PART II: FEASIBILITY STUDY

CHAPTER 1
INTRODUCTION

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1.1 Background to the Project

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.

1.2 Scope of Feasibility Study

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.

The scope of the F/S report is to prepare the preliminary engineering design for the prioritized sewage collection and treatment system, and to check whether the selected priority project is reasonable and feasible for implementation.

CHAPTER 2

PRIORITY PROJECT

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2.1 General

This chapter describes the preliminary design of the proposed sewerage facilities in the Priority Project and prepares the necessary O&M plan. This chapter also discusses capacity building and public awareness programs.

2.2 Design Fundamentals

The aim is to have the project in operation by the year 2013, in accordance with the phased development plan. The service area is about 2,343 ha covering the Lana basin area. The planned service population is approximately 342,500 for 2013.

The design flows are defined as:

- Average Daily Flow: 77,100 m^3/d, predominately used to calculate pollution load and O&M cost; and
- Maximum Daily Flow: 95,900 m^3/d, predominately used to develop design capacity parameters of the sewage treatment facilities.

The design flow rate for the sewers is the maximum hourly flow defined by the M/P (with a target year of 2002).

The following concentrations of BOD_5 and SS define water quality:

- Influent Quality (raw sewage): BOD_5/SS 200/200 mg/L
- Effluent Quality (treated sewage): BOD_5/SS 24/30 mg/L

The above figures are consistent with the M/P. The effluent quality meets the EU effluent standards for BOD_5/SS concentrations of 25/35 mg/L.

2.3 Preliminary Design of the Sewage Collection System

2.3.1 Connections to the Existing Sewer System

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

Ten discharge points were selected (of approximately 50 discharging points) to confirm the invert levels of existing sewers and the Lana interceptors. *Figure 2.3.1* shows the locations of the selected 10 discharge points.

The figures for the Lana North and Lana South Interceptors and the selected 10 discharge points are shown in *Table 2.3.1* and *Table 2.3.2*, respectively. The Lana North Interceptor has a slope of between 3 and 16‰. The Lana South Interceptor has slope of between 4 and 11‰. The difference in level

between discharge point L1 and L10 is approximately 24 m, which occurs over a distance of 2.7 km. This equates to an average fall of 8.8%.

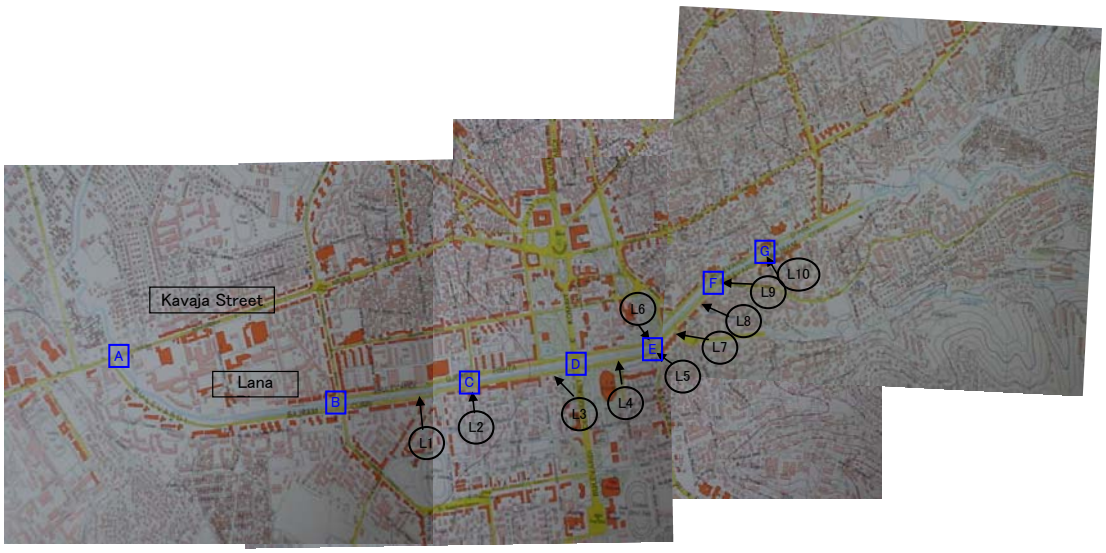


Figure 2.3.1 Points Discharging to the Lana River (10 selected points)

Table 2.3.1 Basic Figures for the Lana North and Lana South Interceptors

Point Name	Sewer invert elevetion		Diameter	Length	Slope	Flow capacity	Notes
	UP	Dwn	mm	(m)		(m3/s)	
North-FE	109.89	104.17	800	359	0.016	3.6	
North-ED	104.17	102.70	800	500	0.003	1.56	
North-DC	102.70	98.76	800	544	0.007	2.38	
North-CB	98.76	93.79	1000	689	0.007	2.77	
North-BA	93.79	89.84	1000	1254	0.003	1.81	down half :2000mm
South-GF	116.14	109.53	800	615	0.011	2.99	
South-FE	109.53	105.56	800	359	0.011	2.99	
South-ED	105.56	*102.59*	800	500	0.006	2.21	
South-DC	102.59	98.90	800	544	0.007	2.38	
South-CB	98.90	93.73	1000	689	0.008	2.96	
South-BA	93.73	88.62	1000	1254	0.004	2.09	

Source: JICA Study Team

Table 2.3.2 Basic Figures for the 10 Selected Discharge Points

Point No.	Ground Level (M)	Sewer invert elevetion (M)	Length (m)	Estimated slope	Flow capacity m3/s	Invert level of Lana Interceptor (M)	Connection way
L-1	98.89	96.14	170	0.0018	0.76	96.86	1)transfer of discharging point
L-2	100.97	98.9	95	0.003	1.56	99.10	1)transfer of discharging point
L-3	-	100.75	385	0.005	4.39	102.14	2)new sewer lines
L-4	106.68	104.16	53	0.001	0.74	104.28	1)transfer of discharging point
L-5	-	104.49	150	0.018	5.25	105.56	2)new sewer lines
L-6	109.8	106.55	60	0.026	3.79	102.99	3)manhole to separate sewage
L-7	-	105.47	170	0.017	8.09	107.23	2)new sewer lines
L-8	111.24	108.32	230	0.017	3.72	108.13	3)manhole to separate sewage
L-9	114.55	112.5	271	0.013	3.25	109.53	3)manhole to separate sewage
L-10	124.08	119.98	30	0.102	9.10	116.14	3)manhole to separate sewage

Source: JICA Study Team

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 2.3.2* 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 2.3.3* 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.

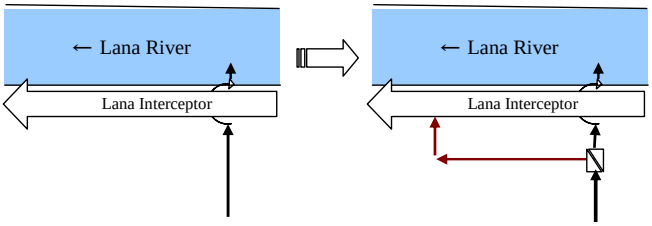
  It is recommended that new sewers be installed along the tributary rivers or streams and that they terminate the existing interceptor. There are two possibilities for connection: crossing over the river/stream; or crossing under the river/stream. To cross over the river/stream, a new sewer would be connected 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.

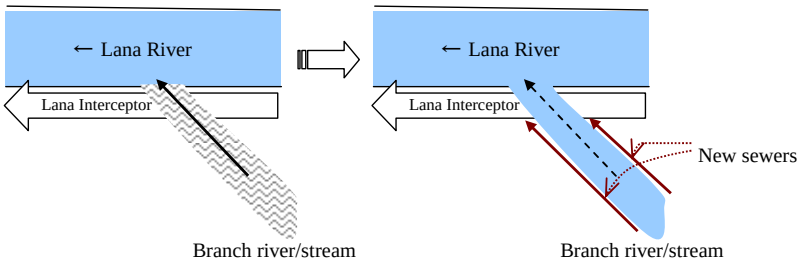
  A manhole and weir would be constructed near where the Lana River discharges. During dry weather conditions, the sewage would flow into the interceptor through the manhole. During wet weather conditions, the separated as sewage would be diverted into the interceptor through the weir

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

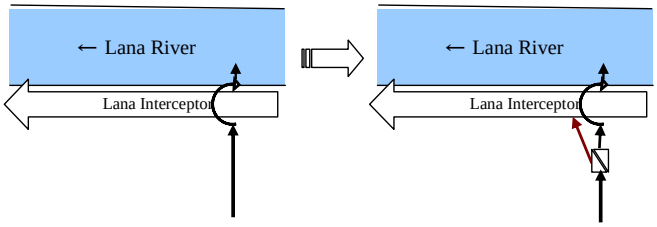


Figure 2.3.2 Ways to Connect to the Existing Interceptor

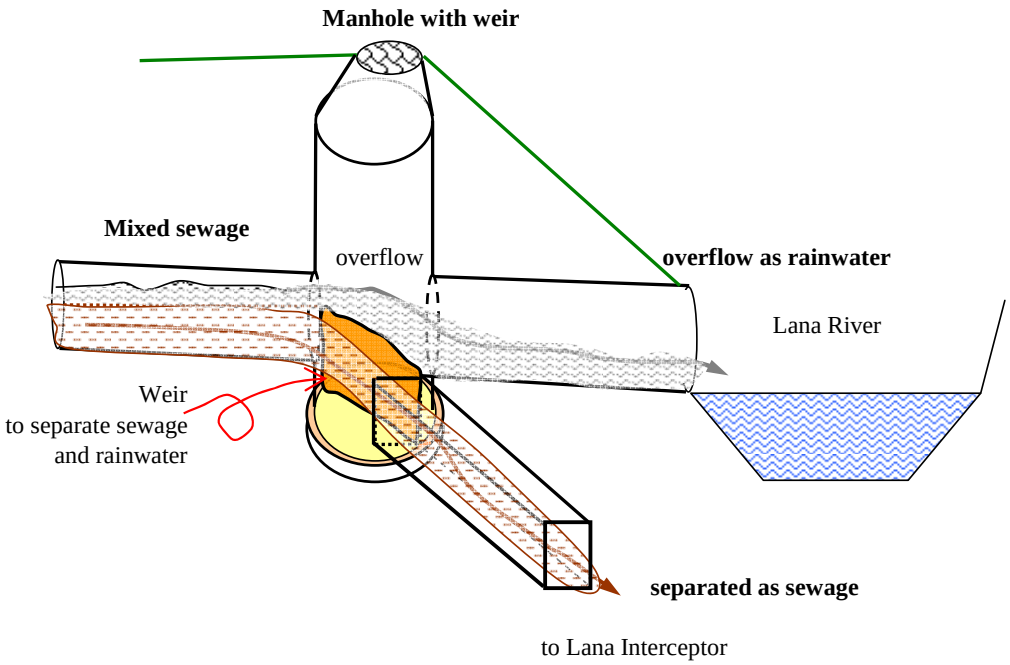


Figure 2.3.3 Manhole and Weir arrangement Used to Separate Mixed Sewage and Rainwater during Wet Weather Conditions

(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. Basic information relating to the existing sewers is summarized in *Table 2.3.3. Figure 2.3.4* shows the location of the branch sewer numbers (as point no).

Table 2.3.3 Basic Information and Flow Capacity for the Upper End of the Existing Sewers

Point No.	Ground level		Sewer invert elevetion		Pipe Diameter mm	estimatedcovering m	Length m	Slope	Flow capacity m3/s	Notes
	Up	Down	Up	Down						
B-1	164.15	157.42	161.55	154.72	400	2.20	360	0.019	2.47	
B-2	151.97	138.74	150.37	137.00	400	1.20	650	0.021	2.6	
B-3	136.20	134.06	133.70	131.88	600	1.90	520	0.003	1.29	
	134.06	123.31	131.88	118.06	600	1.50	780	0.018	3.16	
B-4	135.97	131.00	134.89	129.64	400	0.60	400	0.013	2.05	too shallow
B-5	143.33	126.51	141.53	125.09	400	1.40	430	0.038	3.5	
B-6	135.89	128.85	133.69	125.92	1000	1.10	326	0.024	5.12	
B-7	134.44	128.85	132.84	125.92	500	1.10	180	0.038	4.06	
B-8	130.76	127.51	129.39	124.61	500	0.80	170	0.028	3.49	too shallow
	127.51	115.94	124.61	114.42	500	2.40	370	0.028	3.49	
	115.94	115.57	114.42	113.37	500	1.00	100	0.011	2.19	too shallow
B-9	117.99	116.36	115.70	113.90	400	1.90	150	0.012	1.97	
	116.36	115.23	113.90	112.26	400	2.00	150	0.011	1.88	
B-10	98.75	98.95	96.85	96.20	800	1.00	100	0.006	2.21	too shallow
B-11	110.64	103.40	109.31	102.40	400	0.90	460	0.015	2.2	too shallow

Source: JICA Study Team

All of the new branch sewers can be connected to the existing sewers at a shallow depth, because there is a steep slope.

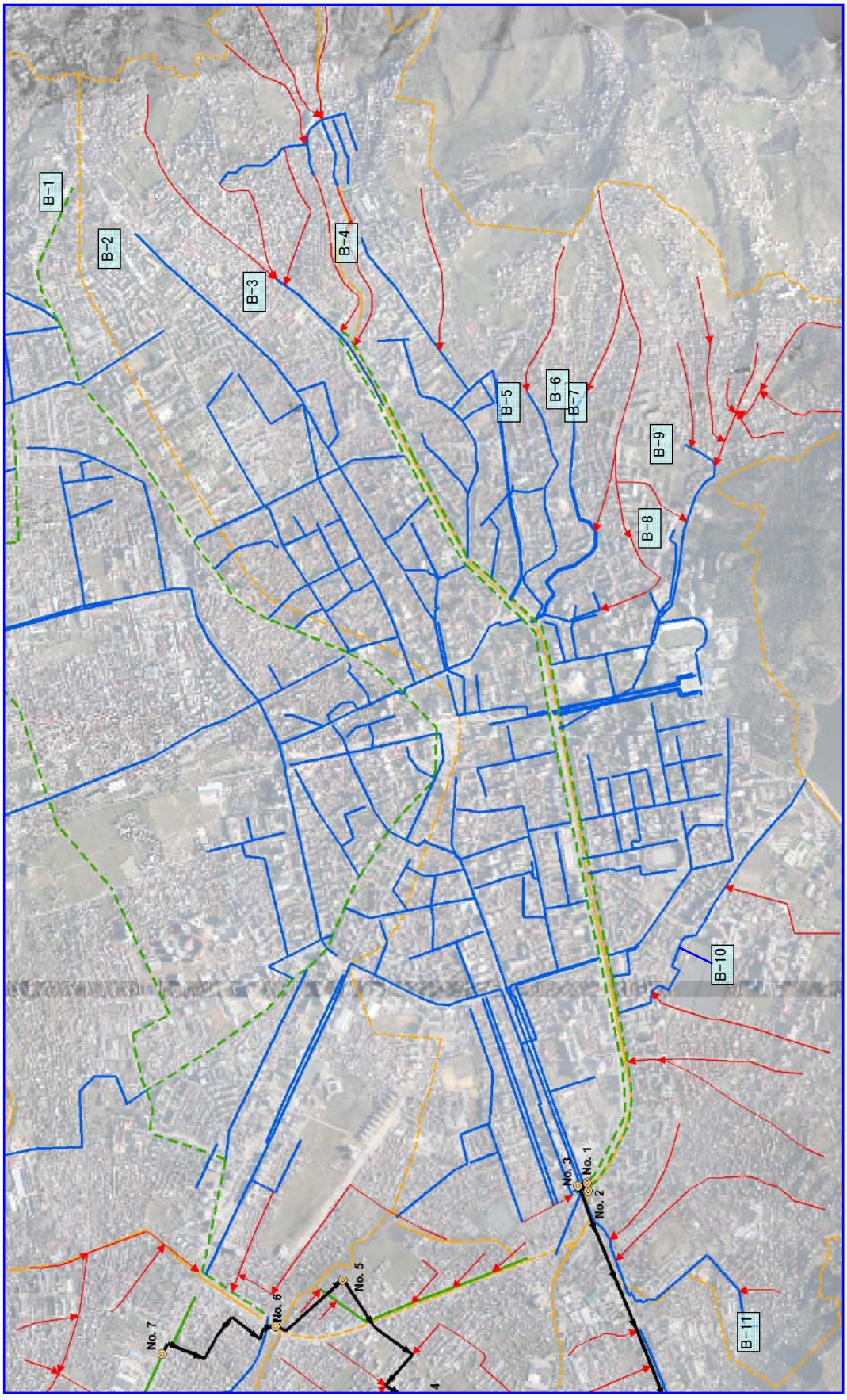


Figure 2.3.4 Investigation of Upper end of Existing Sewers for New Sewer Connections

2.3.2 New Sewage Collection Facilities

(1) Criteria for the flow calculations

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) Definition of terms

- Collection Area:

  'Collection areas' (there are 20 collection areas) were defined after considering the topographic characteristics, river, stream, road, railway, location of houses and buildings, density of population, and facilities (e.g. factories). Each collection area has a connection point to collect sewage.

- Trunk sewer:

  Large diameter pipeline would be used to connect the 'Connection Points'.

- Main sewer:

  Sewers would be used to connect the 'Collection Points'.

- Branch sewer:

  Collected sewage from households, buildings, residential groups, apartments etc would be connected to the main sewers.

- Residential group:

  Some suburbs have houses that are surrounded by a moat. In these cases it is difficult to connect each house to the sewer. Therefore, branch sewers would be constructed in front of the entrance to the moat.

(3) 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.

(4) Sewer System

Figure 2.3.5 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 2.3.4 provides the specifications for Trunk Sewer No.3, assuming it is laid using the jacking method. *Table 2.3.5* shows the specifications for the Main & Branch Sewers assuming they will be laid using the open cut method.

1) Trunk Sewer No.3

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 2.3.6*. Refer to Appendix 8 in the Supporting Report, Volume III for the detailed profile. This trunk sewer crosses under the Lana River (at the starting point) and then under the stream before arriving at the Kashar STP. The maximum depth of the trunk sewer is estimated to be more than 14 m. The earth cover decreases to approximately 8m just before the STP. The plan is to lay about 70% of the trunk line along Kavaja Street. This is the main street joining Tirana municipality to Kavaja municipality. This road is wide enough to lay the trunk sewer shafts, and will require 2 or 3m wide pavements. Downstream of Kavaja Street, the trunk sewer surfaces at the residential area. The residential area has roads ranging in width from 4 to 6m. Plans for temporary work spaces and by-pass roads can now be prepared.

The study indicates that trunk sewer No.3 should be constructed using the jacking method. This means sewage from Collection Points No.1, No.2 and No.3 would flow to Kashar STP by gravity. Branch sewers would be connected to the shafts in Collection Area No.3 to provide for effective sewer networks.

The selection of appropriate locations for Vertical Shaft No.3 required careful analysis. *Figure 2.3.7* shows Collection Point No.3. This point is located on the left side of Lana River. The jacking method cannot be used to construct shafts No.l and No.2 because there is insufficient space by the river. Therefore, vertical Shaft No.3 should begin on the right of Lana River where construction working space is available and the overlapping of pipes can be avoided. Therefore the total length of these trunk sewers is shorter (152m) than that of the master plan.

