021	989	390	14	36				1,429
2022	1,425	403	23	62	183	5	29	2,131

Year	Connection Charge for Users Connected with Kashar STP				Connection Charge for Users Connected with Berxull STP			Total
	Tirana		Kashar	Paskuqan	Kamza	Kashar	Berxull	
	Domestic HHs	Offices, etc.	Domestic HHs	Domestic HHs	Domestic HHs	Domestic HHs	Domestic HHs	
2014	3,121	3,887	10					7,018
2015	156	180	3					339
2016	166	177	3					346
2017	176	175	4					355
2018	4,761	5,087	74	240				10,163
2019	428	373	17	48				867
2020	453	370	20	55				898
2021	479	367	22	63				931
2022	506	365	25	71	1,525	41	241	2,774

Year	Total of Sewerage Charge and Connection Charge							Grand Total
	Tirana		Kashar	Paskuqan	Kamza	Kashar	Berxull	
	Domestic HHs	Offices, etc.	Domestic HHs	Domestic HHs	Domestic HHs	Domestic HHs	Domestic HHs	
2014	3,355	4,030	10	0	0	0	0	7,395
2015	402	329	4	0	0	0	0	735
2016	424	333	4	0	0	0	0	761
2017	446	337	5	0	0	0	0	788
2018	5,625	5,436	83	262	0	0	0	11,406
2019	1,332	736	28	74	0	0	0	2,170
2020	1,399	746	32	86	0	0	0	2,263
2021	1,468	757	36	99	0	0	0	2,360
2022	1,931	768	48	133	1,708	46	270	4,905
2023	1,425	403	23	62	183	5	29	2,131

Financial costs have already been discussed.

It is assumed that the project life will be 35 years. The financial evaluation was made using cash flows based on defined benefits and costs [4]. The results are summarized in *Table S1.6.10*:

Table S1.6.10 Result of Financial Evaluation for M/P

NPV	FIRR	B/C
-664 Million Leks	9.06 %	0.95

As shown above, the FIRR for M/P is 9.06 %. This is slightly lower than the applied discount rate of 10 %. Therefore, M/P seems financially viable. The Sensitivity Test for Plan M/P has been conducted and the results are presented below:

Table S1.6.11 Result of Financial Sensitivity Test for M/P

Cost	Benefit						
	+ 30 %	+ 20 %	+ 10 %	Base Case	- 10 %	- 20 %	- 30 %
+ 30 %	9.06%	7.64%	6.18%	4.65%	3.03%	1.25%	-0.80%
+ 20 %	10.54%	9.06%	7.52%	5.93%	4.26%	2.46%	0.44%
+ 10 %	12.25%	10.68%	9.06%	7.38%	5.63%	3.78%	1.76%
Base Case	14.22%	12.56%	10.84%	**9.06%**	7.21%	5.27%	3.20%
- 10 %	16.53%	14.77%	12.93%	11.03%	9.06%	7.00%	4.83%
- 20 %	19.27%	17.39%	15.44%	13.40%	11.27%	9.06%	6.73%
- 30 %	22.54%	20.56%	18.47%	16.28%	13.99%	11.58%	9.06%

These results show that the FIRR is negative for the case which cost increased by 30% and benefit reduced by 30%. When the benefit is reduced by 30%, the FIRR is 3.20%. When the benefit is reduced by 20% and the cost is increased by 10%, the FIRR is 3.78%. These results are below the benchmark rate of 5%.

When the benefit is reduced by 20%, the FIRR is 5.27%. When the benefit is reduced by 10 % and the cost increased by 10%, the FIRR is 5.63%. Both of these results are above the benchmark rate of 5%[5]. The FIRR of M/P is within the defined rate boundaries and is therefore deemed to be socially responsible.

1.7 Environmental and Social Considerations

1.7.1 Purpose and Level of Environmental and Social Considerations

(1) Purpose

The purpose of the Environmental and Social Considerations is to ensure that development options under consideration are environmentally and socially sound and sustainable and that the environmental consequences of the project are recognized early and taken into account in the project design. The

[5] William A. Ward and Barry J. Deren with Emannuel H. D'Silva, 1991 "The Economics of Project Analysis –A Practitioner's Guide –" EDI Technical Materials, the World Bank.

procedures follow the JICA's Guidelines for Environmental and Social Considerations and Albanian Laws are also taken into account.

The JICA Study Team has assisted DPUK to consider the environmental and social aspects of the proposed sewerage projects. The role of the JICA Study Team is to:

- help DPUK implement the proper environmental and social considerations;
- prepare an effective sewerage M/P and to select Priority Projects which will not cause significant negative environmental or social impacts;
- assist DPUK consult with stakeholders to generate support for the proposed sewerage projects; and
- ensure the positive information disclosure for accountability and promotion of participation of various stakeholders.

(2) Level of Consideration Required by JICA

The preparatory study, which was conducted by JICA in 2005 (prior to this current study), concluded that the proposed sewerage plan was categorized as requiring a "B" level of environmental and social considerations, as defined in the JICA Guidelines for Environmental and Social Considerations. This level of consideration is required because the proposed sewerage facilities could cause some negative environmental and social impacts in terms of land acquisition, hydrological impacts, water pollution and generation of offensive odor.

1.7.2 Legal Framework for Environmental and Social Considerations

(1) Law on Environmental Protection

The Law on Environmental Protection, approved in 1993 (amended in 1998 and 2002), is Albania's law that defines the general principles and procedures for environmental management. The Law establishes national and local policies on environmental protection, stipulates requirements for the preparation of environmental impact assessments and strategic environmental assessments, conditions for approving activities that affect the environment, prevention and reduction of environmental pollution, environmental norms and standards, environmental monitoring and controls, duties of the state bodies in relation to environmental issues, role of the public, and penalties that can be imposed for violation of the Law.

According to the Law all activities that affect the environment should be subject to an Environmental Impact Assessment (EIA) and licensing system. These requirements are further developed in the specific law On Impact Assessment on Environment (the Law on EIA) passed in 2003.

(2) Law on Environmental Impact Assessment (Law on EIA)

A Law on Environmental Impact Assessment, No. 8990, was passed on 23 January 2003, and requires assessment of environmental impacts for future projects or activities. The Law requires the participation of central and local institutions, civil society, NGOs, etc. The Law on EIA defines the rules, procedures

and deadlines for identifying and assessing the direct or indirect impacts of projects or activities on the environment, and establishes the steps necessary to implement EIA procedures. The Ministry of Environment, Forest and Water Management (MoEFWM) is the government authority responsible for requesting, reviewing and approving EIA documentation.

A simplified flowchart of the EIA process in Albania is provided in *Figure S1.7.1*.

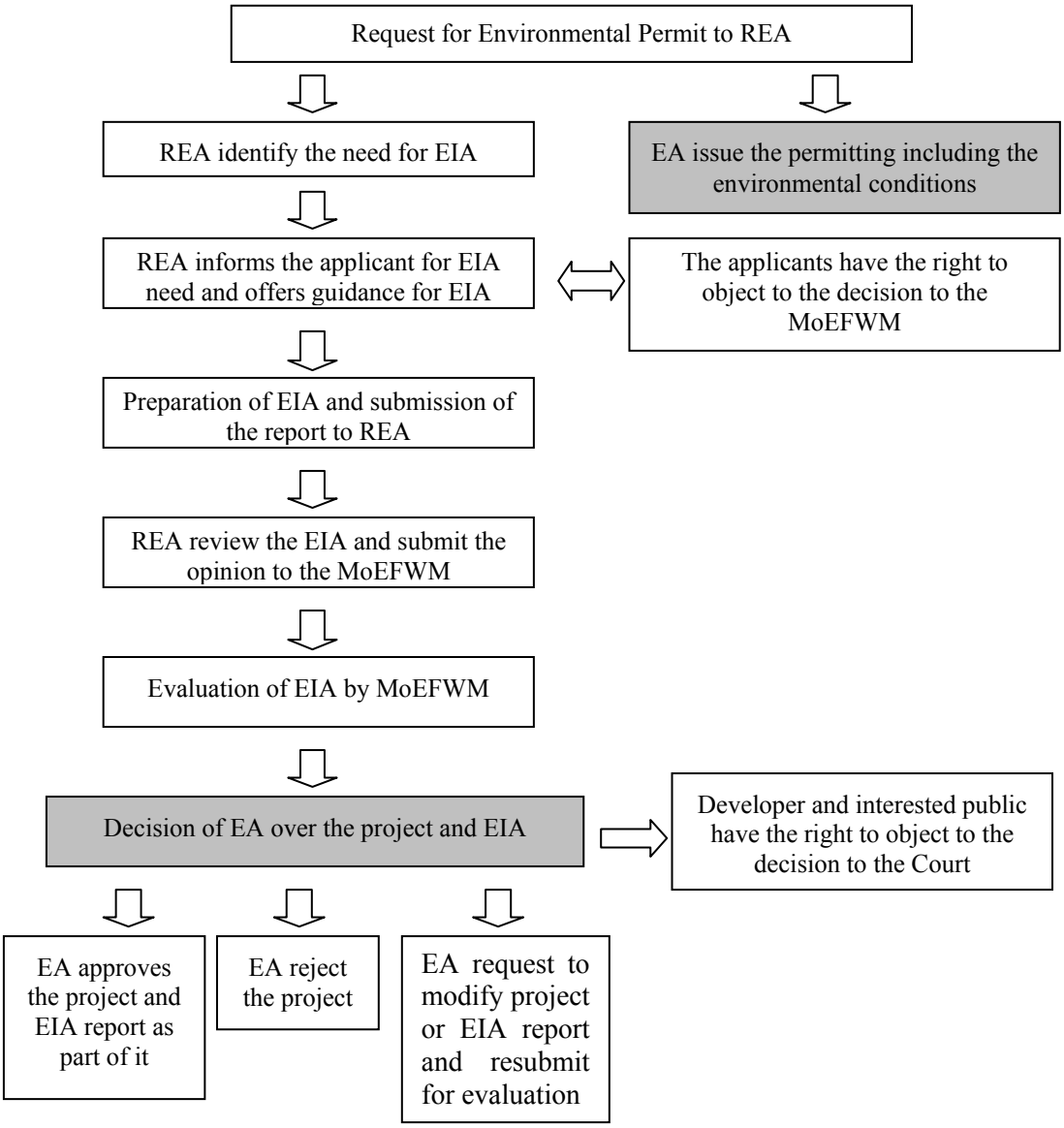


Figure S1.7.1 Flowchart of EIA Process in Albania

Depending on the type activity, projects undergo one of the following two levels of assessment:

- Profound (advance) process of environmental impact assessment; or
- Summary (outlined) process of environmental impact assessment.

Under the regulations (Law No. 8990 on Environmental Impact Assessment, Appendix 1), a waste water treatment plant with a capacity greater than 150,000 equivalent inhabitants must be assessed using a "Profound (advanced) process of impact assessment". The EIA report must be prepared by licensed natural and juridical persons, selected, contracted and paid for by the applicant.

Table S1.7.1 outlines the EIA procedure required in Albania.

Table S1.7.1 EIA Procedures of Albania

Procedure	Description
1) Project Planning	Determination of the level of EIA required based on a review of the Law and consultation with MoEFWM. The EIA will either be undertaken at the "Profound" level or or "Summary" level.
2) Preparation and Submission of the EIA Report	Reports must be prepared by licensed natural and juridical persons. Profound reports must contain the items listed in the box below.
3) Initial Review, Inspection and Opinion by the Regional Environmental Agency (REA)	<Within 5 days> The REA shall conduct the initial review. Finalisation of the EIA level for the project. <Within 20 days> Approval / refusal and opionion by REA to be forwarded to the MoEFWM.
4) Review by the MoEFWM	A review by the MoEFWM shall be conducted within three months. The following procedure must be followed for profound EIAs: 1) Establishment of a commission 2) Consultation with Interested Parties (central government organisations, urban and tourism development organisations, local government organsiations, and specialist environmental institutions) 3) Public comment to be coordinated by the government organisations (central and local government organisations), specialized institutions, interested people, environmental NPO and the applicant - The stakeholders will be given one month to review the EIA report - The stakeholders must be notified at least ten days prior to the public exhibition
5) Decision – making and Notice / Appeal of Decision	- Within five days from receiving the commission report, the MoEFWM must announce their decision regarding approval of the development: environmental declaration or permit. - The decision shall be published and shall be delivered to the applicant, state and local organisations - The proponent may appeal the decision within 30 days of its announcement

1.7.3 Public Consultation

(1) Objectives

Public consultation was incorporated into this project at an early stage. This was done in accordance with the new "JICA Guidelines for Environmental and Social Considerations", and Albanian Regulation Nr.1, dated 17.08.2004 on "Public Participation of EIA Process".

The objective of the JICA Guidelines is to encourage the recipient governments to give appropriate

consideration to environmental and social impacts. The basic principles for the environmental and social considerations (assessment) are:

- Cover a wide range of environmental and social impacts;
- Ensure accountability and transparency of decision-making;
- Ensure a wide range of meaningful participation of stakeholders;
- Disclose information; and
- Enhance organizational capacity.

The intent of the Albanian Regulations Nr. 1, dated 17.08.2004 is to guarantee public participation in the process of evaluating environmental impacts (based on the new environmental legislation requirements; the Convent of AARHUS[6]; and the respective directives form the European Union (EU)).

Public consultation was undertaken based on the guidelines and regulation.

(2) Public Consultation Process

Stakeholder consultation is required to help generate support for the study. Four stakeholder meetings have been held during the study period. These consultations have been scheduled for each key stage of the study. *Figure S1.7.2* shows the timeline for these public consultation sessions.

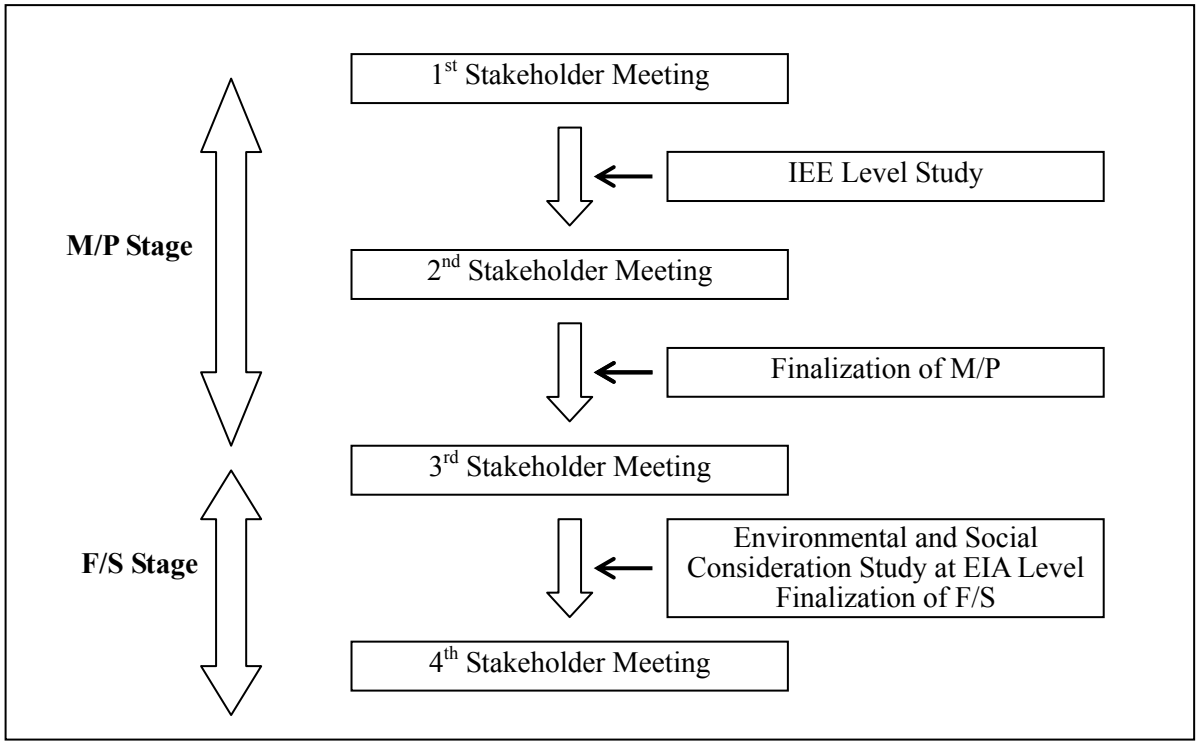


Figure S1.7.2 Timeline for Public Consultation Sessions

[6] The AARHUS Convention on regarding access to information, public participation in decision-making, and access to justice in environmental matters was signed by the Ministries of Environment of EU member states in Aarhus, Denmark, on 25 June 1998. Albania ratified the AARHUS Convention on 27 June 2001.

Table S1.7.2 shows the schedule for the stakeholder consultation meetings.

Table S1.7.2 Schedule for the Stakeholder Consultation Meetings

Stakeholder Meeting	Agenda	Timing
1st	- Explanation of JICA study - JICA Guidelines for Environmental and Social Considerations - Plan for Public Consultation Sessions, Scope of IEE	4 November 2005
2nd	- Progress of the study - Description of the Proposed Sewerage System - Result of IEE	7 December 2005
3rd	- Overview of the M/P - Description of the Priority Projects selected in M/P - Scope of the Environmental and Socical Consideration Study at EIA Level	24 February 2006
4th	- Explanation of Priority Projects - Presentation of results from the Environmental and Socical Consideration Study at EIA Level - Presentation of results and recommendations of the JICA study	July 2006

(3) Stakeholder Selection

According to the Albanian Regulation, "Public" is defined as the general public, interested public, influenced public, local community, national or local environmental non-profit organizations, and other organizations from civil society. The stakeholders were selected by DPUK in collaboration with the JICA Study Team. The stakeholders are categorized as follows:

- People in the study area or people who will be affected by the proposed projects;
- Responsible ministries and relevant government agencies;
- Local governments such as municipalities, communes, and councils in the study area;
- International organizations and donors;
- Non-government organizations;
- Universities and research institutes; and
- Private sector organizations.

The individual stakeholders involved in each stage of consultation were reviewed based on their roles and responsibilities to ensure the appropriate stakeholders were consulted on relevant issues.

(4) Stakeholder Meetings

During the M/P preparation, three stakeholder meetings were held the followings are the main topics discussed:

1) First Stakeholder Meeting

- This project should be based on the Albanian Environmental Standards as well as the EU

Environmental Standards. The JICA Guidelines should be reviewed and adapted to Albania's conditions. The impact assessment should be carried out in accordance with Albanian Legislation. Assistance with the Social Impact Assessment was sought during this meeting.

