MINISTRY OF PUBLIC WORKS
THE REPUBLIC OF INDONESIA

THE REPUBLIC OF INDONESIA

DEVELOPMENT OF BASIC DESIGN OF DRAFT MANAGEMENT CRITERIA FOR SEWERAGE SERVICE PROVIDERS

SURVEY REPORT

(FINAL)

January 2010

JAPAN INTERNATIONAL COOPERATION AGENCY
NIHON SUIDO CONSULTANTS CO., LTD.

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JR
10-005

Exchange Rate

(On 14th January 2010 by Bank Indonesia)

100	JPY	=	10,061.27 IDR
1	USD	=	9,196.00 IDR
1	THB	=	279.26 IDR

FOREWORD

The Project of "Development of Basic Design of Draft Management Criteria for Sewerage Service Providers in Republic of Indonesia" conducted by Japan International Cooperation Agency (JICA), was carried out by Nihon Suido Consultants Co., Ltd. (NSC) during middle of September 2009 to middle of January 2010. The survey team (the Team) carried out the field surveys for data collection twice in Indonesia, and held a workshop on the draft of "Basic Design of Draft Management Criteria for Sewerage Service Providers" hosted by Ministry of Public Works on 10th December 2009 in Jakarta.

Based on the field surveys, as a result, the Team prepared the reports consist of 2 volumes which are:

1. Survey Report (S/R)
   (1) Executive Summary
   (2) Main Report
   (3) Appendices
2. Basic Design of Draft Management Criteria for Sewerage Service Providers (BD/DMC4SSP)

The Executive Summary shows the both summary of "Survey Report" and "Basic Design of Draft Management Criteria for Sewerage Service Providers".

The contents of these two summaries are:

I. Survey Report
   Chapter 1: Introduction
   Chapter 2: Current Condition of Central Governance of Sewerage Development in Indonesia
   Chapter 3: Current Sewerage Condition in 3 cities and Result of Analysis

II. Basic Design of Draft Management Criteria for Sewerage Service Providers
   Chapter 1: Introduction
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   Chapter 4: Governing Structure
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LOCATION MAP

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EXECUTIVE SUMMARY

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEVELOPMENT OF BASIC DESIGN OF DRAFT MANAGEMENT CRITERIA FOR SEWERAGE SERVICE PROVIDERS IN REPUBLIC OF INDONESIA

EXECUTIVE SUMMARY

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I. SURVEY REPORT

CHAPTER 1: INTRODUCTION

1.1 General

Indonesia has set a target of eliminating all open defecation in Indonesia by 2014.[1] The development of large-scale sewerage systems in metropolitan areas has great significance in the elimination of open defecation. Currently, 12 metropolitan areas[2] have large-scale sewerage systems individually, which require expansion and improvements respectively in proportion to development of urban area. However, in spite of such necessity, these large-scale sewerage systems yet remain untouched due to the past economic recession.

Furthermore, the overall service rate of large-scale sewerage systems in Indonesia remains as low as 1.3 % to 3.0 % (the rate depends on documents). Taking this low wastewater collection and wastewater treatment rate into account, Ministry of Public Works, as part of its Middle-Term Development Plan (2010 - 2014), has set a target of attaining 20 % wastewater collection and wastewater treatment rate of large-scale sewerage system in selected 16 metropolitan areas (12 existing areas and 4 new areas[3]).

The development of new large-scale sewerage systems, and expansion and improvements of the existing systems are expected to take place in near future. Therefore it is necessary to make preparations for assuring the management and service quality of sewerage service provider. However, because sewerage services are newly provided by each respective municipality, the quality of sewerage service might differ to each municipality.

Recently, Indonesia has started to design and develop the management criteria for sewerage service providers as a part of Climate Change Programme Loan policy action for 2009. This survey, therefore, intends to assist the government and promote related activities of the Indonesian side to accomplish the policy actions.

1.2 Objective of the Survey

The objective of this survey is to assist in assuring an appropriate level of management and services of sewerage service providers through drafting of basic design of management criteria, such as corporate governance, service quality, technical guidance, tariff setting and so on, of sewerage service providers.

1.3 Target Area of the Survey

The target areas of the survey are Jakarta (Jakarta Special Capital Region Province), Bandung (West Jawa Province), and Denpasar (Bali Province).

1.4 Scope of Work

The survey team (hereinafter referred to as 'the Team') carried out data collection, analysis and deliberation of collected data, preparation of the survey report and draft management criteria for sewerage service providers, and discussion in collaboration with Indonesian side and the team.

1.5 Schedule of the Survey

The Team consisted of Mr. HAYASHI Kiyohiko as Team Leader/Sewerage Management Expert and Mr. OKAZAKI Koichi as Sewerage Expert. The survey work was conducted from September 2009 to January 2010.

[1] By Medium-Term National Development Plan (2010 - 2014) in Urban Areas and the Government, through Vice President Jusuf Kallareiterated, reiterated to rid Indonesia of open defecations practices by 2014 in a bid to increase public health quality in early 2009.
[2] Jakarta, Cirebon, Bandung, Tangerang, Yogyakarta, Surakarta, Balikpapan, Tarakan, Banjarmasin, Medan, Prapat and Denpasar
[3] Semarang, Surabaya, Makasar and Palembang

CHAPTER 2: CURRENT CONDITION OF CENTRAL GOVERNANCE OF SEWERAGE DEVELOPMENT IN INDONESIA

2.1 General

Indonesia had the 1st Long-Term development plan for 25 years (1969 - 1994) which consisted of 5 (five) Five Years Development Plans, and in 1999 - 2000, Central Government conducted the policy of decentralization with shifting the authority of sewerage management to Local Government. Local Government had responsibility for development of sewerage management facilities after implementation of decentralization.

According to the Census 2007, coverage ratio of safe on-site system is 71.06 % in urban areas and 32.4 % in rural areas. Coverage ratio of off-site system is only 2.3 % in 12 cities.

2.2 National Policy, Target and Goal

2.2.1 Millennium Development Goal: The Government of Indonesia (GOI) had committed to the Millennium Development Goal (MDG) in 2015 prepared in United Nations Development Programme (UNDP).

2.2.2 National Policy and Strategy: In December 2008, Ministry of Public Works (DEPPU) instituted the "Regulation Number 16/PRT/M/2008 by Minister of Public Works" on "Policy and National Strategy for Development and Settlement of Sewerage Management System" (KSNP-SPALP).

2.2.3 National Middle-Term Development Plan: The target of National Middle-Term Development Plan (RPJMN) (2004 - 2009) indicated in "Government Rule - PP 7 2005" for domestic sanitation is free of open defecation in all cities in 2009, increasing the utilization of Integrated Sludge Treatment Plant and Wastewater Treatment Plant (WWTP) up to 60 % and decreasing river water pollution from faces up to 50 % based on 2004 condition and centralized sewerage system development in metropolitan city. KSNP-SPALP shows the next Middle-Term Development Plan for the period of 2010 - 2014.

2.2.4 National Action Plan: The Sanitation Development Technical Team consists of National Development Planning Agency (BAPPENAS), Ministry of Public Works (DEPPU), Ministry of Finance (DEPKEU), Ministry of Health (DEPKES), Ministry of Home Affairs (DEPDAGRI), Ministry of Industry and Trade (DEPERINDAG) and The State of State Ministry of Environment. (KLH) are preparing the National Action Plan for Urban Sanitation Development in the period of 2010 - 2014.

2.3 Basic Law and Regulation

2.3.1 Basic Law of Sewerage Management: There is no specific law which regulates municipal domestic wastewater management at present and Ministry of Public Works is currently preparing the first National Sewerage Law. However, it is not clear when the National Sewerage Law will be prepared.

2.3.2 Basic Law of Environment Management: There are "Law of the Republic of Indonesia - Number 23 of 1997 Regarding Environmental Management" published by State Ministry of Environment in 1997, "The Government Regulation Number 82 of 2001 Regarding Water Quality Management and Water Pollution Control" stipulated by State Ministry of Environment, and "Standard Quality of Domestic Waste" on the Decree Number 112 in 2003 stated by he State Ministry of Living Environment.

2.4 Relationship between Central Governance and Local Government

2.4.1 Related Organizations: Policy and regulatory responsibilities for the water and sanitation sector are shared among several ministries namely Ministry of Public Works (DEPPU), Ministry of Home Affairs (DEPDAGRI), Ministry of Finance (DEPKEU), Ministry of Health (DEPKES), State Ministry of Environment (KLH), Ministry of Industrial and Trade Affairs (DEPERINDAG), Ministry of Mines and Energy and etc.

National Government is responsible for sanitation policy and strategy, regulation, minimum standards and monitoring, and overall coordination of the sector. The BAPPENAS, the DEPPU, the DEPKES, the DEPDAGRI (the latter is responsible for Local Government) and the KLH have a role in urban sanitation, and BAPPENAS plays the lead role in decision-making. In contrast to this, responsibility for promoting rural sanitation lies with the DEPKES.

2.4.2 Relationships: Relationship for sewerage management for planning, design and construction between Central Government and Local Government is depicted in ***Figure SSR.2.1***.

Figure SSR.2.2 shows organization structure of Ministry of Public Works (DEPPU). Directorate of Environment and Sanitation Development (PPLP) under Directorate General of Human Settlements manages sanitation in Indonesia. And, the sector of sewerage is managed by Sub Directorate of Sewerage System Development under Directorate of Environment and Sanitation Development (PPLP) as shown in ***Figure SSR.2.3***.

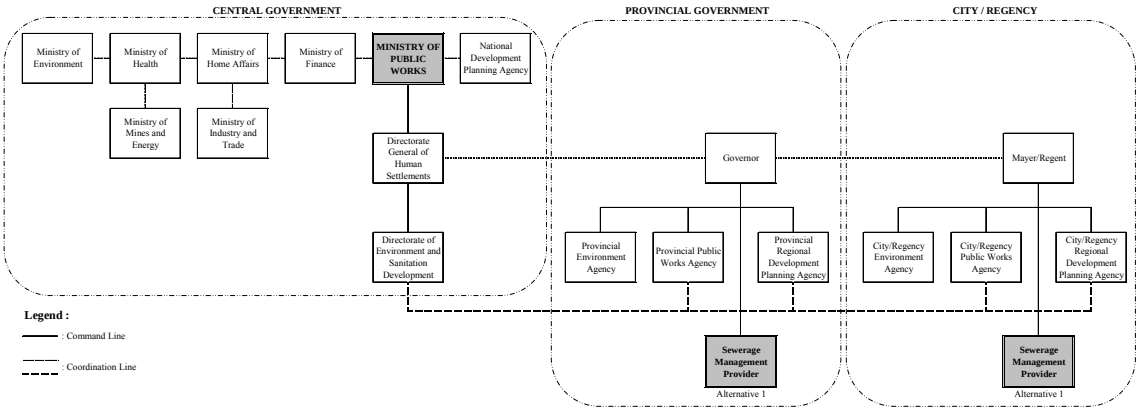

Figure SSR.2.1 - Relationship of Governance Organization for Sewerage Planning, Design and Construction