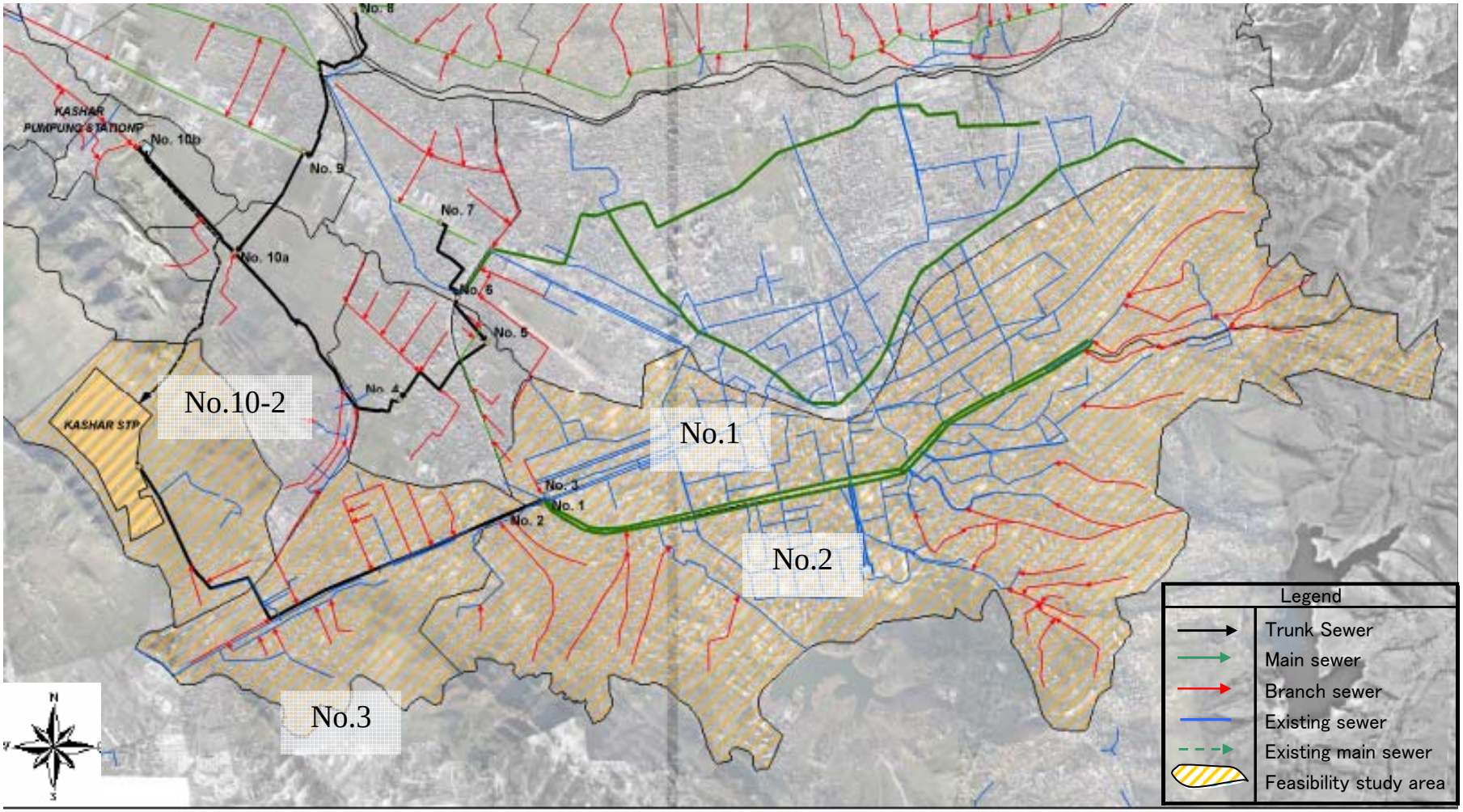


Figure 2.3.5 Sewers System for the Priority Project

(The umber in the figure presents the Trunk Sewer ID number and Collection Area)

Table 2.3.4 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 2.3.5 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

Source: JICA Study Team

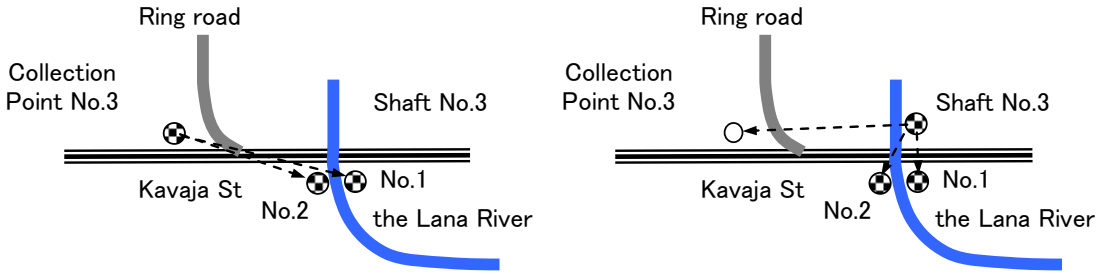


Figure 2.3.7 Location of Vertical Shaft No.3

2) Main sewer and Branch sewer

Existing sewer networks are functional in Collection Area No.1 and No.2. New branch sewers can be connected to the existing sewer network relatively easily because new sewers will be laid in the upper areas of the existing sewer network. These new areas have slope downwards steeply and there are no large rivers or streams. Long branch sewers are not required. Therefore the open cut method can be used to lay the network. There are existing sewers along Kavaja Street in Collection Area No.3. Some of the new main and branch sewers that connect from existing services may be connected directly to Trunk Sewer No.3. The topography in Collection Area No.3 allows the sewers to be connected to Trunk sewer No.3 using the open cut method.

New branch sewers would be laid to collect sewage in Collection Area No.10-2 located near the Kashar STP.

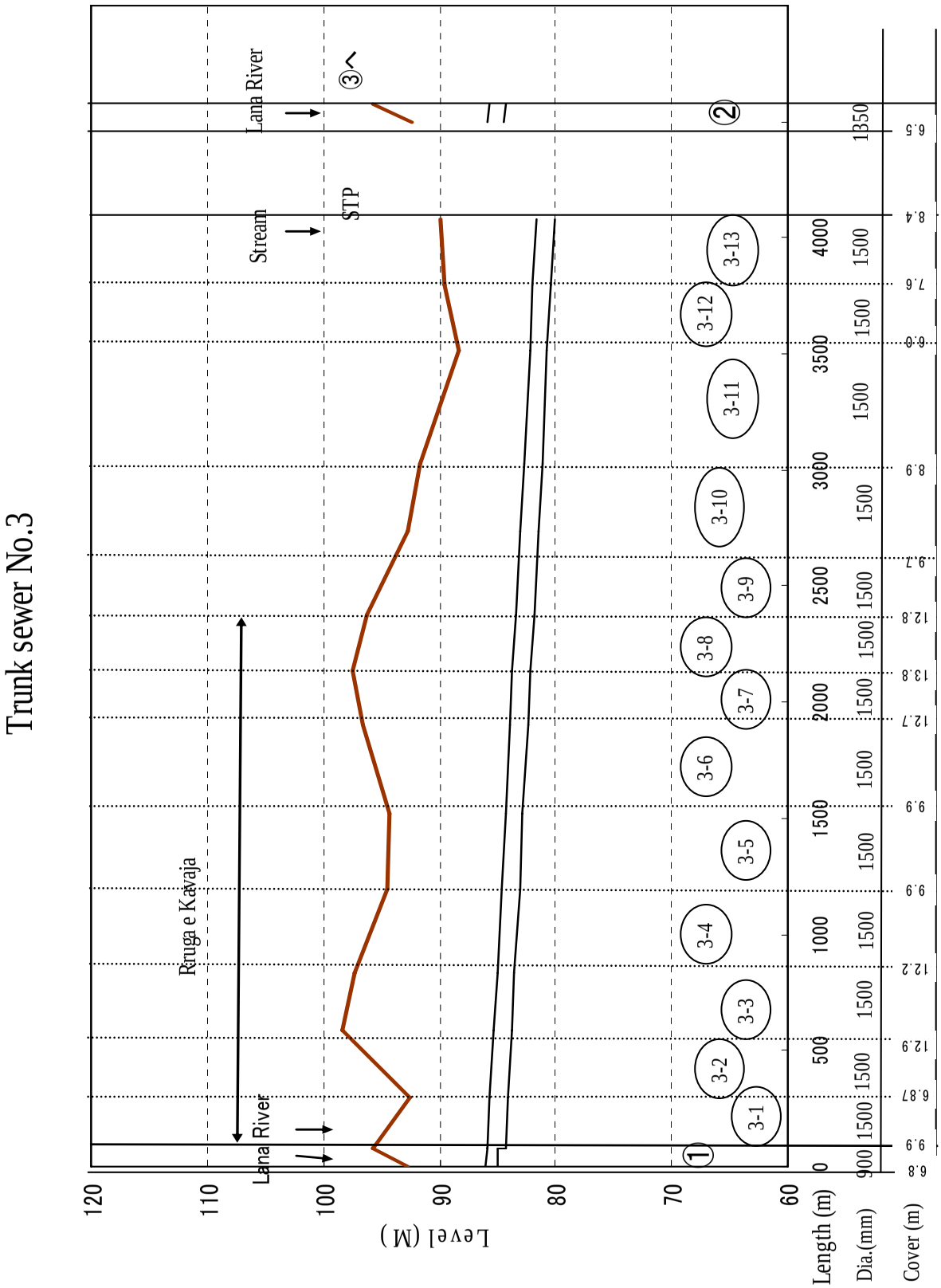


Figure 2.3.6 Schematic Profile of the Trunk Sewer No.3

2.4 Preliminary Design of Sewage Treatment Plant

2.4.1 Sewage Treatment Facilities

The treatment process recommended for the priority project is the 'trickling filter process'. *Figure 2.4.1* is a flow schematic. This figure includes the sludge treatment facilities.

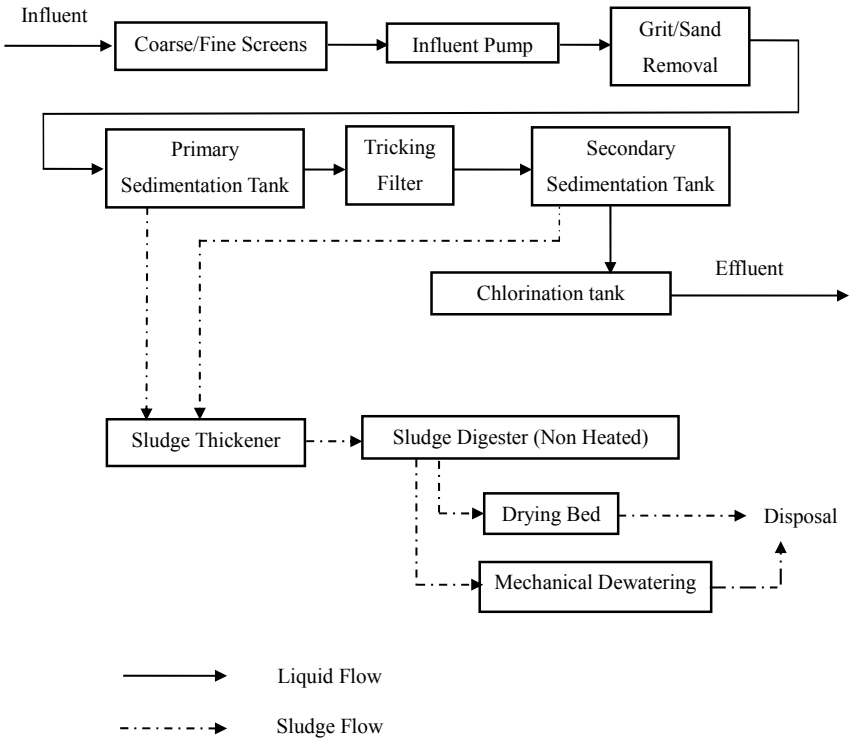


Figure 2.4.1 Flow Schematic

The sewage flows into the STP through coarse and fine screens. These screens remove larger material either manually or mechanically. The sewage is then pumped into grit chambers. Grit chambers remove heavy particles such as sand. The degritted influent is then directed to the primary sedimentation tanks where 'readily settleable' material is removed. Settled material (or primary sludge) is periodically withdrawn from the system and conveyed to a sludge treatment unit.

The effluent from the primary sedimentation tanks then flows into trickling filters. Here microbes grow and attached to the filter media and biologically decompose organics contained in the effluent. The solid are separated from the liquid in the secondary sedimentation tanks. The supernatant (or secondary effluent) is discharged to public water bodies after disinfection. The sludge from the secondary sedimentation tanks mainly consists of biological solids that flake from the filter media. The sludge withdrawn from the secondary sedimentation tanks is conveyed to a sludge treatment unit. The layout plan and hydraulic profile of the sewage treatment plant are shown in *Figure 2.4.2* and *Figure 2.4.3*, respectively. The figures include both sewage treatment and sludge treatment facilities.

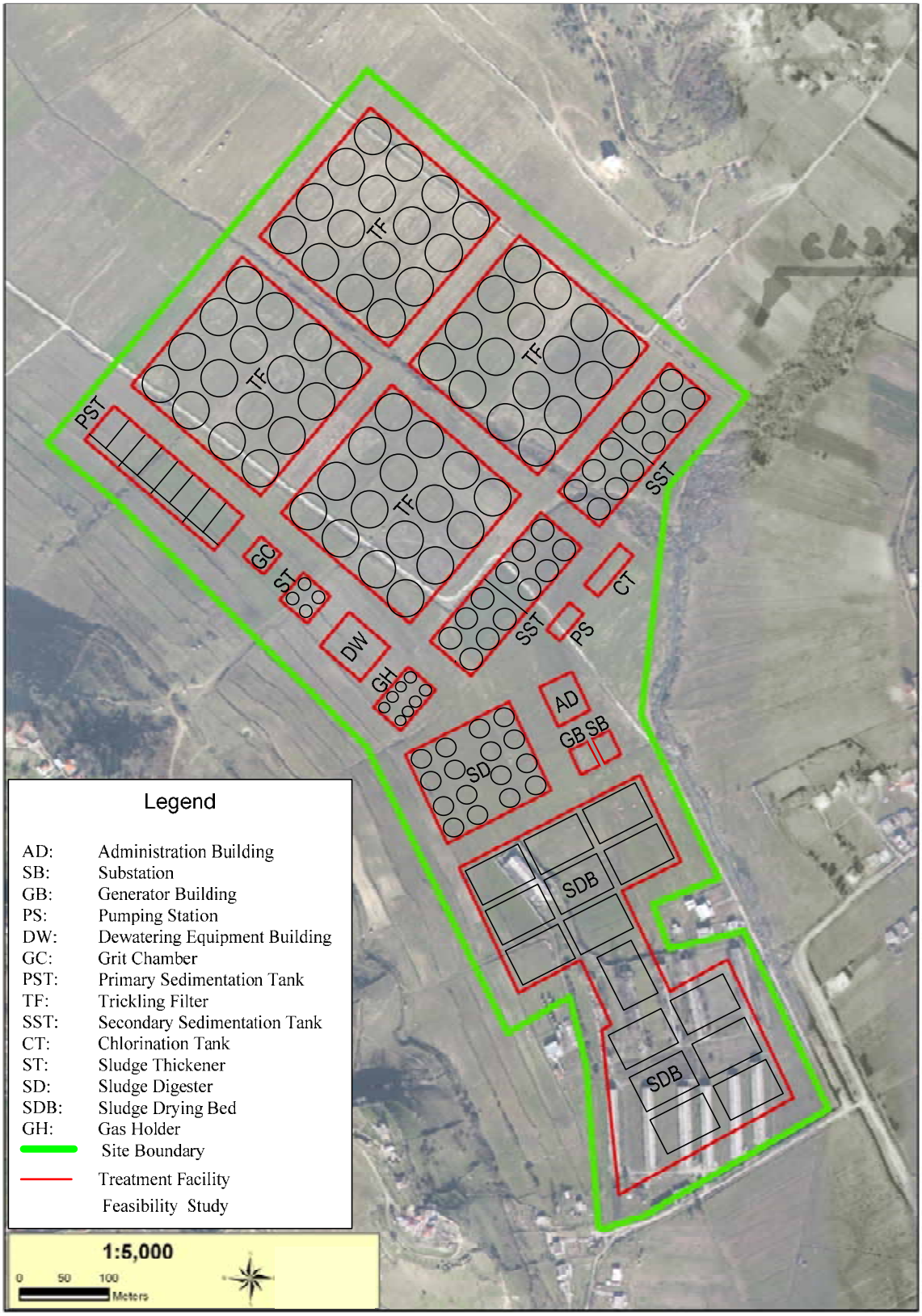


Figure 2.4.2 Layout Plan for the STP

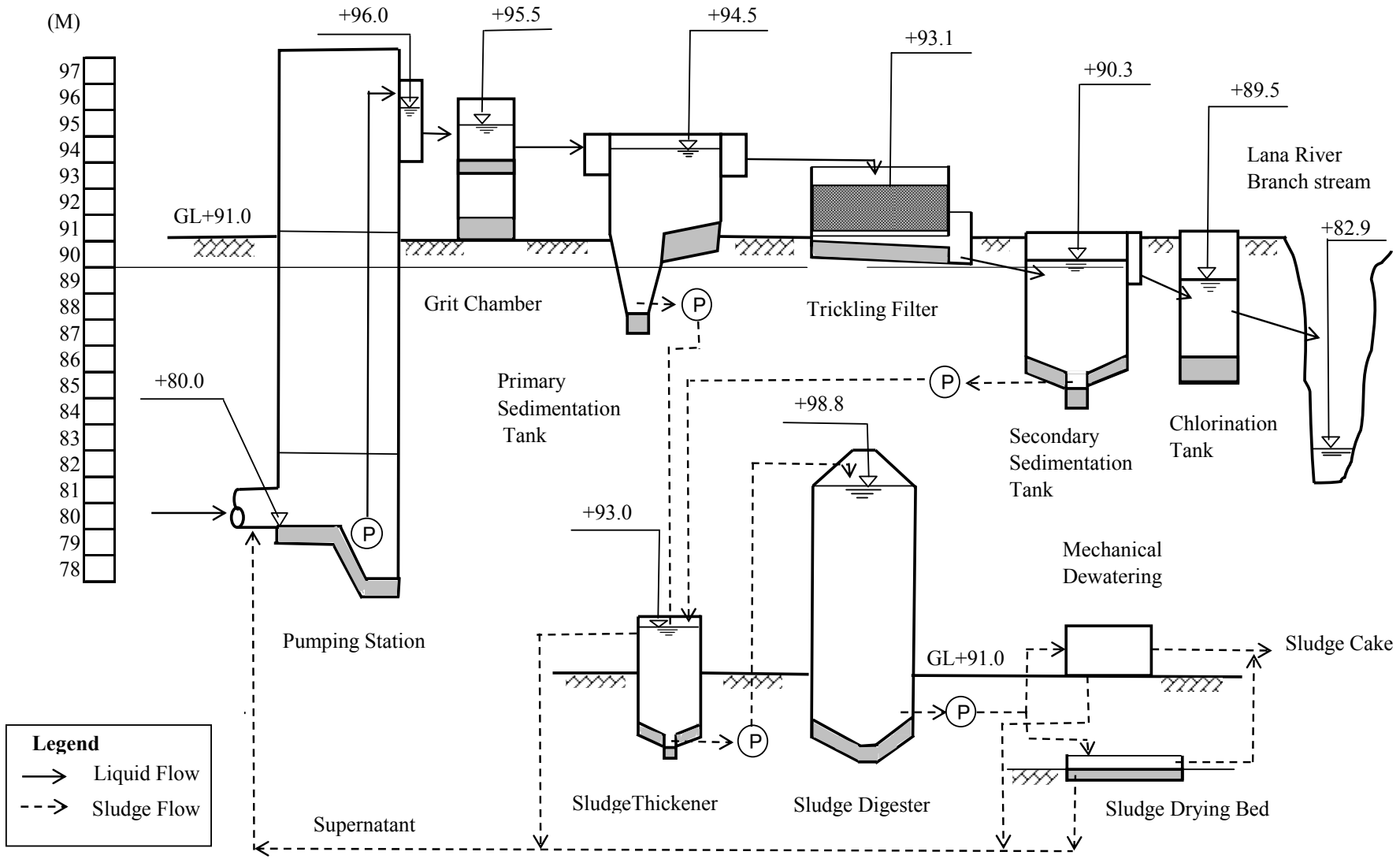


Figure 2.4.3 Hydraulic Profile for Kashar STP

The study on the flow capacity of the receiving water body provided that the water level at the discharging point would be 1.2 m deep, therefore at the discharging point near the Kashar STP, the water level would be about an altitude of 82.9 m above sea level, (the altitude of 81.7 m of the riverbed plus 1.2 m) as shown in *Figure 2.4.3*.

Based on the topographic survey results, a reasonable grand level for construction of sewage treatment plant to minimize the civil works is set at 91.0 m above the sea level. The water levels at the outlet of Chlorination Tanks are set at 89.5 m above the sea level considering the ground level (*Figure 2.4.3*). The final effluent could be discharged by gravity flow when the water level of at the outfall sewer would be 88.0 m above sea level. This water level of 88.m is much higher than the water level of 82.9 m considering the design hourly maximum flow at full capacity and the storm-water runoff with the rainfall intensity of 30-year return period.

Table 2.4.1 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. Further details about the dimensions and specifications are provided in *Appendix 9.1.1* to *9.1.10*.

Table 2.4.1 Dimensions and Specifications for the 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)

2.4.2 Sludge Treatment Facilities

The sludge that is withdrawn from the sedimentation tanks has a moisture content of 98% (primary sludge) or 99.2% (secondary sludge) and requires further treatment before it is handled and disposed of. The sludge is first thickened to a moisture content of 97%. The thickened sludge is then digested in non-heated digesters where organics in sludge are anaerobically biodegraded to about 50%. This produces a more stable sludge material. Digested sludge is dewatered using drying beds or using mechanical dewatering equipment (depending on the sludge production and the climatic conditions). The dewatered sludge is disposed of at designated site or used as soil conditioner. *Table 2.4.2* shows the dimensions of the sewage treatment facilities and the specifications for mechanical equipment used to treat sludge. More detail relating to these dimensions and specifications can be found in *Appendix 9.1.11* to *9.1.16.*

Table 2.4.2 Dimensions and Specifications for 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	(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)

Table 2.4.3 shows how sludge is reduced at each stage of the sludge treatment process. It is assumed that organics contained in the thickened sludge begin at 70% and are reduced by 50% after the digestion process.

Table 2.4.3 Sludge reduction at each stage

Sludge type / Property	Withdrawn	Thickened/ Digested	Mechanically Dewatered	Naturally Dried
Moisture content	99% (~98%)	97% mixed primary and secondary sludges	80%	40%
Relative Volume	1	0.33 (1/3)	0.05 (1/20)	0.017 (1/60)
Solids	1	0.65 after digestion	0.65	0.65

As shown in the table, the process of thickening, dewatering and drying greatly effects sludge reduction and is therefore likely to become more popular as an economical and sustainable sludge disposal method.

2.5 Operation and Maintenance Plan

2.5.1 Operation and Maintenance Tasks for the 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.

2.5.2 Operation and Maintenance Tasks for the 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. Monitoring points include:

- Inlet pumps;
- Screens;
- Grit chambers;
- Primary sedimentation tanks;
- Trickling filters;
- Secondary sedimentation tanks;
- Chlorination;
- Effluent outlet channels;
- Sludge thickeners;
- Sludge digesters;
- Sludge drying beds; and
- Belt filter press.

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.

2.5.3 Operation and Maintenance Requirements for Staff and Utilities.

(1) Staff requirements

Figure 2.5.1 outlines the personnel required for the O&M of sewers and STPs. 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 eleven workers and four 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 issues

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.

