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JAPAN INTERNATIONAL COOPERATION AGENCY

MINISTRY OF PUBLIC WORKS, TOURISM AND
TERRITORY ADJUSTMENT
REPUBLIC OF ALBANIA

THE STUDY ON THE SEWERAGE SYSTEM IN METROPOLITAN TIRANA IN THE REPUBLIC OF ALBANIA

FINAL REPORT

SUMMARY

MARCH 1998

NIPPON JOGESUIDO SEKKEI CO., LTD.
TOHMATSU & CO.

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to the request from the Government of the Republic of Albania, the Government of Japan decided to conduct the Study on Sewerage System in Metropolitan Tirana in the Republic of Albania and entrusted the Study to the Japan International Cooperation Agency (JICA).

JICA sent to Albania a study team headed by Mr. Kenji Hori, and composed of members from Nippon Jogesuido Sekkei Co., LTD and Tohmatsu & Co, three times between August 1996 to January 1998.

The team held discussions with the officials concerned of the Government of Albania, and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Albania for their close cooperation extended to the team.

March, 1998

Kimio Fujita
President
Japan International Cooperation Agency

March, 1998

Mr. Kimio Fujita
President
Japan International Cooperation Agency
Japan

Dear Mr. Fujita,

Letter of Transmittal

We are pleased to submit herewith the Final Report of the Study on the Sewerage System in Metropolitan Tirana in Republic of Albania.

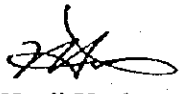
The Study was completed through the discussions with the officials of the Government of the Albania and the field investigation during three visits from August 1996 to March 1998.

The Final Report consists of three volumes consolidating the two progress reports and the draft final report; Volume I – Summary Report which succinctly describes the study and recommendations; Volume II – Main Report which covers not only physical development plans; comprehensive sewerage system plan and feasibility study of the selected project, but institutional and financial strengthening plan for the governments, Volume III – Supporting Report which includes detailed analysis and relevant information.

We hope that the implementation of the proposed sewerage project would greatly contribute to the improvement of water quality in the public water body and sanitation conditions in the study area.

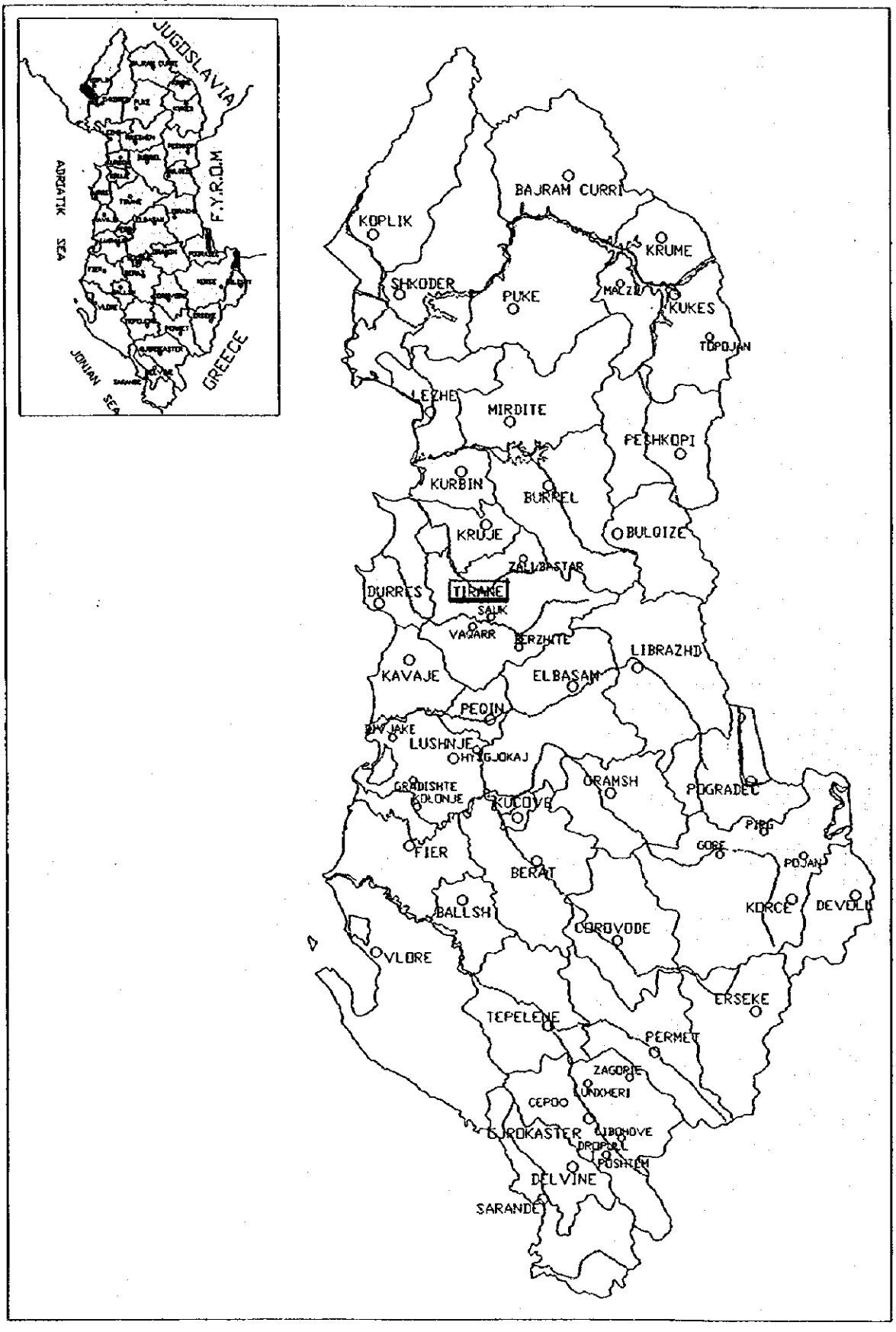
We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs, Osaka Sangyo University, Tokyo Metropolitan Government. We also would like to show our appreciation to the officials of the Ministry of Public Works, Tourism and Territory Adjustment, the JICA Vienna Office and the Embassy of Japan in the Republic of Austria for their kind cooperation and assistance throughout our field survey.

Very truly yours,



Kenji Hori
Team Leader for
the Study on the Sewerage System
in Metropolitan Tirana
in Republic of Albania

Republic of ALBANIA



SUMMARY

TABLE OF CONTENTS

Executive Summary

1. Background of the Study

Construction of the existing sewerage system of Tirana City was commenced in 1938 and majority of its facilities was completed in the middle of 1960s. Due to absence of the sewage treatment facility, the collected sewage has been discharged into rivers resulting serious water pollution in aquatic environment. Since introduction of market economy in 1991, inland migration to the Metropolitan Tirana has rapidly increased and further deterioration of urban environment is feared. In addition to the above, superannuation of sewer pipes and clogging by sediments have become causes of sewage leakage from sewers and contamination to drinking water supply as serious social problems. In this connection, provision of sewage treatment facility as well as cleaning and maintenance of sewer network are indeed required.

2. Objectives of the Study

The objectives of the Study is to prepare the sewerage system development plan for the target year of 2010 and to conduct feasibility study of the proposed project. Preliminary design of urgent and priority project is also included in the part of the Study.

3. Study Area

The Study Area is defined to cover a total of 12,000 ha including Tirana City and residential suburban areas within the Metropolitan Tirana Area. The Metropolitan Tirana area and the Study Area are shown in Figure 1.

4. Present Conditions and Evaluation of the Existing Sewerage System

The existing sewerage service area covers 1,244.8 ha including built-up area of Tirana City wherein approximately 338,000 persons are served. The present service area of the sewerage system is subdivided into 5 zones by drainage area of interceptor main and its lateral sewers as shown in Table 1.