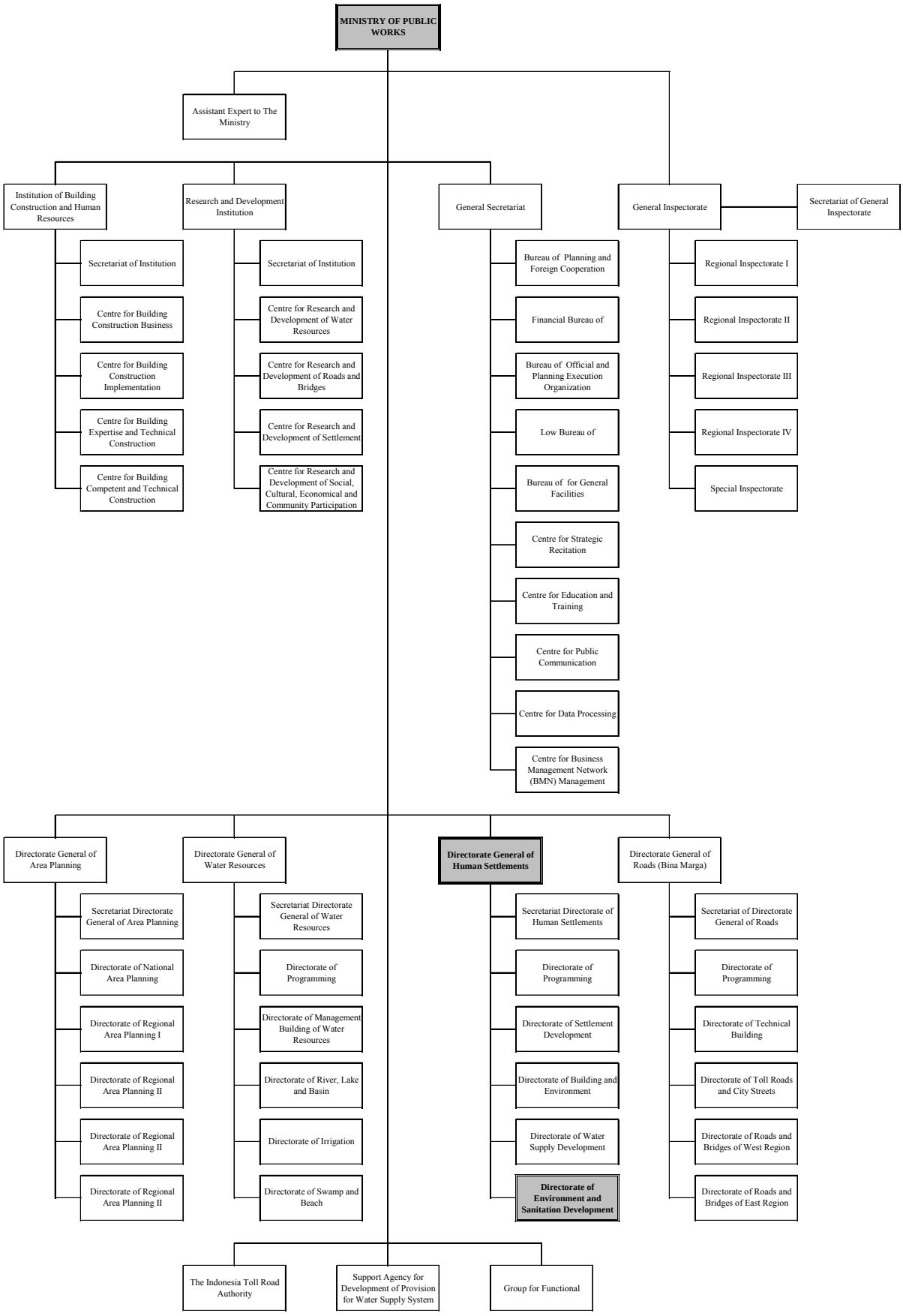

Figure SSR.2.2 - Organization Structure of Ministry of Public Works
Source: Ministry of Public Works

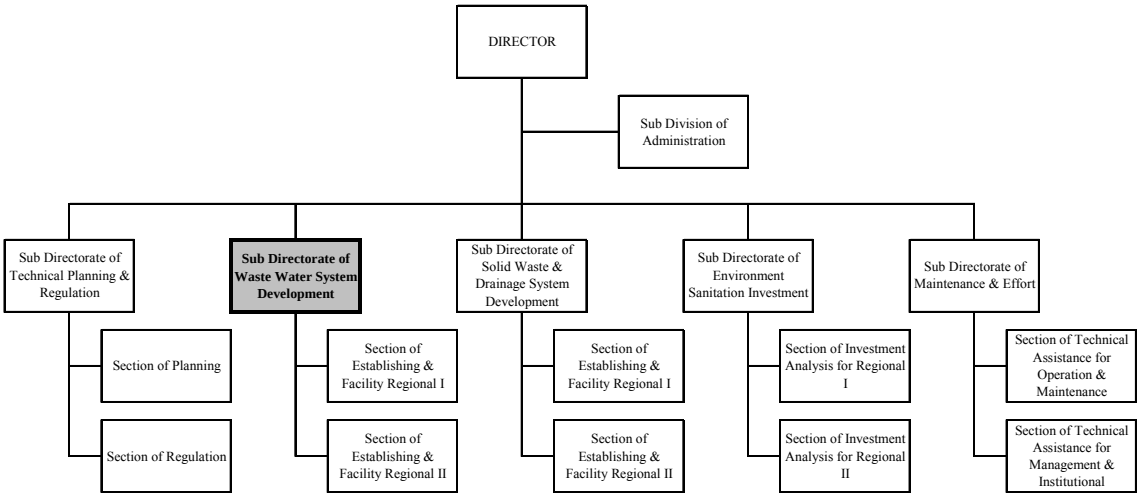

Figure SSR.2.3 - Organization Structure of Directorate of Environment and Sanitation Improvement
Source: Ministry of Public Works

2.5 Existing Sewerage Service Providers

Currently 12 major cities have implemented sewerage works. These 12 major cities are: Jakarta (Great Jakarta Special Capital Region Province), Cirebon, Bandung and Tangerang (West Java Province), Yogyakarta and Surakarta/Solo (Central Java Province), Balikpapan (East Kalimantan Province), Banjarmasin and Tarakan (East Kalimantan Province), Medan and Prapat (North Sumatra Province) and Denpasar (Bali Province).

2.6 Financial Support

The Central Government supports sewerage service provider through Local Government. ***Figure SSR.2.5*** shows flow chart of financial support.

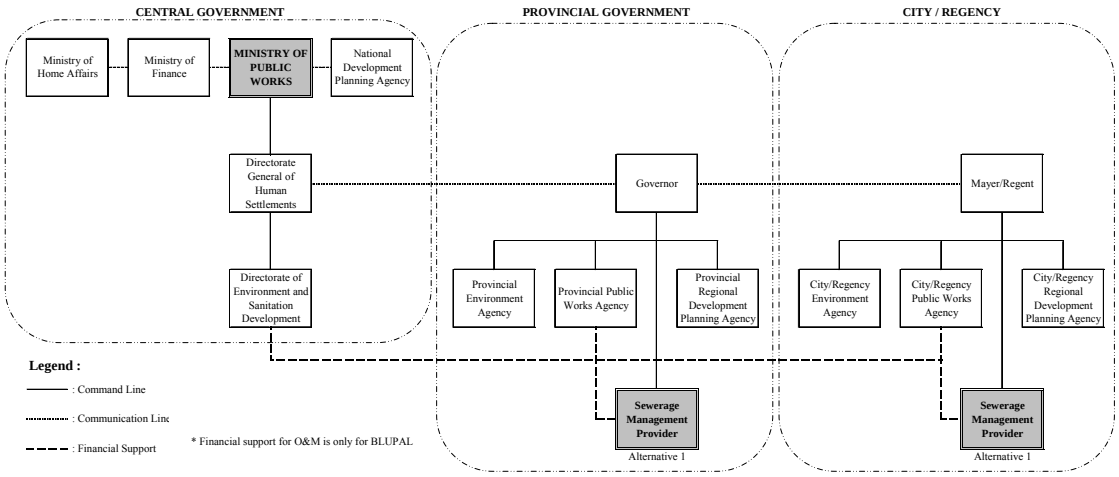

Figure SSR.2.4 - Financial Support Diagram for Design, Construction and O&M

2.7 Monitoring System of Effluent from Wastewater Treatment Plant

The State Ministry of Environment (KLH) is responsible of water qualities; however there is not specified law and regulation on monitoring of effluent from Wastewater Treatment Plant (WWTP). However, Regional Environment Agency monitors wastewater effluent quality. ***Figure SSR.2.6*** shows monitoring system for environment impact and effluent quality.

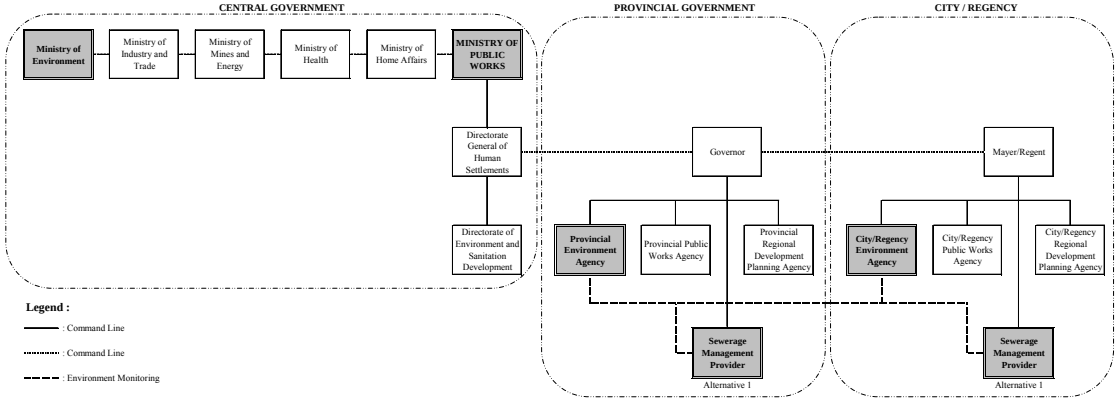

Figure SSR.2.5 - Monitoring System for Environment Impact and Effluent Quality

2.8 Related Projects and International Supports

2.8.1 Indonesian Sanitation Sector Development Programmes: Recently there are several GOI initiatives and programmes which directly or have the potential to address water, sanitation & hygiene needs, and progress further efforts to achieve the MDGs.

2.8.2 Other Related Projects and Supports: The efforts by various donors and investors to assist the GOI to realize the sanitation and water MDGs, improve health and hygiene outcomes, and contribute to improved economic and environmental productivity as a result of water, sanitation and hygiene investments in Indonesia. Although there are many local and international NGOs and CBOs contributing to water, sanitation and hygiene improvements in Indonesia, the following data serves to provide an overview of major investments in the sector.

CHAPTER 3: CURRENT SEWERAGE CONDITIONS IN 3 CITIES AND RESULTS OF THE ANALYSIS

3.1 General

Sewerage works situation in 3 (three) cities, i.e. Jakarta, Bandung and Denpasar were surveyed and differences on structure, service charge and wastewater treatment process etc were found. Municipalities which will implement sewerage works should recognize and refer to the advantages and disadvantages of those differences.

3.2 Identified Differences of Sewerage Works in service providers

3.2.1 Differences in Structure: ***Table SSR.3.1*** shows the structures of sewerage works in the 3 (three) providers

Table SSR.3.1 - Structure of Sewerage Works in 3 Areas

City	Jakarta	Bandung	Denpasar
Structure	PD PAL	PDAM	BLU PAL
	Public Enterprise in Sewerage Works	Public Enterprise in Water Works	Public Agency in Sewerage Works

In Jakarta, PD PAL which is public enterprise in sewerage works is adopted. In Bandung, sewerage works is implemented under PDAM which is public enterprise in water works. In Denpasar, sewerage works is carried out under BUL PAL which belongs to public organization. Advantages, disadvantages and particularities of those structures are mentioned in ***Table SSR.3.2***, ***Table SSR.3.3*** and ***Table SSR.3.4***.

Table SSR.3.2 - Characteristics of PD PAL, PDAM and BLUPAL

	PD PAL Jakarta	**PDAM Bandung**	**BLUPAL Denpasar**
Advantages	Sewerage works can be developed independently.	Experienced water works engineers can be dispatched to sewerage works easily. Existing service charge collection system and customer database can be applied.	Not only for designing and construction but also for O&M, BLUPAL can receive national and provincial subsidies.
Disadvantages	Sewerage works can not use service charge collection system of water works.	Sewerage works can not be implemented independently. Accomplishment of sewerage works is affected by that of water works.	Still not clear.
Particularities	PD PAL is the public enterprise only in sewerage works. PD PAL Jakarta has been managed well; however it is because most of the customers are large commercial buildings. Therefore when other municipalities adopt this structure, financial issues have to be considered.	PDAM is public enterprise of water works and sewerage works is managed together with water works. Not only Bandung but also other municipalities like Banjarmasin and Cirebon use this structure.	Because BLUPAL has only a few years history, it is premature to evaluate the structure.

3.2.2 O&M Cost: ***Table SSR.3.3*** shows the O&M cost and influent wastewater quantity of the 3 (three) service providers.