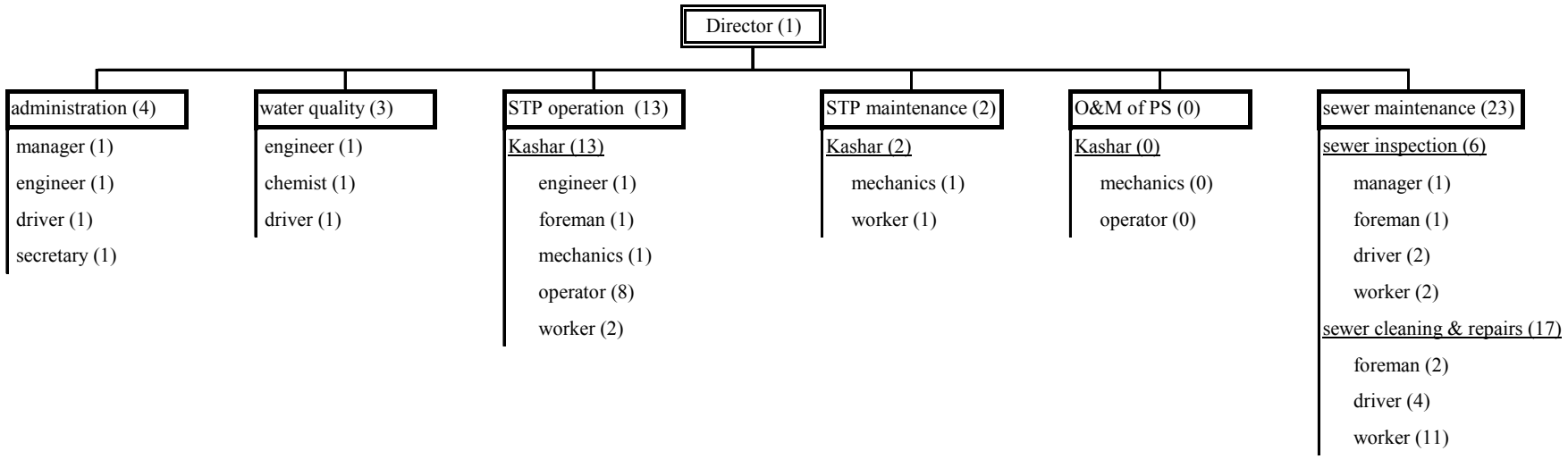


Figure 2.5.1 Operation and Maintenance Organization Chart

2.6 Organization and Management

Prior to the commencement of the Priority (First stage) Works it will be necessary for central government to act on its own decentralization policy and law which was enacted in year 2000 for the transfer to local government of ownership of the assets and the provision of water and sewerage services. Local governments in the Greater Tirana area must agree on the formation of a Joint Authority or other sustainable arrangement that will attract loan financing.

2.6.1 Proposed Reform (Necessary Organization)

(1) Central government

The new government elected into office in July 2005 has stated its commitment to an accelerated decentralization reform of the executive in full compliance with the European Charter on Local and Regional Autonomy, in partnership with local government and other interested parties. A new target date of the end of 2006 has been set. UKT is a National Strategic Enterprise but nonetheless decentralization must take place by law (law No.8652 of 31/07/2000). Central Government should therefore:

- Take a position on its preferred option for the aggregation of local governments that will own the decentralized water supply and sewerage facilities for the Greater Tirana area.
- Initiate a program of information dissemination aimed at increasing the awareness of local governments involved to the practical issues related to the sustainable delivery of water supply and sewerage services, and the global experience related to economies of scale. These will include the asset transfer process, performance targets and monitoring through the Benchmarking Program, and financial policy to support the new water and sewerage authority.
- Set a time frame to achieve decentralization for the Greater Tirana area.

(2) Local Governments in the Greater Tirana Area

Local governments in the Greater Tirana area generally agree that the proposal put forward in this report to form a Joint Authority is "Technically" correct however, there remain many other issues related to aggregation of local authorities that are as yet unresolved. An Executing Agency for the Priority Project has to be formed. Therefore, representatives of the local governments should:

- Meet together at seminars and workshops and rapidly find a way forward to agreement on a Joint Authority for the provision of water supply and sewerage services in Greater Tirana.
- Meet with central government particularly MoPWTT, DPUK, and UKT for full and frank discussions on the possible engagement of a reformed UKT to act as the operator for water and sewerage services in Greater Tirana via a Service Contract.

(3) GTW&SA (Ex-UKT) as the Service Provider

This section contains proposals for the improved organization and management of those parts of UKT of particular relevance to the Priority (First Stage) Project. Other proposals will be found in Part I of the

Main Report which deals with the Master Plan.

1) Overall Organization and Management

The new owners, a Joint Authority of local governments in the Greater Tirana area, will be required to reorganize UKT into a truly commercial operator and will exercise control through its Supervisory Council. It will be necessary for the Joint Authority to take over the buildings, office equipment, plant and vehicle etc. New contracts will be required for the employees taken over from UKT with this change of ownership. The Joint Authority will be free to make any changes deemed necessary to the organization and management of the new GTW&SA to ensure the sustainability of the new authority.

2) Commercial Organization

The Finance Sector will need to incorporate the loans for the sewerage project into the financial and business plans, the latter being essential for the long term financial sustainability of the new authority. Regular reviews of the tariff system will play an important part in this. The VAT specialist should draw up a proposal for consideration by the Supervisory Council regarding the imposition of VAT in general and in particular the charging of VAT on unpaid bills. In the Sales Sector special attention needs to be paid to ensure that existing customers are connected to the sewerage system and the connection of new customers.

3) Engineering Organization

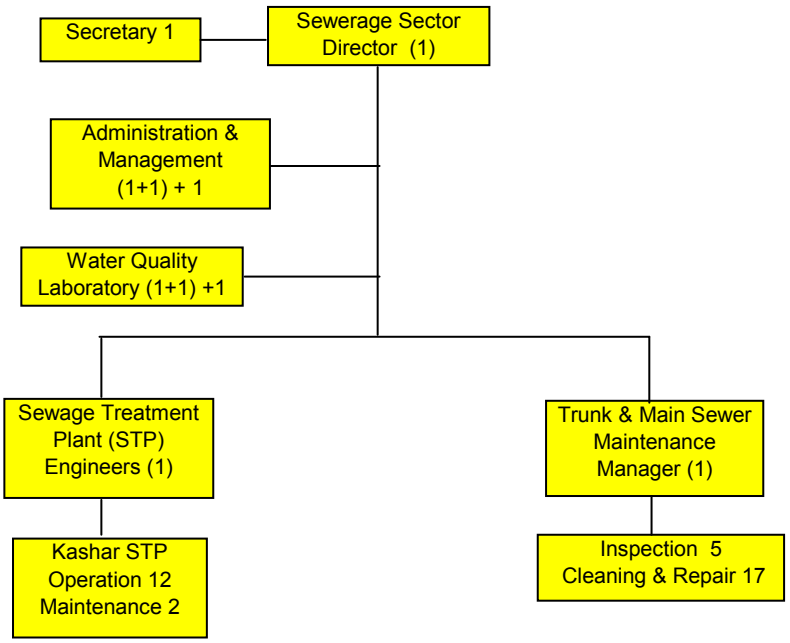
The Technical Department should fully integrate the Sewerage Sector into the mainstream engineering organization in head office. The implementation of the Priority Project will require consultants and contractors who will need to be working in close association with senior technical personnel. Close liaison will be vital to successfully integrate the new works into the existing system, especially during the construction period. The Technical Director will be responsible for the development of the new unit for sewer network extensions in the Sewerage Sector to ensure the technical and financial viability of the new sewerage system and sewage treatment plant.

4) Sewerage Organization

The staff requirements for the operation and maintenance of the Priority Project are detailed in section 2.5.2 in Part II, Feasibility Study. The total number of staff is 46 and details of their deployment are shown in *Figure 2.6.1*. The staffing of the Sewerage Sector for the Priority Project will be generally as described in section 13.2.1 (4) of Part I, Master Plan except that there will be only one smaller STP (Kashar), no pumping stations, and sewerage networks are likely to be largely confined to infill in Tirana and a new network in Kashar for development already approved. The director will have overall responsibility for the works constructed under the Priority project. For clarity, the total organizational requirements for the Priority Project only are given below:

- Administration & Management Unit;

The manager of this unit will be responsible for the overall planning, record keeping, and administration and should have environmental management training for monitoring all matters related to the environment, in particular the quality of the effluent discharge from the sewage treatment plant.



Total staff for the Priority Project: 46

Figure 2.6.1 Organization Chart for Sewerage Sector of GTW&SA (Priority Project)

- Operation & Maintenance Unit;

  This unit will have two qualified engineers to oversee the operation & maintenance of the Kashar STP and the maintenance of the trunk and main sewers as well as the existing sewer network. The laboratory located at the Kashar STP will monitor the influent and effluent as well as the sludge properties at all stages of treatment.

- Kashar STP;

  The operation of the STP will be headed by an engineer with a foreman and mechanic to oversee the two operators for each of 3 shifts per day backed up by a standby crew. The operators will have 2 general workers for assistance during the day shift. Regular routine maintenance will be carried out by a qualified mechanic assisted by a general worker.

- Sewer Maintenance; and

  Trunk and main sewer maintenance will be controlled by a manager with a small team to carry out regular inspections supported by a cleaning and repair team. He will be responsible for carrying out routine inspections in accordance with a planned maintenance schedule drawn up by the operation & maintenance engineers, for the necessary routine cleaning and repairs required as determined from the inspections. The existing sewer network in Tirana will be maintained by the current workforce and the small sewer network in Kamza will be added to the responsibilities of this workforce.

- Sewer Network Extensions.

  Extensions to the sewer network will be the responsibility of the new GTW&SA and there will be a need to establish a new unit for this. It is anticipated that in the first stage of the implementation program sewer networks will be extended in Tirana to achieve 100% coverage and network development will commence in a small area of Kashar.

  The sewerage sector will be fully serviced by the Economic Department as regards finance and sales as per the current organization for the water sector, and will also be served by all other relevant supporting units such as IT and Customer Services.

5) Community Relations Unit

UKT's customers and those who illegally connect and the community in general are ill-informed about their roles in the water and sewerage sector. This is demonstrated by large scale misuse of the water supply system, non-registration, non-payment of bills and abuse of the sewerage system etc. The new GTW&SA should establish a Community Relations Section, preferably combined with the Customer Services Office to address these problems, and to establish a continuing dialogue with the public, making use of local community groups. The section's objectives would include the development of cooperation between the community and GTW&SA and development and delivery of training and promotional programs. This proposal is further discussed in section 2.6.3 below.

2.6.2 Capacity Building

There are three main areas where capacity building is necessary. The first is the local governments themselves who will form a Joint Authority and a Supervisory Council for the Greater Tirana area. The second is UKT transformed into a more commercially oriented operator (GTW&SA), and the third is the sewerage sector of UKT which will for the first time be responsible for the operation and maintenance of a sewage treatment plant with mechanical and electrical equipment and a laboratory to monitor the effluent for compliance with environmental law.

As can be seen from sections 6.3.4 and 6.9.1 of Part I Master Plan of this report, AWSSA has played a significant role in capacity building carrying out project execution for GTZ for its support to commercialization of water supply and sewerage enterprises. It is proposed that AWSSA be appointed to facilitate implementation of capacity building for the Greater Tirana Water & Sewerage Authority, GTW&SA, by targeting the local governments comprising the GTW&SA, its Supervisory Council, and a reformed and renamed UKT as the operator.

(1) Local Governments

It is anticipated that the local governments forming a Joint Authority for the Greater Tirana area will have a much better understanding of the decentralization process & laws and of their duties and responsibilities after the decentralization discussions and agreement to form a Joint Authority. Nonetheless they will still require capacity building to take on the responsibility as owners of the assets and service providers of

water supply and sewerage services. In order to strengthen the capacity of the municipalities and communes the recommended courses should include:

Table 2.6.1 Recommended Courses for Local Governments

Courses	Details/Contents
1. Water Sector Institutional Framework; The role of central government in the water sector	MoPWTT &DPUK Roles & Responsibilities after decentralization. National Water Council; Protection & Use of Water Resources, issue of lisences for water abstraction & wastewater discharge. MoH; Sampling & Testing for compliance by Water Authorities.
2. Responsibilities and Authority of Local Government in the water sector	Provision of Water Supply & Sewerage Services Role & Responsibilites of Supervisory Councils The Service Contract to supervise water & sewerage companies Commercial Operation & Financial Self Sufficiency Regulatory Responsibilities for tariff setting Supply regime & national quality standards
3. Regulation in the Water Sector	NRA; Use & protection of water sources Observance of water quality standards Environmental Protection Monitoring of Private Operators Tariff Methodology & Setting
4. Environmental Responsibilities	MoEFWM: Environmental Protection & Prevention of Pollution
5. Water Sector Legal Framework	General laws relevant to the Water Sector.

(2) GTW&SA (Ex-UKT)

During interviews with most of the departmental and sector heads none expressed a need for capacity building and there were very few requests for training. This is hardly surprising since much has been done to improve the organization and management under Italian Cooperation. However, although UKT is a financially autonomous enterprise it requires more strengthening of its personnel in the true meaning of commercialization. Capacity building courses recommended for appropriate sectors and personnel should include:

Table 2.6.2 Recommended Courses for GTW&SA

Courses	Relevant Department/Sector
Strategic & Business Plan Development	Economic Department/Finance Sector/IT Sector
Cost & Tariff Calculations towards Cost Recovery	Economic Department/Finance Sector/IT Sector
Billing & Collection	Economic Department/Sales Sector/IT Coordinator
Customer Services & Community Relations	Economic Department/Sales Sector/Customer Services Office
Water Loss Management & Control	Technical Department/Technical Sector/ITSector
Efficient Practices for Operation & Maintenance	Technical Department/Water Sector – Maintenance Unit Technical Department/Sewerage Sector - O&M Unit
Community participation in decision making for distribution services	Economic Department/Sales Sector – Customer Service General Director's Office/Public & 3rd Party Relations
Benchmarking as a monitoring tool	Technical Department/ Water Sector & Sewerage Sector Economic Department/Sales Sector/IT Sector

Performance and Quality Standards	Technical Department/Water & Sewerage Sectors
Health & Safety	Technical Sector/Health & Safety Office

(3) Sewerage Sector

Training will be crucial to the capacity building process in the GTW&SA Sewerage Sector. The training objective should be to ensure that there will be adequately skilled staff to manage, operate and maintain the existing and future sewage collection, sewage treatment and disposal facilities and process. *Table 2.6.3* shows a training programs which is suggested for the staff in the new sewage management and operation and maintenance units.

Table 2.6.3 Suggested Training Program

Item	Coverage	Details
Sewerage operation and maintenance	Sewer cleaning, rehabilitation, and maintenance	Sewer cleaning; sewer rehabilitation; work safety procedures; emergency procedures; record keeping (log book); operations reporting system; efficiency and cost-effectiveness; testing procedures; equipment and tools maintenance; work organization and control
	Operation and maintenance of STPs	All STP processes; odor prevention; work safety procedures; emergency procedures; operations reporting system; efficiency and cost-effectiveness; operation and testing procedures; trouble shooting; system failure prevention; equipment and tools maintenance; work organization
	Engineering and management of sewerage systems	Environmental Management; Treatment efficiency (BOD removal rates); sludge management; effluent standards and laboratory methods; operations planning and cost control systems.

For trunk and main sewers it will be necessary to find a source for training on these large diameter pipelines. Short training courses on sewer maintenance were given under Italian Cooperation, so facilities should be available in Italy for such courses.

For the Sewerage Treatment Plant (STP) it is usual practice for the construction contractor to operate the new works for a period of time with the new staff as observers, followed by operation by the new staff under the supervision of the contractor. In addition, the contractor, and in particular the installer of the electromechanical plant is normally required to produce manuals for operation and maintenance and to hand over all technical literature for the installed plant. In addition visits may be made to the wastewater treatment plant at Kavaje to share experiences, and overseas consultants used for special training.

Regarding management of the STP it will be necessary for the manager in the sewerage sector to be trained in environmental management. It should be possible to build into the STP contract a clause requiring the plant designer to give training on how the various components work for a complete understanding of the treatment process. Similarly the suppliers of the laboratory equipment could also be a source for training in the use of the equipment and an understanding of the results.

2.6.3 Public Information, Education and Community Relation Program

UKT has a Public Relations Office under the General Director Whose goals are:

- Keeping direct contact with written and electronic media, preparing press reports and other important information;
- Coordinating work with relevant sectors in exchanging information as well as harmonizing work with groups working with the media, organizing press conferences and other similar activities;
- Securing and choosing daily information in relation to the Enterprises activities, identifying and announcing necessary information to the press, and daily correspondence; and
- Contact with the public and relevant specialists in order to provide solutions to problems occurring in the water supply service.

It is likely that UKT is suffering from an image problem in that it only achieves intermittent water supplies to Tirana and has been unable to extend its services to the surrounding municipalities and communes. In addition there are no sewage treatment facilities and raw sewage flows through the city centre in the Lana River and also in the Tirana River. Solid waste is seen dumped on the banks of rivers and streams and industrial wastewater goes untreated and pollutes the ground water, streams and rivers.

The attitude of the public towards the provision of these services is of great importance and must become public knowledge. The proposed sewerage services must be explained, in particular the major benefits of the availability of sewage disposal for consumers in general resulting in better health and hygiene, improved environmental conditions including river water quality.

This will improved business prospects, and for landowners, land values usually rise when sewage collection and treatment facilities are available. Householders and businesses need to know that they should connect to the sewerage system and that have to pay for these services at an internationally recognized and affordable rate.

A good understanding by consumers of the service benefits and costs for the improved sewerage service and their obligations is therefore necessary to ensure the sustainability of the service.

(1) Objectives and Strategy

The objectives of the public information and education program are to increase demand for improved sewage management at the local level and make the community aware of and understand their obligations as responsible users of the sewerage services. An important feature of the program will be to obtain feedback from the public and channel this to the relevant personnel of GTW&SA (Ex-UKT).

The strategy will be to identify the various types of target audience and develop appropriate dissemination methods for each type.

(2) Target Groups and Suggested Messages

From previous experience of similar projects, *Table 2.6.4* is a summary of some suggested messages targeting specific groups:

Table 2.6.4 Target Groups and Suggested Messages

Suggested Messages	Customer Target Group					
	Domestic			Business		Government
	High	Middle	Low	Major	Minor	
Water supply problems and solutions	*	*	*	*	*	*
Benefits to Health & Hygiene of improved sewerage services	*	*	*			
Danger to the environment; Steams and rivers are polluted due to uncontrolled sewage and wastewater disposal	*	*	*	*	*	
Sewer system is not intended to carry garbage (solid waste)	*	*	*	*	*	*
Untreated industrial wastewater cannot be accepted in the sewerage treatment plant				*		*
Shallow well supplies can be polluted by sewage and wastewater			*	*		*
Uncollected sewage and wastewater is a serious health risk	*	*	*			
New sewer connection policies	*	*	*	*	*	*
How to apply for a sewer connection	*	*	*	*	*	*
How and where to pay for service	*	*	*	*	*	*
How and where to report problems and complaints	*	*	*	*	*	
Sanctions for system abuse	*	*	*	*	*	*

Table 2.6.5 is a summary of suggested dissemination media targeting specific customer groups:

Table 2.6.5 Target Groups and Media

Dissemination Media	Customer Target Groups					
	Domestic (income level)			Business		Government
	High	Middle	Low	Major	Minor	
Radio and TV	*	*	*	*	*	*
Newspapers	*	*		*	*	*
Handbills and fliers		*	*			
Public meetings		*	*			
Posters and billboards	*	*	*	*	*	
Consumer newsletters	*	*	*	*	*	*
School system activities	*	*	*			
Sponsored facilities tours		*	*			
Special events	*	*	*	*	*	*

The existing Public Relations office would be responsible for planning and implementing public information and education programs, in consultation with relevant departments and sectors, in particular the Economic Department. This is within the existing goals of the Public Relations Office which may require additional experts or the use of PR consultants for specific tasks.

(3) Community Relations Unit

As described in section 2.6.1, there is at present large scale misuse and abuse of the UKT water and sewerage system. It is suggested that a Community Relations Unit should be formed operating from the existing Customer Services Office. The objectives would include:

- Establishing a continuing dialogue with the public via local community bodies;
- Assisting the PR Office with the dissemination of information to and education of the public;
- Developing cooperation between communities and GTW&SA (Ex-UKT); and
- Dissemination of information on the future of village water supplies with the formation of GTW&SA.

The Community Relations Unit should initially have about 3 or 4 staff: a section head, community promoters and assistants and a secretary.

2.6.4 Necessary Regulations (Legal Reform)

There are three major legal issues that should be resolved for implementation of the Priority (First Stage) Works. These are included in section 13.1 of the Master Plan section of this report and repeated hereunder as they are considered to be necessary legal reforms for the implementation of the Priority Project:

(1) Law on Membership of Supervisory Councils

The law originally issued as Law No. 7926 (1995) and amended by Law No. 8099 (1996) is designed for central government control and is inappropriate and unacceptable to local government. This law should be further amended to ensure that local governments are the controlling majority on the SC for water & sewerage authorities since the assets are owned by them and they have the responsibility to provide the services. Unless this law is revised it is unlikely that decentralization to local government will progress. A timeframe for resolution of this matter should be set.

It is further suggested that this law should provide for representation on the SC to be by suitably qualified persons appointed by the local authorities, say for a maximum of 2 terms of 4 years. This would provide both the required expertise and continuity.

(2) Late Payment of Bills, Disconnection & Enforcement

In DCM No. 23 dated 10/05/1993, "Water Supply Management for Domestic and Non-Domestic Users", late payment of bills results in a penalty of 5% per day for up to 30 days when the penalty becomes 5 times the amount of the outstanding amount; continued failure to pay results in disconnection of the service. Illegal connections attract a maximum penalty of Lek 10,000 for domestic use and Lek 50, 000 for non domestic users and disconnection. Reconnections may be made upon full payment of the outstanding bill and the cost of disconnection and reconnection.

These draconian penalties are unusual compared to worldwide norms and have apparently contributed significantly to the huge accumulated debt, most of which is clearly uncollectible. Furthermore for low income groups the penalties are almost impossible to pay, similarly for illegal users. This law has resulted in a high degree of non-enforcement of disconnection and may be contributing to the ever increasing illegal use of water for irrigation outside the city limits (up to 40% of supply in the dry season).

The penalty for none or late payment is punitive and therefore has a negative effect on low income customers and illegal users. A fair and realistic penalty should be imposed and disconnection of defaulters properly enforced. It was reported that UKT has appealed to central government several times without action having been taken. There is an urgent need to address this matter and to resolve the issue of massive water losses which leads to restricted supplies in Tirana and lack of available water for Greater Tirana development area.

(3) Compulsory Connection to Sewers

There must be a law that makes it compulsory to connect to the sewer networks when they have been constructed. All future buildings in the proposed service area should have provision for a sewer connection. Unless there is a legal requirement, existing premises and potential new customers may continue to pollute streams and rivers and not contribute to the financial sustainability of the project.