Figure 1 **Summary of Study Area**

Table 1 Area and Served Population by Drainage Zone

Drainage Zone	Area (ha)	Served Population (person)
1. Tirana-South	213.6	47,914
2. Central	183.2	46,791
3. Lana-North	396.2	117,262
4. Lana-South	380.6	108,070
5. Kombinat	71.0	17,640
Total	1,244.8	337,383

The existing sewerage system of Tirana City is so called the combined sewage collection system, but its actual status is rather different from the commonly known concept of the combined sewer system. Whole of the existing sewer network was designed to meet the planned sewage flow as 3 to 5 times of sanitary sewage flow. Thus, most of stormwater can not be accommodated to the sewer network and drained by means of surface run-off resulting inundation of roads and residential areas.

The hydraulic simulation was carried out to evaluate capability of the existing sewers based on the design criteria adopted to the Study in compliance with the currently applied method in Albania. This simulation has revealed that about 80 % of the total length of major sewer pipes do not have sufficient hydraulic capacity and necessitate thorough improvement/renovation.

5. Sewerage System Development Plan

5.1 Principal Approach to Sewerage System Planning

Plan for overall improvement/renovation of the existing sewer network based on the design criteria adopted in the Study was determined to be not appropriate to adopt in the proposed project, since it will require huge capital investment and implementation period. Stormwater drainage facilities as urgent countermeasures to relieve inundation was, however, prepared for the frequently damaged areas.

5.2 Overall Plan and Preliminary Design of Sewerage System

5.2.1 Design Conditions

(1) Planned sewerage service area

A total of 1,810 ha consisting of the existing service area (1,245 ha) and the suburban areas (565 ha) having rapid increase of population and urbanizing areas was delineated as the planned sewerage service area.

(2) Planned population to be served in 2010

525,200 persons

(3) Planned sewage flow in 2010

105,400 m^3/day

(4) Planned sewage quality

Influent:	BOD	200 mg/l	SS	200 mg/l
Effluent	BOD	25 mg/l	SS	35 mg/l

5.2.2 Sewerage System

(1) Sewage collection system

The combined sewer system, which is same as the existing sewage collection system, is adopted for the proposed project. For the expansion area (suburban area) of public sewerage service, Separate sewer system is adopted and only main sanitary sewer is planned to be installed in the proposed project, in due consideration of:

- the expansion area does not have urgency and difficulty on stormwater drainage, and
- the unnecessary overlapping investment shall be avoided because of uncertainty on future sewage collection system in this area.

(2) Sewage treatment system

The aerated lagoon method is selected as the most optimum treatment process based on the overall considerations on:

- technical level of operation and maintenance in Albania,
- operation and maintenance cost, and
- required area of sewage treatment plant.

(3) Outline of major sewerage facilities in the whole plan

Name of Facilities	Specifications
1. Sewer Network	
1-1 Trunk Main	ϕ 1,200 to 1,700 mm, 24.1 km
1-2 Main Sanitary Sewer in Expansion Area	ϕ 200 to 700 mm, 28.2 km
1-3 Replacement/Augmentation of Interceptor Main	ϕ 700 to 1,900 mm, 10.6 km
1-4 Urgent Inundation Countermeasure	36 places
2. Sewage Treatment Plant (Aerated Lagoon)	
2-1 Complete Mixing Aerated Lagoon	75 m x 89 m x 3 m, 8 basins
2-2 Partial Mixing Aerated Lagoon	75 m x 43 m x 3 m, 24 basins (2 basins)
2-3 Chlorine Disinfection Chamber	5 m x 240 m x 3 m, 2 basins
2-4 Stormwater Settling Basin	15 m x 38 m x 3 m, 8 basins (2 basins)
2-5 Administration Building	250 m^2
3. Sewer Pipe Cleaning Equipment	2 sets

(4) Sludge treatment and disposal

Accumulated sludge in partial mixing aerated lagoons are scheduled to be removed from two (2) basins at one time in every half year interval, after disposal of supernatant and natural drying. Removed sludge will be brought to sanitary landfill at the garbage dumping site.

5.3 Outline of the Priority Project

Out of the above mentioned overall plan for sewerage development, facility planning and preliminary design of priority project was prepared focusing onto prevention of further water pollution and improvement of aquatic environment in the Lana River running across the center of Tirana City.. Outline of the priority project is summarized below:

(1) Planned sewerage service area

A total of 842.2 ha consisting of the existing service area (1,244.8 ha) in the Lana-North and the Lana-South areas and three suburban developing areas (65.2 ha) was identified as the planned sewerage service area.

(2) Planned population to be served in 2001

254,000 persons

(3) Planned sewage flow in 2001

50,800 m^3/day

(4) Planned sewage quality

Same as the overall plan

(5) Outline of sewerage facilities

Name of Facilities	Specifications
1. Sewer Network	
1-1 Trunk Main	ϕ1,3500 to 1,700 mm, 13.5 km
1-2 Main Sanitary Sewer in Expansion Area	ϕ200 to 400 mm, 3.3 km
1-3 Replacement/Augmentation of Interceptor Main	ϕ900 to 1,500 mm, 6.6 km
1-4 Urgent Inundation Countermeasure	36 places
2. Sewage Treatment Plant (Aerated Lagoon)	Half of the overall plan
3. Sewer Pipe Cleaning Equipment	2 sets

6. Project Implementation Plan

6.1 Project Cost

Unit: Thousand US$

Cost Item	Project Cost		
	Phase 1	Phase 2	Total
1. Construction Cost			
1-1. Sewer Network	13,174	10,167	23,341
a. Trunk Main	8,849	5,332	14,181
b. Main Sanitary Sewer in Expansion Area	205	1,890	2,095
c. Replacement/Augmentation of Interceptor Main	4,030	2,945	6,975
d. Urgent Inundation Countermeasure	90	-	90
1-2. Sewage Treatment Plant	7,001	6,592	13,593
a. Civil Work	3,786	3,786	7,572
b. Mechanical/Electrical Work	3,215	2,806	6,021
1-3. Administration Cost	1,431	1,431	2,862
Sub-Total	**21,606**	**18,190**	**39,796**
2. Procurement of Sewer Pipe Cleaning Equipment	**1,078**	**155**	**1,233**
3. Engineering Service			
3-1. Detailed Design	1,000	700	1,700
3-2. Construction Supervision	800	800	1,600
Sub-Total	**1,800**	**1,500**	**3,300**
Total of Construction Cost	**24,484**	**19,845**	**44,329**
4. Common Expenses			
4-1. General & Administrative Expenses	300	300	600
4-2. Land Acquisition	2,600	2,100	4,700
Sub-Total	**2,900**	**2,400**	**5,300**
5. Contingency	**4,108**	**3,337**	**7,445**
Grand Total	**31,492**	**25,582**	**57,074**

6.2 Project Implementation Schedule

Project Activity	Phase 1				Phase 2			
	1998	1999	2000	2001	2007	2008	2009	2010
1. Preparatory Work								
2. Detailed Design/Tender								
2-1.Detailed Design								
2-2.Tender								
3. Construction Work								
3-1. Sewer Pipe Inst.								
a. Interceptor								
b. Trunk Main								
3-2 Treatment Plant								
a. Civil Work								
b. Mech./Elec. Work								
4. Proc. of Clean'g. Equip.								

7. Project Evaluation

7.1 Effect of Project Implementation

Effects on the improvement of water quality in the Lana River expected from implementation of the proposed project was verified through simulative evaluation as shown below.