Table SSR.3.3 - O&M Cost and Influent Wastewater Quantity

	PD PAL Jakarta	**PDAM Bandung**	**BLUPAL Denpasar**
O&M Cost (mill. IDR/year)	17,700	8,623	2,494
Influent Quantity (m^3/day)	13,815	~ 40,000	8,000
Ratio of O&M Cost to Annual Influent Quantity (IDR/m^3)	3,510	~ 590	854

Source: PDPAL Jakarta, PDAM Bandung and BLUPAL Denpasar

3.2.3 Tariff Revenue and Ratio of Revenue to O&M Cost: ***Table SSR.3.4*** shows the tariff revenue, O&M cost and ratio of the revenue against O&M cost. Data of BLUPAL Denpasar is not shown because service charge is not fixed yet.

Table SSR.3.4 - Tariff Revenue and Ratio Revenue to O&M Cost

	PD PAL Jakarta	PDAM Bandung
Tariff Revenue (mill. IDR/year)	24,961	21,507
O&M Cost (mill. IDR/year)	17,700	8,623
Ratio of the revenue to O&M Cost	1.41	2.49

Source: PDPAL Jakarta and PDAM Bandung

3.2.4 Wastewater Treatment Processes, Influent Quantities and Effluent Quality: ***Table SSR.3.5*** indicates wastewater treatment processes, influent quantities and effluent qualities in the treatment plants of the 3 (three) service providers.

Table SSR.3.5 - Treatment Processes, Influent Quantities and Influent and Effluent BOD

	PD PAL Jakarta*	PDAM Bandung**	BLUPAL Denpasar***
Treatment Process	Aerated Lagoon	Oxidation Pond	Aerated Lagoon
Influent Quantity (m^3/day)	13,815	~ 40,000	8,000
Influent BOD (mg/lit)	74	91	45
Effluent BOD (mg/lit)	45	31	23
Removal Rate (%)	39	66	51

* Source: Comparative Study - Centralized Wastewater Treatment Plants in Indonesia, USAID, September 2008
** Source: PDAM, Jan. to Nov. 2009
*** Source: BLUPAL, Sep. 2009

3.3 Extraction of Issues

3.3.1 Structural Issues: As shown in **Section 6.2.1**, there are specific advantages and disadvantages in PD PAL and PDAM, and predicted advantage in BLUPAL. A disadvantage in PD PAL i.e. the sewerage works can not use the service charge collection system of water works and 2 (two) disadvantages in PDAM i.e. the sewerage works can not be implemented independently and the accomplishment of the works is affected by that of the water works. However such disadvantages might cause financial difficulty in other small scale municipalities.

3.3.2 Management Issues: As shown in ***Table SSR.3.8***, idling rate i.e. actual influent quantity/design influent quantity is low in Bandung and Denpasar because of low household connection rate.

Table SSR.3.6 - Idling Rate in Wastewater Treatment Plants

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Design Influent Quantity (m^3/day)	42,768*	80,000	51,000
Actual Influent Quantity (m^3/day)	13,815	~ 40,000	8,000
Idling Rate (%)	68	~ 50	84

*Source: Comparative Study - Centralized Wastewater Treatment Plants in Indonesia, USAID, September 2008

Table SSR.3.9 shows the number of staff, household connections and number of connections per staff in the three providers.

Table SSR.3.7 - Number of Staff and Household Connection

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Staff	121	138	69
Household Connection	1,444	98,350	8,647
Connection / Staff	12	713	125
Staff / 1,000 Connections	83.80	1.40	7.98

Source: PDPAL Jakarta, PDAM Bandung and BLUPAL Denpasar

3.3.3 Financial Issues: ***Table SSR.3.8***shows initial investment cost for sewerage works, and ratio to unit design influent and actual influent quantity in 15 years.

Table SSR.3.8 - Initial Investment Cost and Ratio to Unit Design Influent and Actual Influent Quantity

	PD PAL Jakarta	PDAM Bandung
Initial Investment Cost (bill. IDR)	11.86*	113.55*
Cost/Design Influent in 15 years (IDR/m^3)	50.6	259.2
Cost/Actual Influent in 15 years (IDR/m^3)	107.6	518.5

Source: Comparative Study - Centralized Wastewater Treatment Plants in Indonesia, USAID, September 2008

Table SSR.3.9 shows bill collection systems in PD PAL Jakarta and PDAM Bandung.

Table SSR.3.9 - Bill Collection Systems

	PD PAL Jakarta	PDAM Bandung
Collection System	Independent	Together with water charge
Collection Efficiency	60 to 80 %	80 %

Source: Comparative Study - Centralized Wastewater Treatment Plants in Indonesia, USAID, September 2008

Table SSR.3.10 shows total O&M cost and O&M cost per actual influent quantity in PD PAL Jakarta and PDAM Bandung.

Table SSR.3.10 - Total O&M Cost and O&M Cost per Actual Influent Quantity

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Total O&M Cost (mill. IDR/year)	17,700	8,623	2,493
O&M Cost per Actual Influent Quantity (IDR/m^3)	3,510	590	854

Source: PDPAL Jakarta (2008), PDAM Bandung (2008) and BLUPAL Denpasar (2009)

3.4 Evaluation and Deliberation of the Results

3.4.1 Organization Structure: 3 (three) types of organization structure were surveyed and advantages and disadvantages of each structure were emerged as shown in **Section 6.2.1**. Desirable structure might depend strongly on the municipal situation but sewerage service in PDAM might be recommended for newly sewerage works promoting municipalities. Especially small or middle size municipalities of which financial condition is weak should adopt this type of structure.

3.4.2 Law and Regulation: As mentioned above there is no Sewerage Law in Indonesia yet while provincial regulations regarding sewerage works were established already. It is the basic law and should be established soon.

3.4.3 Finance: Except a few big cities, most of municipalities can not commence sewerage works without subsidy from Central Government. Currently planning and designing are subsidized by provincial government and construction of main sewer and treatment plant are subsidized by Central Government. This subsidy system has invigorated municipalities to implement the works therefore it should be continued. Besides such subsidies bond issue by municipalities also should be considered in order to inspire individual implementation of the works. In case of issuing bond, it must be indemnified by Central Government.

3.4.4 Tariff System and Bill Collection: Principle of tariff system is the fairness for all users. Percentage of water consumption like 30% which is adopted in PDAM Bandung seems to be fair because consumed water becomes to wastewater. Moreover service charge can be increased together with water charge easily. On the other hand, tariff based on floor dimension seems to be unfair because wastewater quantity and floor dimension has no relation in some cases. During the service charge is low enough no complaining might be made, however when the charge increases complain also might increase. Bill collection together with water charge is easy for collectors and convenient for customers.

3.4.5 Wastewater Treatment Process: Wastewater treatment processes adopted in Indonesia like oxidation pond system are the optimum choice for rapid development of sewerage system in the country. When such treatment process is operated and maintained well effluent quality would be sufficient for preventing water pollution in discharging water bodies. In the future when it becomes necessary to improve environmental condition treatment plant can be modified to the superior process easily because superior process requires less treatment site area.

II. BASIC DESIGN OF DRAFT MANAGEMENT CRITERIA FOR SEWERAGE SERVICE PROVIDERS

CHAPTER 1: INTRODUCTION

1.1 General

The overall service rate of large-scale sewerage systems in Indonesia remains as low as 1.3 % to 3.0 %. According to the Census 2007, coverage ratio of basic sanitation facilities (i.e. septic tank is 90.5 % in urban area and 67 % in rural area). On the other hand coverage ratio of off-site system is only 2.3 % in 11 cities. The urgent challenges for Indonesian for sewerage sector are to commence the establishment of sewerage service and management structure, development and improvement of sewerage systems, and development and expansion of sewerage service covered areas.

The management of sewerage has responsibility of making effort to work out to sustain and improve sanitation, preserve the water quality, take measure of the stormwater and environmental effect with following policies.

1.1.1 Basic Concept for Management: Sewerage system must be managed to provide necessary service to all user with holding the convenience as possible.

1.1.2 Support for Needs of Users: Required special considerations concerning satisfaction of users against sewerage services are needed.

1.1.3 Water Resources Conservation and Environmental Protection: Sewerage has responsibility of reduction of negative impact to public water body, preservation of water quality and production of comfortable water environment.

1.1.4 Operation and Maintenance of Sewerage System: Sewerage system is lifeline of lives of inhabitant and urban activity, therefore continuous and systematic operation and maintenance is required.

1.1.5 Staff: Special considerations required for management of sewerage system and services are needed.

1.2 Purpose

The purpose of development of this Basic Design of Draft Management Criteria is the basis as the sample for the preparation of the more detailed and concrete management criteria which shall be prepared and developed by Indonesian side to establish new providers or improve the existing providers.

1.3 Target of Appliance

This basic design is mainly targeted on sewerage service provider which newly implements sewerage works. However it will be useful for reviewing sewerage works for sewerage service provider where sewerage works have been operated already. And some of contents can be applied to water supply sector.

CHAPTER 2: SEWERAGE DEVELOPMENT

2.1 General

Development of sewerage works usually proceeds by the following process. (See ***Table SMC.2.1***)

Table SMC.2.1 - Process of Sewerage Development

Process	Contents
Decision of Implementation of Sewerage Works	Development method, target year and financial measure etc. are decided by municipality.
Master Plan	Service area, scale of sewerage works in circa 20 years, treatment process and treatment site etc. are revealed.
Feasibility Study	Identify the most important and feasible project in the master plan
Environment Impact Assessment	Wastewater treatment plant is an object for environment impact assessment.
Acquisition of Treatment Site	Based on the basic design, treatment site of required dimension is acquired. Wastewater treatment Plant is always considered to be troublesome facilities for vicinity resident therefore diligent communication with them is required.
Detail Design	Based on the basic design, those facilities are minutely designed.
Approval of Sewerage Works by National Government	
Construction	Construction term of treatment plant is usually 1 to 3 years which depends on treatment process and capacity. Construction of sewer net works lasts until sewered area covers master plan area.
Commencement of Operation	
Management of Sewerage Works	Operation and maintenance of sewerage facilities, customer service and service charge collection etc. are carried out. Asset management is implemented for intentional rehabilitation to come.

2.2 Basic Survey

It is obvious that sewerage services must conform technologically to the topography of the site and the distribution of the population, but after commencement of service, conformation of condition of economy, industry, and existing water, sewerage and other sanitary facilities are required from management perspective. In addition, through socio-economic survey such as questionnaires or personal interviews with the inhabitants, it must be ascertained what their needs are and what would be a feasible charge.

2.3 Key Issues and Factors

There are key issues and factors should be conducted for developing sewerage such as:

- Methods of Analyzing Factors from Management Perspective
- Establishing Future Frames

2.4 Development of Sewerage Service

2.4.1 Facility Planning: The weather conditions, topography, land values, exchange rates, the portion of expenses to be paid in local and foreign currencies and energy costs are the factors that must be examined in facilities planning. Every effort should be made to develop a plan that will maximize value and realize "cost-effectiveness" in handling construction and O&M expenses. It should be assumed that the plan must also include an Environmental Impact Assessment (EIA), and allocation of time and money required.

2.4.2 Estimation of Approximate Cost: Conditions dealing with domestic and foreign currency for procuring funds differ from the type and combination of assistance, such as the Central Government, donors, grants-in-aid, foreign loans and investment. For the estimation of project cost, these conditions should be considered with a clear direction so that possible procuring funds can be explored.

2.5 General Schedule of Sewerage Works

Figure SMC.2.1 shows general schedule of sewerage works. Required term until commencement of operation of wastewater treatment plant is approximately 4 to 7 years, which depends on wastewater treatment process and scale of sewerage works.