  - The study must consider the Albanian Standards as a priority, and then the EU standards. Other international standards, including the Japanese standards should also be considered. Since this is a JICA study the JICA Guidelines were explained during the presentation. However the emphasis and time spent on explaining these guidelines seemed to confuse some of the participants.

- Concern was expressed that the target year of 2022 is a relatively short-term planning timeframe. It was suggested that the facilities should be designed for a later target date.
  - The target design year was initially forecast by the World Bank to be 2017. This was considered to be too soon, therefore the target year was postponed to 2022. This is the same target year as for the Water Supply Plan. The target year cannot be extended beyond this because the sewerage and water supply systems are closely related.
- Participants asked if the final report would make specific recommendations regarding changes to institutional structures in the wastewater service. Participants also asked if JICA would require the suggested structures to be in place before further funding is provided.
  - The ownership of the project and its longer term sustainability in terms of operation and maintenance is an important issue for this project. This is particularly important because it affects the financial viability of the project, which will be especially relevant during the second phase of the study. This matter will be further discussed with the Albanian counterparts and the study team will then make a recommendation.

2) Second Stakeholder Meeting

- A large amount of land is required for the construction of the treatment plants. Therefore the location needs to be carefully selected.
  - The design for Alternative B requires 102 ha of land for the construction of the plants. This large area means the project costs are lower, suitable technology can be installed and O&M costs will be reduced. The location of the STP will be decided in consultation with each commune and municipality.
- Participants asked for information regarding the level of impact on odor and groundwater pollution resulting from this project.
  - The amount of odor generated depends on the odor characteristics, season, terrain, and wind characteristics (strength, direction etc). The next stage of the study includes further investigation of these issues. If impacts are expected, mitigation measures will be considered.
  - No groundwater contamination is expected to occur.
- Lack of sewage treatment is a significant problem for Tirana area. The participants are keen for this problem to be addressed. Concern was expressed that the areas of Kashar-Berxulle and Vora appropriate area for construction of STP.
  - Two STPs sewerage system is proposed as the best solution to this sewage problem, taken into account financial aspects and possible early start of sewage treatment.

3) Third Stakeholder Meeting

- Participants asked for clarification regarding the treatment system proposed for the priority projects. It was understood that the priority projects would have a primary treatment system at this stage, and secondary treatment facilities would be provided as a next step.
  - This interpretation is correct. The first stage consists of primary sedimentation facilities together with some disinfection and sludge treatment facilities. This means the pollution load will reduce by 30 % only. To comply with the EU standard more time is required. The secondary treatment can be incorporated during the second stage.
- The presentation indicated that some rainwater would enter the STP. Participants asked how much rainwater will enter the STP.
  - Currently rainwater enters the existing sewer system. The study proposes that in the future rainwater will not enter the STP during the dry season, however some rainwater will continue to enter the STP during the wet season. This will be achieved by constructing some structures that will only receive the first flush of rainfall runoff. The only way to totally solve the problem would be to construct larger sewers, however the cost is prohibitive. The Lana and Tirana Rivers are not used for any specific purpose, therefore they can be used to convey and dilute rainwater. During the F/S this issue will be investigated further. (This discussion is reflected to the study on options for the alternative study)
- One of the participants stated that the Kashar Commune would need to be compensated for the impacts they will experience as a result of locating the STP in their local area. The participant asked whether the proponents have sought agreement from the residents of Kashar. The participant also asked what would happen if the EIA indicated there could be significant negative environmental impacts. The participant was interested to learn whether an EIA was going to be undertaken for the alternatives.
  - The compensation rate for purchase of land was estimated based on commercial rates. These rates are relatively high when compared to the actual price of the land.
  - The study team has not yet had sufficient time to fully consult with residents of the Kashar commune. This study will end in July 2006. This meeting, and similar other meetings are carried out for the purpose of public consultation.
  - The study team has assessed alternatives but believe that the selected option is preferred. However, the residents will make the final decision. Executing organization for this project should have the power to persuade the residents to accept the project. Understanding the concerns and needs of the residents is a very important component of this process. To date, detailed consultation has not been required because no resettlement issues are associated with the chosen alternative. However, further public consultation will be required for the surrounding communities. Therefore, full involvement of DPUK, the current executing organization, municipalities and communes in the study area are required. Also, the local government will play an important role in generating public support for this project.

(5) Information Disclosure

The minutes of the three stakeholder meetings are available for public viewing at DPUK, MoPWTT. The minutes are provided in English and Albanian.

1.7.4 Analysis of Alternatives

(1) Project Benefits and Positive Impacts

The main objective of the sewerage project is to improve public health and hygiene, improve the standard of living, and encourage economic growth. Therefore, the project is expected to have the following benefits and positive impacts:

- Collection and treatment of untreated sewage prior to its discharge to rivers will improve the water quality in the rivers and will improve the river environment.
- A proper collection, treatment and disposal system for the sewage will reduce the risks of parasitic infections and prevalence of various diseases including typhoid.
- Appropriate sewage handling and disposal will minimize the chances of contamination of ground and surface water.
- The ecological environment will be maintained by minimizing damage to flora and fauna.
- Beneficial reuse of sewage and sludge e.g. for agricultural activities, greenbelt developments, cement.
- Reduced road blockages and improve aesthetics.
- Increased economic activities (such as commercial and industrial), improved employment opportunities, and economic growth.
- Enhanced tourism which would boost the local economy.
- Improvements to public health which will then result in higher economic activity and productivity.
- Local employment opportunities during the construction phase of the project, either as direct labor for construction or to provide services at the construction camps.

(2) River Water Quality With/Without Project

Preliminary assessments indicate that if the project does not proceed, the BOD_5 in the Lana River could increase to 105 - 130 mg/l, and 45 - 65 mg/l in the Tirana River. The existing BOD_5 level is between 95 - 125 mg/l and 31 -53 mg/l in the two rivers respectively. The BOD_5 level is expected to decrease to 13 - 28 mg/l in the Lana River and 7 - 16 mg/l in the Tirana River if the project is implemented.

(3) Alternative sewerage system plan

When planning the sewerage system the following issues were considered: location and available space for the treatment plant, timeframe, early start of sewage treatment, construction costs, and O&M cost.

Existing reports identify only one potential sewage treatment plant (STP). The proposed location of this STP is at the western edge of the study area, 15km from the urban center of the Tirana municipality.

To improve this existing plan, the following two issues were considered:

- There is a need to start treating the sewage as soon as possible to improve the water quality in the Lana and Tirana rivers.
- The plan should provide sufficient space for the STPs, minimize energy consumption, minimize costs, ensure operation and maintenance activities are simple and easy to undertake, and provide for beneficial reuse of the sludge.

The following two alternative plans are suggested:

- Case A: A single STP System which includes two primary treatment plants (one for Kashar and one for Kamza); and
- Case B: A multi STP System.

A detail comparison of the options is provided in Chapter 10 of the main report.

(4) Possible alternative site for the sewage treatment plant (Berxulle)

The 1998 JICA study proposed a site in Berxulle for the sewage treatment plant. The site is shown in *Figure S1.7.3* (site 1). However, construction of a new road to the airport began in 1998. The new road passes through the proposed site. Therefore, the land now available for the STP is less than originally proposed. Also, the Berxulle site contains many houses meaning resettlement would be required. The environmental and social impacts associated with resettlement are expected to be significant. Therefore, an alternative site was identified.

The alternative site is shown in *Figure S1.7.3* (Site 2). Site 2 is the same size as Site 1. Construction of the STP on Site 2 would avoid the houses, meaning resettlement would not be required. Site 2 is the preferred site for the STP in Berxulle, from environmental, social and technical perspectives.

Site 1

Site 2

Figure S1.7.3 Alternative Sites for the STP in Berxulle

1.7.5 Initial Environmental Examination (IEE)

(1) Objectives

The IEE is an important and useful tool for the early planning stages of development projects / programs. If significant negative impacts are identified by the IEE the concept design can be modified to minimize the impacts.

The objectives of the IEE were as follows:

- To provide a preliminary review of the existing environmental and social conditions in the project area based on desk top studies and simple field surveys; and
- To identify and predict environmental impacts and to identify suitable mitigation measures and monitoring plans.

To meet the above objectives, the IEE study was undertaken to

- 1) identify the existing social and natural environmental conditions of the study area; and
- 2) identify potential constraints and problems for the M/P project.

(2) Methodology

The IEE was undertaken in the following three stages:

- identification of the projects which needs an IEE;
- evaluation of environmental impacts using an environmental impact checklist; and
- evaluation of the level of the impacts

An environmental impact matrix was used as a checklist to evaluate the level of the impacts.

(3) Checklist of the IEE Study

The environmental assessed as part of this study includes both the natural and social environment, and their interactions. The impacts on the environment that may result from the proposed M/P projects have been assessed. The important environmental issues are identified and shown in the following checklist. Each item has been scored or evaluate as either A, B, C, or D.

(4) Evaluation and Conclusions of the IEE Study

The IEE study results are summarized in *Table S1.7.3*.

Table S1.7.3 Scoping Check List

No	Environmental Items	Evaluation	Reason
Socio-Economic Environment			
1	Resettlement	C	Land acquisition is necessary but human resettlement could be avoided by selecting vacant land. Further study is required.
2	Economic Activities	B	Negative impacts on the living conditions for the locals could result from the land use changes. However, potential employment would be a positive economic impact.
3	Traffic / public facilities	B	There could be increased traffic during the construction stage.
4	Separation of Communities	D	No large-scale construction is required therefore separation of communities is not expected.
5	Cultural Property	D	No cultural properties have been identified in or around the project area.
6	Water rights / Common Rights	D	No issues with water rights are required.
7	Public health condition	D	Improvements to public health are expected.
8	Waste	B	Sludge from the STP will be generated. The sludge can be re-used in building materials (e.g. cement) or disposed at a landfill. Disposal of construction waste and excavation material will required.
9	Hazard	D	No significant hazard impacts are expected. Since industrial wastewater is not accepted for treatement the treated sewage and sludge is not likely to contain chemicals that could cause environmental harm.
Natural Environment			
10	Topography and Geology	D	No significant impacts are expected especially since the facilities are likely to be small in size.
11	Soil Erosion	D	No significant soil erosion is expected because the facilities are lcoated on flat land.
12	Groundwater	C	No significant impacts on the groundwater are expected, however further studies are required to confirm that there will be no impact.
13	Hydrological situation	B	No significant hydrologic impacts are expected because the treated sewage will be discharged to the Tirana and Lana Rivers. However, the upper section of the Lana River (especially during the dry season when the natural flows are low) may experience some negative impacts.

14	Coastal zone	D	There is no coastal zone in the study area.
15	Fauna and flora	C	No endangered species or conservation areas have been identified within the study area.
16	Meteorology	D	No significant meteorological impacts are expected due to the small scale of the facilities.
17	Landscape	C	The facilities will be small and they will be designed to minimise visual impact. Therefore, no signficant landscape impacts are expected. The design of the sewerage facilities shall be harmonized with the surrounding environment.
Environmental Pollution			
18	Air pollution	D	No significant air pollution impacts are expected.
19	Water pollution	B	Treated sewage, secondary level by bilogical process, will be discharged into the Tirana and Lana Rivers. The water quality of the receiving water body will be improved. But localized deterioration of water quality may be occurred during power failure without appropriate back-up generator installation.
20	Soil contamination	D	No soil contamination is expected to result from the proposal.
21	Noise and vibration	B	Some noise and vibration during the construction period is expected.
22	Land subsidence	D	Since no ground water will be used for the Project, land subsidence is not expected to occur.
23	Offensive odor	B	Some odor is expected to be generated at the treatment plants

A: Significant impact anticipated
B: Slight impact anticipated
C: Unknown
D: Almost no impact anticipated

The IEE results categorize the propose sewerage plan as a “B” level project, as defined by the JICA Guidelines.

1.7.6 Requirement for an EIA Study

The IEE results categorize the propose sewerage plan as a “B” level project, means an EIA is not required but should be undertaken if thought to be necessary. However, Albanian legislation requires a profound (advanced) EIA to be undertaken and DPUK has to obtain the Environmental Declaration. To obtain this Declaration, DPUK has to submit the application including the EIA report which was stipulated by the Law No. 8990 on EIA to the MoEFWM. JICA Study Team will conduct the environmental and social consideration study at EIA level in F/S stage in accordance with JICA Guidelines, and it will help DPUK prepare the EIA report that is defined by Albanian regulations. Therefore, the F/S for the Priority Projects should include a profound EIA Study in accordance with Albanian legislative requirements.

1.8 Project Implementation Organization & Institutional Options

The main institutional reforms suggested by the Study are set out below:

(1) This report proposes a Joint Authority for Greater Tirana of all communes and municipalities in

the Greater Tirana area, including Tirana, using a reformed and renamed UKT (GTW&SA) as the service provider (operator).

(2) Also proposed is a change to the law on Supervisory Councils which direct the operations of water & sewerage service providers (operators) to allow for majority membership for local governments with representation from central government.

(3) It is recommended that the Commercial Department of UKT extends its financial planning from the next years' budget, to short, medium and long term business plans.

(4) It is further recommended that the Technical Department of UKT gives equal status to the sewerage sector to that of the water sector before conversion to GTW&SA.

(5) These institutional reforms should be accompanied by resolution of the problem of illegal water use from the transmission mains particularly for irrigation.

Part II Feasibility Study

2.1 General for Feasibility Study

A long-term sewerage development program (up to the year 2022) was developed as a Master Plan (M/P) for the improvement of Greater Tirana's sewerage system. The M/P identifies a priority project for immediate implementation. The aim of the priority project is to improve the water quality of Lana River running through the urban center of Tirana municipality. The priority project will treat sewage to a secondary level with trickling filter process at the proposed Kashar STP. The second stage project will further improve the rivers' water quality through the expansion of the service area in Tirana municipality, communes of Kashar and Paskuqan.

The purpose of the Feasibility Study (F/S) is to verify that the proposed priority project (First Stage Project) is technically, economically, financially, and environmentally feasible for immediate implementation.

2.2 Priority Project

2.2.1 Outline of Priority Project

Table S2.2.1 shows outline of the Priority Project. The detail is described in the following sections.

Table S2.2.1 Outline of Proposed Priority Project

Item		Priority Project	Remarks
1.	**Basic Information**		
1.1	Service Area	2,343 ha	Total Service Area: 9,120 ha Total service area to be covered by Kashar STP: 6,090 ha, Tirana Municipality 4,154 ha
1.2	Service Population	342,500 person	Total planning population in 2013 in Kshar STP coverage area: 728,940 person
1.3	Sewage Flows Design Average Daily Flow Design Maximum Daily Flow	 77,100 m^3/day :95,900 m^3/day	
2.	**Sewers**		Length in Kashar STP coverage area
2.1	Branch sewer	Dia. 200mm Length 27.6 km	Dia. 200mm, Length: 60 km
2.2	Main sewer	Dia. 200 to 600mm Length: 1.4 km	Dia. 200 to 600 mm, Length: 49 km
2.3	Trunk sewer	Dia. 900 to 1500mm Length: 4.2 km	Dia. 450 to 1650mm, Length 14.6 km
3.	**Sewage Treatment Plant**	Kashar STP	
3.1	Sewage Treatment	Capacity: 95,900 m^3/day	Trickling Filter Process
(1)	Treatment Level:	Biological Secondary Treatment	

Item		Priority Project	Remarks
(2)	BOD_5 and SS conc.		
	Raw Sewage	200/200 mg/L	
	Treated Sewage	24/30 mg/L	
	BOD_5 and SS Removal Rate	88/85 %	
(3)	Removed BOD_5/SS Load	13.6/13.1 ton/day	Generated BOD/SS Load in the planning area of Kashar STP: 32/32 ton/day
(4)	Effluent BOD_5/SS Load to public water body	1.9/2.3 ton/day	
3.2	Sludge Treatment and Disposal		
(1)	Sludge Generation for disposal Wet (Dry) basis	22.6 ton/day (8.2 ton/day)	
(2)	Disposal	Landfill	Solid waste disposal site
4.	**Preliminary Cost Estimate**		Unit Million Lek
4.1	Project Cost	9,268 Million Leks	Direct Cost: 6,380 M Lek Indirect Cost: 2,888 M Lek
4.2	Annual O&M Cost	108 Million Leks	

2.2.2 Preliminary Design of Sewage Collection System

(1) Connections to the Existing Sewer System

1) Current condition of sewer pipes connecting to Lana North and Lana South interceptors

Based on an investigation of sewers discharging into the Lana River in the central Tirana zone, ten discharge points were selected (of approximately 50 discharging points) to confirm the invert levels of existing sewers and the Lana interceptors.

Three connection cases have been proposed based on considerations of the topographic characteristics, the slope of Lana River, the slope of the interceptors and the locations of the sewers and interceptors,. These cases aim to improve the existing sewers which have not been connected to the interceptors. *Figure S2.2.1* illustrates the three cases. In both Case 1 and Case 2, sewers or tributary rivers/streams are nominated as open sewers crossing under the existing interceptor, and then discharging into Lana River.

- Case 1: The sewer invert level is lower than the invert level of the interceptor at the current discharge point.

  It is recommended that a separate sewer line be laid along the interceptor. A manhole with a weir should be constructed at a suitable location to enable the sewer to connect to the interceptor. *Figure S2.2.2* illustrates the weir structure within the manhole. The topographic characteristics along the Lana Collector allow appropriate connection points with the sewer interceptors downstream. During dry weather conditions, the sewage flows into the interceptor through the manhole. During wet weather conditions, the separated sewage is diverted into the interceptor through the weir, with the remaining overflow diverted as rainwater into the river.

- Case 2: Tributary river / stream is used as an open sewer channel.

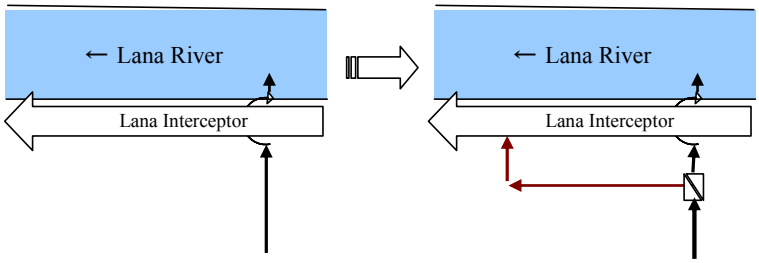
  It is recommended that new sewers be installed along the tributary rivers or streams and that they

terminate the existing interceptor. There are two possibilities for connection: crossing over the river/stream; or crossing under the river/stream. To cross over the river/stream, a new sewer would be connected directly. To cross under the river/stream, the sewer would need to be extended to a location where it meets an interceptor, similar to Case 1.