Unit: BOD mg/l

Target Year		2001			2010		
Reference Point of Water Quality		Up-stream	Middle Stream	Down-stream	Up-stream	Middle Stream	Down-stream
Assumed Present Water Quality (dry season)		(5.7)	(122)	(120)	—	—	—
Estimated Water Quality	Without Project	—	87	87	-	102	106
	After Implementation	—	20	19	-	17	15

As clearly indicated in the simulation results, the implementation of proposed project will contribute to drastically reduce pollution load for about 80 % in 2001 and 85 % in 2010.

7.2 Financial evaluation

The table below summarizes, funds needed during the project period through 2040 and final

cost recovery, and FIRR when the sewerage sector levies the upper limit of general public's willingness- to-pay.

		Sewerage Sector			EMRS
		Loan	Loan/Grant	Grant	
External fund	Construction	-4,062	-4,254	-4,420	
Internal fund	Construction	-901	-708	-543	
	Replace	-1,929	-1,929	-1,929	
	O & M	-3,587	-3,587	-3,587	-3,587
	Financial	-5,809	-2,622		
	Total disbursement	-12,226	-8,846	-6,059	-3,587
	Tariff collection	4,170	4,170	4,170	4,170
	Net cost recovery	-8,056	-4,676	-1,889	583
FIRR		-5.23%	-4.72%	-3.99%	N/A

To navigate the project in a financially sound direction, it is indispensable to increase tariff rates year by year which should be complemented with sufficient government financial subsidies. The table below illustrates possible effects when tariff rates are increased and the corresponding financial subsidies or surplus needed or gained, if the sewerage sector initially charges sewerage tariff corresponding to the upper limit of people's willingness-to-pay.

(in millions of Lek)

Tariff Raise	Tariff Revenue	Case 1 : Loan		Case 2 : Grant & Loan		Case 3 : Grant	
		Subsidy	Disbursement	Subsidy	Disbursement	Subsidy	Disbursement
4%	10,682	1,557	12,239	-1,823	8,859	-4,610	6,072
3%	8,330	3,909	12,239	529	8,859	-2,258	6,072
2%	6,552	5,687	12,239	2,307	8,859	-480	6,072
1%	5,201	7,038	12,239	3,658	8,859	871	6,072
0%	4,170	8,069	12,239	4,689	8,859	1,902	6,072

8. Conclusions

Effectiveness and appropriateness/feasibility of the proposed project was verified and confirmed through the Study and necessary institutional/organizational arrangements for project implementation was judged as possible to be established.

The proposed project for Metropolitan Tirana will contribute to improve public health, sanitation and environmental conditions. It shall be noted that the proposed project clearly meets with the national policy for infrastructure development stipulated in the Public Investment Program 1996-1998.

As a result of the financial analysis, recovering the cost of investment seems difficult without periodical tariff rate increases should be supported by sufficient subsidies. The final resolution of investment, though, may depend on political considerations.

Chapter 1 Introduction

1.1 Preamble

The Study on the Sewerage System in the Metropolitan Tirana in the Republic of Albania (hereinafter referred to as "the Study") was carried out in accordance with the Scope of Work agreed between the Ministry of Public Works, Territorial Adjustment and Tourism (hereinafter referred to as "the MOPWT") and the Preparatory Study Team dispatched by the Japan International Cooperation Agency (hereinafter referred to as "the JICA") on March 26, 1996. JICA had organized the Japanese Study Team (hereinafter referred to as "the Study Team") and dispatched to commence the Study from July, 1996. The Study was completed on March, 1998 and all of the outcome was compiled into this Report.

1.2 Background of the Study

Tirana City, the national capital of Albania, is located mostly at the center in north-south direction and relatively close to the Mediterranean Sea in east-west direction, and has present population of approximately 460,000. Construction of the existing sewerage system in Tirana City was commenced in 1938 and mostly completed in some time 1965. The existing sewerage system, however, does not have any sewage treatment facility and is discharging collected sewage into the river system resulting major cause of water pollution in public water body. Before 1991, almost 100 % of residents in the City were served by the sewerage system. After introduction of market economy in 1991, the population in the sewerage service area has reached about 338,000 owing to the expansion of residential area to cope with rapid increase of inland migration to Tirana City and service coverage of the sewerage system has dropped to about 73 %.

Domestic sewage in the unserved area of sewerage system are disposed/treated by septic tank/holes and cesspools, but septage collected from these facilities are disposed to the rivers without any treatment. In the residential area of low income groups, considerable amount of nightsoil are directly discharged into rivers and open channels resulting one of major causes of water pollution. It has been said among authorities that deterioration of sewer pipes and clogging by sediments in sewer pipes have led to the leakage of sewage from sewer pipes and contamination to drinking water as serious social problems.

Under these circumstances, the Government of the Republic of Albania (hereinafter referred to as "the Government of Albania") requested the Government of Japan to extend the technical cooperation on the development study aiming at improvement of environmental conditions in the Metropolitan Tirana. In response to the request of the Government of Albania, JICA, the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, conducted the Study on the Sewerage System in the Metropolitan Tirana and the Feasibility Study on the Priority Project.

1.3 Objectives of the Study

The objectives of the Study are; (1) to conduct a feasibility study for reorganizing the sewerage system in Metropolitan Tirana having an area of 2,700 ha for the target year 2010, with review of existing plans, and (2) to transfer technology on planning methods and skill to counterpart personnel in the course of the Study.

In the conduct of the Study, due attention and consideration were given to the following matters:

(1) Plan for improvement and development of the sewerage system was prepared from the view point of effective utilization of the existing facilities and feasible staged implementation.

(2) Plan of sewerage facilities as well as plans for project implementation and financial arrangement were prepared within reasonable and feasible range for the executing agency and excessively realistic plan was avoided.

1.4 Study Area

The Study Area was delineated to confine the Metropolitan Tirana including Tirana City and its suburban areas with a total land area of 12,000 ha being defined as residential area under the future land use plan through in depth discussion with the MOPWT and the Study Team.

1.5 Scope of Work

(1) The Study involved the preparation of sewerage system development plan for the target year of 2010 and the preparation of plans for institutional development and operation and maintenance. Since the Albanian public sewerage services is under renovation process since introduction of market economy, analysis and recommendations on public entities in charge of public sewerage services were also included in the Study.

(2) For industrial and agricultural wastewater, recommendations on acceptable level of wastewater quality for the sewerage system were prepared and those wastewater conforming to the said level were considered to be accepted to the sewerage system.

1.6 Formation of the Study

1.6.1 General

The Study was carried out in accordance with the Scope of Work agreed upon between the MOPWT and the JICA. The MOPWT had organized the steering committee and counterpart team, and accomplished the Study in close cooperation with the Study Team. The overall set-up for the implementation of the Study is as shown below.

1.6.2 Implementation Set-up of the Japanese Side

The implementation set-up of the Japanese side consisted of the Study Team and the Advisory Committee under the general supervision of the JICA headquarters. The composition of the JICA Advisory Committee is shown below:

Table 1.1 Composition of JICA Advisory Committee

Name	Assignment in the Committee	Profession
Prof. Masataka Sugahara	Leader/Sewerage Planning	Professor, Osaka Sangyo Univ.
Mr. Yoshihisa Funayama	Sewage Treatment Planning	Chief of Facility Planning, Planning Div., Sewerage Bureau, Tokyo Metropolitan Gov.
Mr. Kazuchika Satoh	Organization/Institution	Development Specialist, JICA

Composition of the Study Team is shown below.