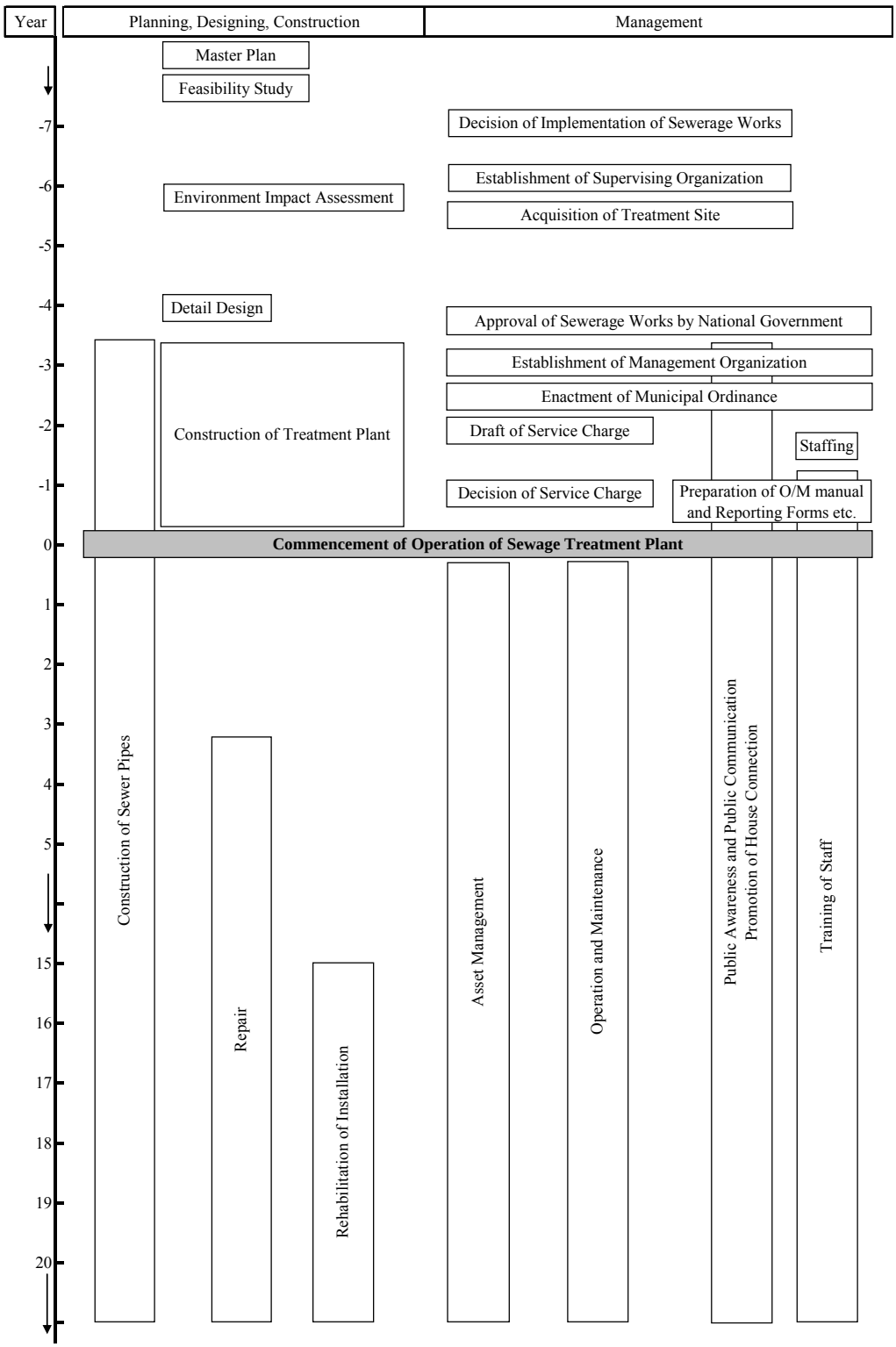

Figure SMC.2.1 - General Schedule of Sewerage Works

CHAPTER 3: LEGISLATION AND STANDARD

3.1 General

In the Indonesia, Sewerage Law which is essential for implementation of sewerage works is now under preparation and the works are carried out based on the Regulation of Ministry of Public Works No.16/PRT/M/2008, "Policy and National Strategy for Development of Settlement of Sewerage Management System". The regulation is based on the Millennium Development Goals, i.e. decrease 50 % of population who can not access safe water and proper sanitation by 2015, and National Medium-term Development Plan (RPJMN), i.e. "free from open defecation by 2014."

On the other hand State Ministry of Environment and Ministry of Health have prepared laws and regulations against discharge of sewerage to environment in order to protect environment and healthy lives. ***Figure SMC.3.1*** shows required relevant laws and regulations for further development of sewerage.

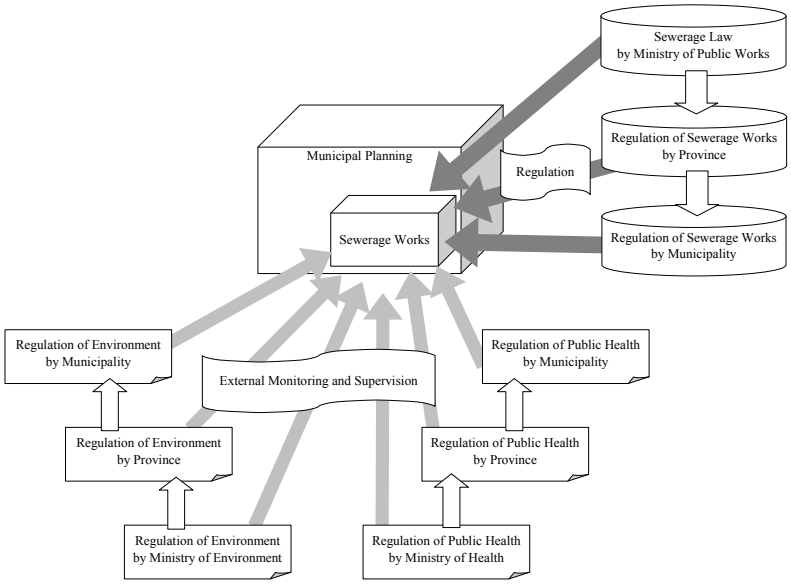

Figure SMC.3.1 - Required Relevant Laws and Regulations for Sewerage Works for Further Sewerage Development

3.2 Sewerage Law

Central Government shall legislate the Sewerage Law as the essential law for implementation of sewerage works of local municipalities.

3.3 Municipal Regulation of Sewerage Works

Based on the Sewerage Law, each municipality has to legislate own regulation regarding sewerage works.

3.4 Relevant Laws and Regulations

Service charge is the basis of sewerage works to be regulated. Besides Laws and regulations regarding sewerage works, sewerage service providers have to consider the issues on environment, on preservation of water source, on solid waste, city planning etc.

3.5 Standards and Guidelines

In order to implement sewerage works efficiently and secure definite quality, Ministry of Public Works has to prepare relevant standards and guidelines.

3.6 Methodology for Preparation of Laws, Regulations and Standards

Even though laws, regulations and standards above mentioned are required, it is impossible to prepare them in short time. Therefore they should be prepared one by one deliberately.

Figure SMC.3.2 shows an example for preparation schedule of laws, regulation and standards above.

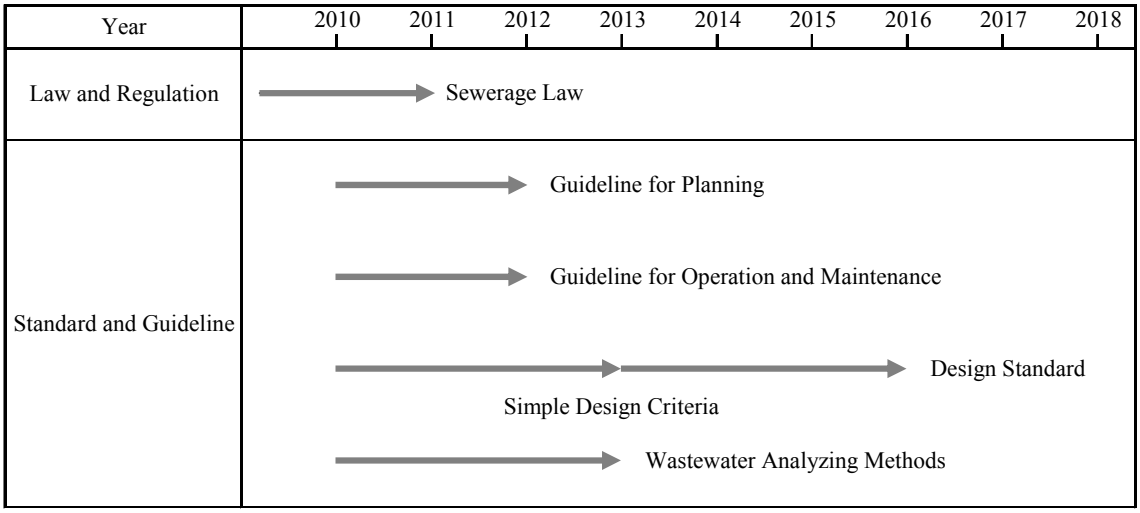

Figure SMC.3.2 - Example for Preparation of Laws, Regulation and Standards

The relevant organizations of the three service providers have prepared regulations and decrees required step-by-step.

CHAPTER 4: GOVERNING STRUCTURE

4.1 General

The governing structure for sewerage services is advisable to be managed with water supply service, and the position of sewerage shall be same level of water supply services, and well-supported, since both works (water supply and sewerage services) are in the same area (water works) and there are many advantages on database management, billing and collection, financial management, planning and design, construction, quality management, risk management, public communication, public awareness and education, regal framework, capacity development, etc. in the combined structure of water supply and sewerage services.

4.2 Typical Structure:

A typical governing structure of sewerage service is depicted in ***Figure SMC.4.1***. As shown in this figure, the typical organization and function for sewerage services should be as parts of an organization structure for water supply and sewerage services.

This organization manages provincial or city/regency regional total water supply and sewerage services. This governing structure of water supply and sewerage services belong to Local Government as company and should be called as Regional (Local Government) **Water Supply & Sewerage Service Enterprise (WS&SSE).**

4.3 Implementation Methodology

The recommended type of sewerage management organization structure is already applied in existing cities in Indonesia such as in Banjarmasin, Cirebon, Bandung, Balikpapan, Surakarta (Solo), and Medan (including Prapat), and BLUPAL (Denpasar) will be merged into existing PDAMs in Denpasar and Badung in future.

A typical process for reorganization as WS&SSE is shown in ***Figure SMC.4.2***.