CHAPTER 3

IMPLEMENTATION PLAN FOR PRIORITY PROJECT

CHAPTER 3 IMPLEMENTATION PLAN FOR PRIORITY PROJECT

3.1 Implementation Schedule for the Priority Project

3.1.1 Components

The following facilities are required as part of the priority project:

- Trunk sewers: 4.2 km to be laid using the jacking method or open cut method (dia.900 – 1,500 mm);
- Main sewers: 1.4 km to be laid using the open cut method (dia.200 – 600 mm);
- Branch sewers: 27.6 km to be laid using the open cut method (dia.200 mm); and
- Sewage Treatment Plant: trickling filter process with a capacity of 95,900 m^3/day.

3.1.2 Implementation Plan

The facilities mentioned above will be implemented according to the implementation plan shown in *Figure 3.1.1*.

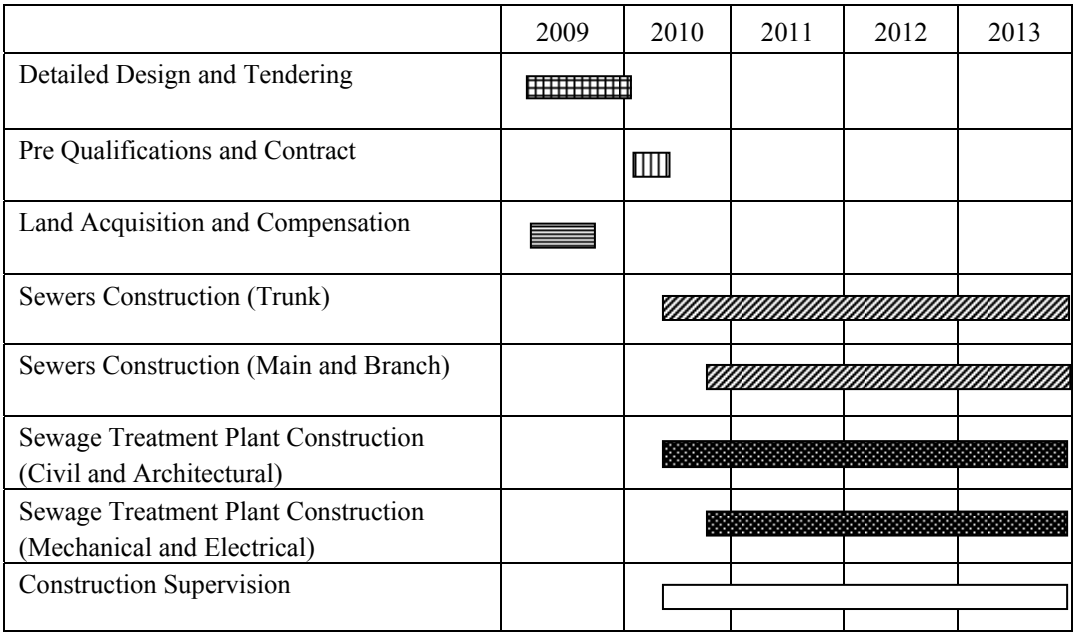


Figure 3.1.1 Implementation Plan

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.

3.2 Project Cost Estimate

3.2.1 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. Refer to Appendix 10.2 for the cost estimate details, Appendix 10.4 for the sewage treatment plant construction costs and Appendix 10.6 for the 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. The following assumptions were made:

- Maximum excavation depth without sheet piling is 5m;
- Manholes are constructed at 30m intervals;
- Excavation volume is calculated taking the outer diameter of PVC pipes into account; and
- Pipes are expected to be founded in sand with normal soil conditions.

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 unit cost of land was the same for the M/P and the F/S, however a discrepancy occurred due to exchange rate fluctuations (the exchange rate was 122.96 Lek per Euro in the F/S and 129.46 Lek per Euro in the M/P).

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
- Capacity Building costs.

The 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.

3.2.2 Project Costs

The costs shown in *Table 3.2.1* were estimated based on the above assumptions. The items are divided into foreign currency (FC) and local currency (LC) portions.

Table 3.2.1 Total Project Cost (Unit: Million Leks)

Component	FC	LC	Total
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

3.2.3 Operation and Maintenance Costs

The expected O&M costs include those items listed in *Table 3.2.2*. The table shows that this sewerage treatment facility would have an annual O&M cost of 108 million Lek. The O&M costs are would be constant between 2014 and 2017 because the influent flow to the STP are expected to reach the design capacity soon after the operation of the STP.

Table 3.2.2 Annual Operation and Maintenance Costs (Unit: Million Leks/year)

Item	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

3.2.4 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.

3.3 Disbursement Schedule

Table 3.3.1 shows the disbursement costs that would result from implement of the priority project:

Table 3.3.1 Disbursement Schedule

(Unit: million Lek)

Component			2009			2010			2011			2012			2013			1st Stage		
	FC	LC	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	**FC**	**LC**	**Total**
Direct Construction Cost																				
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**
Total of 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**
Indirect Construction Cost																				
Land Acquisition and Compensation			-	1,146	1,146												0	**-**	**1,146**	**1,146**
Administrative Expenses*	-	5%	-	64	64		64	64		64	64		64	64		64	64	**-**	**319**	**319**
Engineering Services	10%	10%	263	94	357	81	35	116	20	35	55	20	35	55	20	35	55	**404**	**234**	**638**
Physical Contingency	10%	10%			0	101	59	160	101	59	160	101	59	160	101	59	160	**404**	**234**	**638**
Capacity Building Cost						0	0	0	32	17	49	32	17	49	32	17	49	**96**	**51**	**147**
Total of Indirect Cost			263	1,304	1,567	182	158	340	153	175	328	153	175	328	153	175	328	**904**	**1,984**	**2,888**
Total Project 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**

	2009			2010			2011			2012			2013			1st Stage		
	FC	LC		FC	LC		FC	LC		FC	LC		FC	LC		FC	LC	
Indirect Construction Cost																		
Land Acquisition and Compensation																		
Administrative Expenses		20%			20%			20%			20%			20%			100%	
Engineering Service	65%	40%		20%	15%		5%	15%		5%	15%		5%	15%		100%	100%	
Physical Contingency				25%	25%		25%	25%		25%	25%		25%	25%		100%	100%	

CHAPTER 4

FINANCIAL AND ECONOMIC ANALYSIS

CHAPTER 4 FINANCIAL AND ECONOMIC ANALYSIS

4.1 General

The Priority Project identified in the Master Plan Study has been studied further in the previous chapters: the preliminary design of the sewerage facilities, the implementation programs including capacity building and the necessary financial cost estimates. In the followings financial and economic analysis on the Priority Project will be conducted to evaluate the viabilities of the Project.

4.2 Financial Analysis

4.2.1 Financial Benefit

(1) Tariff Setting

1) Sewerage Service Charge

Table 4.2.1 shows the proposed tariff revision schedule, the estimated annual income per household (HH) and averages expressed as a percentage of income.

Table 4.2.1 Proposed Tariff Revision Schedule

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%

After the completion of construction of sewerage facilities in 2013, the first tariff revision will be introduced in 2014. It is proposed the tariff will be revised every four years. The second tariff revision is planned 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.

The final revision will result in tariff payments increasing in Tirana by approximately 1.38 times (38 % increase) in value and 1.35 times (35 % increase) as a percentage of income. In Kashar, the increases are approximately 1.47 times (47 % increase) and 1.43 times (43 % increase) respectively.

The tariff system for offices and commercial enterprises are set separately. The annual tariff of sewerage service charge for offices and commercial enterprises is estimated at 15,261 (Leks/customer per year). The tariff for offices and commercial enterprises (including small scale industries) was determined using the following formula: "C (project cost) × 0.25 (share rate of sewage volume) ÷ N (number of offices and commercial enterprises) ÷ Y (years, project life) × Multiplier (4.5) based on existing tariff system in Tirana)". Each component is as follow:

1) Total project cost i including price escalation: 10.877 (million Leks);
2) Number of offices and commercial enterprises related to the Project: 22,911;
3) Project Life: 35 (Years);
4) Share rate of the sewage generated from offices and commercial enterprises against whole sewage generation: 0.25 (=50 / (150+50)) in which, the sewerage generation of 50 lpcd for offices and commercial enterprises against that of household of 150 lpcd; and
5) Multiplier based on the existing status of tariff for offices and commercial enterprises: 4.5 times of the tariff of household that is applied for the current tariff system for water supply service. This current multiplier is applied for sewerage service.

Number of future offices and commercial enterprises (including small scale industries) is estimated based on the past increasing trend as shown in *Figure 4.2.1*. And the number of offices and commercial enterprises to benefit by the project has been estimated based on the area to be covered by the project.

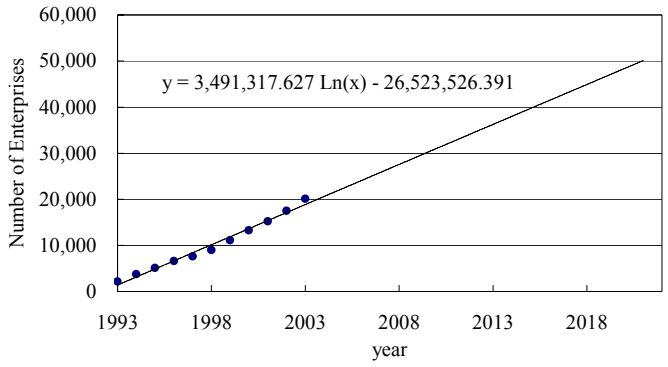


Figure 4.2.1 Increases in Economically Active Enterprises in Tirana

2) Connection Fee

It was assumed that connection fees would be 15,000 Leks for domestic households and Leks 150,000 for offices and commercial enterprises.

(2) Financial Benefit

The financial benefit is the expected revenue resulting from the collection of sewerage service charges and connection charges. The financial benefit from households (HHs) was based on the following assumptions for connection rates and collection rates:

Table 4.2.2 Assumptions for the Estimation of Financial Benefit for Households

	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%

The collection and connection rates for the offices and commercial enterprises are assumed as 100%, respectively because the offices and commercial enterprises are legal entity. *Table 4.2.3* shows the estimated number of customers as of 2014 to provide the sewerage services based on the population in 2013 applying the connection and collection rates indicated in the above *Table 4.2.2* for households (HHs) and full connection of commercials because of designed capacity of the facility for the feasibility study.

Table 4.2.3 Estimated Number of Customer by Collection of Sewerage Block as of 2014

	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

Table 4.2.4 presents the estimated financial revenue expected from collection of sewerage services charges in Tirana municipality and in Kashar commune as of 2014 based on the status of 2013. This revenue is based on the tariff level indicated in *Table 4.2.1*.

Table 4.2.4 Estimated Financial Benefit Based on Sewerage Services as of 2014

(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.

4.2.2 Financial and Economic Cost

Table 4.2.5 shows the financial cost, the economic cost, and their disbursement schedule for the Priority Project.

Table 4.2.5 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 4.2.5 indicates that the Project financial cost is Leks 10,877 million, including price escalation. However, the financial evaluation needs to be undertaken without consideration of price escalation 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 as shown in *Table 4.2.5*.

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 as shown in *Table 4.2.6*. The data was taken from the Official homepage of EUROSTAT website.

Table 4.2.6 CPI in Several Countries Around Albania

Year	1999	2000	2001	2002	2003	2004	2005	Average
Greece[1)]	0.00%	2.91%	6.31%	9.88%	13.42%	16.31%	19.54%	
Italy[2)]	0.00%	2.50%	5.30%	7.73%	10.39%	12.61%	14.60%	
Austria[3)]	0.00%	1.94%	4.64%	6.39%	7.73%	9.81%	12.12%	
Average	0.00%	2.45%	5.42%	8.00%	10.51%	12.91%	15.42%	
Annual increase rate against previous year	2.45%	2.97%	2.59%	2.51%	2.40%	2.51%	2.57%	

Source: Official Web-site HP of EUROSTAT.

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 cost 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.

4.2.3 Financial Evaluation

The financial evaluation shown in *Table 4.2.7* was based on a cash flow comparing the above financial costs and benefits.

Table 4.2.7 Result of Financial Evaluation

NPV	FIRR	B/C
-886 Million Leks	7.21 %	0.84

The resulting FIRR (7.21 %) is less than the applied discount rate of 10 %. This means the Project may not be viable from a financial viewpoint.

According to the World Bank[1] , the discount rate reflects the rate at which the value of consumption changes over time. In general, the FIRR should be higher than the bank's interest rate. If the FIRR is lower than the interest rate, it would be more cost effective to deposit funds in a bank rather than to invest in the project. 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), the value of consumption will decrease year by year, by this rate, over the Project life. Therefore, 5 % is another benchmark to use when evaluating the project in terms of meeting basic human needs that are based on the living environment.

[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.

The financial evaluation presented in *Table 4.2.8* is based on the assumption that the 5% is assumed to be the discount rate:

Table 4.2.8 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 is 7.21 %, the same as for the original case from the very nature of things. This rate 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.

4.2.4 Sensitivity Analysis

The FIRR changes depending on the parameters used in the calculation. The project construction costs and benefits (revenue due to collection of charges) are the most influential factors in the financial analysis.

Considering the above, 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 4.2.9 presents these results:

Table 4.2.9 Result of Sensitivity Test for 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 *Table4.2.9*, 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. The following figures further support this:

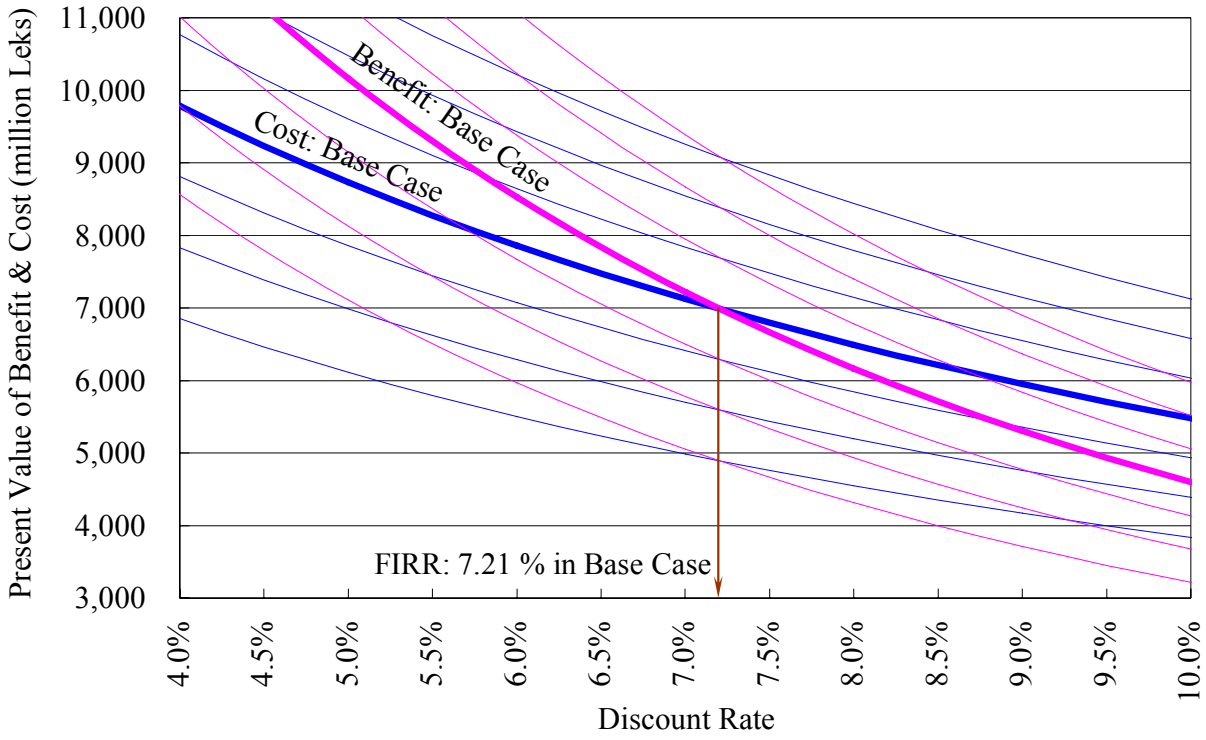


Figure 4.2.2 FIRR Sensitivity for the Project

An FIRR of 7.21 % represents the intersection point of 'benefit' and 'cost', relating to the base case. That is a discount rate of 7.21 % will result in a B/C ratio of 1.0. It also means that the OCC is 7.21 %.

4.2.5 Analysis of Financial Operation

The Project cost is Leks 10,877 million in total including price escalation. 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. 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 the tariff revenue with minimal contribution from the local Government.

(1) Financial Operation

Using the overall average tariff, 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. *Table 4.2.10* summarizes the loan details.

Table 4.210 Disbursement 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, 2 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 4.2.11* and *4.2.12* for Case-1, and *Tables 4.2.13* and *4.2.14* present a detailed future cash flow for the Project.

In *Tables 4.2.11* and *4.2.13:*

Column 3 shows the annual disbursements for the total Project cost. Column 4 shows the interest payments on the foreign loan, and column 5 shows the back-payment for the foreign loan indicated as an annual installment payment.

Column 7 shows the interest payments on domestic finance and column 8 shows the back-payments for this as a one-time payment for each year's loan (the first year is taken as occurring after the four year grace period). The grace period is set at four years. To date, no Albanian state enterprises have had any experience borrowing funds from commercial banks. If the board of directors desired, they could use the banking system to procure some funds for the project. The terms of the loan would be negotiable.

Column 10 shows the O&M costs including replacement cost, and column 11 shows the total outflow.

In *Tables 4.2.112* and *4.2.14:*

Column 12 shows the inflow sourced from the foreign loan. Column 13 shows the revenue received from collection of sewerage services charges and connection fees. It is assumed that these charges will be collected from 2014. During 2014 a significant amount of revenue will be generated from the collection of the connection fees.

Column 14 shows the amount that is domestically financed. This amount comes from land acquisition, housing compensation (if any), and administration costs. Column 14 also includes costs for some of the remaining works, including "Main and Branch Sewers" and the LC portion of capacity building, and interest of foreign loans during construction.

Column 15 shows the total amount of these financial inflows.

Column 16 shows the cash balances assuming a "single-fiscal year system" and assuming the amount that if financed domestically comes from commercial banks. Column 16 shows that except for the four year construction period, deficits only occur during 2017, 2018, and 2028. The deficits are Leks 279 million, Leks 223 million, and Leks 1,894 million respectively.

The column showing the cash balance (assuming a "multiple-fiscal year system") indicates that the four year construction period will result in a deficit. There will be further future deficit until after the sewerage facilities begin operating. After this time, not only will there be no deficit, but the previous deficit (during the construction period) is expected to be recouped. The cumulative cash balance indicates there will be sufficient spare revenue to compensate the deficits. Also, this additional revenue can be re-invested for expansion of the facilities.

This analysis indicates that the services provider, the GTW&SA, does not need grants or subsidies from the central Government or from the local Government until after the services begin.

Column 16 and 17 also show the cash balance of outflows and inflows. However, these results assume

the domestic financing is supported by a grant or subsidy during the construction period. In this case, the GTW&SA would not need to pay any interest or pay back the principal. Therefore, no deficit is expected, even during the construction period except in 2017, 2018, 2019, 2020 and 2028 under the condition of "single-fiscal year system". But this negative balance will be recovered by the cumulative cash balance in the case under the condition of "multiple-fiscal year system".

Table 4.2.11 Outflow Cash Stream 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: Interest Payment	Foreign borrow: Repayment of Principal	Total including Initial Investment Cost	Domestic Borrow: Interest Payment	Domestic Borrow: Repayment of Principal	Domestic Borrow: Total on Domestic Borrow	OM Cost including Replacement Cost	Out Flow in Total
(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 4.2.12 Inflow and Cash Balance Cash Stream for the Financial Operation of the Project (Case-1)

(Million Leks)

(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	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 4.2.13 Outflow Cash Stream 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 4.2.14 Inflow and Cash Balance Cash Stream 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	

(2) Findings of the Financial Operation Analysis

In Case-1 and Case-2, from the very nature of things, Case-2 has higher advantages than Case-1 because of repayment period including grace period and annual interest rate as shown in the above *Tables 4.2.11* through *4.2.14*.

The most influential factor affecting the financially outcomes is the collection of connection fees. This analysis assumes that connection fees are collected from all customers. However, there are several low income households. As discussed above, in 2005 the low income households group (i.e. households earning less than 10,000 Leks/HH per month) represents only 3.34 % of customers.

When establishing the tariff system, some special consideration should be given to these low income households. Options include: (1) exempting the connection fees for households who are living on social security, (2) exempting connection fees for the households who live on a pension, (3) reducing the connection fees for these households, or (4) reducing the connection fee for all these households. With these concessions, the connection rate is expected to improve.

However, further analysis would be required to determine the appropriate option / reduced connection fees rate. These fees should be set to ensure sound finance for the GTW&SA.

4.2.6 Repayment Analysis

(1) Tariff Setting

1) Proposed Tariff Level for Offices, Small Scale Industries and Commercial Enterprises (including Shops, Coffee Shops, Restaurants, Hotels)

For these categories, the tariff would be 15,261 Leks/customer per year in the short term. In this analysis revision schedule is not set up but is recommended to revise in future.