Table 1.2 Composition of JICA Study Team

Name	Assigned Position
Mr. Kenji Hori	Team Leader
Mr. Atsushi Ujiie	Sewerage Planning
Mr. Shin-ichi Osaka	Sewage Treatment Plant Planning
Mr. Hiroshi Terayama	Sewerage Equipment Planning
Mr. Shusaku Ueno	Topographic Survey
Mr. Masuomi Hiroyama	Water Quality Research & Environmental Aspects
Mr. Kenji Hiramatsu	Institutional & Legislative Aspects
Mr. Yoshikazu Tsukide	Financial & Economic Aspects
Ms. Rimiko Kubota	Health & Hygiene Education

1.6.3 Implementation Set-up of Albanian Side

The implementation set-up of Albanian side consists of the MOPWT and its counterpart personnel, and the Steering Committee for the Study composed by representatives from authorities concerned. Overall coordination of the Steering Committee was handled by the MOPWT. The Steering Committee was organized by following representatives of relevant authorities.

Table 1.3 Composition of Steering Committee

Name of Authority & Representative	Official Position
Ministry of Public Works, Territorial Adjustment and Tourism	
Mr. Ernet Noka	Vice Minister
Mr. Stavri Ristani	General Director, Water Supply and Sewerage
Mr. Mirand Caushi	Chief of Sector (Sewerage)
Ms. Mariana Coku	Chief of Sector (Water Supply)
Mr. Arjan Jovani	Specialist for Water Supply
Mr. Shpresa Leka	Architect, Urban Planning
Department of Economic Development and Foreign Aid Coordination, Office of the President	
Mr. Kodora	Director of the Department
Mr. Marieta Koca	Specialist of the Department
Ministry of Health and Environmental Protection	
Mr. Bujar Reme	Specialist for Sanitation
Tirana Municipal Office	
Ms. Juli Shllaku	Director, Department of Urban Planning
Mr. Lulezim Qenami	Director, Department of Public Works
Ms. Luljeta Hoxha	Specialist for Water Supply & Sewerage, Department of Urban Planning
Mr. Xhemal Ceco	Specialist, Department of Road and Sewerage

Table 1.3 Composition of Steering Committee (cont'd)

Name of Authority & Representative	Official Position
Enterprise for Maintenance of Roads and Sewerage	
Ms. Merita Mullaj	Chief Engineer
Waterworks Enterprise of Tirana	
Mr. Faruk Toro	Director
Institute of Hydrogeology	
Mr. Nazmi Rudi	Director
Institute of Urban Planning	
Ms. Fatlinda Murthi	Specialist
University of Geology and Mining	
Mr. Thoma Korini	Director, Department of Mining

Counterpart personnel assigned by the MOPWT were shown below.

Table 1.4 Composition of MOPWT Counterpart Personnel

Name	Position in MOPWT
Mr. Fahri Maho	Specialist for Sewerage, Directorate of Water Supply and Sewerage
Ms. Etleva Milkani	Specialist for Sewerage, Directorate of Water Supply and Sewerage

1.7 Organization of the Study Report

The Report of the Study in English language was compiled the following three parts:

(1) Summary Report

(2) Main Report

(3) Supporting Report

The Summary Report was edited for the convenience to grasp overview of the major study results, while the Main Report presented the overall results of the Study. Detailed discussions and field data were contained in the Supporting Report.

Chapter 2 Overview of the Metropolitan Tirana

2.1 Natural Conditions

Tirana area extends nearly in the middle of Albania in the west part of Mt. Dajti. This area consists of small rolling hills and also extends inside the border of the Field Mediterranean Climate Sub-zone and Hilly Mediterranean Climatic Sub-zone.

A humid and soft winter as well as dry and hot summer are the typical characteristics of this area. Annual mean atmospheric temperature is 15.2 ℃. The coldest month in winter is January with the mean atmospheric temperature of 6.7 ℃, while the hottest month is July or August with the mean atmospheric temperature of 24 ℃. The highest atmospheric temperature was observed at 41.5 ℃ on July, while the lowest was -10.4 ℃ on February. Major rainfall is observed during the months from October to March. Average monthly rainfall in December reaches 204.1 mm.

General conditions of climate in Tirana City is shown in Table 2.1.

Table 2.1 Summary of Meteorological Data in Tirana City

Item	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Yearly
Temp. (℃)	5.9	7.2	9.7	13.5	17.8	21.6	23.8	23.4	20.1	15.8	12.1	8.0	14.9
Rainfall (mm)	161	138	141	95	106	85	52	54	54	82	191	204	1,363
Humidity (%)	74	73	70	72	71	69	62	64	71	70	76	79	71

Note: Atmospheric Temperature & Rainfall, 1961-1970; Humidity, 1963-1967
Source: Scientific Statistics, 1995, Japan

2.2 Socioeconomic Conditions

2.2.1 Historical Background

Albania has suffered severely from occupation by its surrounding European neighbors, even after its independence in 1912 (e.g. Italy in 1939). Following the Italian occupation, communism penetrated its system and cast a strong influence on the Albanian political network and government operations. Enver Hoxha, secretary of the Communist party, influenced by the Soviet Union, kept a tight control of all aspects of Albanian life for the next four decades (from

1944 to 1985).

In 1961, Albania broke off diplomatic relations with the Soviet Union after revealing inefficient economic cooperation for improvement of its domestic economy. However, predominance of a Communist government remained in Albania and was kept steady until Hoxha's death in 1985, as no other system but a Communist one was approved of in Albania.

Following Hoxha's death, party leadership was succeeded by Ramiz Alia from 1985 to 1991. During his mandate, rioting throughout Albania along with student strikes, forced Alia to allow the establishment of opposition groups. Alia reshuffled his government, taking a reformist role against the conservatives. In March 1991, elections were held in Albania. The Communists won a majority again retaining 2/3 of the votes. In spite of this, the new government lasted only 2 months due to continued unrest, strikes and soaring prices.

New elections were called for in March 1992 where the Socialists secured only 25% of the votes. The opposition (a coalition of Democrats, Social-Democrats and Republicans) were swept into a tide of euphoria, and took positive action towards transforming the Albanian economy into market economy.

As a result of this political shift, the People's Assembly of the Republic of Albania now holds supreme legal power of the state, where the President serves as the head of state, and the Council of Ministers serve as the highest body of executive power. Meanwhile, the administrative body of the state is broken down into 12 prefectures, 36 cities , 62 municipalities and 300 communities.

As for its economy, the state is moving towards the process of disinvestment (privatization) of its property, promotion of free initiative in the market, and shifting its own role to one of an economic regulator. Consequently, all types of property enjoy equal rights and protection by law.

Until 1991, the only legally recognized form of property for production was that held by the state. All socioeconomic and cultural activities were based on a general, centralized five-year plan. Free economic initiatives, as well as investment by foreign companies, were both prohibited by law. As a result of this top-down centralized rule, the states economic growth had come to almost a complete halt by the time of the revolution.

2.2.2 State of the Economy / Educational System / PIP

(1) State of the Economy

A year after its initial shift to a market economy in 1991, the Albanian economy, specifically its GDP, finally pulled out of a drastic downturn. The nation's GDP, which had fallen 50% during the years 1989 to 1992, turned back to increase in 1993, displaying a growth rate of 9.6% in 1993, 9.4% in 1994, and an estimated 11.3% in 1995. The bulk of this growth is attributed to ODA assistance, which has served to offset the nation's high trade deficit, and spurred development of an infrastructure.

Basically, macro-economic instability during the 1980's was a result of subsidies for wages and production enterprise in the export sector. Continued increase of subsidies, however, brought the national budget into a deficit, which resulted in hyper inflation and further economic instability.

Under these conditions, post-revolution reform began as of July 1992. The Government's policy program was based upon an agreement concluded with the IMF, which laid out the following three basic principles:

1) Stabilization of the macro-economy, so as to put a halt on the growing budget deficit, curb inflation, and liberalize prices.
2) Reconstruction of the state sector.
3) Privatization of the economy.