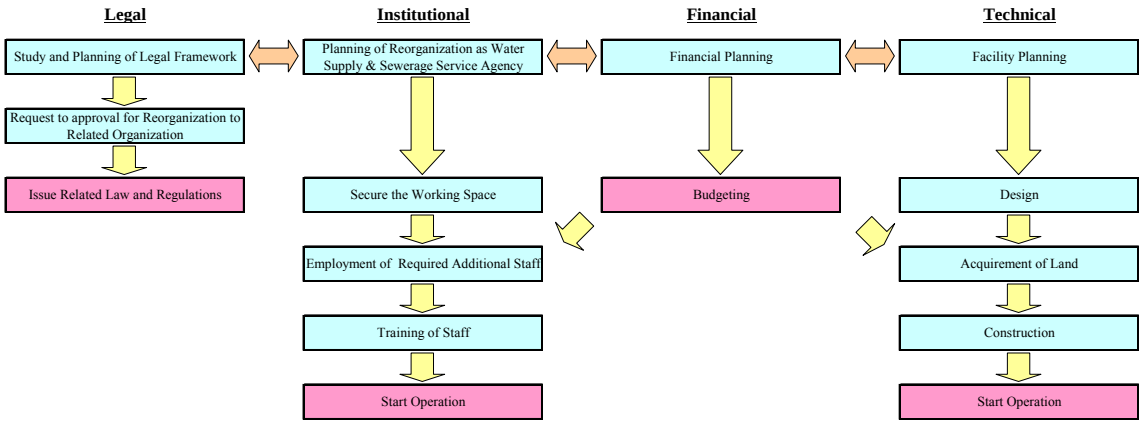

Figure SMC.4.2 - A Typical Process for Reorganization as WS&SSE

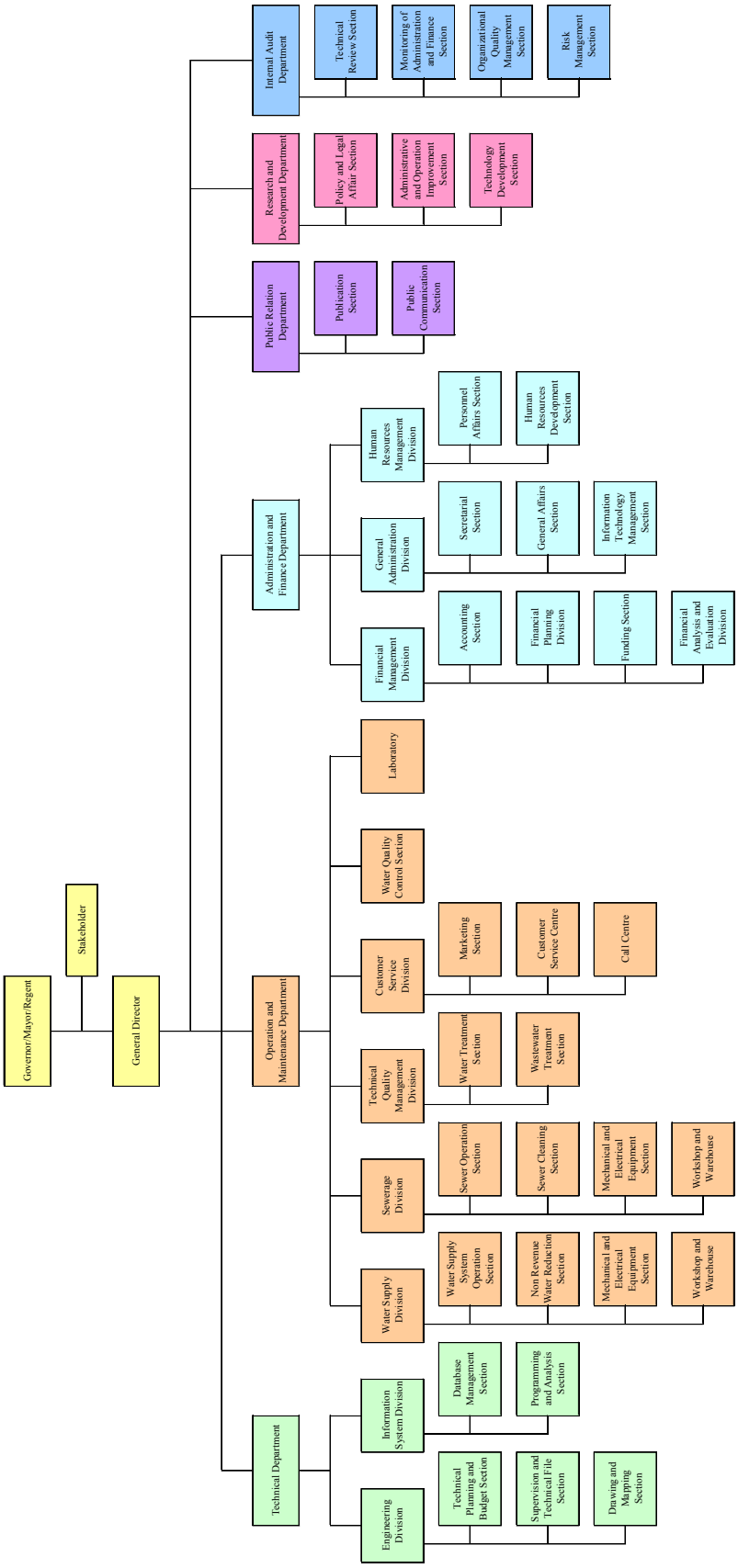

Figure SMC.4.1 - Typical Governing Structure of Water Supply & Sewerage Service Enterprise (WS&SSE)

CHAPTER 5: DATA MANAGEMENT

5.1 General

Innumerable information is involved in sewerage works but inventories, reporting data and customer inventory are the most significant one. Inventories and reporting data are used not only for appropriate management of facilities but also for rehabilitation of facilities in the future. Customer inventory is useful for measure against customer complaint and reduction of non-revenue water, water and wastewater quality etc.

5.2 Case Studies

Table SMC.5.1 shows the preparation condition of various inventories in the three service providers surveyed.

Table SMC.5.1 - Preparation Condition of Inventories in the Three Service Providers

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Sewer	Completed	Around 30% is completed.	Completed in the Denpasar sewerage Development Project Phase I.
Installation	A part of the data was lost when the sewerage works was transferred from Jakarta province to PD PAL.	Completed	
Equipment			
Oil			
Chemical			
Customer	Completed	Around 20% is completed.	Around 58 % is completed.
Factory	A small domestic factory is connected to sewerage system	Because industrial wastewater is not accepted to sewerage system, no factory inventory is prepared. Inventories of hotel, restaurant and hospital are completed. In case of hospital, wastewater which might contain toxic substances is not accepted.	Because industrial wastewater is not accepted, no factory inventory is prepared.

CHAPTER 6: OPERATION AND MAINTENANCE

6.1 General

The objective of operation and maintenance of sewerage facilities are systematic utilization of the sewerage facilities such as the sewers, pumping stations, wastewater treatment plants to meet its intended use, collection of sewerage without delay, proper treatment of sewerage, and to keep effluent in regulated good quality. To perform the proper operation and maintenance works, the development of organization, human resources and facilities is required.

6.2 Establishment of Operation and Maintenance Plans

When establishing operation and maintenance plans, the points regarding Installation and O&M of facilities, finances, accounting, personnel management and water quality management shall be considered.

6.3 Operation and Maintenance of Sewerage Facilities and Equipments

Operation and maintenance of sewerage works is divided into (1) maintenance of sewer pipes and pumping station and (2) operation and maintenance of wastewater treatment plant.

6.3.1 Maintenance of Sewer Pipes: Sewer pipes are the essential facilities of sewerage works. They have close affinity with daily lives of citizen therefore they have to be maintained appropriately.

6.3.2 Operation and Maintenance of Pumping Station: Functions of pumping station are to prevent inundation of urban area and decay of sewerage by immediate pumping out of sewerage. Therefore appropriate operation and maintenance is indispensable.

6.3.3 Operation and Maintenance of Wastewater Treatment plant: Wastewater treatment plant has to treat wastewater whole day long, all the year around, and treated wastewater quality has to meet the effluent standard. Therefore operation and maintenance of wastewater treatment plant has to be implemented deliberately.

6.4 Laboratory Management

Analyzing parameters and samples depend on requirement and scale of laboratory. High-priced equipments are necessary for analyzing heavy metals or organic solvent for instance, therefore analysis on commission to central laboratory, universities and private laboratories is highly recommended.

6.5 Water Quality Monitoring System

Internal monitoring is carried out by service providers, which include analysis on commission to external laboratory. This monitoring is taken place in order to investigate treatment efficiency and comply with effluent standards.

6.6 Violation of Effluent Standard

In case of violation of effluent standard, service provider has to prepare provision against the direction by the province. First of all the provider has to recognize the cause of the violation. If it is caused by failure of operation like shortage of air supply in case of activated sludge process, it should be modifies in order to get back proper effluent quality. However if it is caused by functional problem of treatment process, improvement of treatment process has to be considered. In case of usage of primary treatment process like oxidation pond, effluent quality is usually inferior to effluent quality of secondary or advanced treatment process. Therefore it should be considered whether fixed effluent standard is appropriate for the treatment process or not.

6.7 Outsourcing of Operation and Maintenance Works

Sewerage works usually originates a lot of employment. Generally, the utilization of outsourcing for operation and maintenance works is recommended, in order to reduce the O&M costs. However financial merit of direct management and outsourcing for each work in the plant has to be compared and evaluated before employing staff in order to pursue efficient management of sewerage works.

6.8 Joint O&M and Use of Common Materials and Equipments

Area-wide joint operation and maintenance is effective to reduce cost and contribute to solid management of sewerage works. When a sewerage district is newly designed near existing sewered area, joint operation and maintenance has to be considered for obtaining benefit from economies of scale. Use of common materials and equipments is effective for reducing maintenance cost. It reduces stocks of materials and equipments such as belt for motor, submerged pump and relay for instance.

CHAPTER 7: FINANCIAL MANAGEMENT

7.1 General

Financial projections are an important part of sewerage project planning. Forecasts of the financial situation for each stage of the project have to be made based on project costs and financial resource. The forecasts for each period will be of surpluses or shortfalls of funds, changes in the scale of the assets involved, and other financial factors. The following sources of funds should be examined:

(A) Sewerage service charges
(B) Advances from the Central Government (including assistance from foreign government agencies and private financial institutions), subsidies, bond issuance
(C) Funds carried forward from general accounts of the municipality, etc.

Statements of cash flows, statements showing advances and repayments, profit-and-loss statements and balance sheets are among the information that should be prepared to provide summaries of the financial conditions of projects.

7.2 Setting of Charge

It is recommended the charge will be charged by water consumption basis which unit is;

Charged (IDR) = Water Consumption (m^3) × Applied (IDR/m^3) × 1 month (30 days) for each building type

The assumed flow rate of wastewater per month for general house as an example modified from above sample Charge of PD PAL JAYA is shown in ***Table SMC.7.1*** as follows;

Table SMC.7.1 - Assumed Flow Rate (m^3) per Month

Type of Building	Water Consumption (lit/day)	Flow Rate of Wastewater (lit/day)	Household Members (person)	Total Wastewater (m^3/month)
General Housing	**150**	**120**	**6**	**21.6**

Based on above flow rate and assumed affordability to pay of 15,000 IDR which is mentioned in the reports of USAID, the service charge for general house as an example is calculated as follows;
15,000 IDR / 21.6 m^3 = 694 IDR/m^3 = approximately **700 IDR/m^3** (per connection/month)

Then, the sewerage service charge for general house will be set at 700 IDR/m^3 as the one of the basement of charge structure.

Further detailed study, analysis and calculation should be carried out, when the project will be implemented in specific area. And in calculating the charge for sewerage services, it may also need some additional patterns/ models, which also include penalty/ sanction for customer.On the other hand, other Charge for non-water supply user should be considered, such as for example as in Bandung; 5,000 IDR/connection for non-water supply users.

7.3 Key Points to be Sound Finance

Financial condition of the WS&SSE at initial stage of operation is depicted in ***Figure SMC.7.1***, and desired condition in full cost recovery of WS&SEE in future is depicted in ***Figure SMC.7.2***.