2) Connection Fees for the Domestic Households

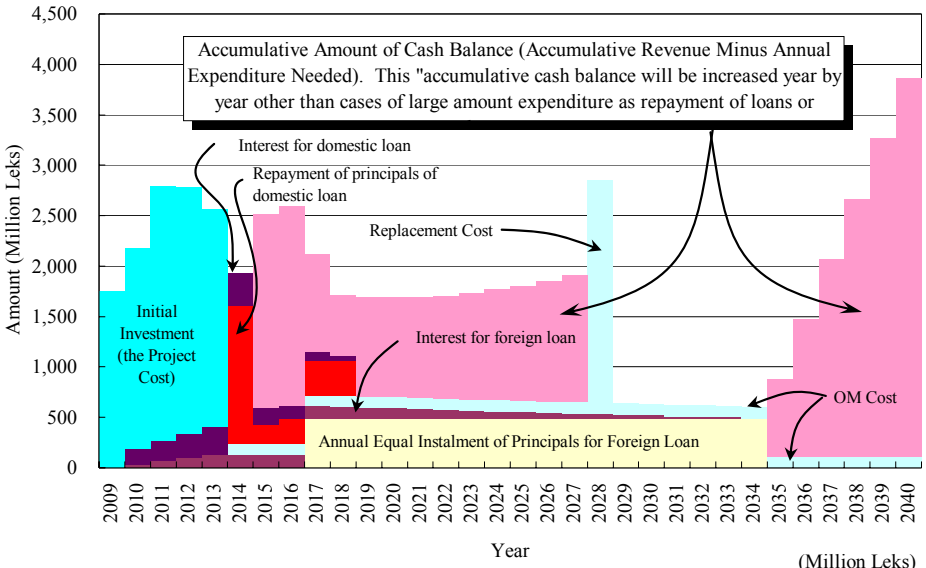
A charge of 15,000 Leks/HH is proposed in the short term. This fee should be collected when the customer connects to the new sewerage facilities. It is also recommended to revise the connection fee in future.

3) Connection Fees for the Offices, Small Scale Industries and Commercials (including Shops, Coffee Shops, Restaurants, Hotels)

For these categories, the amount of 150,000 Leks/customer is proposed. This fee should be collected when the new sewerage facilities are connected. It is also recommended to revise in future.

(2) Repayment Ability

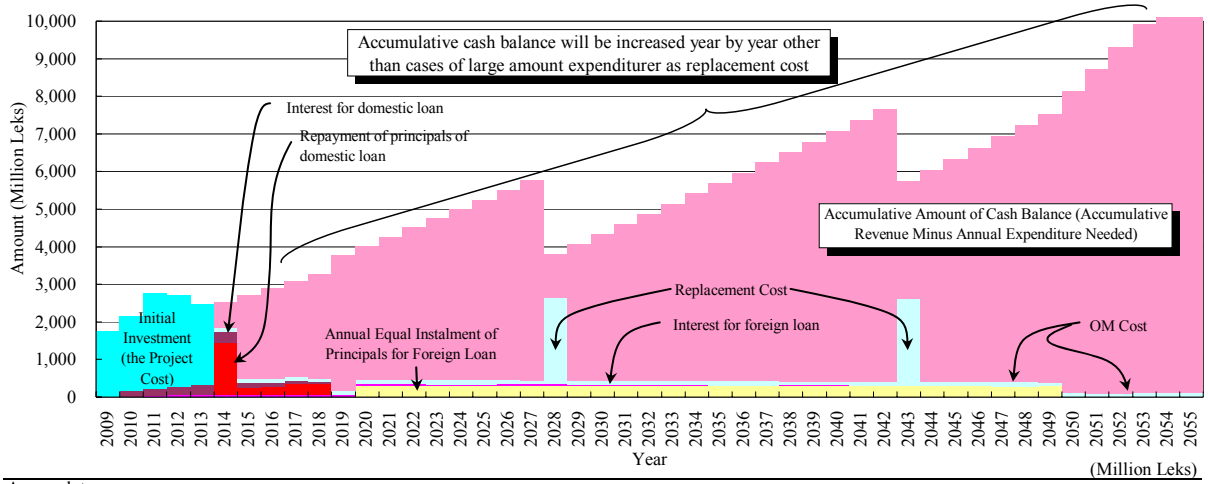
Based on the defined tariff levels, the repayments are calculated as shown in *Figure 4.2.6* and *4.2.7* for Case-1 and Case-2 respectively based on the above *Tables 4.2.11* through *4.2.14*:



(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 4.2.3 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 4.2.4 Cash Flow Including the Repayment of Foreign Loan (Case-2)

As indicated in the above figure s together with tables, the Project is financially viable with enough rooms after finishing the construction works.

In Case-1, the accumulative amount of cash balance in the year 2014 and 2028 through 2034 are not appeared on the figure because going behind of charts of outflow for "interest for domestic loan" and "repayment of principals of domestic loan" or "replacement cost", but actually they exist as indicated in table under the figure as 1,908 million Leks, 2,361 million Leks, 2,680 million Lerks, 3,006 million Leks, 3,340 million Leks, 3,681 million Leks, 4,029 million Leks, and 4,384 million Leks respectively.

In case of comparing Case-1 with Case-2, the accumulative amounts of cash balance in each year in Case-2 are greater than those in Case-1 as indicated in *Figure 4.2.3* and *4.2.4* together with tables under the figures. Therefore, Case-2 has higher advantages than Case-1 as mentioned above.

In this case, the revenue level may be reduced until a balance is reached caused by:

1) Foreign loan interest;
2) Foreign loan principal;
3) Domestic loan interest;
4) Domestic loan principal; and
5) Annual O&M Costs.

Connection fees must be resolved before any loan agreement can be executed, and before the sewerage services will be started.

4.3 Economic Analysis

4.3.1 Economic Cost

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

Table 4.3.1 Economic Cost and 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.

4.3.2 Economic Benefit

The unit economic benefit is summarized in *Table 4.3.2*:

Table 4.3.2 Basic Unit of Economic Benefit for the Project

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 ar 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 I 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 I Assessment" Report No.26213-AL, November 5, 2003, the World Bank.

A detailed explanation of each of the unit economic benefits is discussed in Part I of this report.

4.3.3 Economic Evaluation

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 4.3.3*:

Table 4.3.3 Economic Evaluation of the Project

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

As shown in *Table 4.3.3*, 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.

4.3.4 Sensitivity Analysis

The economic internal rate of return (EIRR) is affected by assumptions made in the calculation. The following items were used to test the EIRR sensitivity:

1) Cost increased by 30 %, 20% and 10%;
2) Cost decreased by 10 %, 20% and 30%;
3) Economic benefit increased by 30%, 20% and 10%; and
4) Economic benefit decreased by 30%, 20% and 10%.

The results are shown in *Table 4.3.4*:

Table 4.3.4 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. *Figure 4.3.1* shows the results of the sensitivity test.

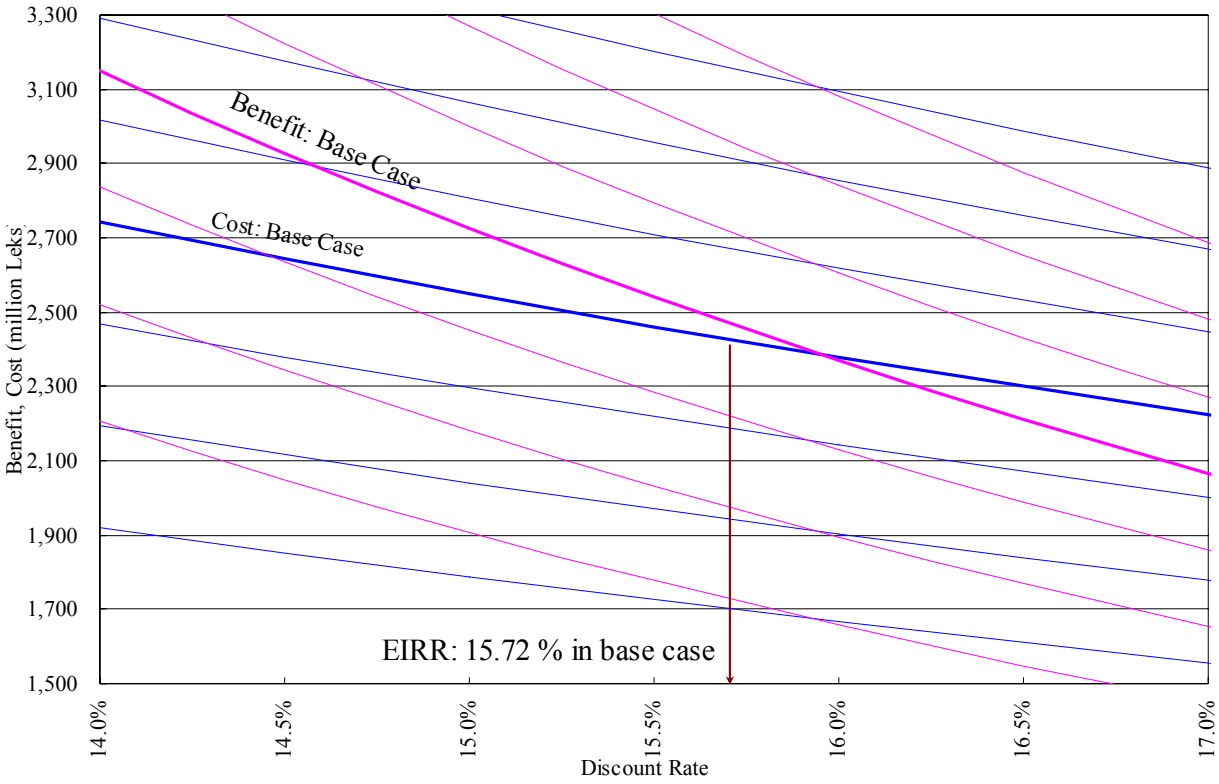


Figure 4.3.1 Sensitivity Analysis for the Project's EIRR

An EIRR of 15.72 % balances the costs and benefits for the base case. If 15.72 % is applied as a discount rate, the B/C ratio and the OCC would balance at 1.0. This EIRR is high when compared to similar projects in developing countries.

CHAPTER 5

ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

CHAPTER 5 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

5.1 Implementation of Environmental and Social Considerations

5.1.1 Level of Considerations Required by JICA

The proposed Priority Project was categorized as requiring "B" level of environmental and social consideration, as defined in the JICA Guidelines. The reason of category "B" is that the construction and operation of the sewerage facilities will be expected to result in some negative environmental and social impacts in terms of land acquisition, hydrological situation, water pollution and odor. 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.

5.1.2 Level of Considerations Required by Albanian Laws

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.

5.1.3 Implementation of Environmental and Social Considerations

In consideration of JICA Guidelines and Albanian Laws, the environmental and social considerations were implemented as a flowchart shown in *Figure 5.1.1*.

Throughout the Study, four times stakeholder meeting as public consultation, the IEE level Study in M/P stage, and the environmental and social considerations at EIA level in F/S were conducted. The environmental and social considerations were conducted based on the JICA Guidelines for Environmental and Social Considerations. Albanian regulations of EIA are also taken into consideration. The public consultation was described in Chapter 5.2 and the environmental and social considerations at EIA level were described in Chapter 5.5, which were the basis of the EIA report which should be prepared by Albanian side for obtaining the Environmental Declaration.

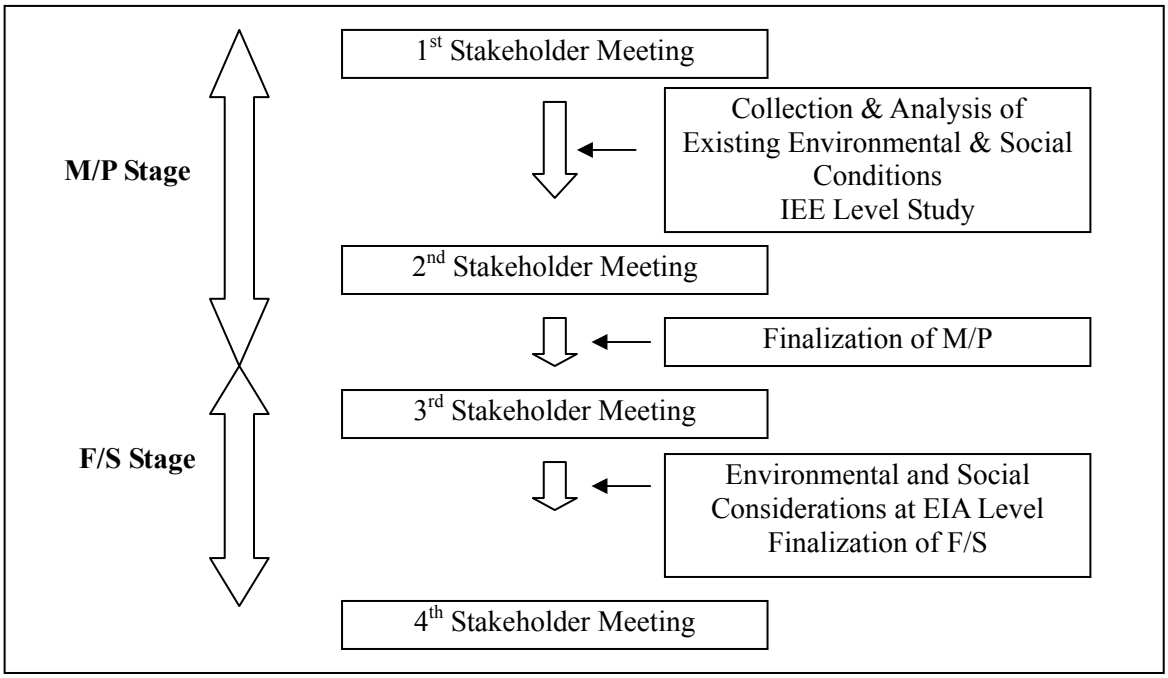


Figure 5.1.1 Flowchart of Environmental and Social Considerations

5.2 Public Consultation

5.2.1 Objectives and Schedule

Four times stakeholder meetings were held throughout the Study as public consultation. 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 schedule of stakeholder meetings was shown in the following *Table 5.2.1*.

Table 5.2.1 Schedule of Stakeholder Meetings

Stakeholder Meeting	Contents	Timing
1st	- Explanation of the JICA study - JICA Guidelines for Environmental and Social Considerations - Public Consultation Plan, Scope of IEE	4 November 2005
2nd	- Progress of the study - Explanation of the Proposed Sewerage System - Results of IEE	7 December 2005
3rd	- Explanation of M/P - Explanation of the Priority Project selected by the M/P - Scope of the Environmental and Social Consideration Study at EIA Level	24 February 2006
4th	- Explanation of Priority Project - Environmental and Social considerations results - Results and recommendations from the JICA study	12 July 2006

5.2.2 Fourth Stakeholder Meeting

The fourth stakeholder meeting was organized by DPUK, MoPWTT, and was held on 12 July 2005 at the Tirana International Hotel. The aim of the meeting was to provide information about the JICA study, to explain the M/P and F/S, to provide information about the environmental and social considerations for the proposed project, and to consult with the public.

(1) Participants

The stakeholders were selected by DPUK in collaboration with the JICA Study Team. Invitation letters were sent to the invitees directly by DPUK.

Table 5.2.2 lists the participants of the fourth of stakeholder meeting.

Table 5.2.2 Participants of the Fourth Stakeholder Meeting

Participants	Number
Ministries, relevant government agencies (MPWTT, Min. of Environment, DPUK etc.)	8
Representative from municipalities and communes	6
UKT, UKK	6
Universities, Institute	2
NGO	1
International Organization, Donors	4
JICA Study Team	11
Total	**38**

(2) Program

The main language used during the meeting was Albanian. An English-Albanian translation was provided as required. The presentation material was provided to the participants in Albanian. *Table 5.2.3* shows the program of the fourth stakeholder meeting.

Table 5.2.3 Program of the Fourth Stakeholder Meeting

10:10 – 10:15	Opening remarks (Mr. Fahri Maho, General Director, DPUK)
10:15 – 11:20	Presentation: Explanation of Priority Project and result of Environmental and Social Study at EIA Level
11:20 – 11:45	Coffee Break
11:45 – 12:45	Questions and Answers
12:45 – 12:50	Closing Remarks (Mr. Fahri Maho, General Director, DPUK)

(3) Main Topics Discussed

The main topics discussed in the meeting are summarized below:

- How much area is required for sludge disposal?
  - It is expected that 27 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 discharge 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.

5.3 Policy, Legal, Administrative Framework and EIA

5.3.1 Policy and Legal Framework

The National Environmental Action Plan (NEAP) was prepared in 1993, and was based of the National Environmental Strategy. The NEAP aims to integrate environmental protection measures into development programs for the economic and social sectors. The NEAP identified six priority areas for actions, including monitoring industrial and urban pollution; assessing environmental protection needs; and implementing European-level environmental mechanisms. The NEAP was updated in 2001 (UNEAP 2001) and the revised priorities were identified to include development of suitable environmental policies; improvement of cooperation among ministries, departments and local authorities; and establishment of an information system. The MoEFWM began preparing the National Environmental Strategy in 2006. It is currently being drafted.

Albania's legal system is structured around the following hierarchy: Constitution; primary legislation (laws) and supporting normative acts, such as by-laws; government decisions; decrees; ministerial orders regulations; instructions; and standards. The Constitution, approved in 1998, calls upon the Albanian authorities to preserve a healthy environment that is ecologically suitable for present and future

generations. Although the first basic law on the environment was approved in 1967, the development of a modern environmental legal system based on democratic principles did not begin until 1991.

The Law "On Environmental Protection" (No. 8934, 5 September 2002) is the basic law that defines the general principles and procedures for environmental management. The Law establishes national and local policies on environmental protection, requirements for the preparation of environmental impact assessments and strategic environmental assessment, conditions for approving activities that affect the environment, requirements for the prevention and reduction of environmental pollution, environmental norms and standards, environmental monitoring and control, environmental responsibilities for state bodies, the role of the public, and sanctions imposed for violation of the Law.

Other laws that relate to environmental management and protection include the Law on Protection of Wild Fauna and Hunting, the Law on Water Sources, and the Law on Protected Areas. The related laws are listed in Appendix 13, Volume III Supporting Report.

5.3.2 Administrative Framework

(1) Ministry of Environment, Forests and Water Management (MoEFWM)

Albania established its first Ministry of Environment in September 2001. During 2005 the Ministry of Environment became the Ministry of Environment, Forests and Water Management. According to the Law on Environmental Protection, 2002 the main responsibilities of the MoEFWM are to:

- cooperate and coordinate with central and local government institutions, the public and non-profit organizations to increase the level of enforcement of environmental legislations;
- prepare draft agreements, conventions, protocols, projects and programs that are carried out in the framework of bilateral and multilateral cooperation (including with international environmental organizations), and to follow their implementation once they are finalized;
- study the national need for environmental specialists and to coordinate the qualification activities of personnel dealing with environmental protection;
- support projects dealing with scientific research, improvement of the state of the environment, introduction of clean technologies, and promotion of non-profit organization activities; and
- assist local government bodies implement environmental protection and prepare local environmental action plans.

(2) Regional Environmental Agency (REA)

The MoEFWM has 12 Regional Environmental Agencies (REAs). REAs are bodies that specialize in environmental protection. They operate at the prefecture level. The REAs:

- enforce environmental protection legislation at a local level;
- assist local government bodies with environmental protection and management within their jurisdictions;

- work with local government to develop local environmental action plans, programs and projects;
- are involved in approving environmental permits and declarations, by performing duties that are defined by the MoEFWM (in a special regulation). They are responsible for providing environmental consent and authorization for local activities; and
- undertake environmental protection awareness activities and liaise with the community, the public, environmental NGOs, and professional business organizations.

(3) Local Government

The local government authorities are the most important governmental structure for administration and environmental protection. Local government implements the responsibilities, rights and duties assigned to them by the Law on the Organization and Functioning of Local Government, No. 8652, 31 July 2000. Local government has the following duties in the field of environmental protection:

- Implementation of environmental legislation;
- Drafting of local environmental protection plans and territory adjustment plans;
- Informing the public about the state of environment and local activities that are subject to environmental impact assessment;
- Identification of sites for the collection and disposal of waste, in accordance with environmental criteria and development plans;
- Management of facilities for the disposal and management of wastes and hazardous substances;
- Protection of green areas in urban centers and their surrounds;
- Administration of urban waste management including waste water treatment and solid waste plants; and
- Regulation of transport and construction activities in the urban environment.

5.3.3 Environmental Approval and EIA Procedure

(1) Environmental Approval

The Albanian Law on Environmental Protection requires that any project or activity that will affect, or is likely to affect the environment, applies for an Environmental Declaration, Environmental Permit, Consent or Authorization issued by the MoEFWM. This must be obtained before project implementation can commence. The Council of Ministers has defined which projects are subject to this process. The Council for Adjustment of Territories (KRT) will not grant a construction permit without a positive Environmental Declaration. These approvals may include mandatory conditions and procedures that must be implemented to minimize pollution and environmental damage. All applications for environmental approvals are submitted to the REA in the region where the project will be implemented or the activity will be undertaken. The REA is responsible for reviewing the documentation and forwarding the request to the MoEFWM for processing. The REA provides the MoEFWM with recommendations for approval, rejection or modifications.

An Environmental Declaration should be obtained for this project. A request supported by relevant

documentation, including an EIA report, needs to be submitted to obtain an Environmental Declaration.

(2) EIA Procedures

Environmental Impact Assessment (EIA) was introduced to Albania in 1993 when the Law on Environmental Protection was passed. A Law on Environmental Impact Assessment (No. 8990) was approved on 23 January 2003. This law defines the rules, procedures and deadlines for identifying and assessing the direct and indirect impacts of projects or activities on the environment. The Law establishes the steps of the EIA process. These steps are: lodging the application, preliminary review, selection and classification criteria, public hearing and consultation, access to information, and duties and rights of other bodies. The MoEFWM is the government department responsible for requesting, reviewing and approving EIA documentation. The Law also includes a list of activities that must undergo a Profound (advance) EIA process and those that must undergo a Summary (outlined) EIA process.

The regulations require that a waste water treatment plant with a capacity greater than 150,000 equivalent inhabitants must undergo a "Profound" (advanced) EIA process. The contents of the profound EIA report are provided in Appendix 13.

The project applicant is responsible for submitting the application including the EIA report for the environmental approval to the MoEFWM. All EIA reports must be prepared by an expert certified by the MoEFWM as competent at preparing EIA reports and for environmental auditing.

The stages of the EIA process are summarized in *Table 5.3.1*.