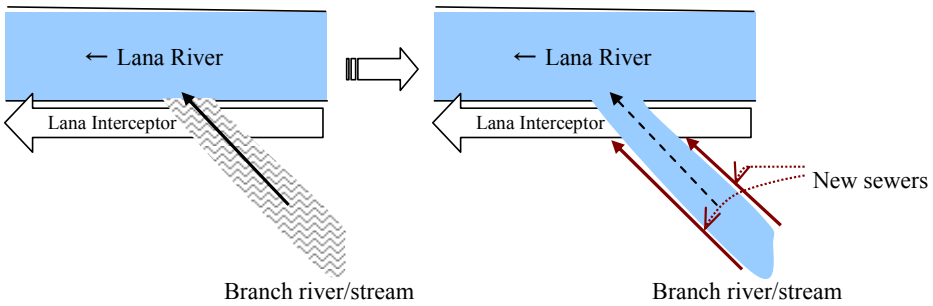
- Case 3: The sewer invert level is higher than the invert level of the interceptor at the existing discharge point.

  A manhole and weir would be constructed near where the Lana River discharges. During dry weather conditions, the sewage would flow into the interceptor through the manhole. During wet weather conditions, the separated as sewage would be diverted into the interceptor through the weir in the manhole, with the remaining overflow diverted as rainwater into the river.

1) To transfer present discharg points to downstream as a lower point of the interceptor



2) To build new sewers connecting the interceptor



3) To build manhole with weir to separate sewer for connectiong the interceptor

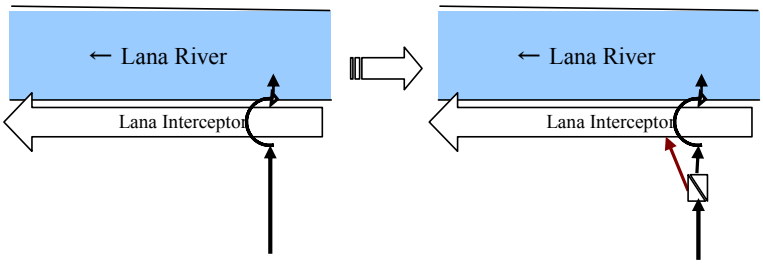


Figure S2.2.1 Connection Ways to the Existing Interceptor

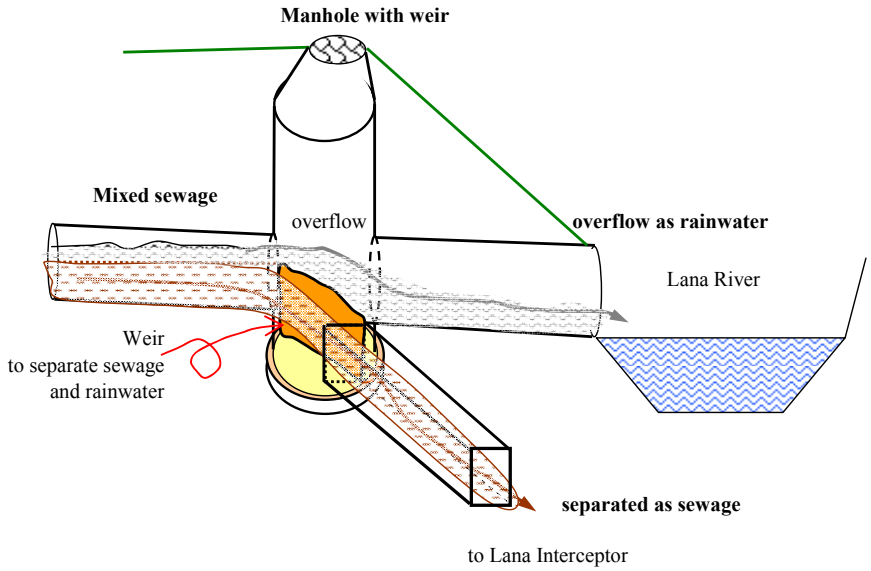


Figure S2.2.2 Manhole with Weir for Separating Mixed Sewage and Rainwater during Wet Weather Conditions

2) Connection of New Branch Sewers to Existing Sewers

New main branch sewers are planned to be installed in the upper area of the existing sewer area. Existing sewers were reviewed to determine the viability of new branch sewers being connected to the upper ends of existing sewers. All of the new branch sewers can be connected to the existing sewers at a shallow depth, because there is a steep slope.

(2) New Sewage Collection Facilities

1) Conditions of flow calculation

The Manning formula was used to calculate flows as shown:

- Velocity (m/s) = 1/n*R^(2/3)*I^(1/2);
- Coefficient of roughness n=0.012;
- (as PVC:0.009-0.012, Concrete pipe:0.012-0.014);
- Minimum velocity (m) = 0.6m/s;
- Type of pipe: circular (concrete and plastic); and
- Minimum diameter: 200mm for open cut method, 250mm for jacking method.

2) Construction method for laying sewers

The sewers would be laid using either open cut or pipe jacking methods.

Open cut method: most of the existing sewers have been constructed using the open cut method. The study team has observed that the open cut method without piles is applied when depths are less than 5m. Various kinds of plastic pipes such as HDPE, corrugate piping, PVC, PP, and PE are used for sewers in Albania because these materials are locally available. Plastic sewers are generally laid using the open cut method.

Pipe jacking method: this method is applied to situations where there is a deep cover depth, or where the sewer needs to cross rivers, highways or railways. Vertical shafts are installed at intersections, curve points on roads and at intervals of 250m or less. The pipes are made from concrete for the jacking method.

3) Sewer System

Figure S2.2.3 shows the sewer system comprises: Trunk, Main and Branch sewers. This system covers Collection Areas No.1, No.2, No.3 and No.10-2. The preliminary design calculation sheets are provided in Appendix 8, of the Supporting Report, Vol. III.

Table S2.2.2 provides the specifications for Trunk Sewer No.3, assuming it is laid using the jacking method. *Table S2.2.3* shows the specifications for the Main & Branch Sewers assuming they will be laid using the open cut method.

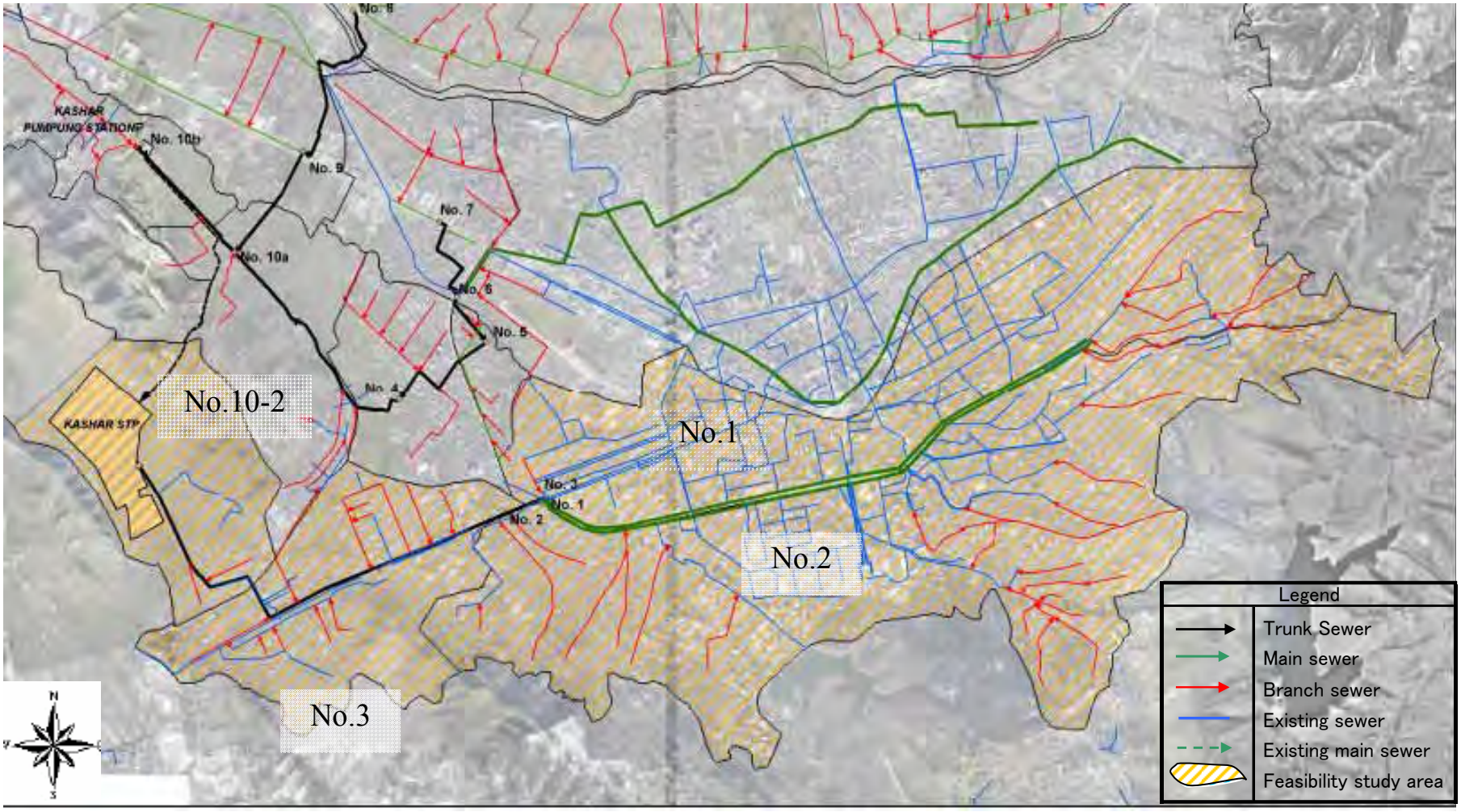


Figure S2.2.3 Sewers System in the Priority Project

Table S2.2.2 Trunk Sewer No.3 (Jacking Method)

Shaft No.	Depth of Shaft(m)		Jacking Pipe			Remark
	Starting	Receiving	Cover Depth (m)	Diameter of Pipe (mm)	Length (m) (center interval)	
1		9.5	6.79	900	76	Lana north
2		9.5	6.54	1350	75	Lana south
3	13.0		9.94	1500	100	
4		11.5	8.55	1500	124	
5	10.0		6.87	1500	199	
6		14.0	11.02	1500	95	
7	16.0		12.98	1500	181	
8		17.0	13.9	1500	170	
9	14.0		11.01	1500	192	
10		13.5	10.15	1500	227	
11	12.5		9.46	1500	177	
12		13.0	9.96	1500	135	
13	15.5		12.35	1500	249	
14		16.0	12.77	1500	143	
15	16.5		13.21	1500	156	Trunk No.3
16		17.0	13.69	1500	185	
17	16.0		12.82	1500	185	
18		14.5	11.28	1500	106	
19	13.0		9.94	1500	69	
20		13.0	9.76	1500	133	
21	12.5		9.37	1500	167	
22		12.0	8.92	1500	203	
23	11.0		8.05	1500	192	
24		11.0	7.69	1500	204	
25	11.0		8.05	1500	176	
26		11.0	7.67	1500	102	
27	11.0		7.93	1500	186	
28		11.5	8.39	1500		STP
Total					4,206	

Source: JICA Study Team

Table S2.2.3 Main & Branch Sewers (Open Cut Method)

	Connection Point No.	Cover depth (m)	Diameter (mm)	Length (m)
Main sewer	1	3	400	90
	2	3	600	130
	3	3	600	130
	10-2	2	200	1000
	Total			1,350
Branch sewer	1	2	200	5,000
	2	2	200	10,000
	3	2	200	5,000
	10-2	2	200	7,600
	Total			27,600

Trunk sewer No.3 receives sewage collected from Collection Point No.1 and No.2 and covers the Collection area No.3. A schematic profile is presented in *Figure S2.2.4*.

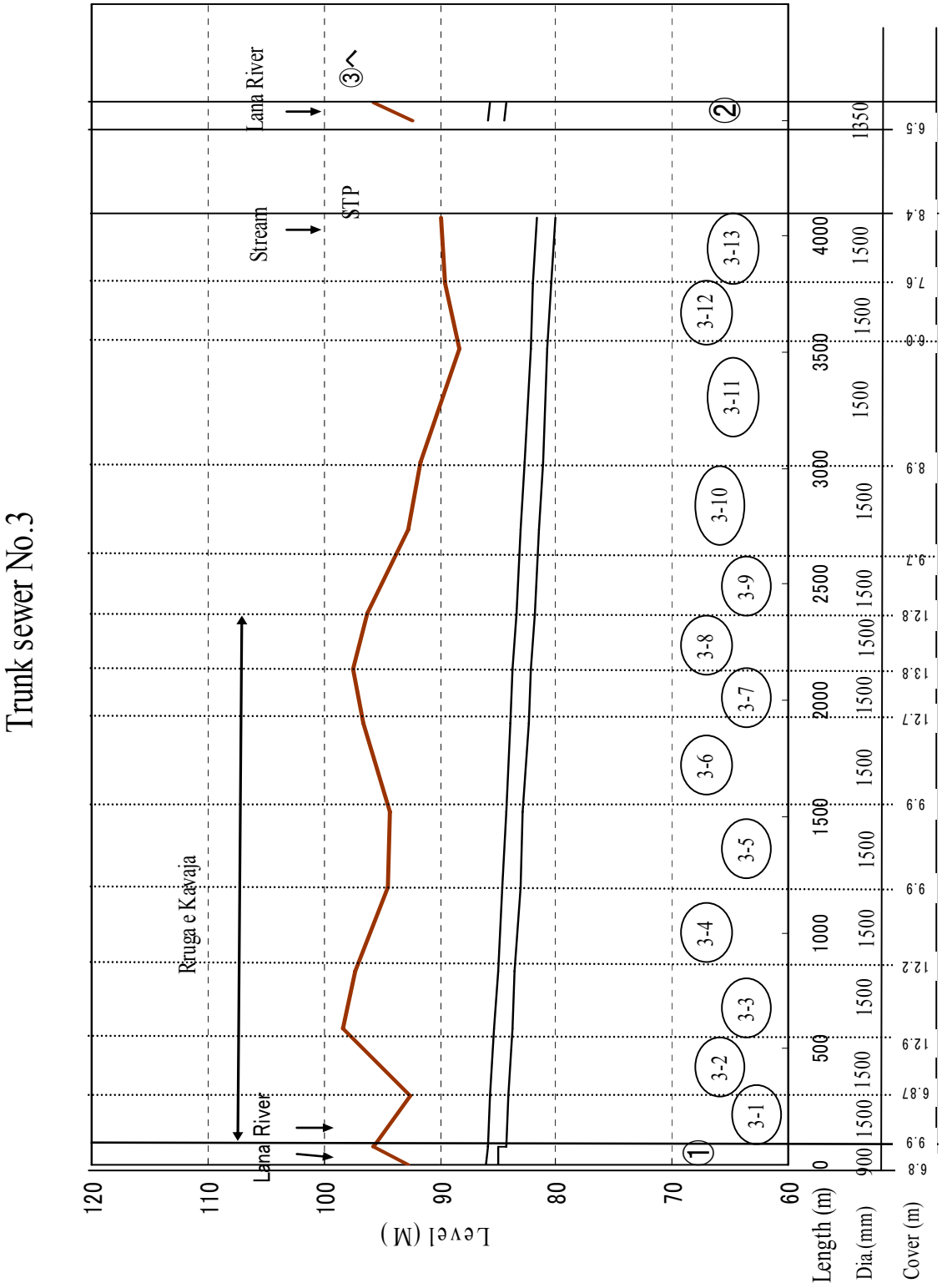


Figure S2.2.4 Schematic Profile of the Trunk Sewer No.3

2.2.3 Preliminary Design of Sewage Treatment Plant

(1) Sewage Treatment Facilities

The treatment process recommended for the priority project is the 'trickling filter process'. *Figure S2.2.5* is a flow schematic. This figure includes the sludge treatment facilities.

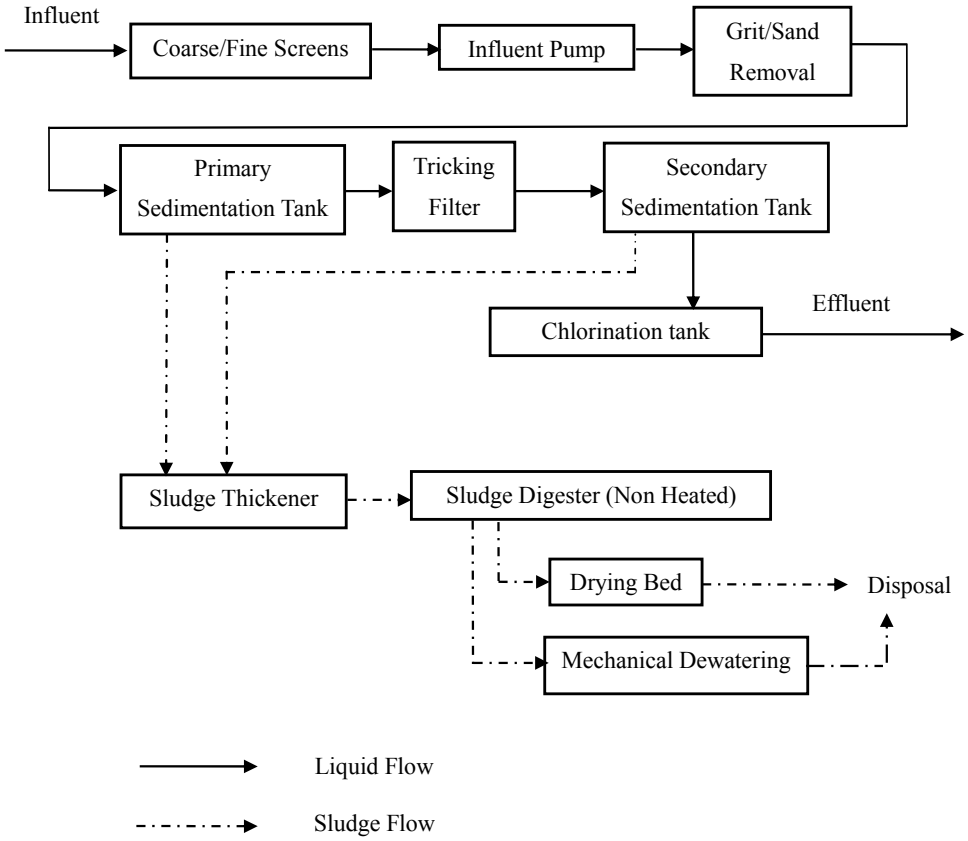


Figure S2.2.5 Flow Schematic for Kashar STP

The layout plan and hydraulic profile of the sewage treatment plant are shown in *Figure S2.2.6 and Figure S2.2.7*, respectively. *Table S2.2.4* shows dimensions and specifications for the facilities and the mechanical and electrical equipment that is used within the sewage treatment facilities. The table also shows four buildings. These are for administration, pumping, generators and a power substation.