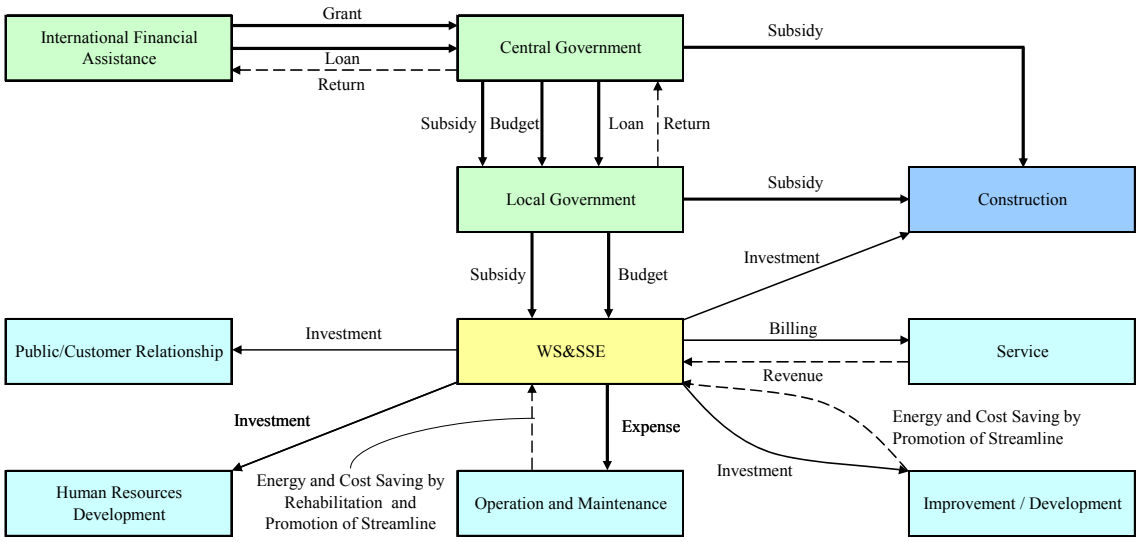

Figure SMC.7.1 - Financial Process at Initial Stage

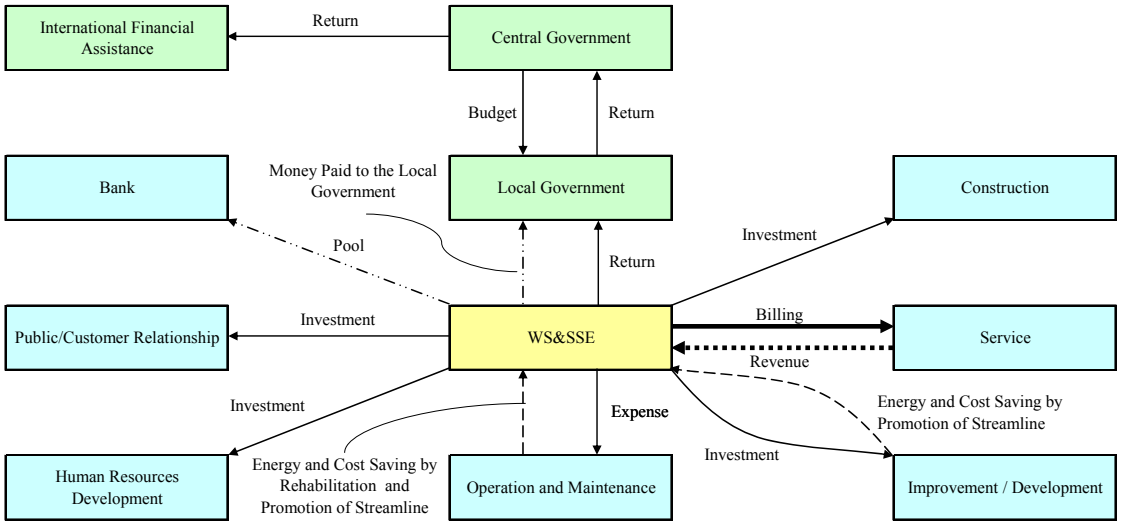

Figure SMC.7.2 - Desired Financial Process in Full Cost Recovery

At the initial stage, WS&SSE will need financial support for construction of the sewerage system by the Central Government of Local Government, and will need enough subsidy or budget for the costs for O&M and other expenses from Local Government since that the number of connection to the system will not many and revenue collection will be not much.

The key points to start and operate the system at the initial stage are to receive the enough assistance (financial and technical) for the construction and O&M. And, introduction of the Energy and Cost saving technologies and system in O&M is also one of the effective key points to curb the O&M costs. (E.g. curb the expense for electric charge, chemicals, personnel, etc.)

After expansion of the service area, increasing the number of connections, proper billing and enough revenue collection, WS&SSE will can operate in the condition of full-cost recovery. And WS&SSE may be able to pool some funds in the bank for future development, and may distribute the profit to the Local Government for development or improvement of other infrastructures.

The key points to be sound finance are to secure the service area and customers and to assure the billing and collections. And the most important key section in the structure of WS&SSE will be Customer Service Section.

CHAPTER 8: HUMAN RESOURCE

8.1 General

The sewerage service provider should conduct activities of;

(1) Human Resource Management (HRM)
(2) Human Resource Development (HRD)

8.2 Capacity Assessment

A capacity assessment is an essential basis for formulation of coherent strategies for capacity development, and an analysis of current capacities against desired future capacities, which generates an understanding of capacity assets and needs of specific entities and individuals within the system, which in turn leads to the formulation of capacity development.

The Human Resources Development Section will assess the capacity of staffs, and the Administrative and Operation Improvement Section will assess the capacity of their organization, and then understand of capacity assets and needs for the formulation of capacity development.

8.3 Capacity Development

8.3.1 General Model for Human Resource Development System: There are four basic assumptions shown as follow;

- HRD planning is not "one-shot" but continuous process. (E.g. planning and management are interrelated)
- An effective HRD education and training delivery system should be responsible to shifts in the specific demands of labour markets at all levels
- HRD should be planned through systematic definition and understanding occupational supply and demand for the sector
- HRD planning necessitates a coordinated interagency approach, involving all the necessary stakeholders

8.3.2 Establishment of Training System: In order to implement appropriate human resources development, establishment of the following systems are required.

(1) Training system in organization
(2) Training of trainers
(3) Evaluation system
(4) Modification system

CHAPTER 9: COMMUNICATION AND PUBLIC AFFAIR

9.1 General

Success of sewerage management programmes depends on effective public communication through information, awareness, and education. A communication process includes advocacy, social mobilization and programme communication, three components that do not necessarily happen consecutively.

9.2 Public Announcement

The way to communicate with people for announcement on the roles and responsibilities, kinds of services, water qualities, service charges and water conservation etc. are;

(1) Word of mouth
(2) Direct contact
(3) Advertising
(4) Publicity
(5) Identity
(6) Event
(7) Media

Communications and relations with people through communities are advisable to carry out efficient sewerage works in Indonesia.

9.3 Public Education

Public education is indispensable for public awareness on sewerage works, which in turn may serve to promote household connection and reduce complaint of resident. The following methods are effective for public education;

(1) Education of sanitary and hygiene in school
(2) Education of sanitary and hygiene to cadres of National Movement Organization of Empowerment and Welfare of the Family (PKK)
(3) Invitation to site tour (e.g. SANIMAS Sites)
(4) Invitation to treatment site
(5) Publicity by TV, newspaper and poster

9.4 Case Studies

As shown in ***Table SMC.9.1***, various kind of public communication is carried out in the three service providers

Table SMC.9.1 - Public Communication in Indonesia

PD PAL Jakarta	➢ Promotion of house connection for future service area has been carried out. No public communication program for existing sewered area is implemented.
PDAM Bandung	➢ Presentation of information about sewerage works is carried out by staff of PDAM in communities. ➢ Public communication by TV and radio has been implemented. ➢ Site visit to wastewater treatment plant which is not only for primary school students but also for university students is carried out 20 to 30 times a year.
BLUPAL Denpasar	➢ Public communication by using TV, radio and newspaper has been carried out. ➢ Door-to-door promotion of house connection is implemented by staff of Consultant Company in DSDP. ➢ Around 10 schools visit wastewater treatment plant in a year. ➢ Staff of Consultant Company shows the plant for them. After the completion of DSDP-II in 2014, staff of BLUPAL will guide the plant for students.

CHAPTER 10: CUSTOMER SERVICE

10.1 General

The WS&SSE should have a clear customer mandate describing the level of service to be provided and responsibilities of customers to pay bills, settle arrears and to comply with regulations with respect to illegal connections or improper disposal, tampering with providers, etc.

The WS&SSE should conduct customer survey and develop the database to ensure that all customers who connected the wastewater collection system are registered on the billing database.

The WS&SSE must have "Customer Service Strategy" or service policy in place. Consequently, customer service practices and standards vary within and across Regions and are highly dependent on local management attitudes towards customer service provision. The WS&SSE will therefore need to consider introduction of a strategy that clearly details the organisation's strategic intent with regard to customer services.

10.2 Structure and Function

10.2.1 Effective Provision and Management of Customer Services: Effective provision of customer services will require that the WS&SSE is organised in such a way that focuses on service delivery.

10.2.2 Organization Design: The WS&SSE should recognize that staff has key to their success and that creating the right culture is fundamental to delivering excellent service. In this respect, customer service training should be provided to all staff.

Organizational Model

The sewerage service provider's goal will be to provide a seamless service "to protect public health, environment and water resources". This can be achieved by centralising the key customer processes, managed at "the Centre" without losing sight of the importance of local service provision within the regions. The sewerage service provider should therefore maintain a network of regional Customer Service Centres with clear accountability to the Centre. The key functions at the Centre are listed as follows;

(1) Customer Relations
(2) Revenue management
(3) Performance and Planning

10.2.3 Commercial and Customer Contact System: The sewerage service provider should conduct customer database management, bill printing and some contact management (complaints handling) activities. The main activities for the managements on customer services are;

(1) **Revenue Management:** Whilst a part of the bill collection services are being conducted by water supply service providers, the WS&SSE will want to ensure that customers are provided with clear, accurate billing and collection in the most efficient and cost-effective way available. As such the WS&SSE will need to ensure that existing water supply service provision arrangements are closely monitored in accordance with the contract to ensure compliance with performance standards.
(2) **Contact Management:** The WS&SSE will target to provide customers with a courteous, informed, and prompt response to their enquiries.

10.2.4 Customer Relations: The WS&SSE will need to develop a "Communication Strategy" that addressed the need to provide customers with clear concise information about services, for example; routine day to day operational information such as advance notification of interruptions of water supply, sewerage flooding or public education information, such as advice on water conservation.

10.3 Customer Service System

The Customer Service Centres and Call Centres are closely related, and three important functions assumed by these Centres are: (1) Finance (2) Information (3) Communication, and are depicted in ***Figure SMC.10.1***

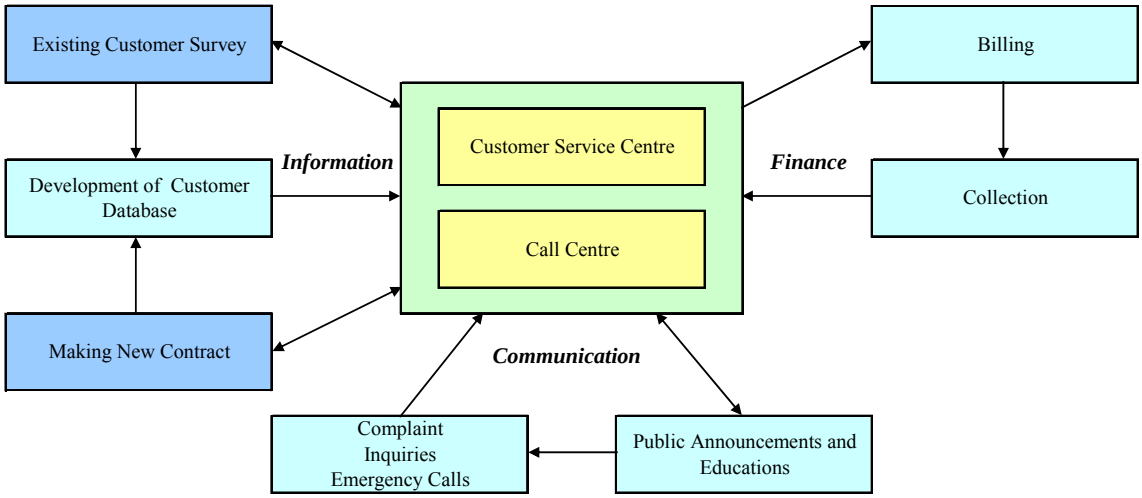

Figure SMC.10.1- Functions of Customer Service Centres and Call Centres

10.4 Case Studies

As shown in ***Table SMC.10.1***, the service providers surveyed have their own customer service system.

Table SMC.10.1 - Customer Service in the Three Service Providers

	PD PAL Jakarta	**PDAM Bandung**	**BLUPAL Denpasar**
Service Centre	No, because service area is small.	Customer service section is in PDAM. Branch offices of customer service section are in each district.	Currently one is in BLUPAL and one is in DSDP. After completion of DSDP Phase II in 2014, service centre of DSDP will be merged with BLUPAL one.
Call Centre	24 hr service	24 hr service	24 hr service

CHAPTER 11: QUALITY MANAGEMENT

11.1 General

Sewerage systems are built and operated mainly to protect public health and the environment. The Type of sewerage system needs to be chosen and adapted in context with the density of the population, climatic conditions, environmental requirements for treatment and the technical/socio-economical ability of the responsible body to implement it, operate it and maintain it. It needs to be cost effective and sustainable, as well as permitting phased development to overcome the financial constraints while not compromising the stated objectives.

11.2 Quality Management System

The organization will conduct;

(1) **Water Quality Management:** The water quality management system is shown in ***Figure SSR.11.1***.