Table 5.3.1 EIA Procedures

Procedure	Description
1) Classification	Determination of the level of EIA required based on the Law and consultation with MoEFWA (either 'Profound' EIA process or 'Summary' EIA process)
2) Preparation and Submission of the EIA Report	Reports must be prepared by licensed natural or juridical professionals. Profound EIA reports must contain the items specified.
3) Initial Review, Inspection and Opinion by the Regional Environmental Agency (REA)	<Within 5 days> REA shall conduct the initial review. Finalisation of the level of EIA required for the project. <Within 20 days> Recommendation for either Approval or refusal by REA to be forwarded to the MoEFWA.
4) Review by MoEFWM	The MoEFWM review must be undertaken within three months. The following procedure must be followed for "Profound" EIAs: 1)Establishment of a commission 2)Consultation with Interested Parties (Central organisations. Urban and Tourism Development organisations, Local government organisations, Specialist environmental institutions) 3)Public consultation organized and managed by local government organisations (consultation required with central and local government organisations, specialist institutions, interested people, environmental NPOs and the applicant) - 1 month for notification of the EIA report to the public - Participants should be notified of the consultation period at least 10 days prior.
5) Decision – making and Notice / Appeal of Decision	- The MoEFWM shall make a decision whether to declare or permit the proposal within five days of receiving the commission report. - The decision shall be published and shall be delivered to the applicant, state and local organisations. - An appeal against the decision can be lodged within 30 days of the publication of the decision.

5.3.4 Land Acquisition

All procedures for expropriation are based on:

- Law 8561, dated 22.12.1999, "On Expropriations and Temporary Takings of Private Property for a Public Interest";
- Government Decree No. 126 dated 23.3.2000 "Composition and Procedures of the Special Committees for Expropriation";
- Government Decree No. 127 dated 23.3.2000 "On the Content and Procedures for the Submission of the Requests and Notifications for Expropriation and Temporary Utilization of private Property for the Public Interest";
- Government Decree No. 138 dated 23.3.2000 "On Technical Criteria for Evaluation and Calculation of Compensation for Expropriated Private Property, Devalued Properties and Third Party Rights"; and
- Government Decree No. 147 dated 31.3.2000 H.E.Dr. Bajram Raxhepi "On Functioning Rules and modalities for Special Committees for Expropriation".

The expropriation of private properties is done only for a public interest and with fair compensation and the expropriation of property is compensated by cash based on market value or land. If land-for-land is the preferred option, the affected people will be provided with land that is at least equivalent to the advantages of the land taken. If land-for-land is not the preferred option, cash compensation will be offered at levels that will be sufficient to replace the lost land and other assets and cover moving and other necessary allowances.

The procedures are summarized below:

- The Council of Ministers decides on the expropriation based on the application of the request from the interested person (juridical person).
- A Special Committee for expropriation is established in the responsible line ministry.
- When the ministry, through the Special Committee, is convinced that the documents are prepared based on the law and government decrees, it decides to accept the request for the expropriation and notifies the person that has made the request.
- Within 10 days from such a notification it is foreseen to enter into agreement between the Ministry and the person who has made the request.
- Within 10 days from the date of the signing of the agreement, the Ministry starts the procedures with respect to the owners of the properties affected. In the meantime a public notification is published in official newspapers and reputable notional and local newspapers. These notifications are published during one week.
- One month after the latest date of publication, the ministry submits the proposal for the expropriation to the Government, to take the final decision.

The detail procedures are described in Chapter 2.8 of Appendix 13.

5.3.5 Environmental Standards and EU Directives

(1) River Water Quality Standards

There are no water quality standards for rivers and the sea in Albania.

(2) Effluent Standards

A draft effluent standard has been prepared and is ready for approval. However, this effluent standard is for industrial effluent. Municipal wastewater is not included in the draft standard.

The Albanian Government is considering joining the EU in future. Therefore measures to meet EU Directives should be undertaken.

Table 5.3.2 EU Effluent Standards

Parameter	Concentration (mg/L)	Minimum Reduction Percentage (%)	Measurement Method
BOD_5	25	70 – 90	Unfiltered Nitrification inhibited
COD	125	75	Potassium dichromate
TSS	35	90 under	- 0.35 μm of membrane filter. Drying at 105 ■ - Centrifuge for at least five minutes with 2800 to 3200 G Drying at 105 ℃

(3) Air Quality

The Albanian national norms and EU norms for air quality are summarized below:

Table 5.3.3 National and EU Norms for Air Quality

Parameter	LGS	PM10	SO_2	NO_2	O_3	Pb
National Norms	140	60	60	60	120	1.0
EU Norms	80	50	50	40	120	0.5

(4) Noise

There are no noise standards in Albania.

(5) EU Directives

The planning and design of the sewerage system shall respect the EU Directives, codes and standards. The main EU directives related to the project are:

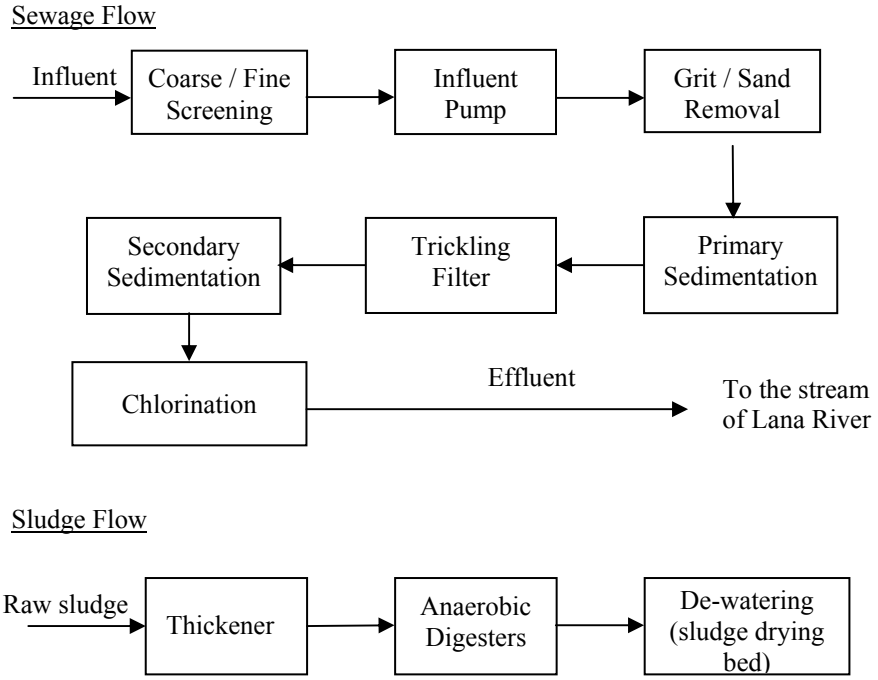
- Directive 91/271/EEC on Urban Waste Water Treatment;
- Directive 98/15/EEC amending directive 91/271/EEC;
- Directive 2002/60/EU Water Framework Directive;
- Directive 96/61/EC Integrated Pollution Prevention and Control (IPPC);
- Directive 97/11/EC Environmental Impact Assessment (the Albanian EIA system is already in alignment with this Directive);
- Directive 86/278/EEC protection of the environment. This is particularly relevant for soil when sewage sludge is to be used for agriculture purposes;
- Directive 76/160/EEC Bathing Water Quality; and
- Directive 98/83/EC Quality of Water intended for Human Consumption.

5.4 Description of Proposed Priority Project

5.4.1 Proposed Sewerage System for Priority Project

The outline of the proposed sewerage project is summarized in *Table 5.4.1*. Details of the proposed sewerage system for Priority Project are provided in Chapter 2, Part II of this report.

Table 5.4.1 Summary of the Sewerage System Proposed for Priority Project

Item	Description of Proosed Sewerage System
1. Planning Area and Population	Service population in the year 2014 : 342,500 person Service area : 2,343 ha
2. Design Flows	Design average daily flow : 77,100 m^3/d Design maximum daily flow : 95,900 m^3/d
3. Design Sewage Characteristics	Design influent quality / Design effluent quality / Standard of EU BOD_5: 200 mg/l / 24 mg/l / 25 mg/l SS : 200 mg/l / 30 mg/l / 35 mg/l
4. Sewers	Trunk sewer : Dia.: 900~1,500 mm, Length: 4.2 km Main sewer : Dia.: 200~600 mm, Length: 1.4 km Branch sewer : Dia.: 200 mm, Length: 27.6 km
5. Sewage Treatment Plant	The proposed STP site with about 46.6 ha is located at Mezezi Stalla in Kashar Commune, the south-west of the Tirana Municipality. Capacity (max. daily) : 95,900 m^3/d
6. Treatment Method	Treatment Method : Trickling filter Treatment process flow diagram: 
7. Sludge Production and Disposal	Wet and Dewatered sludge production : 22.6 ton/d and 8.2 ton/d Disposal method : landfill at the disposal site which WB proposed
8. Receiving water body	Stream near-by, meeting the Lana River at Kashar

5.4.2 Implementing Schedule and Project Cost

The implementation schedule and project costs are shown in *Table 5.4.2* and *Table 5.4.3*.

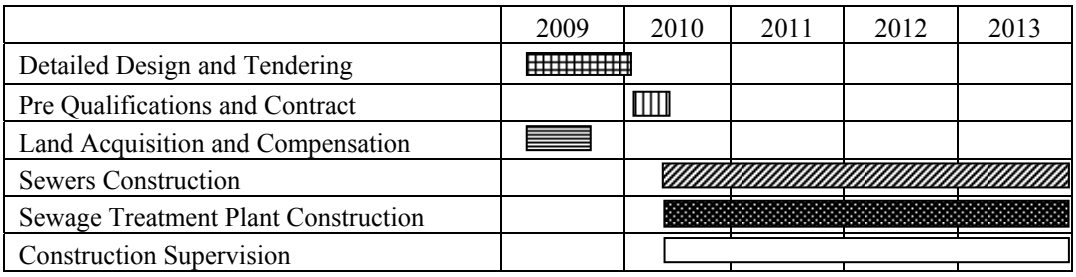


Figure 5.4.1 Implementation Plan

Table 5.4.2 Total Project Cost (Unit: Million Leks)

Component	Cost
Direct Construction Cost	
Trunk Sewer	2,038
Main and Branch Sewers	288
Sewage Treatment Plant	4,054
Total of Direct Construction Cost	6,380
Indirect Construction Cost	
Land Acquisition and Compensation	1,146
Administrative Expenses	319
Engineering Services	638
Physical Contingency	638
Capacity Building	147
Total of Indirect Cost	2,888
Total Project Cost	9,268

5.5 Methodology and Results of the Environmental and Social Considerations at EIA Level

5.5.1 Methodology

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 5.5.1*.

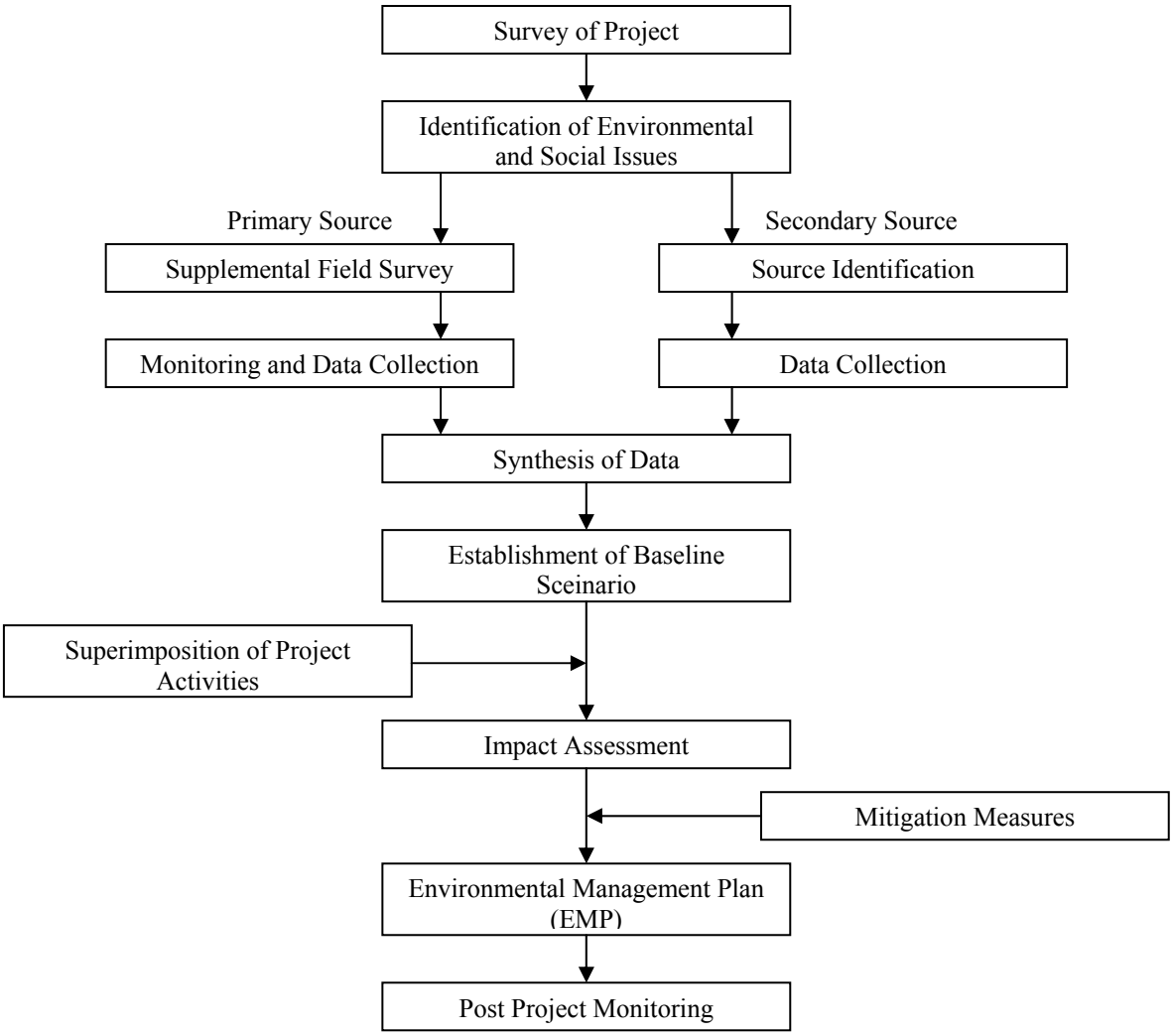


Figure 5.5.1 Schematic Diagram of Approach and Methodology

5.5.2 Baseline Environmental Data

(1) Physical Environment

Albania is located on the western edge of the Balkan Peninsula. The land area is 28,748 km^2, making Albania one of the smallest countries in Europe. Albania is located between latitude 39 degree's 38' – 42 degree's 39' north and longitude 19 degree's16' – 21 degree's 4' east. The perimeter of its border is 1094 km, of which 476 km is coastline on the Adriatic and Ionian Seas. These are on the western border.

Tirana Municipality is located at the center of the country. It is located at Latitude: 40 degree's 21'20" north; and Longitude: 20 degree's 14'30" east.

1) Topography

Albania is mainly mountainous. Mountains and hills higher than 300 m in elevation cover

approximately 77 % of the total land area (28,748 km^2). The median altitude of the country is approximately 710 m which is about twice the median altitude of Europe. Albania can be divided into four topographic zones: the Albanian Alps, the central mountain regions, the southern mountain region, and the western plain. Half of Tirana Municipality is on the western plain next to the Adriatic Sea and the other half is on the mountainous and hilly area. The altitude of the study area ranges between 80 m and 130 m (the center of Tirana is at approximately 110m altitude). The ground surface gradient ranges from 1 to 5 %, sloping down in a western direction. The hilly area to the east of Tirana extends to Mt. Dajiti (1,612 m).

2) Geology

There are two distinct geological formation types in Albania: the western domain consisting of Monotonous Permian to Mesozoic Sediments; and the eastern domain characterized by Paleozoic to Mesozoic basis, acidic volcanic rocks and ultramafic massifs.

The Tirana syncline is a depressed lateral basin filled with molasse deposits of serravallian – tortonian. The Tirana depression is on the Kruja tectonic area. Its western border partly coincides with the Kruja tectonic area. It therefore makes sense that the Tirana syncline is a depressive unit overlying the most western part of the Kruja tectonic area. This depressed unit was created before Serravallian and Tortonian. Following this period sedimentation occurred at the base of the formation. The conditions forming the Tirana syncline resulted in a molasse syncline overlaying the Kruja tectonic area. It represents a structural unit formed during the most recent geological period (Serravallian – Pliocene). This confirms the recent tectonic movements in this area. This syncline is characterized by a gentle eastern rise, a smooth western down slope, and a hard western rise to the peak. This is confirmed by seismic crosscuts. These tectonics are also shown in the late tectonic and neo-tectonic map of the area.

3) Climate and Meteorology

The Albanian climate is characterized by hot, dry summers and mild, wet winters. Due to the inland topography, the climate can be divided into three main climatic zones. The Tirana area consists of small rolling hills and extends inside the border of the Mediterranean Climate Sub-zone and the Hilly Mediterranean Climate Sub-zone. This area experiences a humid, mild winter and a dry, hot summer.

- Temperature

The mean annual atmospheric temperature in 2004 was 16.8 degrees Celsius. The coldest month in 2004 was January, with a mean atmospheric temperature of 7.9 degrees Celsius, and the hottest month was July with a mean atmospheric temperature of 26.3 degrees Celsius. *Table 5.5.1* shows the annual average temperature in Tirana Municipality from 1992 to 2004.

Table 5.5.1 Temperature Data for Tirana Municipality

Year	1992	1998	2000	2002	2003	2004
Yearly Average Temperature (℃)	15.3	15.3	16.4	16.7	17.3	16.8

Source: Agriculture, Livestock, Agro-industry, Fishery, Forestry, Ministry of Agriculture and Food, 2004

- Rainfall

During 2004, the mean annual rainfall was 1,310 mm. The rainfall is not even throughout the year. Approximately 60% of the annual rainfall occurs during winter. During 2004, the highest monthly rainfall occurred in November (216.5 mm) and the lowest monthly rainfall (14.7 mm) occurred in August.

Table 5.5.2 Rainfall Data for Tirana Municipality

	1992	1998	2000	2002	2003	2004
Annual Rainfall (mm)	787	1,173	1,014	1,188	718	1,310

Source: Agriculture, Livestock, Agro-industry, Fishery, Forestry, Ministry of Agriculture and Food, 2004

4) Regional Wind Pattern

Data from the Institute of Hydrometeorology indicates that the wind in the study area tends to be slow, with an average annual wind speed of 1.5 m/s (based on records from 1951 to 2000). Wind does not occur for 56 % of the time. The dominant wind directions are northwest and southeast. Winds come from these directions for 14.6 and 12.0 % of the time, respectively.

5) Surface Water

The study area is located in the upstream area of the Ishmi Basin, which shares approximately 50 % of the Erzeni-Ishmi Basin area (1,439 km^2). This is a relatively flat basin surrounded on three sides by mountains. Its average altitude is about 120m.

The main river in the study area is the Lana River. The Lana River runs through the southern part of Tirana Municipality, flowing from east to west. Lana River is a tributary of Tirana River. Tirana River is a tributary of Ishmi River. The Ishmi River discharges into the Adriatic Sea. The Lana River is severely polluted by direct discharge of untreated sewage and garbage dumping. The Lana River is 29 km long. The section of the river which flows through Tirana Municipality has concrete embankments (3.5 km long). The upstream area of Lana River is sparsely populated. The main activity in this are is olive oil production. The mid-part of the river (where the concrete embankments are) passes through the urban area. This area is densely populated and a significant volume of untreated sewage is discharged into the river. The sewage comes directly from households and small to mid-scale commercial areas. The BOD_5 data for Lana River, from the last two years, indicates the sparsely populated section of river has relatively low organic pollution levels. However, the BOD_5 levels in the urban area are 50 to 60 mg/l, with the maximum value exceeding 100 mg/l.

6) Groundwater

The geology of the local area (combination of sand and conglomeratic packages with argillaceous

sections) means it is possible for considerable amounts of groundwater to exist. There are two groundwater geology types: (i) compact rock groundwater, and (ii) loamy rock groundwater. The geologic formation, including their facial nature, means that there are two types of water aquifers in the study area:

- Tortonian aquifer complex; and
- Quaternary aquifer complex.

7) Ambient Air Quality

Air quality data is recorded by monitoring institutions (the Institute of Public Health and the Institute of Hydrometeorology) and is reported to the MoEFWM. Air samples are tested for PM10, black smoke, SO2, NO2, O3, and Pb. Samples are taken five days each month in Tirana (from five stations) and other cities (Korçe, Durrës, Elbasan, Shkodër, Fier and Vlorë). This is done by the Institute of Public Health.

Table 5.5.3 Annual Average Results from Air Quality Monitoring in Tirana Municipality for 2004

	Measureed pollutant (concentration in µg /m^3)					
Measureing station	LGS	PM10	SO_2	NO_2	O_3	Pb
Tirana 1 (center)	280	126	16	40	97	0.2
Tirana 2 (Nju Bazar)	233	108	13	31	100	0.16
Tirana 3 (PHI)	151	67	14	23	102	0.13
Tirana 4 (21 Dhjetori)	965	432	26	57	93	0.3
Tirana 5 (Liceu Artisitk)	219	99	13	21	103	0.2
National Norms	140	60	60	60	120	1.0
EU Norms	80	50	50	40	120	0.5

Source: Komente per studimin e cilesise se ajrit ne Shqiperi, viti 2004, MoEFWM

8) Ambient Noise

Noise is measured at 15 points in the Tirana district. The monitoring data indicates that the area experiences high noise levels during the day and night. The urban noise monitoring data for 2005 is presented in Appendix 13.

(2) Biological Environment

The climatic features, geographic position, topography, geology, hydrology and pedological factors result in a high diversity of natural habitats and sub-ecosystems. However, unsustainable agricultural and forestry practices, industrial pollution and uncontrolled building are detrimentally impacting on Albania's biological environment. The forested areas have decreased from 45 % to 36 % of the total land area since the 1950s. This has resulted in soil erosion.