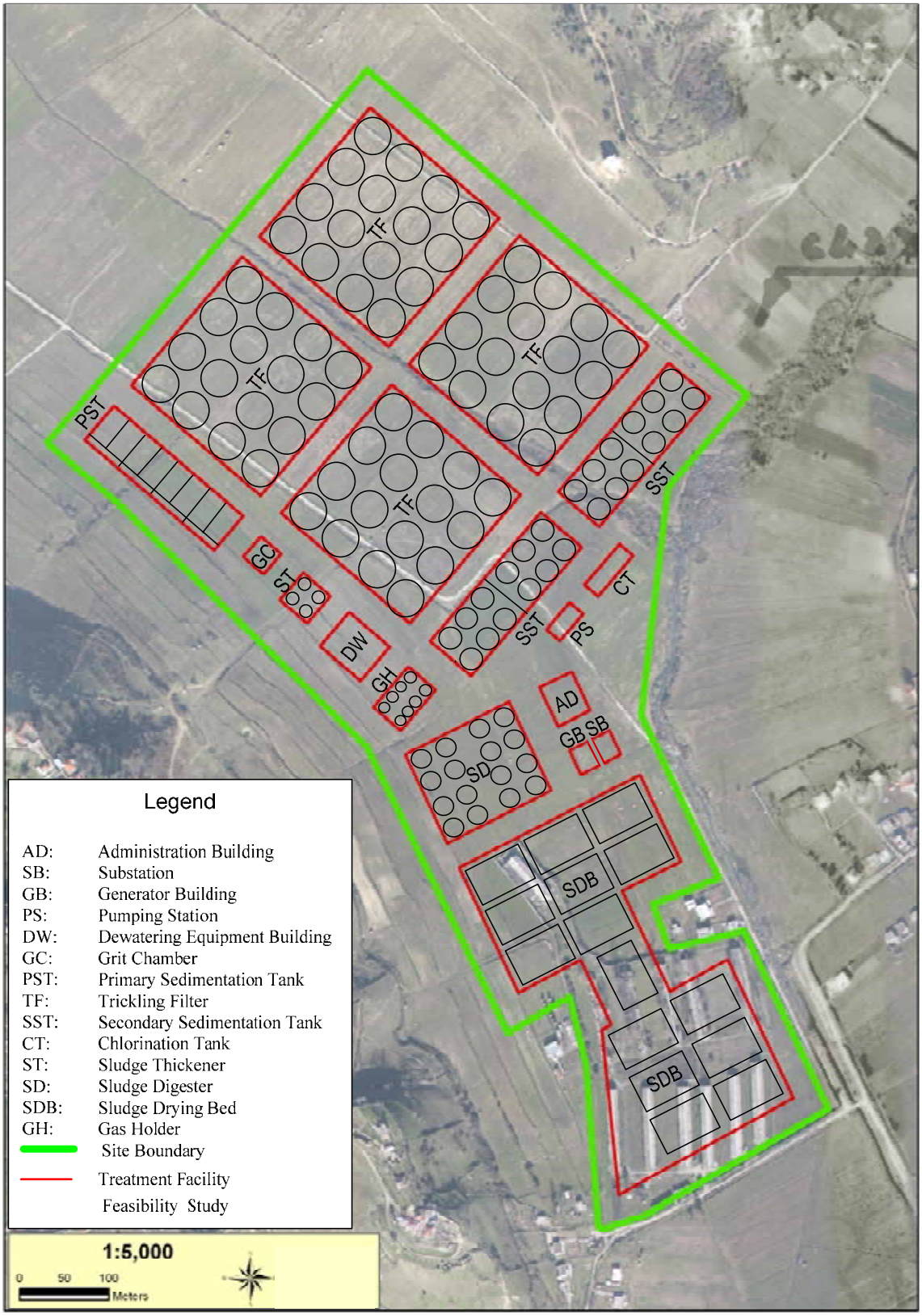


Figure S2.2.6 Treatment Facilities to be constructed under the Priority Project at Kashar STP

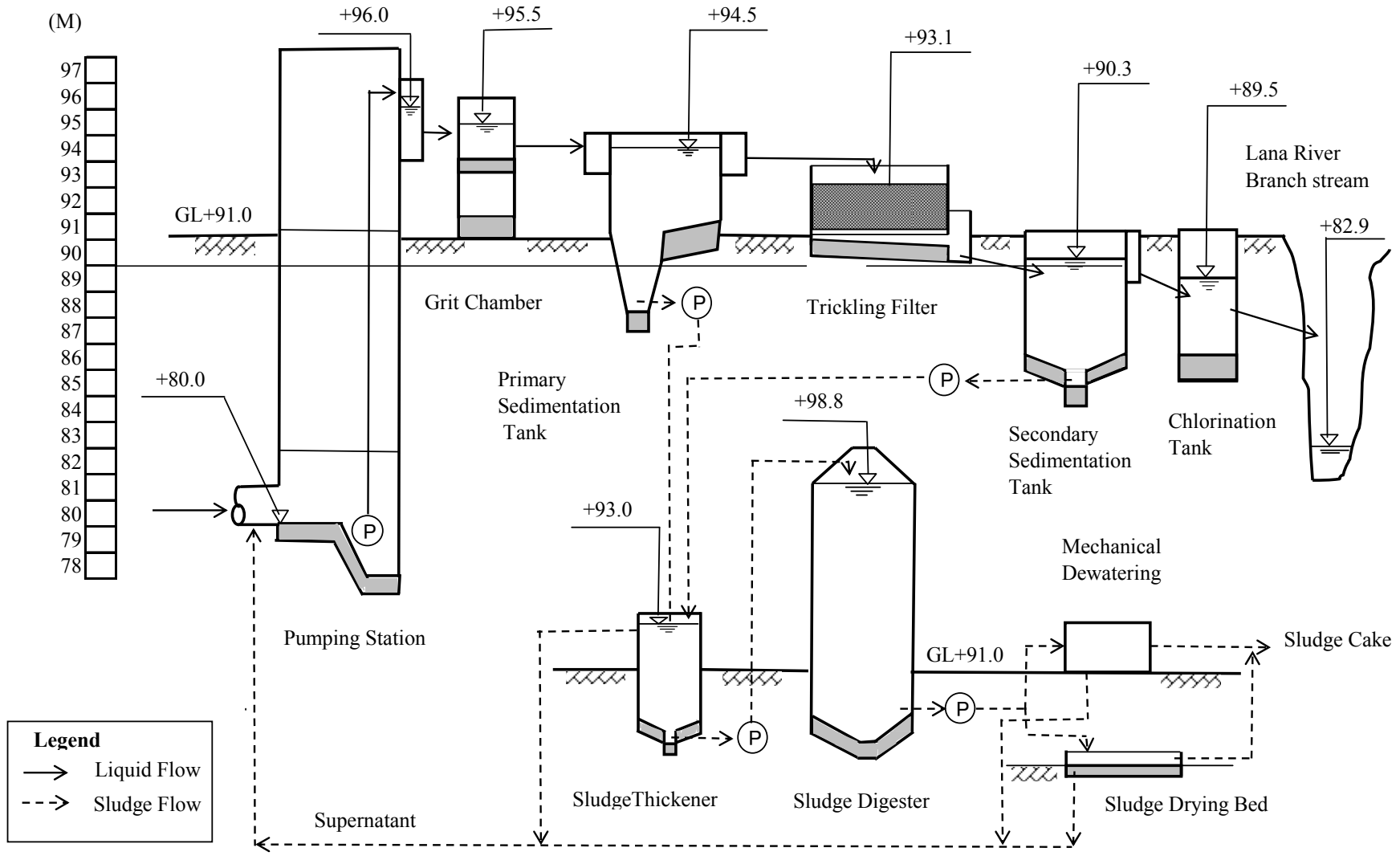


Figure S2.2.7 Hydraulic Profile of Kashar STP

Table S2.2.4 Dimensions and Specifications of Major Sewage Treatment Facilities

Name of facility and equipment	Dimensions and specifications	Nos	Remarks
Civil and architectural			
Administrarion building	2,000 m^2	1	
Pumping station	1,200 m^2	1	
Generator building	150 m^2	1	
Substation building	150 m^2	1	
Grit chamber	(L) 20.5m×(W) 2.5m	2	With bucket conveyor Overflow rate: 1,800 m^3/m^2/day
Primary sedimentation tank	(L) 40.5m×(W) 4.0m×(H) 3.0m	12	With scrapers Overflow rate of 50m^3/m^2/day
Trickling filter	(D) 41.5m×(H) 1.5m	24	With filter media Hydraulic loading of 3 m^3/m^2/day BOD loading of 0.3 kg/m^3/day
Secondary sedimentation tank	(D) 26.2m×(H) 3.5m	9	With scrapers Overflow rate of 20m^3/m^2/day
Chlorination tank	(L) 112m×(W) 4.0m×(H) 3.0m	1	Contact time of 15 minutes
Mechanical and electrical			
Coarse screen	(W) 1.2m	4	Manually raked
Fine screen	(W) 1.2m	4	Mechanically raked
Influent pump	(D) 500mm×33.0 m^3/min	2(1)	Vertical shaft type, head of 16.5m (one for standby)
	(D) 700mm×63.0 m^3/min.	1	Vertical shaft type, head of 16.5m

(L: length, W: width, H: height, D: diameter)

(2) Sludge Treatment Facilities

Table S2.2.5 shows the dimensions of the sludge treatment facilities and the specifications for mechanical equipment used to treat sludge.

Table S2.2.5 Dimensions and Specifications of Major Sludge Treatment Facilities

Name of facility/equipment	Dimensions/specifications	Nos	Remarks
Civil and architectural			
Sludge thickener	(D) 15.0m×(H) 4.0m	2	With scrapers
Sludge digester	(D) 19.6m×(H) 9.8m	8	With desulphirizer, waste gas burner and gas holder
Sludge drying bed	(W) 40m×(L) 60m×(H) 0.2m	15	3 units for standby
Dewatering equipment building	750 m^2	1	
Mechanical and electrical			Ordinary Operation: 6 days a week, 6 hous a day (Max. 12 hours) 312 days/year
Belt filter press	Filter width of 3m and capcity of 120kg/m/hour	3	

(L: length, W: width, H: height, D: diameter)

2.2.4 Operation and Maintenance Plan

(1) Operation and Maintenance Tasks for Sewage Collection System

Sewage collection systems are important to the community as they provide improved environmental conditions by removing sewage from dwellings and commercial premises. Sewage can be treated to controlled levels and discharged into public water bodies.

The O&M of the collection systems include the following tasks:

- Inspection: Inlet chambers and manholes are visually checked. Detailed inspection of the inside of manholes and connection pipes is undertaken. The insides of sewers are inspected using video cameras.
- Cleaning: Sewers and manholes are cleaned using high-pressure jet cleaners, mud suction vehicles and water tankers. Deposits in sewers are collected at manhole locations and are sucked up by mud suction vehicles and disposed.
- Repair: The packer method is used (cement milk injection) is applied to decayed parts of sewers lines. The number of annual repairs is estimated on Japanese experiences.

(2) Operation and Maintenance Tasks for Sewage Treatment Plant

- Collected sewage is treated at a STP. It is important to check that mechanical equipment (such as inlet pumps; scrapers used in primary/secondary sedimentation tanks and thickeners; distributors of trickling filters; digesters and mechanical dewatering devices). Routine monitoring of sewage odor, color and sludge is required in addition to the continuous operation of the mechanical equipment and water quality analysis tasks.

Sewage treatment and sludge treatment produce a significant volume of byproducts which must be disposed of in an appropriate manner. These byproducts include screenings, grit and sludge.

(3) Operation and Maintenance Staff and Utilities Requirements

1) Staff requirements

Figure S2.2.8 outlines the personnel required for the O&M of sewers and the Kashar STP. The director is responsible for all sewerage facilities constructed as part of the priority project.

The administration section plans and administers general O&M matters. The water quality section is responsible for the measurement of the quality of influent and effluent that enters and leaves the STP. This section also measures the sludge properties at each stage of the sludge treatment process. The STP operation section and the STP maintenance section are responsible for the daily operation of the STP and for daily maintenance works.

The STP operation section operates in three shifts, to provide for continuous operation of the STP. This is carried out in cooperation with the STP maintenance section which is responsible for the efficient and effective operation of the STP. If the STP facility were to be constructed, two workers (each with three shifts) and one standby team would need to be allocated.

The sewer maintenance section is responsible for periodic inspection, cleaning and repairs of sewers, as necessary. The organizational chart shows that one worker and one driver would be required to carry out the inspection works, and four workers and two drivers would be required for the cleaning and repair work.

The administration section will be responsible for keeping the O&M records, and must make these readily available.

2) Utilities requirements and others

The O&M of sewerage facilities requires utilities such as electricity and chemicals; and equipment for inspection, cleaning and repairs.

Electricity: Electricity is required to operate the mechanical equipment (raked screens, pumps, scrapers in the sedimentation tanks and thickeners, mixers in the digestion tanks and dewatering equipment).

Chemicals: Chemicals are required for disinfection, dewatering and water quality analysis.

Consumables for routine repairs: Lubricant and spare parts are required for daily maintenance of the mechanical and electrical equipment.

Sludge Disposal: Sewage treatment produces significant volumes of sludge daily. The sludge must be removed and disposed of efficiently to allow for the effective treatment of sewage. To improve the sludge management it is thickened, digested and then either naturally dried or mechanically dewatered. Sludges are then disposed of at a designated disposal site. It may be possible to use dried and/or dewatered sludge as a soil conditioner in the future.

Operation and maintenance of sewers: Costs are estimated per unit length of constructed sewers, except for personnel costs. These costs include those associated with sewer inspection and cleaning apparatus such as TV cameras, vehicles for jet cleaning, vehicles for the suction of deposits, and equipment and materials that may be necessary for repairs.

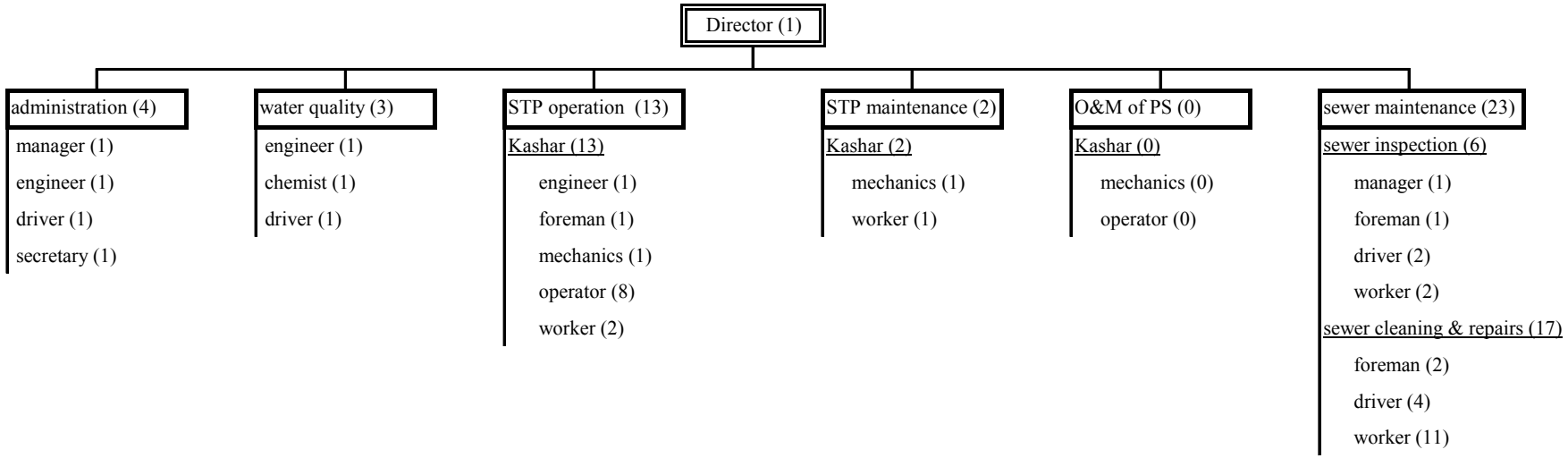


Figure S2.2.8 Operation and Maintenance Organization Chart

2.2.5 Organization and Management

(1) Proposed Reform (Necessary Organization)

Central government should take a leading role in guiding local governments on the preferred decentralization option for a Greater Tirana Water and Sewerage Authority. Local governments have concerns over the asset transfer process, financial support, and the performance of UKT, among others. Conferences and/or seminars/workshops are recommended for central government, local governments and UKT to resolve the decentralization issue.

As and when a Joint Authority is instituted with a reformed UKT (GTW&SA) as the service provider (operator) under the new local government ownership, GTW&SA will require reorganization into a truly commercial operator. The following organization & management reforms are proposed:

1) The formation of a Community Relations Unit is recommended to carry out a Public Information, Education & Community Relations Program targeting groups of customers in the domestic, business and government categories. A sewage treatment plant is a new concept in Tirana and customers need to understand the benefits and costs for the improved sewerage service, their obligations and the necessary protection of the environment.
2) The Commercial Department must reform its organization to cater for long term loans and the corresponding need for business plans. The Sales Sector must ensure that existing customers are paying the sewerage charge, new premises are connected to the sewerage system, and Customer Contracts are issued and the tariff charges paid.
3) Engineering re-organization must include integration of the sewerage sector into the mainstream activities of the Technical Department of GTW&SA to ensure the technical and financial viability of the Priority Works.
4) Organization of the Sewerage Sector needs extensive reform for the Priority Works. A new unit is required for operation and maintenance of the sewers and the sewage treatment plant, and a laboratory to control and monitor the effluent. An administration and management unit is required which will include responsibility for environmental management. A sewer network extension unit needs forming for infilling the Tirana network and for new networks in the surrounding communes and municipalities within the Greater Tirana area. Capacity building and training will be key elements to the reform of this organization.

(2) Capacity Building

The following capacity building measures are recommended:

1) Local Government

There is a need to strengthen the capacities of the local governments forming the Joint Authority for Greater Tirana. The AWSSA can act as a facilitator for the following recommended courses:

- Water Sector Institutional and Legal Framework;
- Responsibilities and Authority of Local Government in the Water Sector;

- Regulation in the Water Sector; and
- Environmental Responsibilities.