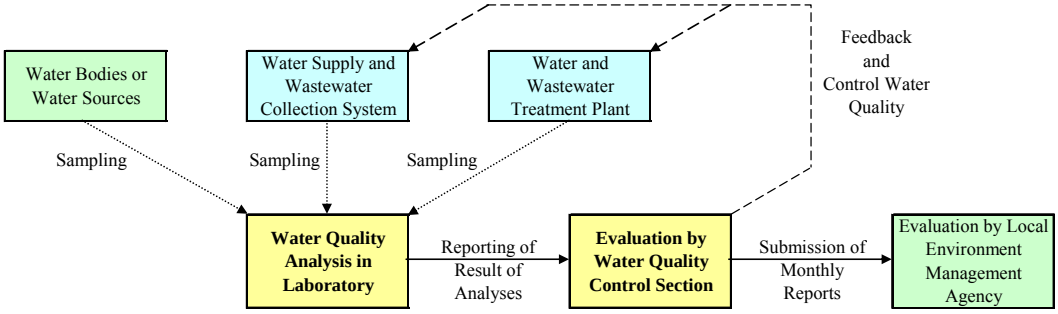

Figure SMC.11.1 - Water Quality Management System

(2) **Organizational Quality Management:** For the management organization, Organizational Quality Management Section will control the quality based on Quality Management System (QMS) by ISO9001 & ISO 9004 with Environmental Management System (EMS) by ISO14001 & ISO14004 and ISO/TC224 for Service Activities relating to Drinking Water Supply and Sewerage as the Guideline.

(3) **Quality Management for Construction:** On the other hands, for the construction, the contractor normally controls the quality on their responsibility, and supervisor monitors and evaluates their quality control activities.

11.3 Case Studies

As shown in ***Table SMC.11.1***, effluent water quality management which is one of the most important quality management parameters in sewerage works is carried out in the three service providers surveyed as a quality management.

Table SMC.11.1- Quality Management in the Three Service Providers

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Quality Management	Effluent water quality management is carried out however no other quality management is carried out.		

CHAPTER 12: RISK MANAGEMENT

12.1 General

All managements entail a variety of risks - small and some large. When operate the sewerage service, full consideration has to be given to the categories and extent of risks involved in the management, and how to avoid them.

12.2 Extraction of Risk and Risk Management Planning

The risks in the management of sewerage services are categorized as follows:

(1) Risks in planning, design and construction phases
(2) Risks in O&M
(3) Economic and financial risks
(4) Indirect risks

12.3 Risk Management System

The Risk Management Section will implement the measures to minimize risks as mentioned above and monitor the operation condition. However, the minimization of the risks sometime will cost much; therefore, the risk management should be conducted in moderation with considering about the costs implemented.

The Risk Management Section will develop the "Emergency Response System" (ERS) and "Emergency Response Manual" (ERM) to provide against emergency cases.

12.3.1 Emergency Response System: To provide against emergency cases, such as abnormal operation of WWTP, overflow of wastewater, the case that wastewater contains substances harmful to health etc., the Emergency Response System (ERS) should be established and developed, and typical ERS is shown in ***Figure SMC.12.1*** as for example.

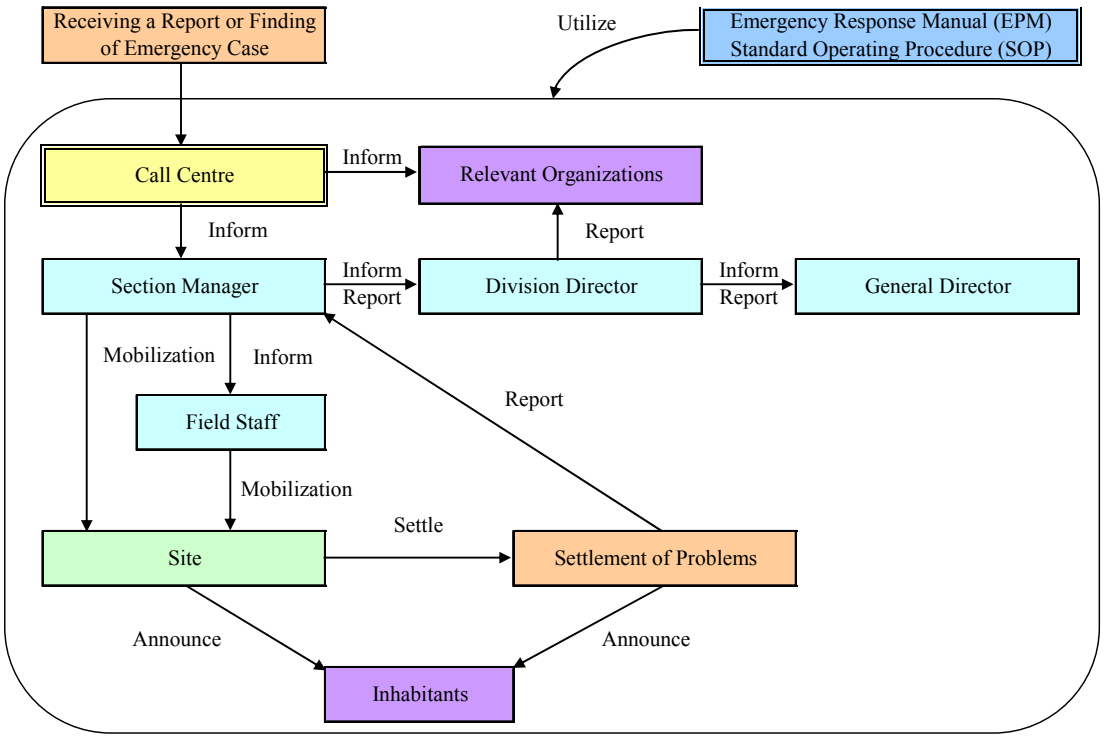

Figure SMC.12.1 - Typical Emergency Response System

12.3.2 Emergency Response Manual: The Emergency Response Manual (ERM) should be provided to provide against emergency cases.

12.4 Case Studies

As shown in ***Table SMC.12.1***, no special risk management is carried out in the three service providers surveyed, besides management against claims from customers or residents in vicinity. However, because sewerage works has always possibility to be involved in serious accident, therefore service providers have to implement risk extraction and consider precaution and provision method in order to shelter the organization. It may lead to proper management of service providers.

Table SMC.12.1 - Risk Management in the Three Service Providers

	PD PAL Jakarta	PDAM Bandung	BLUPAL Denpasar
Risk Management	Management against claims from customers and residents in vicinity, No other risk management is carried out.		

CHAPTER 13: CORPORATE GOVERNANCE

13.1 General

Corporate governance is defined as audit and order of management of enterprise. For public enterprise or public institution like sewerage works enterprise, the definition is read to be appropriate management of enterprise or institution and apt relationship with stakeholders.

The targets of corporate governance are said to be;

(1) To prevent scandal in enterprise or institution
(2) To strengthen profitability of enterprise or institution

13.2 Stakeholder

(1) In case of public enterprise, stakeholders might be as follows:
    1) Central, provincial and municipal government
    2) Customers
    3) Relevant communities
    4) Staff (employees)
(2) Public enterprise should be governed by internal and external audit for appropriate management. For external audit, committee which consists of stakeholders and experts has to be established.
(3) Apt relationship with stakeholder is executed by public relations like periodic meeting and publication of data and information.

13.3 Evaluation

Achievement of corporate governance has to be evaluated. Implementation of evaluation in internal and external audit is efficient. Results of evaluation are published and reflected to provision.

13.4 Implementation Methodology

Corporate governance is raised based on the following stages:

(1) Establishment of internal committee for implementation of corporate governance
(2) Preparation of management system of corporate governance
(3) Establishment of internal and external audit committee and approval of the system by the committees
(4) Preparation of program of corporate governance of next year

13.5 Case Studies

In Indonesia, president decree regarding corporate governance was already declared and each organization is required to promote appropriate corporate governance.

Three service providers surveyed have propelled good relationship with stakeholders like national, provincial and municipal government, customers and communities by sharing information. This means the corporate governance although the providers do not declare those activities as corporate governance. Improvement of those activities and guidance regarding corporate governance for newly developing service providers are requested for the three providers.

CHAPTER 14: MANAGEMENT CRITERIA

14.1 General

This basic design of draft management criteria needs further development with more selectable alternative options to be suited to regional condition in the Indonesia. Indonesian side should be proactive in developing the management criteria. The further development of the management criteria needs basic concept and policies based on National Sewerage Law.

14.2 Implementation Methodology

14.2.1 Implementation Schedule: The implementation schedule with mile stones for developing the management criteria is needed to commence the concrete actions. An example of implementation schedule is introduced in ***Figure SMC.14.1***, however the Indonesian side should review and revise or prepare the more detailed and feasible implementation schedule. Development of the management criteria should be reviewed and revised through workshops. And the results of development will be announced to relevant authorities through seminars.

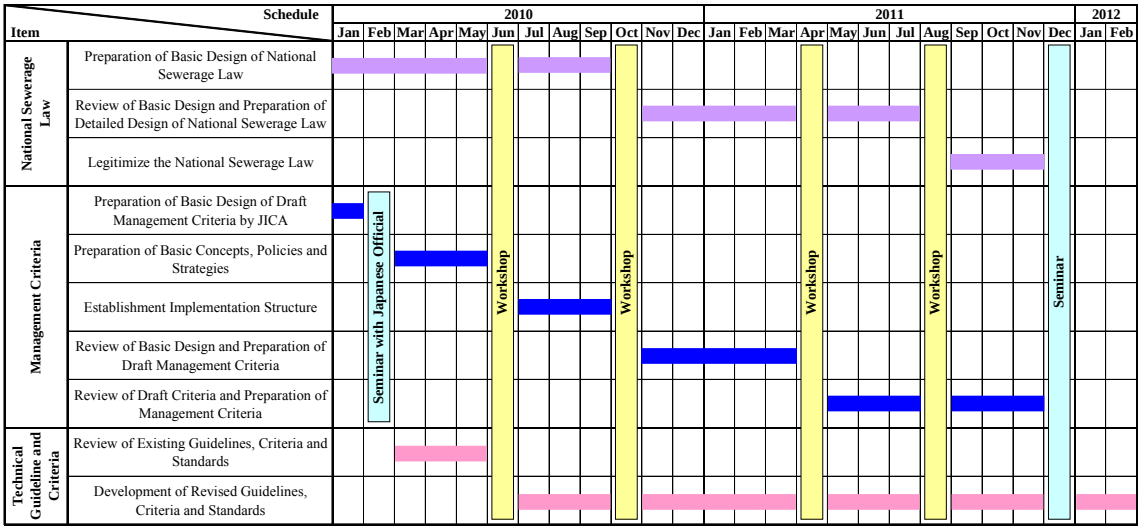

Figure SMC.14.1 - An Example of Implementation Schedule of Development of Management Criteria

14.2.2 Implementation Schedule: The **Special Task Force** for management of development The "Special Task Force" for management of development works and "Development Project Team" with assignment of experts will be required to develop the management criteria. It is advisable to establish the "Sewerage Development Committee" consists of the 16 cities which already/will manage wastewater collection and treatment system, and the "Advisory Council" consists of 7 cities which manage large scaled wastewater treatment plant(s). The management criteria should be covered wide sectoral issues, and the scheduled development needs much human resources to be implemented in a short term.

An example of implementation framework for Development of Management Criteria is illustrated in ***Figure SMC.14.2***.