Drastic reduction of budgetary expenditure in the last few years was mainly due to the elimination of salary subsidies to state enterprises, the reduction of basic investments made by the state, as well as removal of subsidies on agricultural and industrial production and raw materials destined for export.

The nation's inflation rate has also dropped dramatically, falling from a high of 226% in 1992 to 6% by 1995. The main reason for this result is the stability of the national currency. The Lek was held under tight control by the implementation of tight fiscal and monetary policies, which were put into effect in an agreement with the IMF. The liberalization of the currency in 1992 initially caused rapid depreciation of the Lek, falling to a low of 130 Lek to the U.S. dollar and then stabilizing at roughly 95 Lek.

After the revolution, the unemployment rate increased from 7% in 1989 to 27% in 1992. However, this has decreased since, to 22% (1993), 18% (1994) and 13% (1995) respectively.

The sector which provided the greatest opportunity for new jobs in 1995 was by far the trade sector. With more than 18,600 people finding new jobs, employment in trade increased by 57.8%. Construction also continued to add jobs, increasing employment in its sector by 16.7% and the GDP by 21%, followed by the transport sector, which increased employment by 8.6% and the GDP by 16%.

Jobs were lost in several sectors, mainly lower paying state sectors. The manufacturing sector lost over 16,500 jobs, which meant a decline of over 20%, as state enterprises continued restructuring by laying off employees. In 1989 the state sector employed 889 thousand people, but the number decreased to 615 thousand in 1992, and 276 thousand in 1995. Contribution of state enterprises creating job opportunities has weakened since the introduction of the market economy in 1992.

Recently, export business has become active and trade increased with exports in 1995 being 1.5 times higher than that in 1992. Although the amount achieved was only 40% of that in 1989, when the government subsidized Albanian goods exported. The scale of export however is still too small to have an impact on the recovery of its economy.

Major goods exported in 1995 were shoes and raw materials occupying 40% and 24% respectively, versus 57% raw material exports in 1990.

The effects of overseas aid are particularly visible in Tirana, where assistance has helped to trigger a degree of economic growth and enabled a rapid increase in construction activity and the start-up of small businesses. A good portion of this assistance has been provided by Albanians living abroad, and a number of foreign investors who have entered the market. The result of this being an acceleration in its economic growth with a high rate of internal migration into Tirana whose population has doubled in recent years. This in turn has placed an immense strain upon the present infrastructure and other public services.

Moreover, while this growth looks positive in numerical terms, one must also realize that the Albanian economy is starting from almost nothing. However, its estimated GNP

growth rate of 11.3% for 1995 far surpasses that of Japan for the same year (under 2%). When analyzed in actual terms, i.e., standard of living and quality of life, one realizes that the current level of its infrastructure, especially that of Tirana, is far sufficient in terms of coping with a growing population and for catching up with other advanced nations of the European Union. A particularly telling figure is the national budget, which remains at roughly US$800 million per annum.

It can be said that the present economic stability in Albania is not due to sustainable economic growth but due to development cooperation from developed countries.

(2) Educational System

The educational system in Albania consists of the following categories:

1) Pre-elementary school system (ages three to six)
2) Primary school system (eight years)
3) General secondary school system / vocational training
4) High-school system (university)

All of the above are provided free. As a result, attendance rates are reasonably high up to the secondary school level, which has provided Albania with a well-educated, highly literate populace. This is one of Albania's most attractive points to foreign investors, since the populace has already received a fairly high level of education.

(3) PIP (Public Investment Program)

Department of Economic Development and Aid Coordination (the "DEDAC") prepares annual Public Investments Programme ("PIP") which are series of three-year rolling investments programmes.

The PIP is intended to strengthen the management of economic resources in a number of ways:

- by ensuring that public investments is clearly linked to sectoral policies and priorities which in turn are consistent with national macro-economic objectives;
- by requiring that public investment projects are identified and planned within the framework of a realistic assessment of the available financing of PIP;
- by providing a basis for matching investment needs with aid allocations; and
- by facilitating a strong project planning and management cycle by providing a framework and schedule for the preparation, implementation and evaluation of investment

projects.

The DEDAC divides public investments into following five main categories and sub-sectors:

- Natural Resources Management (sub-sector: Agriculture, Minerals, Water Resources, Environment)
- Private Sector Development (sub-sector: Enterprise Promotion, Tourism)
- Public Infrastructure & Utilities (sub-sector: Energy, Transport, Communications, Urban & Rural Infrastructure, Housing & Urban Development) -- Sewerage project is classified here
- Human Resources (sub-sector: Health, Education & Science, Social Safety Net & Labor Market Services, Culture)
- Government Services (Public Administration & Judiciary)

Total investment expenditure under the 1996-98 PIP is projected at Lek 122.6 billion based on DEDAC's strategy to realize the national policies and strategies in the sector concerned.

Table 2.2 Sectoral 1996-98 PIP Resource Ceilings

Investmet Sector	PIP Allocation		Financing Status			Financing Gap
	1996-98	Share in Total PIP	Committed	Programmed	Financing GAP	Share in Sector PIP
NATURAL RESOURCE MANAGEMENT	**18.5**	**15%**	**10.8**	**2.7**	**5.1**	**27%**
Agriculture	16.0	13%	10.0	2.4	3.7	23%
Environment/Water Resources	1.2	1%	0.3	0.3	0.6	49%
Mineral Resources	1.4	1%	0.6	0.0	0.8	59%
PRIVATE SECTOR DEVELOPM'T	**9.4**	**8%**	**6.9**	**1.4**	**1.0**	**11%**
PUBLIC INFRASTRUCTURE & UTILITIE	**75.3**	**61%**	**40.7**	**11.1**	**21.7**	**29%**
Energy	10.8	9%	6.9	2.0	1.9	18%
Transport	33.8	28%	21.8	6.8	5.4	16%
Communications	3.6	3%	1.2	0.0	2.4	67%
Urban & Rural Infrastructure	22.8	19%	8.8	2.2	11.8	52%
Housing & Urban Development	4.3	4%	2.0	0.2	2.1	48%
HUMAN RESOURCES	**15.7**	**13%**	**7.9**	**1.1**	**6.7**	**43%**
Eduction & Science	6.8	6%	3.0	0.3	3.4	51%
Health	8.0	7%	4.2	0.7	3.0	38%
Soc. Safety Net & LAB Market Service	0.6	1%	0.6	0.0	0.0	5%
Culture	0.4	0%	0.1	0.0	0.3	71%
GOVERNMENT SERVICES AND INSTITUTIONAL DEVELOPMENT	**3.7**	**3%**	**2.3**	**0.8**	**0.6**	**17%**
TOTAL PIP	**122.6**	**100%**	**68.6**	**17.1**	**35.1**	**29%**

Source: DEDAC "Public Investment Programme 1996-98", March 1996, page 31. Some subsidiary total column might not consistent , but quote without any alteration for our report purpose.

2.3 Land Use

2.3.1 Present Land Use

The Study Area is regarded as the most advanced and developed area in the country owing to the presence of Tirana City, the national capital of Albania, with a population of about 15 % of the nation.

The present land use in the Study Area as shown in Figure 2.1 consists of residential, commercial, industrial, hospital, green, sport, lake areas and other undeveloped area. This figure has been prepared in the process of urgently required future land use plan to cope with rapid inflow of inland migration to the urban area and increase of illegal residents in the suburban area since introduction of market economy in 1991. This figure shows on-going development of residential and commercial areas being expanded to outskirts of Tirana City.

2.3.2 Future Land Use

The Land Use Plan for 1994-2015 (draft) of Tirana City and its suburban area prepared by the National Planning Institute (NPI) is shown in Figure 2.2 and areas by land use classification are shown in Table 2.3.