2) GTW&SA (Ex-UKT)

Strengthening is required for commercialization and the recommended courses, facilitated by AWSSA with assistance from external consultants as necessary, are:

- Strategic & Business Plan Development;
- Cost & Tariff Calculations towards Cost Recovery;
- Billing & Collection;
- Customer Services & Community Relations;
- Water Loss Management & Control;
- Efficient Practices for Operation & Maintenance;
- Community Participation in Decision Making for Water Distribution & Sewage Collection;
- Benchmarking as a Monitoring Tool; and
- Health & Safety.

3) Sewerage Sector of GTW&SA

Trunk and main sewers and a sewage treatment plant will be new facilities to this sector and capacity building through training is recommended for the following:

- Sewer cleaning, rehabilitation, and maintenance;
- Operation & Maintenance of the Sewage Treatment Plant;
- Engineering & Management of Sewerage Systems (including Environmental Management); and
- Much of this training can be provided during the construction and commissioning of the works through the various contracts, augmented by external consultants where necessary.

2.3 Priority Project Implementation Plan

2.3.1 Implementation Schedule

The facilities mentioned above will be implemented according to the implementation plan shown in *Figure S2.3.1*. Detailed design and tender is the first task, with land acquisition being carried out concurrently. Following this step, pre-qualifications and contract would be negotiated after which implementation would commence. Construction of Trunk Sewer No.3 would start from No.28 shaft at Kashar STP and extend to No.3 shaft over Lana River. No.1 and No.2 would then be constructed. Main sewers and branch sewers would be constructed along with the trunk sewer, and would be connected sequentially. Given the nature of this project, mechanical and electrical works would be carried out before the civil and architectural works. While the civil and architectural works are carried out, the mechanical and electrical equipment would be procured and installed. The construction works would be completed and the sewage treatment plant would begin operation by 2013.

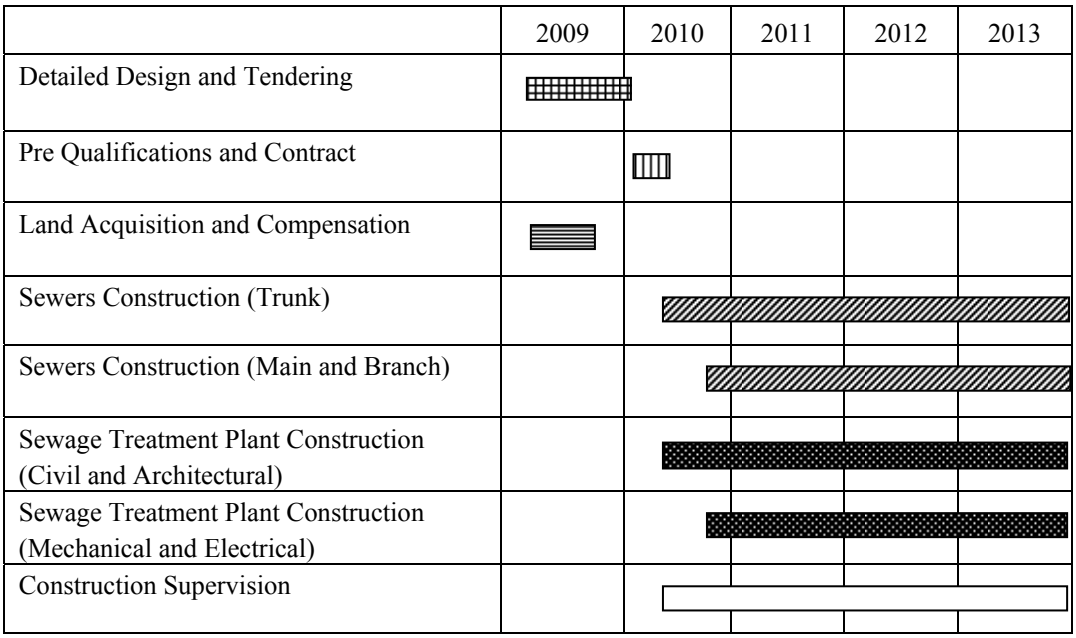


Figure S2.3.1 Implementation Plan for the Priority Project

2.3.2 Cost Estimates

(1) Basis of Cost Estimate

The project cost is based on the price offset as of 21 June, 2006. The exchange rates on that day were:

- 1 US dollar = 96.28 Albanian Lek = 115.13 Japanese Yen; and
- 1 Euro = 122.96 Albanian Lek.

Quantity estimates for various items were made during the planning stage. A survey of the unit costs for various items was also undertaken. The quantities and unit costs were then used to determine the construction and O&M costs.

Little information is available about actual sewage construction costs in Albania. However, actual cost information is available for civil works including the rates for excavation/backfilling, concrete and reinforcing steel bars. The civil and architecture work cost includes cost required for a plantation around the treatment plant site. This plantation is needed as a mitigation measure for offensive odor in case when inadequate operation of sludge treatment and/or mishandling of screens and scum removed from the screen facilities and sedimentation tanks. Construction costs for mechanical and electrical equipment are less readily available. Hence, mechanical and electrical equipment costs were estimated based on a ratio (50%) of the costs in Japan, considering only one example of the cost required for existing STP in Kavaya into account.

For sewer construction, open cut and jacking methods are recommended. Costs for each of the

construction method were estimated as outlined below:

Open cut method: Direct costs were estimated based on standard Japanese estimates. This direct cost was adjusted to account for material prices, product costs, fuel costs, power costs and personnel expenditure.

Jacking method: Cost estimates for the proposed jacking method are based on Japanese cost information and material cost information provided by various EU companies that have experience building a STP in Durres. The source of the data for the various cost categories is listed below:

- Personnel expenditure: EU data;
- Rental fee for construction machinery: EU data;
- Mechanical and electrical equipment: Japanese data;
- Pipes used for the jacking method: Japanese data;
- Materials e.g. sand, steel and concrete.: Albanian prices; and
- Fuel, electric power: Albanian prices.

Operation and maintenance costs were estimated using personnel and utility costs provided by the UKT.

The indirect costs were estimated as follows:

- Administration expenses (5% of direct construction cost);
- engineering services cost (10% of direct construction cost);
- Physical contingency (10% of direct construction cost); and
- Capital Building costs.

Capacity building costs include the costs to provide for international and local experts to manage the capacity building activities and to prepare the required documentation.

(2) Project Costs (Construction, Capacity Building and Promotion Plan)

Table S2.3.1 shows the project cost for the priority project.

Table S2.3.1 Total Project Cost

Component	FC (million Lek)	LC (million Lek)	Total (million Lek)
Direct Construction Cost			
Trunk Sewer	2,038	0	2,038
Main and Branch Sewers	0	288	288
Sewage Treatment Plant	2,000	2,054	4,054
Total of Direct Construction Cost	4,038	2,342	6,380
Indirect Construction Cost			
Land Acquisition and Compensation	-	1,146	1,146
Administrative Expenses	-	319	319
Engineering Services	404	234	638
Physical Contingency	404	234	638
Capacity Building	96	51	147
Total of Indirect Cost	904	1,984	2,888
Total Project Cost	4,942	4,326	9,268

(3) Operation and Maintenance Costs

The expected O&M costs include those items listed in *Table S2.3.2*. The table shows that this sewerage treatment facility would have an annual O&M cost of 108 million Lek. The O&M costs would be constant between 2014 and 2017.

Table S2.3.2 Overall Operation and Maintenance Costs (Unit: Million Leks)

Items	Cost
Power Consumption	20.1
Chemicals	13.4
Personnel	39.1
Routine Equipment Repair	10.0
Sludge Disposal	6.6
O&M and Repair for Sewers	18.8
Total	108.0

(4) Replacement Cost

Mechanical and electrical equipment will be replaced after 15 years operation. The replacement cost is estimated about 2,206 million Leks: FC 2,000 million Lek and LC 206 million Leks.

2.4 Financial and Economic Analysis

2.4.1 Financial Analysis

(1) Project Cost Needed

Table S2.4.1 shows the financial cost, economic cost, and the disbursement schedule for the Priority Project.

Table S2.4.1 Financial and Economic Cost of the Priority Project

(million Leks)

Item	2009			2010			2011			2012			2013			**Total**		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	**FC**	**LC**	**Total**
Direct Construction Cost				585	818	1,403	985	838	1,823	1,385	343	1,728	1,083	343	1,426	4,038	2,342	6,380
Trunk Sewer				585	0	585	585	0	585	585	0	585	283	0	283	2,038	0	2,038
Main and Branch Sewers				0	58	58	0	58	58	0	96	96	0	76	76	0	288	288
Kashar STP				0	760	760	400	780	1,180	800	247	1,047	800	267	1,067	2,000	2,054	4,054
Indirect Construction Cost	263	1,304	1,567	182	158	340	153	175	328	153	175	328	153	175	328	904	1,984	2,888
Land Acquisiotion and Conpensation	-	1,146	1,146	0	0	0	0	0	0	0	0	0	0	0	0	0	1,146	1,146
Administrative Expenses	-	64	64	0	64	64	0	64	64	0	64	64	0	64	64	0	319	319
Engineering Services	263	94	357	81	35	116	20	35	55	20	35	55	20	35	55	404	234	638
Capacity Building	0	0	0	0	0	0	32	17	49	32	17	49	32	17	49	96	51	147
Physical Contigency	0	0	0	101	59	160	101	59	160	101	59	160	101	59	160	404	234	638
Sub-Total of Financial Cost	263	1,304	1,567	767	976	1,743	1,138	1,013	2,151	1,538	518	2,056	1,236	518	1,754	4,942	4,326	9,268
Price Escalation	21	165	185	82	168	250	154	222	376	253	139	392	240	166	406	750	859	1,609
Total Financial Cost	284	1,469	1,752	849	1,144	1,993	1,292	1,235	2,527	1,791	657	2,448	1,476	684	2,160	5,692	5,185	10,877
Economic Cost Converted	237	173	410	690	614	1,304	1,024	626	1,651	1,384	315	1,699	1,112	315	1,427	4,448	2,043	6,491

(Note)

Administration Cost:	5%	of the Construction Cost.
Engineering Cost:	10%	of the Construction Cost.
Physical Contingency:	10%	of the whole cost from construction cost to engineering cost
Share Rate of Labor to Construction	28%	to the Construction Cost in LC portion.
Standard Conversion Factor (SCF):	0.9380	from the international trading statistics.
Income Tax for Labor:	5%	According to Personal Income Tax Law.
Foreign Portion of Equipment:	80%	of the equipment cost in total.
Value Added Tax (VAT):	20%	for domestically procured equipment (assumed).
Corporation Income Tax:	10%	According to Corporation Income Tax Law.
Shadow Price of Land for the Treatment Plant:	0.0212	
Shadow Wage Rate for Labor:	0.5971	of financial labor cost against average wage rate in Tirana Municipality (=(42,245/1.77)/40,000).
Construction Cost Index (CCI) for LC Portion:	4.04%	against previous year based on INSTAT.
Consumer Price Index (CPI) for FC Portion:	2.57%	against previous year based on CPI data in several countries around Albania since 1999 till 2005.

Table S2.4.1 indicates that the Project financial cost is Leks 10,877 million, including inflation. However, the financial evaluation needs to be undertaken without consideration of inflation because that cost / benefit analysis is done based on present value. Therefore, the financial cost to be used in the financial evaluation is Leks 9,268 million.

The conditions and assumptions used when estimating the economic costs presented in the above table are generally the same as those applied in the M/P study. The only difference is that the "Consumer Price Index (CPI) for FC Portion" being estimated at 2.57% based on the CPI data from Greece, Italy and Austria between 1999 and 2005. The data was taken from the Official HP of EUROSTAT website.

There will be O&M costs for the project, in addition to the above initial investment cost. The O&M costs are estimated to be Leks 108 million per annum (in financial terms) in 2014 (and Leks 76 million in economic terms).

In addition, a replacement for mechanical and electrical equipment is estimated at Leks 2,206 million in

financial terms and Leks 1,545 million in economic terms. The replacement cost will be derived at the time of every 15 years after operation of the sewerage facilities.

(2) Financial Revenue

Based on the existing income level of the households, following tariff level and tariff revision schedule are proposed for the Priority Project:

1) Sewerage Service Charges

i) Proposed Tariff Level for Household

The construction works are scheduled to be complete by 2013. The first tariff revision will be introduced in 2014. *Table S2.4.2* shows the proposed tariff revision schedule, the estimated annual income per household and averages expressed as a percentage of income.

Table S2.4.2 Proposed Tariff Revision Schedule for Household

Year	Average Annual Growth Rates of Income per House-hold	Annual Revised Schedule of Tariff Level Based on the Affordability of People to Pay					
		Tirana			Kashar		
		Estimated Annual Average Income Level (Leks/HH)	Teriff per Year (Leks)	Share Rate to Annual Income per HH	Estimated Annual Average Income Level (Leks/HH)	Teriff per Year (Leks)	Share Rate to Annual Income per HH
2014	3.63%	680,868	4,267	0.63%	551,960	2,922	0.53%
2015	3.50%	704,731	4,267	0.61%	571,305	2,922	0.51%
2016	3.38%	728,583	4,267	0.59%	590,641	2,922	0.49%
2017	3.27%	752,422	4,267	0.57%	609,967	2,922	0.48%
2018	3.17%	776,250	6,314	0.81%	629,283	4,812	0.76%
2019	3.07%	800,066	6,314	0.79%	648,590	4,812	0.74%
2020	2.98%	823,870	6,314	0.77%	667,887	4,812	0.72%
2021	2.89%	847,663	6,314	0.74%	687,175	4,812	0.70%
2022	2.81%	871,443	8,714	1.00%	706,453	7,065	1.00%

As noted in the above table, the tariff will be revised every four years. The first tariff revision will occur in 2018. After this revision, the annual household tariff in Tirana will have increased by approximately 1.48 times in value (48 % increase), and approximately 1.42 times (42 % increase) as a percentage of income. In Kashar the annual tariff will increase by approximately 1.65 times (65 % increase) in value and by 1.58 (58 % increase) as a percentage of income.

ii) Proposed Tariff Level for Offices, Small Scale Industries and Such Commercials as Shops, Coffee Shops, Restaurants, Hotels, and so on

For these categories, the amount of 15,261 Leks/Firm per year is proposed. In this analysis, revision schedule is not set up. However, it may be needed to revise in the future.

iii) Connection Fee

In addition to the above, it was assumed that connection fees would be 15,000 Leks for domestic

households and Leks 150,000 for offices and commercial enterprises.

2) Assumptions

This revenue was based on the following assumptions:

Table S2.4.3 Assumptions for Estimation of Financial Benefit

	Connection Rate		Collection Rate	
Year	Tirana	Kashar	Tirana	Kashar
2005	56.20%	0.00%	77.71%	0.00%
2014	90.00%	70.00%	93.00%	30.00%
2015	90.28%	80.00%	93.50%	50.00%
2016	90.91%	90.00%	94.00%	70.00%
2017	91.53%	90.76%	94.50%	85.00%
2018	92.16%	91.59%	95.00%	95.00%
2019	92.78%	92.43%	95.00%	95.00%
2020	93.41%	93.26%	95.00%	95.00%
2021	94.03%	94.09%	95.00%	95.00%
2022	95.00%	95.00%	95.00%	95.00%

Table S2.4.4 shows the estimated number of customers to provide the sewerage services.

Table S2.4.4 Estimated Number of Customer Collection of Sewerage Block

	Tirana						Kashar
	1		2		3		10-2
Year	Tirana (Lana-N)		Tirana (Lana-S)		Tirana -W		(For FS)
	Domestic HHs	Offices, etc.	Domestic HHs	Offices, etc.	Domestic HHs	Offices, etc.	Domestic HHs
2014	16,981	5,655	56,733	17,077	924	179	60

3) Estimated Financial Benefit

Table S2.4.5 presents the estimated financial revenue expected from collection of sewerage services charges in Tirana municipality and in Kashar commune between 2014 and 2022. This revenue is based on the tariff level indicated in *Table S2.4.2*.

Table S2.4.5 Estimated Financial Benefit Based on Sewerage Service Charge

(1,000 Leks/year)

	Tirana						Kashar
	1		2		3		10-2
Year	Tirana (Lana-N)		Tirana (Lana-S)		Tirana -W		(For FS)
	Domestic HHs	Offices, etc.	Domestic HHs	Offices, etc.	Domestic HHs	Offices, etc.	Domestic HHs
2014	72,460	86,297	242,091	260,610	3,942	2,733	175

Additional revenue will be collected in the form of connection fees, for connection to the newly constructed sewerage facilities.

(4) Financial Analysis

The average interest rate for a bank deposit in Albania is currently 5 %. From this perspective, if the opportunity cost of capital (OCC) in Tirana is assumed to be 5 % (from the perspective of meeting basic human needs that are based on the living environment), 5 % is a benchmark to use when evaluating the project in terms of meeting basic human needs that are based on the living environment.

The financial evaluation presented in *Table S2.4.6* is based on the assumption that the OCC is assumed to be the discount rate[1] :

Table S2.4.6 Result of Financial Evaluation in Case of 5 % of Discount Rate

NPV	FIRR	B/C
1,429 Million Leks	7.21 %	1.16

The FIRR of 7.21% is higher than the applied discount rate of 5%. The resulting B/C ratio is 1.16 (which is higher than "1.00"). The NPV is positive Leks 1,429 million. Therefore, the Project is financially sound from the perspective of meeting basic human needs that are based on the living environment.

A sensitivity test using 49 combinations of options including the base case indicated that:

1) the cost fluctuates between a range of -30 %, -20 %, -10% base case, +10 %, +20 %, and +30 %; and

2) the benefit fluctuates between a range of +30 %, +20 %, +10 %, base case, -10 %, -20 %, and -30 %. *Table S2.4.7* presents these results:

Table S2.4.7 Results of Sensitivity Test of FIRR

Cost	Benefit						
	+ 30 %	+ 20 %	+ 10 %	Base Case	- 10 %	- 20 %	- 30 %
+ 30 %	7.21%	6.02%	4.78%	3.46%	2.01%	0.36%	-1.67%
+ 20 %	8.44%	7.21%	5.92%	4.57%	3.11%	1.49%	-0.43%
+ 10 %	9.85%	8.55%	7.21%	5.80%	4.31%	2.69%	0.84%
Base Case	11.48%	10.10%	8.68%	**7.21%**	5.66%	4.00%	2.16%
- 10 %	13.42%	11.93%	10.41%	8.84%	7.21%	5.48%	3.61%
- 20 %	15.75%	14.14%	12.49%	10.80%	9.04%	7.21%	5.26%
- 30 %	18.63%	16.87%	15.06%	13.21%	11.29%	9.30%	7.21%

As shown in *Table S2.4.7*, the project is financially viable with a FIRR of 5.80 % or 5.66% respectively and (because this is greater than the 5 % benchmark), when the cost can increase by 10 % under the benefit in base case, or the benefit can decrease by 10% under the cost base case. This sensitivity analysis demonstrates that the project has contingency to be viable.