During the last 5 years, considerable damage has been happened on spontaneous flora, forests of laurel, birch and oak in particular. This situation in general is a consequence of the uncontrolled development of human activities and especially of illegal constructions.

1) Environmentally Protected Area

Protected areas cover 183,749 ha, which is over 6 % of Albania's territory.

The MoEFWM has advised that there is no protected area in or around the sewerage planning area. There are 14 monuments and natural sites of historical significance in the Tirana district but none of them are in the sewerage planning area.

2) Fauna and Flora

Information provided from the MoEFWM indicates that there are no endangered fauna or flora species in the sewerage planning area.

Tirana Municipality is rich in flora. There are more than 1,600 different plant species in the Tirana region. The municipality is surrounded by 4,200 ha of forest. The main forest species are beech, oak, and alpine meadows. In the area around Tirana-Durres, there are 10 different amphibian species, which represents 60 % of all the amphibian species found in Albania. There are 25 recoded reptile species in the study area, which represents 70 % of the total registered reptile species in Albania. A complete list of recorded amphibians, reptiles and mammals is attached in Appendix 13.

(3) Socio-Cultural Environment

1) Population

The 2001 Population Census indicated that the Albanian population was 3,069,275, the population in the Tirana district was 519,720, and the population in Tirana Municipality was 341,453.

The Tirana district is one of two districts in the Tirana region (the other one is the Kavaje district). Tirana district consists of Tirana Municipality and 16 communes. Of these, Tirana Municipality and Kashar Commune are of relevance because they are the Project targeted area.

Municipalities and communes have a section that deals with civic registration. This section registers the names of all the people living in each territory. The population data for the municipalities and communes in the project area, obtained from this civic registration section, is shown in the *Table 5.4.4*.

Table 5.5.4 Population of Territories Concerned

Administrative Unit	2001	2002	2003	2004	2005
Tirana Municipality	478,424	494,904	518,243	552,336	581,414
Kashar Commune	16,810	17,058	17,202	17,347	18,228

The census data and civic registration data are different from each other. This could be due to the different methodologies used and / or the different purposes for collecting the data. This project used the civic registration data because it is expected to be more reliable.

2) Traffic

The Tirana Municipality administers 258 roads, with a total length of 160 km. The road condition and types of pavement are listed here:

- Paved streets 140 km;
- Unpaved streets 20 km;
- Public squares 43,682 m^2;
- Pavement with tiles and stone 384,510 m^2; and
- Paved pavement 147,561 m^2.

3) Socio-Economic

In Albania, the mandatory education is fixed at 9 yeas, elementary and primary education. Distribution of primary and secondary schools and access to basic education it the region of Tirana are quite good. The regional net enrolment rate for primary education is 98 % in the 2003/2004 academic year. The level of illiteracy in the region of Tirana is 1.2%, which is lower than the national average, 1.6 %.

The 2001 Census indicates that the economically active population in 2001 was 1,347,281, and the national unemployment rate was 22.68 %. This is a relatively high unemployment rate when compared with other developing countries. The economically active population in the Tirana district and Tirana Municipality are 235,482 and 160,450, respectively and their unemployment rates are 25.31% and 25.84 % respectively.

4) Public Health

The average number of visits to hospitals and / or clinics per person who actually visits a health facility in the Tirana district is 2.40 times (or days) per year. The average number of days in bed per hospitalized person is estimated to be 7.62 days in the Tirana district.

INSTAT data indicates that the following public health institutions exist in Tirana Municipality:

- 4 hospitals;
- 15 policlinics;
- 12 women consultancies; and
- 13 child consultancy.

5.5.3 Impact Identification

(1) General

An EIA is used as a planning tool to ensure environmental and social considerations are incorporated into the initial stages of project planning. EIA also helps ensure that the cost of environmental protection measures are treated as an integral component of the total project cost. The impacts of the proposed project can be grouped into the following two categories: (1) impacts during construction, (2) impacts during operation. The impacts during construction will be short term while impacts during operation would be long term.

The first step in preparing an EIA is to identify potentially significant impacts. The following aspects were considered when identifying the impacts of the project:

- project components;
- project phases;
- impact generating activities; and
- type of impact.

The impact identification was done by using a matrix table. This is a common tool for impact identification and it is useful because it presents various project impacts in a compact way. This report describes the impacts in more detail.

The matrix table presents the activities in columns and the environmental parameters in rows (*Figure 5.6.1*). In this way the matrix identifies the environmental factors that are likely to be affected, and the activities that are responsible for the impact. The cells at the junction of an activity and an affected parameter have been shaded. The impacts can be negative or positive. The following sections describe the nature of the impacts.

1) Activities during the construction phase

The following construction activities are likely to contribute towards significant environmental impacts:

- Site preparation (fencing, grading and site clearing);
- Excavation (leveling of ground, digging of foundations, etc.);
- Construction of access roads, pumping station, STP and trunk sewers, etc.;
- Transportation and disposal of earth materials and construction spoils;
- Soil compaction; and
- Construction camps (temporary site office, maintenance workshops, facilities and other infrastructure to support all these activities and also workers camps).

All these activities will have the environmental impacts identified in the following sections.

Several types of negative environmental impacts may result from construction. This would largely result from negligent practices. Appropriate techniques and responsible supervision would help to avoid / minimize / mitigate these negative impacts.

2) Activities during the operation phase

The major operational activities that are likely to cause environmental impact are:

- use of energy;
- O&M of the STP;
- discharge of treated effluent from the STP; and
- sludge disposal from the STP.

Figure 5.5.2 provides a visual representation of the parameters affected during the construction and operation phases.

(2) Positive Impacts

The construction of new sewerage facilities and the treatment of sewage from Tirana Municipality will improve the quality of life and the life style of the residents. Better sanitation facilities will improve health conditions and produce a cleaner environment. The risk of contagious diseases will be minimized and perhaps removed. Provision of sewers would reduce the chances of groundwater contamination and contamination of the water supply pipelines. This would further reduce the incidence of diseases, improve health and improve the economic well being of the community. Also, the current practice of discharging sewage into road drains, streams and the Lana River (this practice produces foul smells and is unsightly) will cease. The overall aesthetics of the community will improve, which will have a positive impact on the economy and on the tourism industry. The positive impacts are summarized below:

- The collection and treatment of untreated sewage before it enters Lana River and its tributaries will improve the river water quality.
- Proper collection, treatment and disposal of sewage will reduce the risks of parasitic infections and incidence of various diseases.
- An appropriate 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 flora and fauna.
- Controlled reuse of sewage sludge may be enhanced agricultural activities and development and also sustenance of environmental protection.
- The project will encourage economic growth through commercial and industrial activities. The project will also improve employment opportunities and economic growth in the project area.
- The treated water will be rich in nutrients and can be used for irrigation.

Beneficial impacts from the project will not be visible during the construction phase. During construction most of the impacts are negative. However, the impacts during construction are normally of short duration and are temporary. The construction phase of the project would result in the benefit of employment opportunities for the local population, and the associated increase in trade and business. This would have a positive impact on the economy and the population during the construction phase.

In summary, the overall socio-economic impact is expected to be positive, largely because the residents within the project area will benefit from improved public health.

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
Air Quality	■	■	■	■	■			■	■		
Noise / Vibration	■	■	■	■	■			■	■		
Water Environment	■	■	■			■			■	■	■
Soil Quality	■	■		■	■	■					■
Flora & Fauna	■									■	
Land use	■	■					■			■	■
Socio-Economic			■			■	■		■	■	
Public Health			■	■	■	■			■	■	■
Land Acquisition	■										
Traffic	■	■	■								■
Worker Health			■			■					

Figure 5.5.2 Impact Identification Matrix

(3) Impacts on Socio-Economic Environment

1) Land Acquisition / Resettlement

It is expected that 47 ha of land will need to be acquired to provide for the proposed STP. The selection of the STP site had been done with consultation of the Mayor of Kashar Commune and a topographic survey and geological investigation for the STP site had been done with consultation and assistance of Kashar Commune. Our field reconnaissance identified that main impacts during construction would be loss of agricultural land and might be loss of a few village houses. Resettlement of the village houses can be avoided by the proposed layout plan of treatment facilities shown in *Figure 5.5.3*. A map of the land use in the area of the proposed STP was obtained from the Real Estate Registering Office. However, it has been difficult to obtain the name of each landowner. The map (refer the Figure 5.3 in Appendix 13) shows that the site is divided into many lots. Assuming that each lot belongs to a different landowner, it is expected that more than 80 landowners could be affected by need for land acquisition. The land acquisition should be done according to the Albania laws mentioned in the Section 5.5.3 and proper compensation by alternative land or money should be ensured.

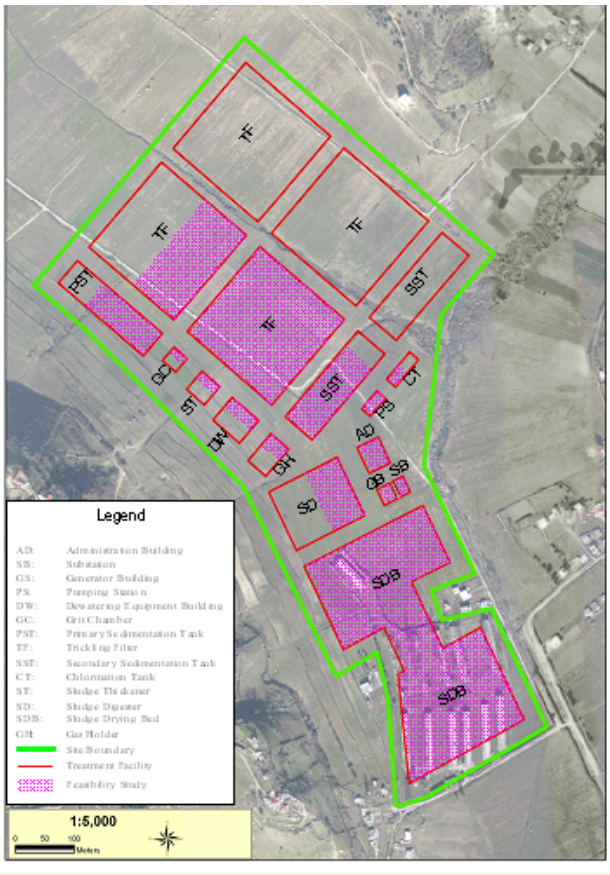


Figure 5.5.3 Location of Proposed STP

2) Economic Activities

In general, the construction of the STP and sewer lines will improve the annual income of a few families by creating temporary job opportunities in the form of construction laborers, tradesmen and contractors. This impact will be beneficial. The sale of private land may also profit the local landowners.

3) Traffic and Public Facilities

Currently the traffic in Tirana Municipality is heavy. The transportation of construction materials through the municipality will increase traffic congestion within the municipality limits. Pedestrian movement will be hindered during the construction of sewer lines. The road passing near the proposed STP site is narrow and unpaved, which will make movement of resident and construction staff vehicular traffic difficult during the construction phase. These impacts will be temporary and short term.

The three steel electricity towers that are currently on the STP site will need to be relocated. The removal and transfer of these towers should be done in close consultation with the electricity company.

4) Cultural Property

There are no cultural assets within the project area. Therefore there will be no cultural impact. Regardless, the construction phase will not last long and will not involve blasting or any other techniques that might damage or weaken any nearby archaeological heritage.

5) Public Health Condition

The nearby residents will experience slightly reduced air quality and increase noise during the construction phase. However these impacts will be temporary. Once the proposed facilities begin operation there will be an improvement to the public health of the community because sewage that is currently discharged directly into rivers and streams without treatment will be collected and treated.

6) Waste

Spoil will be generated during construction. The spoil will include vegetation that is removed during site clearing, excess earth, excavation, etc. The spoil must be disposed of in a proper manner at pre-identified safe disposal sites.

On average, the sludge produced by the STP will be 22.6 tons /day (as wet sludge). The sludge will either be dried on sludge drying beds or by using de-watering machines. The dried sludge can be used as fertilizer by farmers or a material for cement, if there is demand. Otherwise the sludge should be disposed of at an appropriate landfill site. Landfills that accept domestic waste can also accept sludge for disposal. The existing landfill site (Sharra) has sufficient capacity to receive sludge from the STP for a few years. The World Bank proposed new landfill sites in the "Strategic Plan for Greater Tirana, 2002". The new landfill sites will be able to receive sludge from the STP.

(4) Impacts on the Natural Environment

1) Soil Quality

When the sewers are being laid, topsoil will be displaced and permanent loss of topsoil may occur unless it is appropriately stored and subsequently replaced. The surplus earth after raising levels and refilling sewers should be disposed of in an environmentally safe manner. Regardless of the location of the STP site, the topsoil in the area that will be covered by the treatment units (sedimentation tank and trickling filter structure) will be lost.

2) Groundwater

No aquifer passes through the proposed STP site. Therefore the chance of groundwater contamination is quite low. However, the hydro-geological map identifies that there are two wells near the site. If these wells are still in use, the monitoring of water quality will be necessary.

3) Hydrological Situation

Overall, the sewage treatment proposal will positively impact on the receiving water bodies because untreated sewage will no longer be discharged into rivers, streams or drains. Water quality data indicates that most of the Lana River is polluted. Operation of the STP will reduce the pollutant load by 13.6 tons BOD_5 / day, and it will contribute to improving the water quality in the Lana River in Greater Tirana.

The STP effluent will be discharge into a nearby stream. This stream is a tributary of Lana River. It is expected that 77,100 m^3/d of effluent will be discharged into the stream after completion of the Priority Project. Followings are a summary of the impact assessment of effluent on the flow capacity of the receiving water body:

Impacts of effluent discharge on the receiving water body were examined and described in detail in the section of 9.6 of the Supporting Report. The impacts were assessed at two locations of the stream where the river section survey were conducted: one (No. 14) is located near a planned discharge point and the other (No. 15) is located near where the stream joins the Lana River. The assessments were conducted under the following conditions: the design hourly maximum flow of the Kashar STP of 365,400 m^3/d (4.3 m^3/s) at the target year of 2022 was applied and a storm-water runoff from the catchment area was calculated by the rational method with rainfall intensity of 30-year return period. The assessment results showed that the stream had enough flow capacity against the total flows of the effluent and the storm-water runoff: 37.84 m^3/s > 20.54 m^3/s at No.14 and 52.77 m^3/s > 27.63 m^3/s at No.15

(5) Environmental Pollution

1) Air Pollution

No serious air quality impacts are expected. The main air quality impacts resulting from the project would be dust generated by the construction activities. The increase of traffic around the site during the construction period would also generate dust. The dust emissions could be controlled by implementing appropriate construction methods, such as spraying the sites and roads with water. Overall, no appreciable adverse impacts on air quality are expected during either the construction or operation period.

2) Water Pollution

During the construction period, sediments and soil may be washed from the construction site into the river, causing turbidity.

Kashar STP will reduce the pollutant load by 13.6 ton/day of BOD_5 after the commencement of its operation. This will improve the water quality in the Lana River described in the section 11.4 of M/P and the section 5.5.4 (1) as well as the quality of life for those living in the proposed project area.

3) Noise and Vibration

Noise will be generated during the construction period by on-site labor, and the operation of light and heavy construction machinery including pneumatic tools (bull dozers, scrapers, concrete mixers, pumps, vibrators, cranes, compressors etc.) and vehicles etc. The noise level is expected to be in the range from 80 – 95 dB(A). The noise will be intermittent and of short duration, and will mostly occur during the daytime. Therefore, no significant noise impact is expected.

4) Odor

Without appropriate operation, the STP would generate odor. When the facilities are not operated properly, the expected odor generation source will be the sludge handling system such as sludge drying beds / de-watering machine.

5.5.4 Analysis of Alternatives

(1) With and Without Proposed Project

If the project is not implemented (without project scenario) the risks of degraded public health will increase; biodiversity values will decrease; and there will be a decline in the local economy.

If the project is implemented (with project scenario), sewage that is currently discharged into the rivers will be treated from 2014. If the project is not implemented, untreated sewage will be discharged into the Lana River, degrading its water quality and river environment. Estimates indicate that BOD_5 in the Lana River (at the reference point of F1) will increase to 101 mg/l if the project is not implemented, currently the BOD_5 is 95 mg/l. If the project is implemented the BOD_5 value will decrease to 13 mg/l.

(2) Alternatives

In Chapter 10, Part I of this report, various alternatives are proposed and compared to select the best sewerage system for the Greater Tirana area. The alternatives are prepared considering: 1) locations of STP, 2) Trunk sewer routes and total sewage conveyance system, and 3) sewage treatment level and service area.

Through the comparison of the alternatives, the proposed sewerage development plan up to the year 2022 is selected as the best plan in which the proposed sewerage projects would be mostly realized, technologically sound, financially and economically feasible and environmentally and socially sound.

The proposed priority project that is planned to be implemented as the first stage project is selected based on the evaluation using the following criteria:

- Beneficiaries: Direct and Indirect;
- Pollution Load Reduction;
- Treated Sewage Quality and Flow;
- Operation and Maintenance Requirements;
- Project Cost (Direct and Indirect Costs);

- Operation and Maintenance (O&M) Cost;
- Environmental and Social Impacts; and
- Promotion and Public Awareness.

5.5.5 Environmental Management Plan (EMP)

Environmental Management Plan (EMP) consists of the set of mitigation, monitoring and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels.

(1) General Mitigation Measures

1) Construction Phase

The impacts during construction phase are outlined in section 5.5. The following measures should be implemented to mitigate these impacts:

- Minimum the damage to existing flora and fauna, structures, electricity and telephone cables.
- Minimize disturbance to local activities and business.
- The sewer pipes should be stacked properly in pre-determined locations to avoid blocking pedestrian access alongside the roads.
- Earth stockpiles should be managed to prevent soil washing 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 lakes, rivers and irrigation canals.
- Dust pollution should be controlled by implementing the measures outlined in Appendix 13.
- Pavements and roads should be repaired immediately after construction. The project site and surrounding area should be restored as far as possible to pre-project conditions.
- Adequate measures should be taken to minimize construction related noise.
- Proper precautions should be taken to minimize the risk of accidents.

2) Operation Phase

The impacts during operation phase are outlined in section 5.5.3. All these adverse impacts have been taken into consideration. The detail mitigation measures are described in Chapter 7 of Appendix 13. The major mitigation measures are summarized below and *Table 5.5.5*.

- 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 should be taken when exceedances are noted.
- 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 to provide for good health and safety of the operating staff and the general population.

Table 5.5.5 Environmental Mitigation Measures

	Environmental Issues	Adverse Impact	Nature of Impact	Proposed Mitigation Measures	Implementing Authority
1. Construction Phase					
1.1	Land Acquisition	• Inadequate compensation • Relocation trauma and infections and other diseases in the new location	Significant and Permanent	• Minimize relocation • Advance realistic payments to be made to relocated (estimation for compensation for land and property should be made on the prevailing market rates) • Provision of clean drinking water, sanitation, proper drainage at new locations	Tirana Municipality/ Kashar Commune, Joint Authority
1. 2	Existing Infrastructures	• Site clearance and works • Damage existing structures • Affect electricity supply and telecommunication lines, • Clutter road sides with pipes, • Cause general nuisance to public.	Not Significant and temporary	• Minimum damage to existing structures, flora and fauna, avenue trees and other natural vegetation, electricity & telephone lines and other infrastructure services • Cleared earth and debris should be properly disposed off • Storage sites should be identified for stacking pipes so as not to clutter road sides	Contractor
1.3	Traffic	• Traffice jams, bottlenecks, delaye and inconveniences to general public • Serious disruptions of vehicular traffic, pedestrian access and commerce	Significant and Temporary	• Co-ordinate and plan all activities in advance • Adequate actions to direct traffic in consultation with traffice police • Minimize vehicle movements • Preference for unused or low traffic roads • Construction of temporary roads and diversion of traffic • Use local construction materials to avoid long distance transportation, especially of earth and stones • Seek publice co-operation through public awareness	Contractor/ Joint Authority / traffic police
1.4	Cultural/ Archaeological Relics	• Loss of information / relics of historical / archaeological or religious importance • Legal problems and delays can arise if not handled properly	Significant	• If fossils, coins artefacts of value or antiquity, structure and remains of geological or archaeological interest are found, the local government should be immediately informed and excavation should be stopped until idenficiation of cultural relics by authorized institutions is completed.	Contractor/ Joint Authority/

	Environmental Issues	Adverse Impact	Nature of Impact	Proposed Mitigation Measures	Implementing Authority
1. Construction Phase					
1.5	Social Disruptions	• Disruptions in utility services • Social hostility due to employment of outsiders on construction activities	Significant and Temporary	• Minimize interruptions to services through proper planning and scheduling of activities and strong inter-departmental co-ordination • Preference should be given to local labor / skilled persons during construction, operation and maintenance	Joint Authority/ Traffic Police/ Contractor
1.6	Public and Workers' Health	• Adverse health of workers due to unsanitary practices and spreading of diseases from vectors	Significant and Temporary	• Workers are the immediately affected people • Proper sanitation and drinking water should be provided • Medical facilities to be provided to prevent communicable diseases	Contractor/ Joint Authority
1.7	Loss of Natural Vegetation	• Loss of avenue trees and natural vegetation expecially in the clearance for treatment plant site	Significant and Permanent	• Replantation on treatment plant area, as well as around the periphery (usually ten trees should be planted for every tree felled) • Replantation of avenue trees and ensuring proper care for growth	Joint Authority/ Contractor
1.8	Water Quality/ Drainage	• Increase in turbidity affecting surface water quality • Sanitary pollution	Significant	• Ensure steps to prevent earth and stone from silting up the drainage systems • Control run off and soil erosion through proper drainage channels and structures • Provide adequate sanitation facilities to construction site workers	Contractor/ Joint Authority
1.9	Landscape	• Visually anaesthetic conditions due to cluttering of waste, and spols, dup up roads and pavements	Significant and Temporary	• Enhance aesthetics through proper housekeeping of construction site • Disposal of construction wastes at the approved sites quickly • Repair pavements and roads after sewer laying work is completed • Completing the construction activity by removing all spoils	Contractor