Table 2.3 Future Land Use Plan (Draft) for Metropolitan Tirana

Category	Area (ha)
1. National park zone	7,312
2. Forests	1,369
3. Existing rural residential zone	335
4. Intensive new residential zone	1,890
5. Semi-intensive new residential zone	1,290
6. Extensive new residential zone	1,130
7. Rural residential zone	1,088
8. Business zone	250
9. Green zone, isolated belt and river	2,190
10. Road and vacant zone	8,312
11. Tirana City	4,150
(1) Residential area	(1,902)
(2) Industrial area	(525)
(3) Others	(1,723)
Total	29,316

Source : Regulation of Suburban Zone Plan prepared by the NPI.

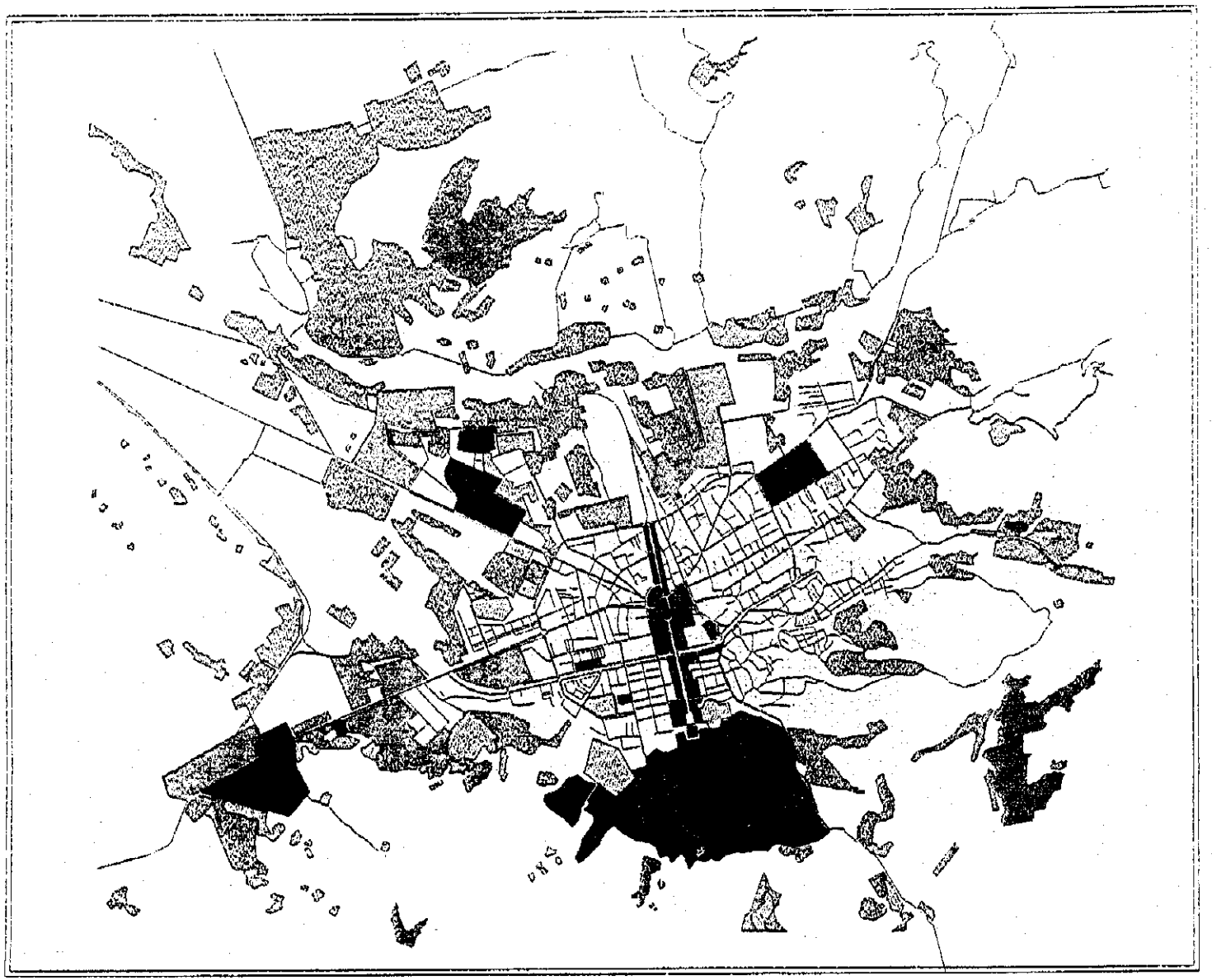
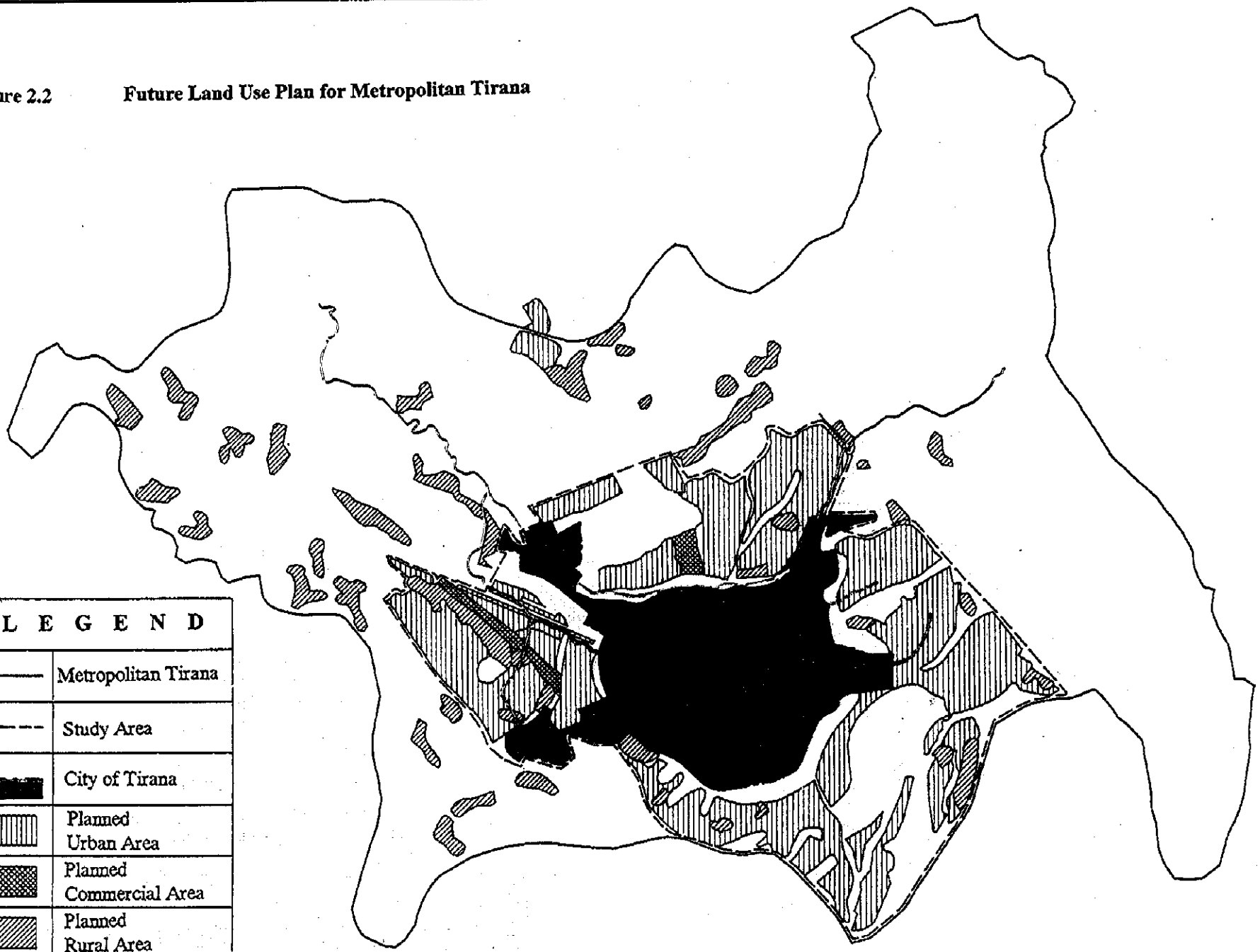