[1] William A. Ward and Barry J. Deren with Emannuel H. D'Silva, 1991 "The Economics of Project Analysis –A Practitioner's Guide –" EDI Technical Materials, the World Bank.

(5) Analysis of Financial Operation

The Project cost is Leks 10,877 million (including inflation). This cost cannot be expected to be financed by foreign loans. Once the project has been constructed, funds must be available to finance the operation and maintenance costs (the O&M cost). Both the initial investment and the O&M cost must be funded by tariff revenue with minimal contribution from the local Government.

A cash flow analysis was made using the terms and conditions of a Japanese Yean Loan. To do this, the loan amount must first be made clear. The loan details and disbursement plan are presented in *Table S2.4.8* and *Table S2.4.9*, respectively.

Table S2.4.8 Project Cost Estimated Together with Proposed Foreign Loan Amount

(million Leks)

Item	Project Cost in Total			Loan
	FC	LC	Total	Amount
Direct Construction Cost	4,038	2,342	6,380	6,092
Trunk Sewer	2,038	0	2,038	2,038
Main and Branch Sewers	0	288	288	
Kashar STP	2,000	2,054	4,054	4,054
Indirect Construction Cost	904	1,985	2,889	1,314
Land Acquisiotion and Conpensation	0	1,146	1,146	
Administrative Expenses	0	320	320	
Engineering Services	404	234	638	609
Capacity Building	96	51	147	96
Physical Contigency	404	234	638	609
Sub-Total of Financial Cost	4,942	4,327	9,269	7,406
Price Escalation for All the Project Cost	750	859	1,609	1,308
Total Financial Cost	5,692	5,186	**10,878**	
Economic Cost Converted	4,448	2,043	6,490	
Loan Amount				8,714

Table S2.4.9 Disbursement Schedule of the Loan Amount Required

(million Leks)

Item	2009			2010			2011			2012			2013			**Total**			Loan
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	**FC**	**LC**	**Total**	Amount
Direct Construction Cost	0	0	0	585	760	1,345	985	780	1,765	1,385	247	1,632	1,083	267	1,350	4,038	2,054	6,092	6,092
Trunk Sewer	0	0	0	585	0	585	585	0	585	585	0	585	283	0	283	2,038	0	2,038	2,038
Kashar STP	0	0	0	0	760	760	400	780	1,180	800	247	1,047	800	267	1,067	2,000	2,054	4,054	4,054
Indirect Construction Cost	262	82	345	182	82	264	153	99	252	153	99	252	153	99	252	904	462	1,365	1,314
Engineering Services	262	82	345	81	31	112	20	31	51	20	31	51	20	31	51	404	205	609	609
Capacity Building	0	0	0	0	0	0	32	17	49	32	17	49	32	17	49	96	51	147	96
Physical Contigency	0	0	0	101	51	152	101	51	152	101	51	152	101	51	152	404	205	609	609
Sub-Total of Financial Cost	262	82	345	767	842	1,609	1,138	879	2,017	1,538	346	1,884	1,236	366	1,602	4,942	2,516	7,457	7,406
Price Escalation	21	10	31	82	145	227	154	193	347	253	93	346	240	117	357	750	558	1,308	1,308
Total Financial Cost	283	93	376	849	987	1,835	1,292	1,072	2,364	1,791	439	2,230	1,476	483	1,960	5,692	3,074	8,765	**8,714**
Loan Amount			376			1,835			2,347			2,213			1,943			**8,714**	

(Note) ☐ Subject of Foreign Loan.

For making clear financial operation, two cases of foreign loans are considered under the terms and conditions of:

Case-1

- i) Foreign Loan
  - Payment Period: 25 years, which include a 7 year grace period; and
  - Interest Rate: 1.50 % per annum (on the principal balance) for remaining balance.
- ii) Domestic Finance (Local Loan)
  - Payment Period: 1 year. It means that the amount of the domestic finance (local loan) in each year should pay in full after 4 years of the grace period.
  - Interest Rate: 11.50 % per annum (on the principal balance) for remaining balance.

Case-2

- i) Foreign Loan
  - Payment Period: 40 years, which include a 10 year grace period; and
  - Interest Rate: 0.75 % per annum (on the principal balance).
- ii) Domestic Finance (Local Loan)
  - Same terms and conditions with Case-1.

Full amount of this cost cannot be expected to be financed by foreign loans, but a part of the total cost is to be financed by the foreign loan as mentioned above. The remaining cost must be financed domestically. *Tables S2.4.10* and *Tables S2.4.11* present a detailed future cash flow for the Project in Case-1 and Case-2, respectively.

As a result, it seems that the Project has a capability not only to keep the sound finance over the Project life, but also to compensate the deficits that would be derived during the period of the construction works by its cumulative cash balance.

Accordingly, the Project has enough viability from the financial viewpoints of the above two analyses.

Based on the defined tariff levels, the repayments are calculated as shown in *Figure S2.4.1 and Figure S2.4.2* for each case. The figures show the Project is financially viable.

Table S2.4.10 (1) Cash Balance for the Financial Operation of the Project (Case -1)

(Million Leks)

Year in Order	Fiscal Year	Out Flow								
		Improvement of Sewerage Network and Construction of Sewerage Treatment Facilities	Foreign borrow		Total including Initial Investment Cost	Domestic Borrow			OM Cost including Replacement Cost	Out Flow in Total
			Interest Payment	Repayment of Principal		Interest Payment	Repayment of Principal	Total on Domestic Borrow		
(1)	(2)	(3)	(4)	(5)	(6)=4 + 5	(7)	(8)	(9)=7 + 8	(10)	(11)=6 + 9 + 10
1	2006	0	0	0	0	0	0	0	0	0
2	2007	0	0	0	0	0	0	0	0	0
3	2008	0	0	0	0	0	0	0	0	0
4	2009	1,752	0	0	1,752	0	0	0	0	1,752
5	2010	1,991	33	0	2,025	158	0	158	0	2,183
6	2011	2,526	68	0	2,594	198	0	198	0	2,792
7	2012	2,448	102	0	2,550	231	0	231	0	2,781
8	2013	2,160	131	0	2,291	274	0	274	0	2,564
9	2014	0	131	0	131	319	1,377	1,695	108	1,934
10	2015	0	131	0	131	166	189	355	108	593
11	2016	0	131	0	131	126	247	373	108	612
12	2017	0	131	484	615	93	336	430	108	1,152
13	2018	0	123	484	608	51	348	399	108	1,114
14	2019	0	116	484	600				108	708
15	2020	0	109	484	593				108	701
16	2021	0	102	484	586				108	694
17	2022	0	94	484	579				108	687
18	2023	0	87	484	571				108	679
19	2024	0	80	484	564				108	672
20	2025	0	73	484	557				108	665
21	2026		65	484	549				108	658
22	2027		58	484	542				108	650
23	2028		51	484	535				2,314	2,849
24	2029		44	484	528				108	636
25	2030		36	484	520				108	628
26	2031		29	484	513				108	621
27	2032		22	484	506				108	614
28	2033		15	484	499				108	607
29	2034		7	484	491				108	599
30	2035			0	0				108	108
31	2036			0	0				108	108
32	2037			0	0				108	108
33	2038			0	0				108	108
34	2039			0	0				108	108
35	2040			0	0				108	108
Total		10,878	1,968	8,714	21,560	1,616	2,497	4,113	5,123	

(Note) (1) Interest rate of foreign loan: 1.50%

(2) Equal annual repayment amount of capital for foreign loan (million Leks): 484

(3) Interest rate of domestic loan: 11.50%

Table S2.4.10 (2) Cash Balance for the Financial Operation of the Project (Case-1)

(Million Leks)

Year in Order	Fiscal Year	In Flow				In Case of Using a City Bank for the Amount of Domestic Financing Portion		In Case of Full Subsidy from the Local Government for the Amount of Domestic Financing Portion	
		Foreign Borrow	Revenue in Case of Revised Collection and Cennection Rates with Revised Value per Bill including	Domestic Financing Supporting by the Local Govern-ment	In flow in Total	Cash Balance	Cumul-ative Cash Balance	Cash Balance	Cumul-ative Cash Balance
(1)	(2)	(12)	(13)	(14)=3 - 12	(15)=12 + 13 + 14	(16)	(17) $=\sum(16)$	(16)"	(17)" $=\sum(16)$
1	2006	0	0	0	0	0	0	0	0
2	2007	0	0	0	0	0	0	0	0
3	2008	0	0	0	0	0	0	0	0
4	2009	376	0	1,377	1,752	0	0	0	0
5	2010	1,835	0	189	2,025	-158	-158	0	0
6	2011	2,347	0	247	2,594	-198	-357	0	0
7	2012	2,213	0	336	2,550	-231	-588	0	0
8	2013	1,943	0	348	2,291	-274	-862	0	0
9	2014	0	5,223	0	5,223	3,289	2,427	4,984	4,984
10	2015	0	679	0	679	86	2,513	440	5,424
11	2016	0	688	0	688	76	2,588	449	5,873
12	2017	0	691	0	691	-461	2,127	-31	5,842
13	2018	0	696	0	696	-418	1,709	-20	5,822
14	2019	0	692	0	692	-17	1,692	-17	5,805
15	2020	0	694	0	694	-7	1,685	-7	5,798
16	2021	0	696	0	696	2	1,687	2	5,801
17	2022	0	705	0	705	18	1,705	18	5,819
18	2023	0	705	0	705	25	1,731	25	5,844
19	2024	0	705	0	705	33	1,763	33	5,877
20	2025	0	705	0	705	40	1,803	40	5,917
21	2026		705	0	705	47	1,850	47	5,964
22	2027		705	0	705	54	1,905	54	6,018
23	2028		705	0	705	-2,144	-239	-2,144	3,874
24	2029		705	0	705	69	-171	69	3,943
25	2030		705	0	705	76	-94	76	4,019
26	2031		705	0	705	83	-11	83	4,102
27	2032		705	0	705	91	80	91	4,193
28	2033		705	0	705	98	178	98	4,291
29	2034		705	0	705	105	283	105	4,396
30	2035		705	0	705	597	880	597	4,993
31	2036		705	0	705	597	1,476	597	5,590
32	2037		705	0	705	597	2,073	597	6,186
33	2038		705	0	705	597	2,670	597	6,783
34	2039		705	0	705	597	3,266	597	7,380
35	2040		705	0	705	597	3,863	597	7,976
Total		8,714	23,447	2,497	34,659	3,863		7,976	

Table S2.4.11 (1) Cash Balance for the Financial Operation of the Project (Case -2)

(Million Leks)

Year in Order	Fiscal Year	Out Flow								
		Improvement of Sewerage Network and Construction of Sewerage Treatment Facilities	Foreign borrow		Total including Initial Investment Cost	Domestic Borrow			OM Cost including Replacement Cost	Out Flow in Total
			Interest Payment	Repayment of Principal		Interest Payment	Repayment of Principal	Total on Domestic Borrow		
(1)	(2)	(3)	(4)	(5)	(6)=4 + 5	(7)	(8)	(9)=7 + 8	(10)	(11)=6 + 9 + 10
1	2006	0	0	0	0	0	0	0	0	0
2	2007	0	0	0	0	0	0	0	0	0
3	2008	0	0	0	0	0	0	0	0	0
4	2009	1,752	0	0	1,752	0	0	0	0	1,752
5	2010	1,991	17	0	2,008	158	0	158	0	2,166
6	2011	2,526	34	0	2,560	196	0	196	0	2,756
7	2012	2,448	51	0	2,499	225	0	225	0	2,724
8	2013	2,160	65	0	2,225	261	0	261	0	2,487
9	2014	0	65	0	65	298	1,377	1,675	108	1,848
10	2015	0	65	0	65	144	173	317	108	490
11	2016	0	65	0	65	106	213	319	108	493
12	2017	0	65	0	65	78	286	363	108	537
13	2018	0	65	0	65	41	283	324	108	497
14	2019	0	65	0	65				108	173
15	2020	0	65	290	356				108	464
16	2021	0	63	290	354				108	462
17	2022	0	61	290	351				108	460
18	2023	0	59	290	349				108	457
19	2024	0	57	290	347				108	455
20	2025	0	54	290	345				108	453
21	2026		52	290	343				108	451
22	2027		50	290	341				108	449
23	2028		48	290	338				2,314	2,652
24	2029		46	290	336				108	444
25	2030		44	290	334				108	442
26	2031		41	290	332				108	440
27	2032		39	290	330				108	438
28	2033		37	290	328				108	436
29	2034		35	290	325				108	433
30	2035		33	290	323				108	431
31	2036		30	290	321				108	429
32	2037		28	290	319				108	427
33	2038		26	290	317				108	425
34	2039		24	290	314				108	422
35	2040		22	290	312				108	420
36	2041		20	290	310				108	418
37	2042		17	290	308				108	416
38	2043		15	290	306				2,314	2,620
39	2044		13	290	304				108	412
40	2045		11	290	301				108	409
41	2046		9	290	299				108	407
42	2047		7	290	297				108	405
43	2048		4	290	295				108	403
44	2049		2	290	293				108	401
45	2050			0	0				108	108
46	2051			0	0				108	108
47	2052			0	0				108	108
48	2053			0	0				108	108
49	2054			0	0				108	108
50	2055			0	0				108	108
Total		10,878	1,474	6,100	18,452	1,509	2,330	3,839	5,123	

(Note) (1) Interest rate of foreign loan: 0.75%

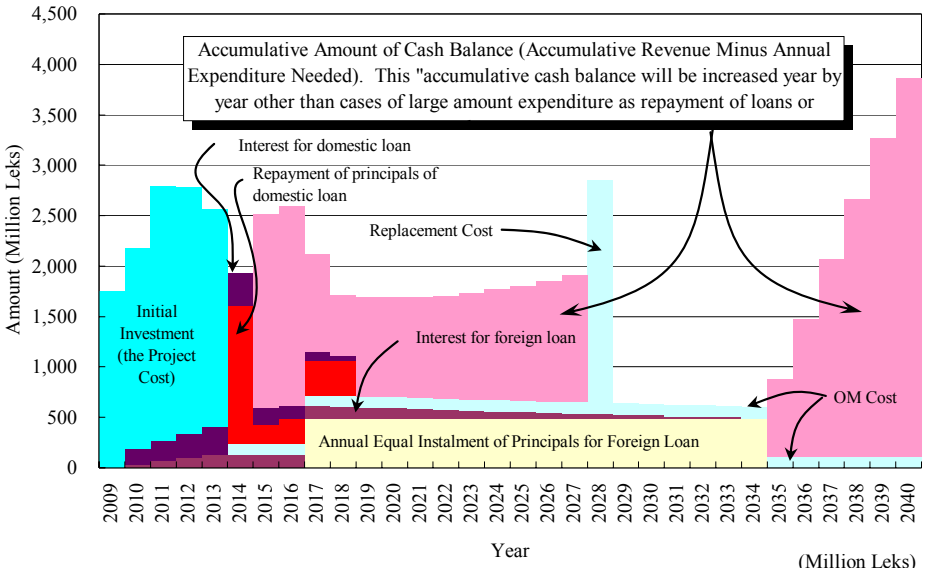
(2) Equal annual repayment amount of capital for foreign loan (million Leks): 290

(3) Interest rate of domestic loan: 11.50%

Table S2.4.11 (2) Cash Balance for the Financial Operation of the Project (Case -2)

(Million Leks)

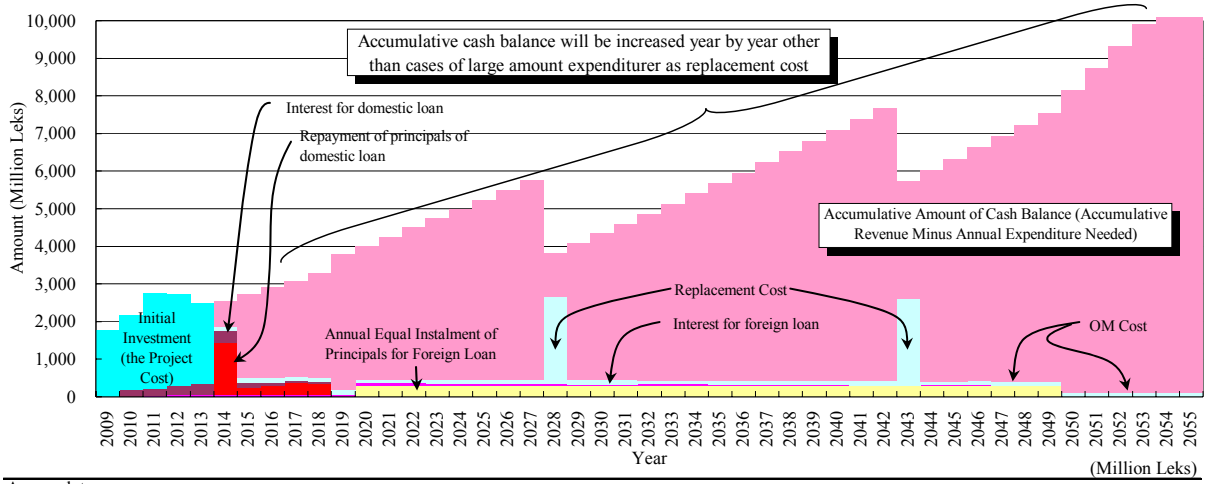
Year in Order	Fiscal Year	In Flow				In Case of Using a City Bank for the Amount of Domestic Financing Portion		In Case of Full Subsidy from the Local Government for the Amount of Domestic Financing Portion	
		Foreign Borrow	Revenue in Case of Revised Collection and Cennection Rates with Revised Value per Bill including	Domestic Financing Supporting by the Local Govern-ment	In flow in Total	Cash Balance	Cumul-ative Cash Balance	Cash Balance	Cumul-ative Cash Balance
(1)	(2)	(12)	(13)	(14)=3 - 12	(15)=12 + 13 + 14	(16)	(17) = ∑(16)	(16)"	(17)" = ∑(16)"
1	2006	0	0	0	0	0	0	0	0
2	2007	0	0	0	0	0	0	0	0
3	2008	0	0	0	0	0	0	0	0
4	2009	376	0	1,377	1,752	0	0	0	0
5	2010	1,835	0	173	2,008	-158	-158	0	0
6	2011	2,347	0	213	2,560	-196	-355	0	0
7	2012	2,213	0	286	2,499	-225	-580	0	0
8	2013	1,943	0	283	2,225	-261	-841	0	0
9	2014	0	5,223	0	5,223	3,375	2,533	5,049	5,049
10	2015	0	679	0	679	189	2,722	506	5,555
11	2016	0	688	0	688	195	2,917	514	6,069
12	2017	0	691	0	691	155	3,072	518	6,587
13	2018	0	696	0	696	199	3,271	523	7,110
14	2019	0	692	0	692	518	3,789	518	7,628
15	2020	0	694	0	694	230	4,019	230	7,858
16	2021	0	696	0	696	235	4,254	235	8,093
17	2022	0	705	0	705	245	4,499	245	8,338
18	2023	0	705	0	705	247	4,746	247	8,585
19	2024	0	705	0	705	250	4,996	250	8,835
20	2025	0	705	0	705	252	5,247	252	9,086
21	2026		705	0	705	254	5,501	254	9,340
22	2027		705	0	705	256	5,757	256	9,596
23	2028		705	0	705	-1,948	3,809	-1,948	7,649
24	2029		705	0	705	260	4,070	260	7,909
25	2030		705	0	705	263	4,332	263	8,172
26	2031		705	0	705	265	4,597	265	8,436
27	2032		705	0	705	267	4,864	267	8,703
28	2033		705	0	705	269	5,133	269	8,972
29	2034		705	0	705	271	5,404	271	9,244
30	2035		705	0	705	273	5,678	273	9,517
31	2036		705	0	705	276	5,954	276	9,793
32	2037		705	0	705	278	6,231	278	10,071
33	2038		705	0	705	280	6,511	280	10,351
34	2039		705	0	705	282	6,794	282	10,633
35	2040		705	0	705	284	7,078	284	10,917
36	2041		705	0	705	287	7,365	287	11,204
37	2042		705	0	705	289	7,653	289	11,493
38	2043		705	0	705	-1,915	5,738	-1,915	9,577
39	2044		705	0	705	293	6,031	293	9,870
40	2045		705	0	705	295	6,327	295	10,166
41	2046		705	0	705	297	6,624	297	10,463
42	2047		705	0	705	300	6,924	300	10,763
43	2048		705	0	705	302	7,225	302	11,065
44	2049		705	0	705	304	7,529	304	11,369
45	2050		705	0	705	597	8,126	597	11,965
46	2051		705	0	705	597	8,723	597	12,562
47	2052		705	0	705	597	9,319	597	13,158
48	2053		705	0	705	597	9,916	597	13,755
49	2054		705	0	705	597	10,513	597	14,352
50	2055		705	0	705	597	11,109	597	14,948
Total		8,714	23,447	2,330	34,492	7,078		10,917	