	Environmental Issues	Adverse Impact	Nature of Impact	Proposed Mitigation Measures	Implementing Authority
1. Construction Phase					
1.10	Soil Quality	• Due to excavation and earthwork: soil erosion, loss of top soil, silting and blocking of drainage / stream, which can cause slush; damage to existing structures • Due to compacting: loss of original quality, reduction in fertility	Significant and Permanent	• Stabilize all slopes with provision of benches / pitching • Avoid earthwork during heavy rainy season • Provide adequate cross drainage / stream facilities • Restrict traffic movements and use low ground pressure machines • Preserve top soil to be replaced after the completion of construction activity; avoid wet soils • Dispose of surplus earth after raising levels and refilling sewers, in low lying areas with proper compacting and planting of surfaces • Plant shrubs / trees / grass on exposed slopes and surfaces	Contractor
1.11	Air Quality	• Localized increas in dust due to excavation & earthwork • Temporary increase in the levels of SO_2 / NO_x from construction equipment and vehicles	Significant and Temporary	• Dust dontrol through sprinkling / washing of construction sites and access roads particularly in congested areas • Use of dust cover over construction material • Dust collectors should be used in all drilling operations • Unnecessary idling of trucks should be avoided • Construction material trucks to be covered to minimize spills • Preventive maintenance of construction equipment and vehicles to meet emission standards • Construction requiring heavy traffic street closing / diversion should be carried out during night time	Contractor

	Environmental Issues	Adverse Impact	Nature of Impact	Proposed Mitigation Measures	Implementing Authority
1. Construction Phase					
1.12	Noise	• Increase in noise levels due to construction work, transport of construction materials etc.	Significant and Temporary	• Equipment emitting noise over 90 dB(A) should be avoided • Where residences are located within 200 m and in sensitive areas like hospitals, schools, zoos, noisy construction work should be carried out in day time only • Equpiment maintenance strengthened to keep them low noise • Sound barriers should be installed if needed	Contractor
1.13	Risk of Accidents	• Endangering lives of people / workers during construction due to inadequate safety measures	Significant	• Adequate traffic control measures should be taken • Sign board warning presence of open sewer laying • Guard rails to protect pedestrians • Strong safety policy for workers; protective helmets to be provided	Contractor/ GTW&SA
1.14	Construction Camps	• Prevalence of unsanitary conditions and practices like open air defecation • Possibilities of public health problems • Pilling of garbage from workers	Significant and Temporary	• Adequate measures such as provision of septic tanks / pit latrines around the construction camp sites • Provision of clean drinking water • Collection of garbage in gargabe cans n fixed places and disposal of it regularly	Contractor

	Environmental Issues	Adverse Impact	Nature of Impact	Proposed Mitigation Measures	Implementing Authority
2. Operation Phase					
2.1	Public Health	• Mixing of sewage with drinking water • Outbreak of waterborne diseases • Unhealthy conditions: mosquito breeding over sludge drying beds, etc.	Significant	• Any such health risk to public should be minimized by proper maintenance and operation of sewers, pumping station, treatment plant etc. • In case of failure, inform relevant authorities to alert public at risk so that precautions might be taken	GTW&SA/ Operator
2.2	Workers Health & Safety	• Workers may be inflicted by endemic & other diseases respiratory ailments • Accidents and loss of lives may occur during sewer cleaning & maintenance • Non availability of emergency medical facilities at all times during day & night	Significant and Permanent	• Proper house keeping of the treatment plant to prevent unsanitary conditions • Regular medical check ups and immediate treatment of affected workers • Maintenance personnel should not perform dangerous tasks when alone, enter the manholes without checking for gas and without proper protective clothing, enter the manholes without ropes and harnessess firmly tied • Manholes should not be left open especially in busy roads, near schools and residential areas	GTW&SA/ Operator
2.3	Social Disruptions	• Breaking of sewer lines by farmers for irrigation as sewage would be a continuous source of water for irrigation	Significant	• The sewers should be patrolled and any unauthorized human activity should be discouraged • Farmers should be educated on health effects of using untreated sewage for irrigation, especially the effect of sewage flooding due to breakage of sewers with risks of epidemics	GTW&SA/ Operator / NGOs
2.4	Sludge Treatment & Disposal	• Improper treatment of sludge could lead to putrefaction and other related problems such as bad odor, health effects etc.	Significant	• Sludge should be treated properly and dewatered • Dried sludge should be disposed of in a specified landifill site (i.e. Sharra Landfill Site) with proper precautios or given for land application fo farmers, if it can be handled properly by them • The close cooperation should be required with Tirana Municipality for the new landfill site which is proposed by the World Bank.	GTW&SA/ Operator

	Environmental Issues	Adverse Impact	Nature of Impact	Proposed Mitigation Measures	Implementing Authority
2. Operation Phase					
2.5	Landscape	• Pumping stations, treatment work site might pose an unaethetic sight but is affects only close residents	Not significant	• Sewage plant should be located away from the densely populated residential areas • Plantation of trees in and around the punping station / treatment plant would improve the aesthetics	GTW&SA/ Operator
2.6	Water Quality	• Overflow of sewers and breakdown of treatment plant leading to failure in meeting the requisite standards • Poor performance will affect the receiving water body and also the proposed reuse for irrigation	Significant	• Preventive maintenance of all components should be performed regularly • Relevant standby equipment and spare parts should be provided; standby power generation should be provided at pumping station, if any • Proper response plan must be prepared and all workers must be trained to tackle emergencies	GTW&SA/ Operator
2.7	Air Quality	• Problems of bad odor from the treatment plant	Significant	• Some odor from treatment plant is unavoidable; however, steps should be taken to minimize odor by proper maintenance and housekeeping of the treatment plant	GTW&SA/ Operator
2.8	Odor	• If the treatment plant is not propery operated and maintained, the odor might be generated.		• The treatment plants should be properly operated and maintained. • To prevent the spread of odor, a plantation of trees for formulating buffer zone should be done at the whole boundary of the plant site.	GTW&SA/ Operator

(2) Monitoring Plan

Regular monitoring of key environmental parameters will be undertaken by an operation body (the proposed GTW&SA (ex-UKT)) with the help of external agencies. This monitoring will help determine the effectiveness of the EMP. The monitoring schedule and parameters to be monitored are described below.

1) Sewage and Effluent Quality

Sampling and analysis of the influent and effluent will help check the performance of the treatment plant. Daily analysis of parameters such as pH, transparency and SS, and weekly monitoring of BOD_5 and COD will be undertaken. The monitoring results will be provided to the Director of sewerage sector of GTW&SA for review. The Director will be responsible for checking that the treatment plant is operating properly and that no environmental pollution occurs.

2) Water Quality in the Receiving Water Body

The river water quality is measured by the government institutes, the Institute of Hydrometeorology and the Institute of Environmental Protection at upper, middle and lower stream of the Lana and the Tirana Rivers at present. In close cooperation with these institutions, the executing body of the project and the operator of GTW&SA shall collect monitoring data at the upper, middle and lower stream of the Lana and the Tirana Rivers, for examples at the reference points selected for the future water quality, to show the impacts of sewage treatment to the water quality improvement of the receiving water body.

3) Air Quality, Noise Monitoring, Groundwater and others

Environmental monitoring is conducted by other institutions under the MoEFWM. The monitoring of air, noise and meteorology is conducted by the Institute of Hydrometeorology. The Institute of Geological Survey is responsible for groundwater monitoring. The GTW&SA should monitor air quality, noise and groundwater in close cooperation with these institutes.

Table 5.5.6 shows the environmental monitoring items and institutions which are conducted by the request from MoEFWM.

Table 5.5.6 Environmental Monitoring Conducted by Various Institutions

Subject	Institution	Measurements	Frequency and Place
Groundwater	Geological Survey	• Na^+, K^+, Ca^{2+}, Mg^{2+}, Fe^{2+}, Fe^{3+}, NH_4^+, HCO_3^-, CO_3^{2-}, Cl^-, SO_4^{2-}, NO_3^-, NO_2^-, mineralization, hardness • Cu, Pb, Zn, Cr • Pesticides • Microbiological	• Twice a year, 25 observation points in 6 water basins • Twice a year, 9 points • Twice a year, 25 points • Twice a year, 25 points
Rivers	Institute of Hydrometeorology	Temperature, pH, alkalinity, dissolved oxygen, Ptotal, NO_3^-, NO_2^-, NH_4^+, BOD_5, COD	Twice a year, 13 points in 13 rivers
	Institute of Public Health	• Ptotal, NO_3^-, NO_2^-, NH_4^+, BOD_5, COD, turbidity, alkalinity • Microbiological analysis (total Coli, Faecal Coli, Faecal Streptococcus)	• Once a month, 32 points in rivers near Tirana, Shkoder, Durres, Elbasan, Sarande, Vlore • Twice during summer, 3 points
	Institute of Nuclear Physics	• Cl^-, K^+, Ca^{2+}, Ti, Va, Mn^{2+}, Fe^{2+}, Fe^{3+}, Ni, Cu^{2+}, Zn^{2+} • Beta activity	• Twice a year, 13 points • Twice a year, 13 points
Air	Institute of Public Health	SPM, PM10, black smoke, SO_2, NO_2, O_3, Pb	Five days a month, 12 stations
	Institute of Nuclear Physics	• Beta total • Pb, Cu, Hg, Cr	• Four times a year, 3 points • Four times a year, 2 points
Noise	Institute of Public Health	Noise	10 day intervals for each season, three times a day. 9 poinst in Tirana
Soil	Institute of Soil	• In inducstiral area; heavy metals (Zn, Cu, Co, Cr, Ni, Pb, Fe, Mn, Mg, Na, K, P) • Soil fertility in agricultural land (pH, Na, Cl, SO_4, P, K, Mg, Ca, N); erosion	

Source: Environmental Performance Review of Albania, United Nations, 2002

4) Odor Monitoring

There are no regulations or quality standards to monitor the odor, and odor problem will not happen when the STP is properly operated and maintained. Thus, the installation of analytical equipment or analysis of odor are not included in the monitoring plan, however, the chemist working in the laboratory in the STP will monitor the odor by walking around the STP twice a month. And if the odor is identified, the chemist reports it to the Director of the Sewerage Sector and the Director will take the appropriate actions to identify the reasons and to execute appropriate measures such as proper handling of screens and proper operation of sludge treatment. The monitoring cost is included in the O&M cost of sewage treatment plants.

(3) Responsible Organization of EMP

The success of an EMP depends on the efficiency of the organization responsible for its implementation.

During the construction phase, the contractor will be responsible for implementation of the mitigation measures. The contractor should be supervised by the consultants and the executing body (may be the proposed Joint Authority). During the Operation phase, GTW&SA will have the overall responsibility of sewerage facilities. The Director of the Sewerage Sector of GTW&SA will be responsible for implementing the EMP during operation of the STP. The responsibilities of the Director are:

- collecting effluent and sludge quality data;
- implementing the mitigation measures;
- monitoring of sludge treatment, disposal and re-use if it is applicable;
- collection of statistics on the health of workers and the local population;
- ensuring the development and maintenance of the green belts;
- monitoring the progress of the EMP implementation; and
- coordinating the environmental activities within the project as well as with external agencies.

(4) Cost Estimate for EMP

The impact mitigation measures suggested in this report naturally involve certain costs, but they are insignificant when compared to the total project cost. The Environmental Mitigation Management Plan cost includes mainly the plantation around the treatment plant site. The plantation cost of 35 million Leks is estimated for planting trees necessary for formulation of buffer zones around the whole site boundary. This cost is included in the direct construction cost of Sewerage Treatment Plant.

This cost estimate does not include: (i) the environmental monitoring, which is categorized with sewage treatment plant operation; (ii) the land acquisition costs and other compensation costs, which are categorized with the project investment costs; (iii) the costs of closing of trenches, cleaning of debris, soil compaction and relaying of roads which are included in the construction works.

The construction phase EMP is to be incorporated at the planning and design stage and should form a part of the contract given out for construction (most of mitigation measures suggested would fall under this category).

(5) Environmental Training

To be successful, the EMP must be implemented by trained and skilled staff. The training of staff is required not only for day-to-day operation and maintenance of the STP, but also for environmental management. Staff who will be responsible for implementing the EMP and the operation of STP should be involved during the construction phase. Also, staff should be trained in the correct way to undertake the mitigation actions and for the day-to-day monitoring that is required during operation.

The training should include:

- operation and maintenance of the sewage treatment plant;
- emergency preparedness to handle unexpected situations;
- principles of sewage / wastewater analysis;
- other environmental monitoring techniques;
- development of the green belt and its maintenance; and
- communication with farmers and the general public.

This training is different and is required in addition to the mandatory training required for operation and maintenance of the STP.

(6) Risk Analysis and Contingency Plan

1) General

The sanitation project includes sewer laying, construction of pumping stations and the sewage treatment plant, and their operation. Risks associated with laying the sewers are mainly for the larger pipelines that require cranes for lifting. It is important to consider and plan for the risk of mechanical equipment failure and the possibility of resulting accidents.

Contingency plans have been prepared to include measures that mitigate:

- sewage treatment activities that could reasonably be expected to cause significant environmental impacts as a consequence of operational disruption (e.g. poor maintenance, breakdown).
- accidents which may occur while laying sewers or during construction of the treatment works.
- discharge of sub-standard sewage into the environment from STP. Such discharge could cause a significant public health impact. Therefore, continuous monitoring of influent and effluent is required to identify potential problems as and when they arise.

When preparing the contingency measures:

- the most likely causes of process disruption / breakdown were identified;
- an attempt was made to estimate their probability of occurrence;
- the possible resulting adverse, environmental impacts were estimated;
- the recommended courses of action to minimize the severity of the impacts were highlighted; and
- the agency responsible to act in case of emergencies has been indicated.

Table 13.8.1 of Appendix 13 presents the potential construction, operation and maintenance risks, and identifies corrective actions.

5.5.6 Conclusions and Recommendations

The objectives for implementing this sewerage project in Greater Tirana are to:

- improve the sanitary conditions for the communities; and

- stop the discharge of untreated sewage into Lana River, thereby improving the water quality.

These objectives mean the project will, in general, have the positive impacts such as improvement of water environment and the public health.

The negative impacts on traffic flow, air, noise, and public utilities during construction phase, noise, odor and water environment during operation phase have been identified. But these impacts during construction would be temporary and both impacts during construction and operation could be minimized by implementing appropriate mitigation measures.

In general it can be concluded that the priority project would have a positive effect in that it would improve the river water quality. The mitigation measures, if implemented correctly, will not have any adverse impacts on the environment.

However, these recommendations should be followed by Albanian Government.

- 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.
- 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.
- 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.
- 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.
- The environmental monitoring should be conducted in close collaboration with other institutions such as Geological Survey, Institute of Hydrometeorology and Public Health. Joint Authority and GTW&SA should consult with MoEFWM and institutions regarding monitoring system.

To achieve the objectives of sewerage development, i.e. contribution to water quality improvement in the Lana and the Tirana Rivers, not only the sewerage project but also the other measurements are required written below:

- Solid waste management in project area is found to be inadequate. Sewerage facilities and rivers are used as dumping grounds for solid waste. This will cause the proposed sewerage facilities to become dysfunctional resulting into serious problems of unhygienic conditions in the city as well as pollution of the rivers. Indiscriminate throwing of solid wastes in the sewers and rivers must be stopped. This requires extensive public awareness / environmental education on the solid waste management and if necessary, stringent laws against this practice be enacted with provision of punishment for violation.
- Discharge of untreated industrial waste into the rivers must be controlled and monitored effectively. The proposed institutional arrangement to strengthen and ensure the coordination of all the concerned parties should be conducted according to the JICA Study.
- If the land use planning will be prepared by Tirana Municipality or other organizations, the planning should be taken account of sewerage planning.

CHAPTER 6

PROJECT EVALUATION

CHAPTER 6 PROJECT EVALUATION

6.1 General

This chapter evaluates the proposed Priority Project (to be implemented as the first stage project for the Greater Tirana area) from technical, economic, financial and environmental perspectives.

6.2 Technical Evaluation

The objectives of the long-term sewerage development plan are:

(1) Contribution to water quality improvement in the Lana River and the Tirana River, by introducing sewage/wastewater treatment; and

(2) Provision of better living and sanitary environments for more people by expanding the sewer system to collect and convey sewage in an appropriate manner.

The proposed Priority Project aims to improve the water quality in the Lana River. The Lana River passes through the urban center of Tirana municipality (the capital city of Albania). The central government offices and central offices for Tirana municipality are located near the river.

Future BOD_5 concentration in the Lana River was predicted at the F1 reference point. The predictions were made for periods of low flow (based on the limited available flow data). The predictions indicate that without the project the BOD_5 concentration could reach 101 mg/L, but with the project the BOD_5 levels are expected to be 13 mg/L. Improved water quality will significantly improve the aesthetics of the river, providing a more enjoyable and relaxing environment. Also, there are plans to install benches along the sidewalks and to revegetate the riverbanks, to further enhance the visual character of the area.

Table 6.2.1 provides the basic planning information for the project.

Table 6.2.1 Planning Information for the Proposed Priority Project

Item		Priority Project	Remarks
1.	**Basic Information**		
1.1	Service Area	2,343 ha	Total Service Area: 9,120 ha Service area 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**		In Kashar STP coverage area
2.1	Branch sewer	Dia. 200mm Length 27.6 km	Dia. 200mm, Length: 60 km

	Item	Priority Project	Remarks
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	
(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	

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

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

Table 6.2.2 summarizes the technical evaluation of the proposed Priority Project.

Table 6.2.2 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 quantity would contribute to improve the current water quality of the receiving water body of which the water is polluted by the direct discharge of sewage. The treated sewage flow would not give adverse impacts to the receiving water body based on the engineering judgement based on the study discussed in the section of 9.6 of Appendix 9 of the Supporitng Report. The impacts of treated sewage quality and flow to the receiving water body are mentioned breifly in the section 5.5.3 (4) 3).
(5) **Operation and Maintenance (O&M) Requirements**	Since the sewage would be conveyed in the proposed Trunk Sewer No.3 by gravity flow, that is no pumping station is required in the Proirity Project. Sinc 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 in section 2.6.2 and the proposal is evaluated in the section 6.5.
(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**	Based on the figures shown in *Table 6.2.1*, the sewer develoment ratio for the Priority Project 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.

6.3 Financial and Economic Evaluation

6.3.1 Financial Viability of the Project

A financial evaluation of the project was undertaken and the resulting FIRR is 7.21 %. 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 result of the analysis indicates that the Project is expected to be financially viable over the project life, and it is expected that sufficient revenue will be generated to compensate for the deficits generated during the construction period.

The above analysis indicates that the Project would be financially viable.

6.3.2 Economic Feasibility

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.

6.4 Environmental Consideration

The EIA study indicated that overall, the project is expected to result in positive benefits for the local people. These benefits are expected to enhance the socio-economic situation and quality of life for the local communities. Therefore, the project is judged to be environmentally feasible.

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.

6.5 Institutional Evaluation

This study makes some institutional recommendations for reform of the water and sewerage services for Greater Tirana. These recommendations do not pose a major risk because existing laws already provide for the decentralization of water and sewerage services to local governments. Also central government and other stakeholders in the water sector have indicated that they would prefer the aggregation of local governments to achieve sustainable water and sewerage services.

However, in the particular case of Greater Tirana, no agreement on forming a Joint Authority has yet been reached. Also there are outstanding legal issues (as set out in section 3.6.4) that require attention by the central government. Unless a timeframe for resolving these issues is set, there is a risk that the decentralization process for Greater Tirana will be prolonged.

6.5.1 Sewerage Management

There is currently a very low level of sewerage management because the only possible management function is maintenance and urgent repairs to the Tirana gravity sewerage pipes that discharge untreated sewage into the rivers. The Priority (First Stage) Project recommends integration of sewerage management into UKT's main stream activities in readiness for the introduction of the trunk and main sewers and a STP. This would be followed by organizational reform of the UKT sewerage sector.

The creation of new units in the sewerage sector would be a relatively easy task because there are suitable skilled personnel in Albania who could establish a capacity building program and conduct the required training.

6.5.2 Engineering Management

The recommended operator is the UKT, (which is now called GTW&SA). This is an existing institution, which has qualified engineers in senior positions supervising technicians with appropriate technical qualifications. The engineering workforce mainly consists of long serving personnel trained on the job. Some staff have enhanced training provided through Italian Cooperation. Engineering tasks have been rationalized and improved by the purchase of computers, and use of appropriate software. Training in the use of this technology was provided through Italian Cooperation. The recommended priority project do not pose any risks provided there is appropriate capacity building and training.

6.5.3 Commercial Management

UKT has an Economic Department, which is staffed by suitably qualified financial personnel. The recent Italian Cooperation intervention improved the computer equipment and software, enhanced the department's capacity, introduced a management information system, and linked some of the financial operations with relevant engineering information.

UKT is a 100% state owned autonomous entity. Some improvements have been made in terms of commercialization. This progress should be maintained under the new local government ownership. Short, medium and long term business plans are required to move towards cost recovery with sustainable levels of service. Significant attention should be paid to the commercialization progress so that risks to financial sustainability are managed.

6.5.4 Capacity Building

It is proposed that institutional capacity building be facilitated by the AWSSA. The AWSSA has a proven track record in implementing information dissemination projects dealing with the decentralization of systems (moving responsibilities from central to local government). The AWSSA also has experience providing institutional and technical assistance to local authorities when they take over ownership of assets and take on water and sewerage services responsibilities. The AWSSA has strong links with central government and donors in the Albanian water sector. The AWSSA has been instrumental in assisting these groups by providing policy guidance.

Considering the financial situation, it is recommended that the AWSSA facilitate capacity building using local resources and where necessary engage overseas consultants to provide specialist input on the Priority Works.

Training being an important component of capacity building can largely be achieved by building in these Training is an important component of capacity building. Therefore, provision for training should be incorporated into the construction and electromechanical contracts for plant design and installation. This training provision should be supported by overseas consultants, where necessary.

It is expected that appropriate capacity building and training will result in management sustainability, and adequate O&M for the Priority Project.

6.6 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.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

CHAPTER 7 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

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).

7.2 Recommendations

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.

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.