Figure 2.1

Present Land Use in the Study Area

Figure 2.2 **Future Land Use Plan for Metropolitan Tirana**



Chapter 3 Population and Water Demand Projection

3.1 Population

3.1.1 Present Population

Present population as of 1996 estimated by the MOPWT is 506,401 persons, of which 459,956 persons in Tirana city and 46,445 persons in suburban area. These figures are estimated based on the size of residential area or number of houses by type of housing development in accordance with the housing typology as shown below. This manner of demographic study owes to rapid movement of current population and difficulty to count actual population residing in illegally built houses.

Table 3.1 Housing Typology Defined by MOPWT

Category	Description
Type-1	Constructed in post-1990 as illegal
Type-2	Constructed in post-1990 as legal
Type-4	Under construction
Type-5	Constructed before 1990 as legal

Note: Type-3 is not applied under current urban development.

The breakdown of present population by housing typology is shown in Table 3.2

Table 3.2 Present Population in Metropolitan Tirana

Area and Housing Typology	Area (ha)	No. of Building	Population (person)	Population Density (person/ha)	Occupation Density per Building (person/bldg.)
Inside of City					
Type-1	534.57	2,463	14,781	28	6.0
Type-2	143.40	-	27,787	194	-
Type-5	1,070.23	-	417,388	390	-
Sub-Total	1,748.20	-	459,956	263	-
Expansion Area Type-4	88.80	Under Construction			
Total	1837.00	2,463	459,956	250	6.0
Outside of City					
Type-1	386.96	2,342	14,050	36	6.0
Type-5	138.98	-	32,395	233	-
Total	525.94	-	46,445	88	-
Grand Total	2,362.94	4,805	506,401	214	

Source : Population list prepared by the MOPWT

3.1.2 Future Population

When the Study was conducted, the expansion and improvement project for water supply in Tirana was on-going. This project was urgently initiated to cope with the serious shortfall of water supply capacity to the Metropolitan Tirana in the shortest time possible. In this regard, the project was not based on the future framework, such as population projection, water demand projection as well as future land use and urban development, but was brought out based on the supply capacity of the Bovilla Dam.

Population projection in this Study was, therefore, prepared principally based on the current population projection method employed by the NPI taking into account of the future land use plan (draft) and trend of population development since 1991 in the Metropolitan Tirana. Brief description of projection method is presented in Table 3.3.

Table 3.3 Present and Future Population of Tirana City

Housing Typology	Present (1996)	Future (2010)
Inside of Tirana City		
Type-1	- The population is estimated based on the number of buildings and assumed family size of 6 persons per building which is equivalent to 28 ps/ha 2,463 Bldg. x 6 ps/Bldg. ≒ 14,781	- Assuming that 50 % of new development area will be built by Type-1 and population density is 30 ps/ha, the population will be: (1,902 - 1,748) ha x 0.5 x 30 ps/ha + 14,781 = 17,091
Type-2	- The population is estimated on based on the assumed population density at 200 ps/ha 143 ha x 200 ps/ha ≒ 27,787	- Assuming that another 50 % of the new development area will be built as Type-2, the population is: (1,902 - 1,748) ha x 0.5 x 200 ps/ha + 27,787 = 43,187
Type-5	- The population is estimated based on the assumed population density at 390 ps/ha 1,070 ha x 390 ps/ha = 417,388	- The population density is assumed to increase 15 % from the present due to the re-construction of some areas 1,070 ha x 390 ps/ha x 1.15 = 479,895
Total	459,956	540,173 Say 540,000

Table 3.3 Present and Future Population of Tirana City (cont'd)

Housing Typology	Present (1996)	Future (2010)
Outside of Tirana City		
Type-1	- The population is estimated on the basis of the number of building in which 6 persons live in one building, which is corresponds to 36 ps/ha 2,342 Bldg. x 6 ps/B ≒ 14,050	- Assuming that 30 % of the intensive new residential zone area (570 ha) is developed by the target year of 2010, and the population density increases from 36 to 200 ps/ha under the authorized suburban plan, the population is: 1,890 ha x 0.3 x 200 ps/ha + 14,050 = 127,450
Type-5	- The population is estimated on the basis of constructed area with population density of 233 ps/ha 139 ha x 233 ps/ha = 32,395	- Construction of this type is assumed to decrease in the future. Assuming that the same size of area as the present with the same density will be constructed by the target year, the inhabitant population is: 139 ha x 233 ps/ha + 32,395 = 64,782
Total	46,445	192,232 Say 192,000
Grand Total	**506,501 ≒ 506,000**	**732,000**

Note: ps - person

3.2 Water Supply Conditions

3.2.1 Existing Water Supply System and Water Supply Conditions

The existing water supply system of Tirana City supplies drinking water to Tirana City and its suburban areas. Water sources are three springs and seven groundwater sources as shown in Table 3.4. Water of these sources are transmitted to four reservoirs and distributed by gravity flow after disinfection.

Yield from spring sources fluctuates by influence of annual rainfall that approximately 50 % of nominal yield is obtainable in drought year. Due to absence of measuring facility, actual intake amount is not clearly confirmed and nominal supply capacity of the existing water supply system is known to 120,000 to 150,000 m^3/day. Physical loss of supplied water is said to be about 50 % owing to superannuation of existing facilities and lack of maintenance.

Table 3.4 Water Sources and Production Capacity

Source	Min. (Dry season) l/sec	Max. (Wet season) l/sec
1. Bovilla spring	140	400
2. Shenmeria spring	440	660
3. Selita spring	250	770
4. Laknas wells	160	160
5. Berxull wells	240	240
6. Pishina wells	140	140
7. Kroi I shengjinit	40	40
8. Buka shengjinit	30	30
9. Cokollata shengjinit	20	20
10. Pema shengjinit	30	30
Total	1,490 = 128,736 m^3/day	2,490 = 215,136 m^3/day

Assuming that present served population is 450,000 persons and 30 % of total consumption is occupied by commercial, industrial and institutional use, the daily average water consumption in domestic use is estimated to be 93 to 117 liter/capita/day. This consumption rate is about 60 % of consumption in average European cities (150 to 200 liter/capita/day) and considered to reflect present water supply shortage that water is supplied only 6 hours a day in Tirana City.

3.2.2 Scope of On-going Water Supply Expansion/Improvement Project

To mitigate the current water shortage, the Albanian government is constructing the Bovilla Dam with its own fund by 1997.

In parallel to the construction of Bovilla Dam, a water purification plant with a planned supply capacity of 150,000 m^3/day is also under construction by financial assistance from the Italian Government. Installation of new distribution lines and improvement/replacement of existing distribution lines as well as improvement of associated water supply facilities are being implemented and expected to be completed by the end of 1998. The water purification plant will have chemical coagulation and sedimentation, rapid sand filter, chlorine disinfection facility. Upon completion of this plant, it is expected that the current water supply capacity will be doubled and serious water shortage will be drastically dissolved.