(Million Leks)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Accumulated Amount of Inflow in Total	1,752	3,777	6,371	8,921	11,212	15,916	16,748	17,603	18,477	19,368	20,269	21,186	22,119	23,074	24,029	24,983	25,938	26,893	27,848	28,803	29,758	30,712	31,667	32,622	33,577	34,532	35,487	36,442	37,396	38,351	39,306	40,261
Accumulated Amount of Outflow in Total	1,752	3,935	6,728	9,509	12,073	14,007	14,601	15,213	16,365	17,480	18,188	18,889	19,583	20,269	20,949	21,621	22,285	22,943	23,593	26,442	27,078	27,706	28,328	28,942	29,548	30,148	30,256	30,364	30,472	30,580	30,688	30,796
Accumulated amount of Cash Balance	0	-158	-357	-588	-862	1,908	2,147	2,391	2,111	1,888	2,081	2,297	2,536	2,804	3,080	3,363	3,653	3,950	4,255	2,361	2,680	3,006	3,340	3,681	4,029	4,384	5,231	6,078	6,925	7,771	8,618	9,465

Figure S2.4.1 Cash Flow Including the Repayment of Foreign Loan (Case-1)



(Million Leks)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055
Accumulated Amount of Inflow in Total	1,752	3,761	6,321	8,819	11,045	15,749	16,581	17,437	18,310	19,201	20,102	21,019	21,952	22,907	23,862	24,816	25,771	26,726	27,681	28,636	29,591	30,546	31,500	32,455	33,410	34,365	35,320	36,275	37,229	38,184	39,139	40,094	41,049	42,004	42,959	43,913	44,868	45,823	46,778	47,733	48,688	49,643	50,597	51,552	52,507	53,462	54,417
Accumulated Amount of Outflow in Total	1,752	3,919	6,675	9,399	11,886	13,734	14,224	14,717	15,253	15,751	15,924	16,388	16,850	17,309	17,767	18,222	18,675	19,125	19,574	22,226	22,671	23,113	23,553	23,990	24,426	24,859	25,291	25,720	26,146	26,571	26,993	27,414	27,832	28,248	30,868	31,279	31,689	32,096	32,501	32,904	33,304	33,412	33,520	33,628	33,736	33,844	33,953
Accumulated amount of Cash Balance	0	-158	-355	-580	-841	2,014	2,357	2,720	3,056	3,450	4,178	4,631	5,102	5,598	6,095	6,595	7,097	7,601	8,107	6,409	6,920	7,433	7,948	8,465	8,984	9,506	10,029	10,555	11,083	11,613	12,146	12,680	13,217	13,756	12,091	12,634	13,180	13,727	14,277	14,829	15,383	16,230	17,077	17,924	18,771	19,617	20,464

Figure S2.4.2 Cash Flow Including the Repayment of Foreign Loan (Case-2)

2.4.2 Economic Analysis

(1) Economic Cost

As mentioned in previous section, the economic project cost is:

Table S.2.4.12 Economic Cost and Its Annual Disbursement

(million Leks)

Item	2009			2010			2011			2012			2013			Total		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
Economic Cost Converted	237	173	410	690	614	1,304	1,024	626	1,650	1,384	315	1,699	1,112	315	1,427	4,448	2,043	6,490

The economic O&M cost is estimated to be Leks 76 million each year, once the system is operational. The replacement cost estimated at Leks 1,545 million is applied at the time every 15 years after the system is operational.

(2) Economic Benefit

The unit economic benefit is summarized in *Table 2.4.13*:

Table S2.4.13 Basic Unit for Economic Benefit of the Project of the Feasibility Study

Benefit Items	Expected Willingness of People to Pay[1] (Leks/HH per Year)		Saving Amount of Medical Expenditure[2] (Leks/HH per Year)		Saving Amount of Income Decreasing[3] (Leks/HH per Year)			
	Tirana Municipality	Kashar Commune	Outpatient	Inpatient	Tirana Municipality		Kashar Commune	
					Outpatient	Inpatient	Outpatient	Inpatient
Amount of Economic Benefit	4,926	1,897	244	660	5,071	16,104	4,248	13,491

Remarks & Sources
1. Estimated based on existing bills raised and actual collected charges for sewerage treatment services and total number of households in the service area.
2. Basic data and information for the nation and Tirana District are based on the information of the "Albania Poverty Assessment" Report No.26213-AL, November 5, 2003, the World Bank.
3. Basic data and information for the nation and Tirana District are based on the information of the "Albania Poverty Assessment" Report No.26213-AL, November 5, 2003, the World Bank.

(3) Economic Analysis

The evaluation is made using cash flows that have been based on the above cost-benefit analysis, assuming a 35 year life span, commencing once construction is complete. The results are summarized in *Table S2.4.142*:

Table S2.4.14 Result of Economic Evaluation of the Project

NPV	EIRR	B/C
2,101 Million Leks	15.72%	1.56

As shown in *Table S2.4.14*, the resulting EIRR is 15.72 %. This is greater than the applied discount rate (or opportunity cost of capital) of 10%. Therefore the project is economically viable.

(4) Sensitivity Analysis

The economic internal rate of return (EIRR) is affected by assumptions made in the calculation. The results are shown in *Table S2.4.15*:

Table S2.4.15 Results of Sensitivity Analysis

Cost	Benefit						
	+ 30 %	+ 20 %	+ 10 %	Base Case	- 10 %	- 20 %	- 30 %
+ 30 %	15.72%	14.60%	13.43%	12.21%	10.92%	9.54%	8.06%
+ 20 %	16.88%	15.72%	14.50%	13.23%	11.89%	10.47%	8.94%
+ 10 %	18.20%	16.98%	15.72%	14.39%	13.00%	11.52%	9.93%
Base Case	19.71%	18.44%	17.11%	**15.72%**	14.25%	12.71%	11.05%
- 10 %	21.47%	20.13%	18.72%	17.26%	15.72%	14.09%	12.35%
- 20 %	23.55%	22.12%	20.64%	19.08%	17.45%	15.72%	13.88%
- 30 %	26.05%	24.53%	22.94%	21.28%	19.53%	17.68%	15.72%

International financing institutions, such as the World Bank, recommend that for projects of this type, the EIRR should be greater than 5 %. This EIRR reflects the consumption required for basic human needs. This project exceeds this minimum recommendation (the project EIRR of 8.06 %). Therefore, it is recommended that the project proceed.

2.5 Environmental and Social Considerations

2.5.1 Implementation of Environmental and Social Considerations

The Study was categorized as requiring "B" level of environmental and social consideration, as defined in the JICA Guidelines. When DPUK prepared the IEE that was undertaken in conjunction with the formulation of M/P, the DPUK and the Study Team did not find any reason to change the category for the phase of Feasibility Study.

According to the Laws of Albania, the Environmental Declaration is necessary to be obtained for the proposed project. To obtain the Environmental Declaration, the request and relevant documentation including EIA report should be prepared during the F/S and submitted to MoEFWM to environmental license before implementation. Under the regulations (Law No. 8990 on Environmental Impact Assessment, Appendix 1), waste water treatment plant with a higher capacity than 150,000 equivalent inhabitants shall conduct "Profound (advanced) process of impact assessment" on environment. The EIA report shall be compiled by licensed natural and juridical persons, selected, contracted and paid by the proponent.

2.5.2 Public Consultation

Throughout the Study, four times stakeholder meeting as public consultation, the IEE level Study in M/P stage, and the EIA level Study in F/S were conducted by DPUK with the assistance of the Study Team.

The fourth stakeholder meeting was held in the F/S stage to inform the result of priority project, environmental and social considerations and recommendations of the JICA Study. The fourth stakeholder meeting was organized by DPUK, MoPWTT, and was held on 12 July 2005 at the Tirana International Hotel.

The main topics discussed in the meeting are summarized below:

- How much area is required for sludge disposal?
  - It is expected that 23 ton of sludge will be generated everyday (this is 8,000 ton / year). If the disposal site is one meter deep, a total of 8,000 m^2 of land will be required for sludge disposal. This is a rough estimate. The exact area will be determined during the detailed design stage.
- The STP effluent will be discharged into a small stream near the STP site. Are there plans to remove garbage or stabilize the riverbank as part of this project?
  - Solid waste management is not included as part of this study. However, the study team will make a recommendation for solid waste management, as well as a public awareness campaign to encourage people to connect to sewers and to dispose of their garbage appropriately. The capacity of the stream is checked to have enough capacity over the design hourly maximum flow of ultimate stage of 2022 when the wet weather conditions. An overflow structure of effluent will be constructed at the river bank.
- It is proposed that the sludge is put to beneficial use as a material in cement or as a fertilizer. Is the sludge of a suitable quality for these uses?
  - Because the proposed anaerobic digestion process produces stable sludge, any significant problems associated with the re-use of the sludge will not occur. No hazardous industrial wastewater will be accepted by the sewerage system, the sludge may not include any hazardous substances.
- If revisions to the water supply and sewerage tariffs are being recommended, please provide details.
  - The tariffs will be revised. Currently, the sewerage service charge level in Tirana municipality is only 0.25 % of the average annual income. This sewerage service charge level is too low to operate and maintain the proposed sewerage system. In the study it is proposed that 1 % of the average income should be charged for sewerage services by the target year of 2022 and that the charge level will be revised a few times until it reaches.

2.5.3 Environmental and Social Consideration Study Procedure

An environmental and social consideration study includes a description of the existing environmental situation, a study of the specific activities related to the project, and evaluation of the potential environmental and social impacts. Based on this information, necessary protective and mitigation measures are recommended.

Therefore, the study requires collection of detailed data and information on the existing environmental

situation. This information is used to establish a "Baseline Environmental Scenario". Data regarding the proposed activities is also collected. The environmental and social impacts associated with construction and operation of the proposal are predicted, and the necessary protective and mitigation measures to avoid adverse environmental and social impacts are recommended as an environmental management plan (EMP).

The adopted methodology is presented in *Figure S2.5.1*.

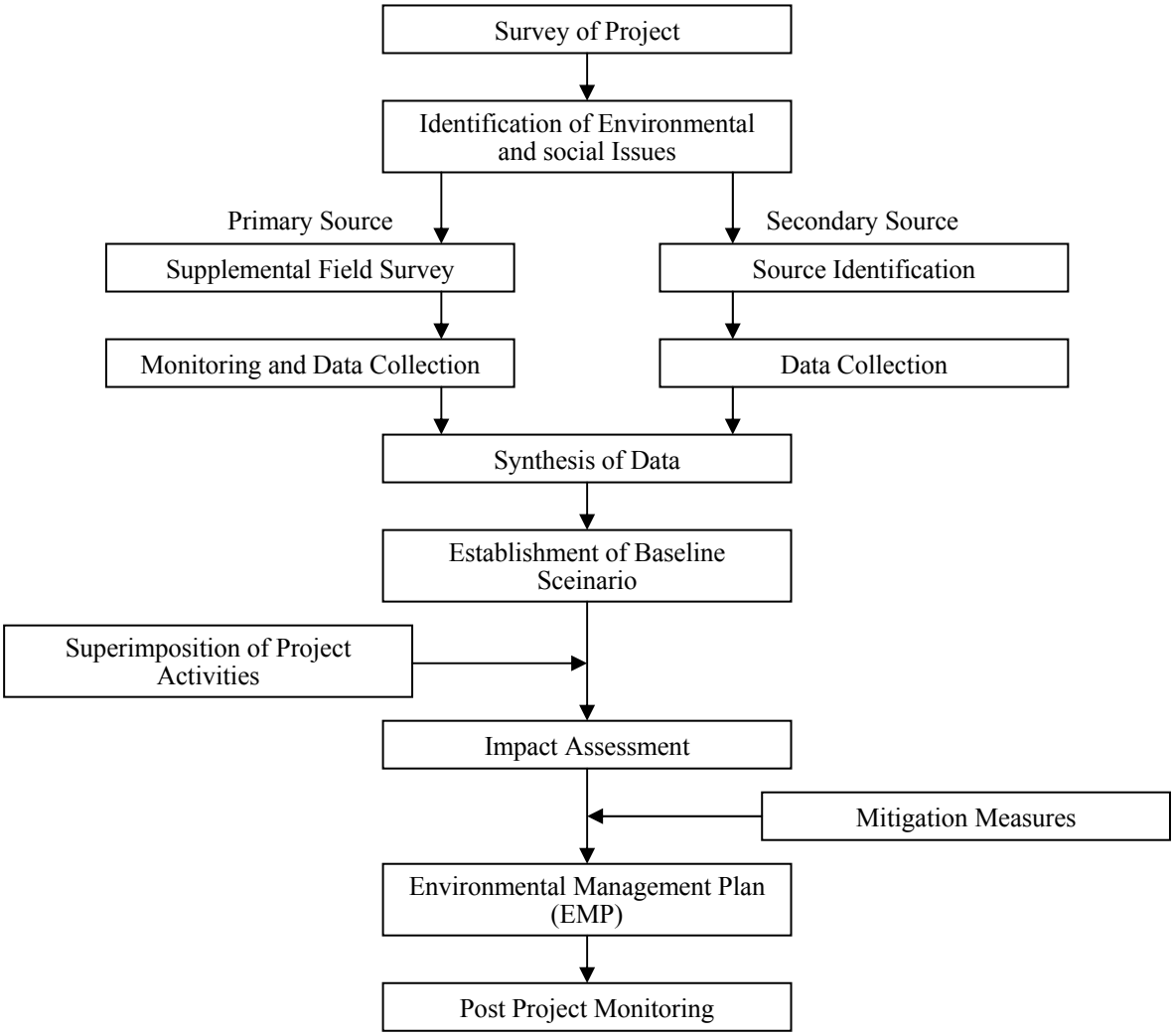


Figure S2.5.1 Schematic Diagram for Approach and Methodology

2.5.4 Impact Identification

The impact of the proposed project may be grouped into two categories namely 1) construction phase impacts, 2) operation phase impacts. The impacts during construction will be short period while the impacts during operation phase would be long term.

Figure S2.5.2 gives a visual representation of the parameters affected at construction and operation phase.

(1) Positive Impacts

Followings are positive impacts expected by the project, but will be visible after commissioning of the sewerage system:

- The collection and treatment of untreated sewage before entering the Lana River and its streams will improve the river water quality.
- Proper collection, treatment and disposal of sewage will reduce the risks of parasitic infections, incident of various diseases including malaria, typhoid etc.
- A proper sewage handling and disposal arrangement will minimize the chances of contamination of ground and surface water and piped water.
- Such provisions assist to maintain ecological balance by reducing damages to fauna and flora. Controlled reuse of sewage supplements agricultural/farming activities and sustenance of environmental protection components.
- Development of the project will encourage increased economic activities like commercial, industrial, etc. and will generate enhanced employment alternatives and economic growth for the Greater Tirana area.

(2) Adverse (negative) impacts

In the followings, major potential adverse impacts are selected and discussed.

1) Impacts on Socio-Economic Environment

Land Acquisition / Resettlement: The main impacts of construction phase are loss of village houses and agricultural land. About 47 ha of Land acquisition is necessary for the proposed Kashar STP. The map obtained from Real Estate Registering Office shows that the site is divided into many parcels / blocks and assuming that each parcel / block belongs to a landowner, more than 80 landowners shall be affected by the expropriation of the proposed STP site. The effort to avoid the resettlement is made and no resettlement occurs by the proposed project.

Waste: On average the sludge production will be 22.6 t /day as wet sludge from the STP. The dried sludge can be used as manure by farmers if there is the demand or should be disposed of in specific landfill sites. Disposal of sludge with domestic waste is acceptable. The existing landfill site, Sharra has capacity to receive the sludge from the STP for a few years. The World Bank proposed the new landfill site in the "Strategic Plan for Greater Tirana" in 2002, and new landfill site will be able to receive sludge from the STP.

2) Impacts on Natural Environment

Hydrological Situation: The effluent will be discharge into the stream nearby the STP and it flows into the Lana River. The present condition of the stream is polluted with sewage and solid waste and flow is small. Thus, the effluent which meets the EU standards will improve the present water quality of the stream. The amount of effluent is 95,900 m^3/d and the stream has enough capacity to receive that amount.

Phases	Construction Phase							Operation Phase			
Parameter	Site Preparation	Excavation	Construction	Transportation and disposal of earth	Soil Compaction	Construction Camps	Employment of People	Energy Utilization	O&M of treatment plant	Treated Effluent Discharge	Sludge disposal
Land Acquisition	■										
Socio-Economic Activities			■			■	■		■	■	
Traffic	■	■	■								■
Public Health			■	■	■	■			■	■	■
Soil Quality	■	■		■	■	■					■
Hydrological Situation	■	■	■			■			■	■	■
Flora & Fauna	■									■	
Air Quality	■	■	■	■	■			■	■		
Noise / Vibration	■	■	■	■	■			■	■		
Land use	■	■					■			■	■
Worker Health			■			■					

Figure S2.5.2 Impact Identification Matrix

3) Environmental Pollution

Odor: STP will generally generate odor without proper operation. In STP, the majority of the odor comes from the sludge handling system such as sludge drying beds and de-watering machine.

2.5.5 Mitigation Measures and Environmental Management (Monitoring) Program

The objective of preparing an Environmental Mitigation Plan (EMP) is to formulate measures, whose implementation will:

- Mitigate adverse effects on various environmental components and resources as have been identified in the EIA study;
- Protect Environmental Resources wherever possible; and
- Enhance the value of the environmental component wherever possible.

The EMP also includes a plan for monitoring so as to enable evaluation of the success or failure of environmental management measures and reorientation of the plan if found necessary. It is necessary that the resources required for the mitigatory / protection / enhancement measures, as also for monitoring are provided for in the cost estimates of the project so that their implementation is ensured.

(1) General Mitigation Measures

1) Construction Phase

Adverse impacts during construction phase have been taken into consideration. Following measures should be adopted in general for all activities:

- Minimum damage to existing flora and fauna, structures, electricity and telephone cables.
- Minimum disturbance to the local activities and business should be ensured.
- The sewer pipes should be stacked properly in pre-determined location and should not be cluttered around blocking the pedestrian area alongside the roads.
- Excavated earth should be prevented from getting washed into drainage channels, rivers and canals.
- Surplus excavated earth should be disposed of immediately.
- Measures should be taken to prevent direct discharge of polluted waters from construction activities into lake, rivers and irrigation canales.
- Dust pollution should be controlled with the measures outlined in the Appendix 13.
- Pavements and roads should be repaired immediately following the construction activity and the project and surrounding area should be restored to as near as possible pre-project conditions.
- Adequate measures should be taken to minimize construction related noise.
- Proper precautions should be taken against risk of accidents.

2) Operation Phase

Adverse impacts during operation phase have been taken into consideration. The following measures should be adopted in general for all activities:

- The treated water quality should be maintained as per the requirements at all times.
- Air, noise and odor quality should be monitored and corrective action taken in case it exceeds applicable norms.
- The sludge drying bed should be maintained properly and the sludge should be disposed of in an environmentally sound manner.
- Proper precautions should be taken for the good health of the operatives and the population.

(2) Environmental Management Plan

The success of the Environmental Mitigation Plan depends on the efficiency of the organizational set up responsible for the implementation of the program. The Environmental Management Plan will consist in:

- Setting up the organizational set up to implement the mitigation measures in operation phase;
- Ensuring a proper operation and maintenance of the treatment works;
- Ensuring a proper maintenance of the sludge drying beds and the disposal of dry chemical sludge in a proper landfill site;
- Monitoring the waste and treated water quality;
- Monitoring the built in pollution control equipment, for vehicles and equipment; and
- Maintaining tree plantations around the treatment plant.

(3) Monitoring Plan

To evaluate the effectiveness of the Environmental Management Plan, regular monitoring of the important environmental parameters will be taken up by the service provider (the proposed GTW&SA (ex-UKT)) with the help of outside agencies.

1) Sewage and Effluent Quality

The sampling and analysis of influent and effluent will be carried out daily to check the performance of treatment plant. These data should be delivered to the Director of sewerage sector to check that the treatment plant operates properly and no environmental pollution occurs.

2) Water Quality of Receiving Body

The monitoring of river water quality is conducted by the responsible government organization such as Institute of Hydrometeorology and Institute of Environmental Protection. In close cooperation with there institutions, GTW&SA should collect the monitoring data to check the water quality of receiving body.

3) Air Quality, Noise Monitoring, Groundwater and others

The proposed service provider (GTW&SA) should monitor the air quality, noise and groundwater with the close cooperation with the government institutions concerned.

(4) Risk Analysis and Contingency Plan

Contingency measures plans have been prepared for:

1) sewage treatment works that could reasonably be expected to cause significant environmental impacts as a consequence of operational disruption (i.e. maintenance, etc. or breakdown);
2) accidents which may occur while laying sewers or during construction of the treatment works;
3) discharge of sub-standard wastewater into the environment from STP which could cause a significant public health impact, and which therefore requires a continuous system of influent / effluent monitoring to identify potential problems as and when they arise.

(5) Recommendations

The followings are important recommendation for the EMP:

1) Land acquisition should be strictly followed by Law 8561, dated 22.12.1999, "On Expropriations and Temporary Takings of Private Property for a Public Interest" and four Council of Ministers decisions which define the procedures for expropriation of immovable property in Albania. The expropriation of property is compensated by cash based on market value or land. The settlement does not exist within the proposed site at present, thus no resettlement will be occurred. However, there will be the possibility of new housing construction within the site when the Albanian Government acquires land. If the settlement exists with in the site, the Albania Government should take necessary actions for the resettlement.
2) There are some houses close to the proposed STP. There is the possibility that they will suffer from the STP and they prefer to move to another place, rather than living close to the STP. Thus, when a public notification is published, DPUK should consult with these people to confirm their will.
3) The Sharra Landfill site is proposed for the sludge disposal site for the moment. But the capacity will be not enough after 2-3 years and Sharra has the environmental problems, so DPUK and GTW&SA should have the close discussion with the Tirana Municipality about the new landfill site which is proposed by the World Bank.
4) The information disclosure is not done in a positive manner. The Albanian Government ratified the Convent of AARHUS so that DPUK should conduct the positive information disclosure and promote the public participation in adherence with the spirit of Convent of AARHUS.

2.6 Project Evaluation

2.6.1 Technical Evaluation

The technical robustness of the proposed Priority Project was evaluated using the following criteria:

- Beneficiaries: Direct and Indirect;
- Pollution Load Reduction;
- Treated Sewage Quality and Flow;
- O&M Requirements;
- Service area coverage;
- Sewer development ratio; and
- Promotion and Public Awareness

Table S2.6.1 summarizes the technical evaluation of the proposed Priority Project.

Table S2.6.1 Technical Evaluation of the Proposed Priority Project

Criteria	Proposed Priority Project
(1) **Beneficiaries**	The direct beneficiaries are the polutaion within the Lana River Basin being serviced (342,500 people). Indirect beneficiaries are those who visit and work in the center of the municipality. These people will benefit from the improved water quality in Lana River. The service cover ratio for the planned population in 2013 is about 47%.
(2) **BOD/SS Load Reduction**	A BOD_5/SS load reducion of about 13.6/13.1 ton/day is expected. The total BOD_5/SS load generated in the Kashar STP area is about 32/32 ton/day. The STP is expected to be able to reduce the pollution loads by 40%. Maximizing the use of the existing sewer system would help to reduce pollution loads but would save on construction costs for the branch and main sewers.
(3) **River Water Quality Improvement**	In the Lana River, at the reference point 'F1' where the densely populated area ends or the existing interceptors (Lana North and Lana South) discharge the sewage to the river, the water quality would be improved drastically by the implementation of the Priroity Project. Our study described in section 11.4 projected that the BOD_5 concentrations at 'F1' would be 13 mg/L with the project and 101 mg/L without project. The BOD_5 concentration with project could be further improved by an appropriate management of unregulated garbage dumping and industrial wastewater. While in the Tirana River, the water quality improvements would be expected after the second stage project because the Priority Project focussed only to the Lana River basin.
(4) **Treated Sewage Quality and Flow**	BOD_5/SS conc.: 24/30 mg/L, Average Daily Flow: 77,100 m^3/day Effluent Load of BOD_5/SS: 1.9/2.3 ton/day. The treated sewage flow would not give adverse impacts to the receiving water body based on the engineering judgement based on the study discussed breifly in the section 5.5.3 (4) 3).of the Main Reprot and section 9.6 of the Supporitng Report.
(5) **Operation and Maintenance (O&M) Requirements**	Since the sewage would be conveyed in the proposed Trunk Sewer No.3 under gravity flow, no pumping station would be required. Because this is the first sewerage project which introces the sewage treatment and sludge treatment and disposal for the Greater Tirana area, extensive training of the operators of the sewage and sludge treatement systems would be required to operate the facilities properly. Various capacity building programs are proposed to promote the project and to facilitate the project.
(6) **Service Area Coverage**	The service area covered by the priority project is 2,343 ha, and the planned service area covered by Kashar STP is 6,090 ha. This means the coverage ratio compared to the Kashar STP coverage area is 38%.
(7) **Sewers Development Ratio**	The sewer develoment ratio for the Priority Project against the planned sewers are: branch sewer 46%, main sewer 3%, and trunk sewer 28%. The ratios of the main sewer and trunk sewer seem low but this means that with the minimum investment the higher pollution load reduction could be achieved. In other words, the Priority Project will use the existinting sewerage faciltities at maximum.
(8) **Project Promotion and Public Awareness**	The project is expected to have only a small number of beneficiaries but would help to improve the living environment in the Lana area and the water quality in the section of the Lana River in the urban center. This project is expected to significantly contribute to peoples' understanding of the sewerage system and its positive effects because people can visit the STP and see the treated sewage.

The Priority Project assumes the maximum use of existing sewers and the new sewerage system. The aim is to reduce the pollution loads discharged into the Lana River, thereby contributing to the improvement of the Lana River water environment, especially near the urban center. The project also aims to improve the sanitary standards for the residents in the sewer service area. If the Priority Project

is not implemented, further environmental degradation and public health deterioration will occur.

The Priority Project provides an affordable and technically sound solution to the current pollution problems. The Project would result in substantially improved sewerage services for the communities and a noticeably cleaner environment.

2.6.2 Financial and Economic Evaluation

The FIRR (7.21%) is higher than 5 %, which is the benchmark rate that is required to ensure basic human needs are accounted for. The 5% benchmark is recommended by international financial institution such as the World Bank. Therefore, the Project is expected to be financially sound from the perspective of basic human needs.

The resulting EIRR is 15.72 %. This is higher than the applied discount rate (the opportunity cost of capital) of 10 %. Therefore, the Project is economically feasible.

2.6.3 Environmental Consideration

The environmental assessment indicated:

- Overall, the proposed project is expected to have positive environmental impacts in terms of water quality and public health. This will be achieved through the improved sewerage system service standards.
- Construction of sewers and STPs may cause short term localized impacts for the nearby residents. However, these hazards can be limited through careful consideration of which construction methods to use and through proper operation and management of the sewerage system.
- Collection of sewage that is currently directly discharged into the Lana River and its tributaries will significantly improve the water quality in the Lana River and its tributaries.
- The beneficial effects of the project outweigh the adverse effects.

Mitigation measures, corrective action plans for risk, and monitoring should be properly undertaken to ensure that serious adverse impacts on the socio-economic situation and on the environment do not occur.

2.6.4 Institutional Evaluation

The institutional issues and recommendations for the Priority (First Stage) Works are evaluated as follows:

(1) Decentralization

The outstanding issues of decentralization of water and sewerage services from central to local government, and the recommendation to form a Joint Authority of local governments for the Greater Tirana area with GTW&SA (Ex-UKT) as the service provider (operator) need to be resolved. There is a risk that this will be prolonged unless a time frame is set and adhered to.

(2) Sewerage Management

The integration of a new Sewerage Sector into the mainstream engineering activities should not pose any problems. The increased sophistication of the sewerage system can be coped with since suitable personnel are available in Albania for a capacity building program and training to the level of skills required for the management of the improved sewerage system.

(3) Engineering Management

The recommended operator, a reformed UKT renamed GTW&SA, is an existing institution with qualified engineers and technicians, and a workforce mainly comprised of long serving personnel trained on the job. Engineering management tasks have been improved by the purchase of computers, and appropriate software, and training through Italian Cooperation. This organization should readily convert to the new owners and the addition of the Priority Works.

(4) Commercial Management

UKT has an Economic Department staffed with qualified personnel. Financial and management information systems were improved under the recent Italian Cooperation intervention which provided computer equipment, software and training to enhance the capacity of this department. Progress towards commercialization must be maintained to eliminate any risk to the new company GTW&SA.

(5) Capacity building

Programs for institutional capacity building are available in Tirana and may be facilitated by AWSSA as an experienced implementer of programs for GTZ on decentralization, and commercialization. AWSSA has good links with central government, and the donors. Training can largely be achieved through the construction and electromechanical contracts for the Sewage Treatment Plant design. There is a high degree of optimism that capacity building and training will achieve sustainability of the Priority Project by proper management and good operation and maintenance practices.

2.6.5 Overall Project Evaluation

The above discussions indicate that the proposed Priority Project is technically, financially and environmentally sound and will significantly contribute to improved environmental conditions in the Lana River (and its tributaries). The projects will also improve the living and sanitary conditions of the Lana basin area.

The Project represents a major step toward improving the environment in the Greater Tirana area, resulting in a significantly improved water environment and improved sanitation conditions.

Part III Conclusion and Recommendation

3.1 Conclusions

(1) M/P

The Study has prepared: a) the sewage development plan to improve the water environment and the living environment of the Greater Tirana area through comparative studies on several alternatives; b) formulated the implementation plan up to the year 2022 as the Sewerage System Master Plan, including consecutive three stage implementation program with preliminary financial and economic evaluations and recommended institutional reform to implement the program; and c) finally identified the Priority Projects for Feasibility Study.

(2) Priority Project

The F/S for the proposed Priority Project verified the technical, economic, financial and environmental feasibility and sustainability. This includes institutional reforms and capacity building programs.

The proposed Priority Project is expected to efficiently and effectively reduce pollution loads and improve the water quality in the Lana River in the Greater Tirana area.

The F/S indicates that the proposed Priority Project should be implemented immediately to improve public health and the water environment. The Priority Project is the first sewage treatment project in Albania that uses biological secondary treatment at such a large scale.

This project is expected to significantly improve the communities' understanding of sewage treatment because the public will be able to visit the operating STP and observe the treated sewage being discharged into the public water bodies. It is expected that the successful operation of the Priority Project will encourage further improvements through the execution of the second and the third stage projects. The priority project will also improve the communities' awareness of the natural environment (mountain, forest, lakes, rivers, streams) which is currently being impacted by human activities (such as unregulated housing development, dumping of household solid wastes, construction debris, construction waste soil, and direct sewage and wastewater discharge).

3.2 Recommendations

(1) M/P

Followings are major recommendation to step forward to realize the projects:

It is highly recommended to devote considerable efforts to obtain the land area for construction of the proposed STPs, PSs and sites for construction of vertical shaft for trunk sewer construction by jacking method.

It is also recommended that central government decide on their position in the decentralization of water supply and sewerage services for the Greater Tirana area.

Local governments in the Greater Tirana area must be educated on the true effects of decentralization to enable them to make rational decisions on the available options for the provision of the services. The relevant local authorities should have round table discussions and mutually agree on their position. Central and local governments should then work out the details of the way forward on the transfer of assets or shares, and the amendments to laws for effective operation and regulation. UKT must be fully informed as the process progresses to prepare for the change.

Local governments may form Joint Powers Authority only mutual agreement. When a decision has been made on the institutional option to be adopted, a local government partner will then be available for implementation of this proposed project.

(2) Priority Project

The F/S concludes that implementation of the Priority Project is feasible. The Project cannot be implemented without external financial support, Albanian government subsidies, and self-funding mechanisms. This is because the up-front investment costs for the proposed construction and improvement works would be a significant financial burden for the Albanian executing body.

Some important institutional arrangements are proposed to strengthen the coordination between all concerned parties. The MoPWTT and DPUK should continue to actively promote the project, however the decentralization process will mean that the local governments will be the key departments responsible for project execution and management.

Prior to implementing the proposed works the following three key legal issues need to be resolved:

- Law on Membership of Supervisory Councils

  The Law on Membership of Supervisory Council was originally issued as Law No. 7926 (1995) and was amended by Law No. 8099 (1996). It is recommended that this law should be further amended to ensure that local governments have majority control over the Supervisory Council (SC) for water and sewerage authorities. This is because they own the assets and they are responsible for providing the services. A timeframe for resolution of this matter should be set. It is also suggested that this law be amended to provide for suitably qualified persons (appointed by the local authorities) to be representatives on the SC, for a maximum of two terms, each consisting of four years.

- Late Payment of Bills, Disconnection and Enforcement

  The penalties provided for under the DCM No. 23 dated 10/05/1993, “Water Supply Management for Domestic and Non-Domestic Users” are unusual compared to worldwide norms and have

apparently significantly contributed to the huge accumulated debt. Most of the debt is not collectible. It is almost impossible for low income groups and illegal users to pay the penalties.

To avoid these problems in the future, a fair and realistic penalty should be imposed and disconnection of defaulters properly enforced. There is an urgent need to address this matter because it contributes to massive water losses which cause restricted supplies in Tirana and lack of available water for the Greater Tirana development area.

- Compulsory Connection to Sewers

  It is recommended that a law is passed to make connection to the sewer networks compulsory once they are constructed. Therefore, all buildings in the proposed service area should have provision for a sewer connection. If this is not incorporated into the law, existing premises and potential new customers may continue to discharge untreated effluent into streams and rivers, and they will not be contributing to the financial sustainability of the project.

(3) Others

The sewerage system development is only one way to improve public health and the natural environment. It should be supported by the following mitigation measures which will help to enhance the positive outcomes for the river water environment:

- Tight regulation of household solid waste, construction debris and construction spoil dumping;
- Regulation of housing development especially in the upstream areas of the Lana and Tirana Rivers;
- Establishment of a water quality and flow rate monitoring system for the Lana and Tirana Rivers;
- Strengthening of the regulatory system for industrial wastewater monitoring and management;
- Provision and promotion of an environmental education and awareness campaign aimed at preventing garbage dumping into the Lana and Tirana Rivers; and
- Preparation and immediate implementation of a comprehensive solid waste management plan for the Greater Tirana area.