3.2.3 Water Demand in Target Year

Future water demand in target year was estimated for the inside and the outside of Tirana City, respectively.

(1) Water demand inside of Tirana City

Future population of Tirana City in target year is estimated at 540,000 and service coverage of water supply is assumed at 100 %. Per capita water consumption is assumed at 170 liter/capita/day in due consideration of living standards in the Study Area and water consumption at 150 to 200 liter/capita/day in average European cities.

Commercial, industrial and institutional consumption is considered to be same as the present status at 30 % of the total consumption.

Physical loss in water supply system is assumed to be improved to 45 % from the present 50 %.

Under the above mentioned assumptions, the water demand in the target year is estimated as follows:

a. Domestic consumption (70 % of total consumption)
   540,000 persons x 170 lpcd = 91,800 m^3/day
b. Other consumption (30 % of the total consumption)
   91,800 m^3/day x 0.3/0.7 = 39,200 m^3/day
c. Physical loss (expected to be improved to 45 %)
   (91,800 + 39,200) m^3/day x 0.45/0.55 = 107,000 m^3/day

Total (a + b + c) 238,000 m^3/day

(2) Water demand outside of Tirana City

Future population of suburban area of Tirana City in the target year is estimated at 192,000. Water supply service coverage is assumed to be 90 %. The per capita consumption rate is considered to be same as the inside of Tirana City (170 lpcd), while water consumption by commercial, industrial and institutional uses is assumed at 25 % of the total consumption in this area. Physical loss of water supply system is considered to be improved to the same as the inside of Tirana City (45 %).

Under the above assumptions, future water demand in this area will be 72,000 m^3/day.

(3) Total water demand in the target year

The total water demand in the target year (2010) will reach 310,000 m^3/day. To meet with this water demand, there will be a shortage of about 40,000 m^3/day of supply capacity, even after completion of the on-going Bovilla water supply project.

In this respect, additional water sources will have to be developed. Recommendations on further improvement to decrease physical loss of water in water supply system are also prepared.

Chapter 4 Existing Sewerage System

4.1 Present Conditions of the Existing Sewerage System

In Tirana City, there are about 510 km of sewer networks covering approximately 70 % of the total population. Septic tanks or other types of toilet facilities are used in the unserved area of the existing sewerage system. General composition of the existing sewerage system by sewered area is shown in Table 4.1 and Figure 4.1, respectively.

Table 4.1 Existing Sewerage Service Area

Zone	Area (ha)	Population (1996)
Tirana River	213.6	47,914
Center	183.2	46,791
Lana - North	396.4	117,262
Lana - South	380.6	108,070
Kombinat	71.0	17,640
Total	1,244.8	337,383

Although the existing sewerage system in Tirana City is so called as the combined sewer system, its actual design is rather different from commonly known combined sewer system that the existing sewers are designed to have diameter for 3 to 5 times of sewage flow. Therefore, most of rainwater can not be accommodated in the sewer network and drained by surface runoff which results inundation on many streets and residential areas in the City. The background of this sewer design is assumed to be caused by economic priority under financial constraints since most of sewer networks has been constructed in early 1960s.

There are four interceptors, two lines at both side along the Lana River, one line along the Tirana River and another one line in the center of the City. Due to absence of the sewage treatment plant, all untreated sewage intercepted by these lines are discharged into the Lana River and the Tirana River at outskirts of the City. Along with these interceptors, collected sewage are discharged into the Lana River at many locations, resulting serious water pollution.

Field survey was carried out to confirm accumulation of sand and mud as well as deterioration and damages in interceptors along the Lana River. This survey revealed that sewer pipes were relatively good conditions though it had been used for more than 35 years. Progress on deterioration of concrete surface of sewer pipes was not at such state to repair/replace urgently. Another survey conducted by Tirana City reported, however, that leakage of sewage from sewer pipes had reached to 40 % in the whole city.

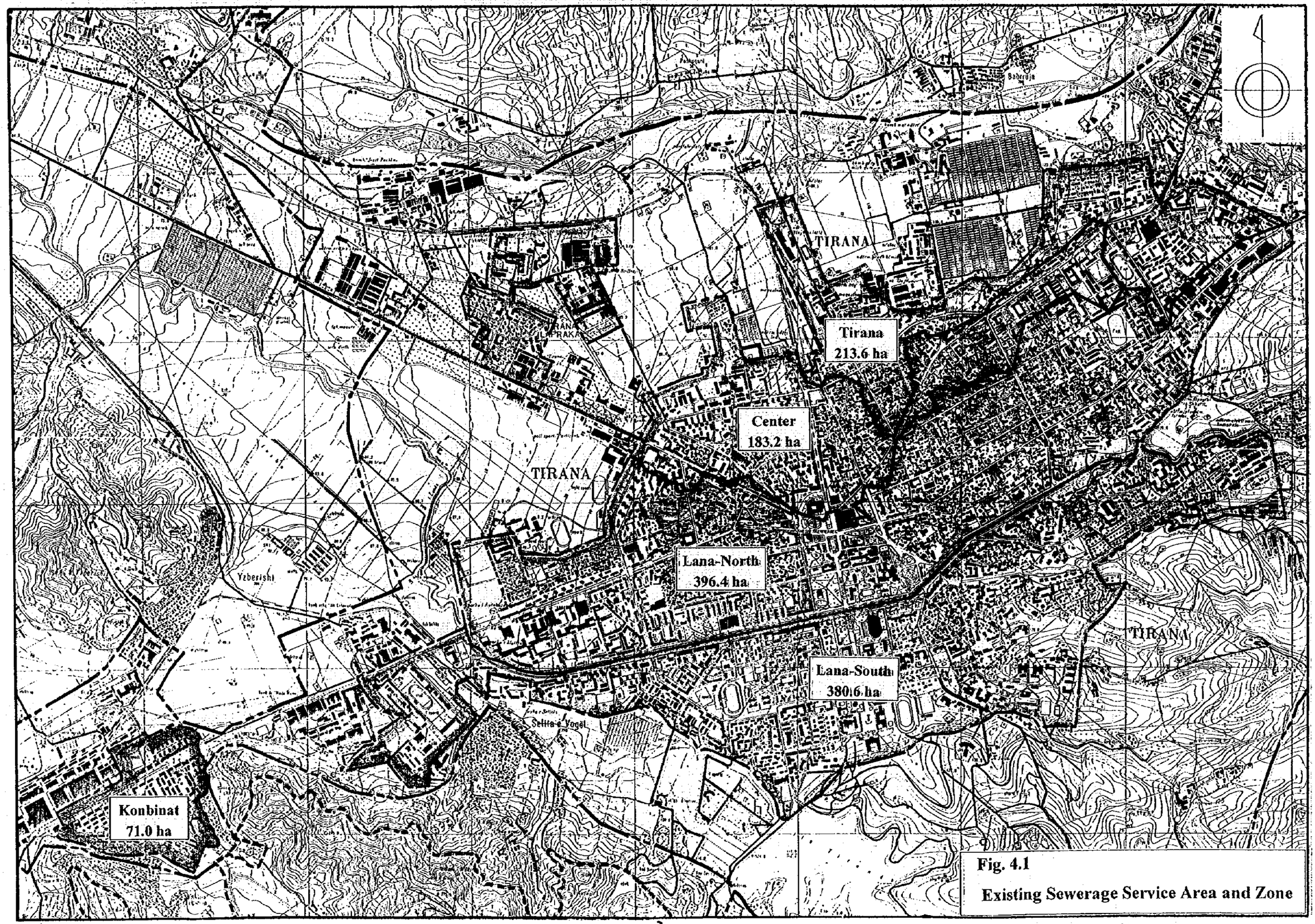


Fig. 4.1

Existing Sewerage Service Area and Zone