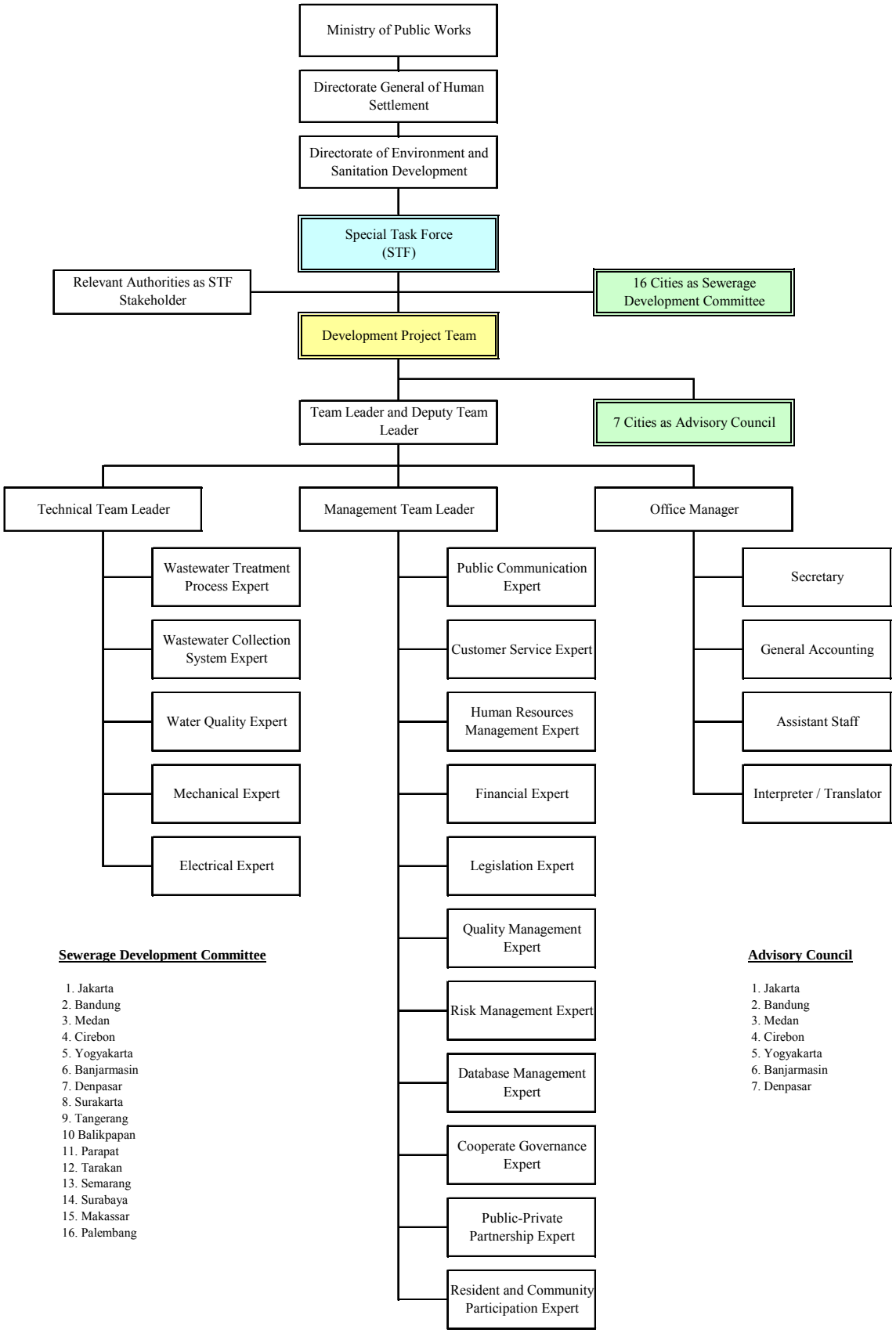

Figure SMC.14.2 - An Example of Implementation Framework for Development of Management Criteria

MAIN REPORT

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEVELOPMENT OF BASIC DESIGN OF DRAFT MANAGEMENT CRITERIA FOR SEWERAGE SERVICE PROVIDERS IN REPUBLIC OF INDONESIA

SURVEY REPORT

- MAIN REPORT -

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List of Abbreviations

Abbreviation	Definition in Indonesian	Definition in English
AAS	Penyerapan Spektrometri Atom	Atomic Absorption Spectrometry
AC	Arus Bolak-Balik	Alternating Current
ACCESS	Pembangunan Masyarakat Australia dan Skema Penguatan Masyarakat Sipil	Australian Community Development and Civil Society Strengthening Scheme
ACWSI	Inisiatif Akses ke Air Bersih dan Sanitasi	Initiative Access to Clean Water and Sanitation
ADB	Bank Pembangunan Asia	Asian Development Bank
ADSCR	Rasio Cakupan Jatah Utang Tahunan	Annual Debt Service Coverage Ratio
AK		Sewerage
ANTARA	Australia Nusa Tenggara Assistance for Otonomi Daerah	Australia Nusa Tenggara Assistance for Regional Autonomy
APBD	Anggaran Pendapatan dan Belanja Daerah	Revenue and Expenditure Budget
AusAID	Agen Australia untuk Pembangunan Internasional	The Australian Agency for International Development
B/S	Neraca	Balance Sheet
BAPEDALDA	Badan Pengendalian Dampak Lingkungan Daerah	Regional Environmental Control Agency
BAPPEDA	Badan Perencanaan Pembangunan Daerah - Kabupaten	Regional Development Planning Agency
BAPPEDA - PROP	Badan Perencanaan Pembangunan Daerah - Propinsi	Provincial Development Planning Agency
BAPPEDAL	Badan Pengelolaan dan Pengendalian Dampak Lingkungan	Environmental Impact Management and Control Agency
BAPPENAS	Badan Perencanaan Pembangunan Nasional	National Development Planning Agency
BCC	Perubahan Perilaku Komunikasi	Behaviour Change in Communication
BD/DMC4SS	Konsep Desain Dasar Kriteria Manajemen Untuk Pembuangan Kotoran Penyedia Layanan	Basic Design of Draft Management Criteria for Sewerage Service Providers
bill.	Milyar	Billion
BLH - Propinsi Bali	Badan Lingkungan Hidup Propinsi Bali	Provincial Environment Agency of Bali
BLUPAL	Badan Layanan Umum Pengelolaan Air Limbah	Public Service Organization of Sewerage Management
BMN	Jaringan Manajement Bisnis	Business Management Network
BOO	Membangun - Memiliki - Operasi	Build-Own-Operate
BOT	Membangun - Operasi - Transfer	Build-Operate-Transfer
BPAK		Wastewater Treatment Department
BPAL	Badan Pengelolaan Air Limbah	Sewerage Management Body
BPAP		Water Supply Department
BPAT-AK		Sewerage Technical Design Department
BPJT	Badan Pengelola Jalan Tol	The Indonesia Toll Road Authority
BPLHD	Badan Pengelola Lingkungan Hidup Daerah	Local Environment Management Agency
BPLHD Kota Bandung	Badan Pengelola Lingkungan Hidup Kota Bandung	Local Environment Management Agency of Bandung
BPLHD Propinsi DKI Jakarta	Badan Pengelola Lingkungan Hidup Daerah Propinsi DKI Jakarta	Provincial Environment Management Agency of DKI Jakarta
BPLHD Propinsi Jawa Barat	Badan Pengelola Lingkungan Hidup Propinsi Jawa Barat	Provincial Environment Management Agency of West Java
BPM & PKUD	Badan Pananamana Modal dan Pendayagunan Kakayaan dan Usaha Daerah	Investment and Business Empowerment Board
BPMP	Badan Perjuangan Masyarakat Pergulaan	Jakarta Sugar Society Struggle Board
BPSPAM	Badan Pengatur Sistem Penyedia Air Minum	Supervisory Agency to Control The Readiness of Drinking Water
BTO	Mmbangun-Transfer-Beroperasi	Build-Transfer-Operate
BUDP	Proyek Pembangunan Perkotaan Bandung	Bandung Urban Development Project
BUDS	Studi Pembangunan Perkotaan Bandung	Bandung Urban Development Study
BUMD	Badan Ushaha Milik Daerah	Local Owned Government Company
BUNM	Badan Ushaha Milik Negara	Central Government Owned Company
BUPATI	Kepala Daerah Kabupaten	Head of Regency
CAMAT	Kepala Kecamatan	Head of District
cap.	Kapasitas	Capacity
CBO	Organisasi Berbasis Komunitas	Community-Based Organization
CBS	Sanitasi Berbasis Masyarakat	Community Based Sanitation
cc	Sentimeter kubik	Cubic Centimetre
CDD	Pembangunan Berbasis Masyarakat	Community-Based Development
CFS	Laporan Arus Kas	Cash Flow Statement
CIPTA KARYA	Cipta Karya	Directorate General of Human Settlements
CLTS	Total Sanitasi Dipimpin Masyarakat	Community Led Total Sanitation
CSS	Strategi Sanitasi Kota	City Sanitation Strategy

Abbreviation	Definition in Indonesian	Definition in English
CTPS	Cuci Tangan Pakai Sabun	Hand-Washing with Soap
CWSHP	Proyek Komunitas Layanan Air dan Kesehatan	Community Water Services and Health Project
DCK Badung	Dinas Cipta Karya Badung	Human Settlement Service of Badung Regency
DEPDAGRI	Departemen Dalam Negeri	Ministry of Home Affairs
DEPERINDAG	Departemen Perindustrian dan Perdagangan	Ministry of Industry and Trade
DEPKES	Departemen Kesehatan	Ministry of Health
DEPKEU	Departemen Keuangan	Ministry of Finance
DEPPU	Departemen Pekerjaan Umum	Ministry of Public Works
Dinas	Dinas	Government Service or Department
Dinas Kebersihan	Dinas Kebersihan	Cleaning Agency
DIP	Pipa Besi Ductile	Ductile Iron Pipe
DKI	Daerah Khusus Ibukota	Capital City with Special Authority
DKP	Dinas Kebersihan dan Pertamanan	Local Cleaning and Landscaping Service
DLH	Dinas Lingkungan Hidup	Environmental Service Agency
DO	Oksigen Terlarut	Dissolved Oxygen
DPRD	Dewan Perwakilan Rakyat Daerah	Local Council
DPU - Propinsi / Dinas PU - Prop	Dinas Pekerjaan Umum Propinsi	Provincial Public Works Service Agency
DPU - Propinsi Bali	Dinas Pekerjaan Umum Propinsi Bali	Provincial Public Works Service Agency of Bali
DPU Kota Denpasar	Dinas Pekerjaan Umum Kota Denpasar	Public Service Agency of Denpasar
DSCR	Rasio Cakupan Layanan Jatah Hutang	Debt Service Coverage Ratio
DSDMP	Rencana Induk Pembangunan Penyaluran Air Kotor Denpasar	Denpasar Sewerage Development Master Plan
DSDP	Proyek Pembangunan Saluran Limbah Denpasar	Denpasar Sewerage Development Project
E&M	Listrik dan Mekanical	Electrical and Mechanical
EIA	Analisa Dampak Lingkungan	Environmental Impact Assessment
EIRR	Tingkat Pengembalian Ekonomi Internal	Economic Internal Rate of Return
EMS	System Manajement Lingkungan	Environmental Management System
ERM	Manual Tanggap Darurat	Emergency Response Manual
ERS	Sistem Tanggap Darurat	Emergency Response System
ESI	Inisiatif Sanitasi Ekonomi	Economics of Sanitation Initiative
ESP	Program Jasa Lingkungan	Environmental Services Programme
EUR	Euro	Euro
FIRR	Tingkat Pengembalian Keuangan Internal	Financial Internal Rate of Return
FIS	Sistem Informasi Keuangan	Financial Information System
FRP	Plastik Yang Diperkuat Serat	Fibre Reinforced Plastics
G/T	Tujuan dan Alat	Goal and Tool
GIS	Sistem Informasi Geografis	Geographic Information System
GNP	Produk Nasional Bruto	Gross National Product
GOI	Permerintah Indonesia	Government of Indonesia
GOJ	Pemerintah Jepang	Government of Japan
GOK	Pemerintah Korea	Government of Korea
GTZ	Bantuan Pemerintah Jerman	Deutsche Gesellschaft für Technische Zusammenarbeit (German Government's Aid Programme)
GUBERNUR	Kepala Daerah Propinsi	Governor (Head of Province)
H / h	Ketinggian	Height
ha	Hektar	Hectare
HP3	Kesehatan Tempat da Kesejahteraan Rakyat	Health Places Prosperous People
hr	Jam	Hour
HRD	Pengembangan Sumber Daya Manusia	Human Resource Development
HRM	Manajemen Sumber Daya Manusia	Human Resource Management
HSP	Program Pelayanan Kesehatan	Health Services Programme
HWTS	Pengolahan Air Rumah Tangga dan Penyimpanan	Household Water Treatment and Storage
Hz	Hertz	Hertz
I/S	Pernyataan Penghasilan	Income Statement
IBRD	Bank Internasional untuk Rekonstruksi dan Pengembangan	International Bank for Reconstruction and Development
IDA	Asosiasi Pembangunan Internasional	International Development Association
IDIJ	Institut Pengembangan Infrastruktur - Jepang	Infrastructure Development Institute - Japan
IDR	Rupiah Indonesia	Indonesian Rupee
IFC	Perusahaan Keuangan Internasional	International Finance Corporation
IMCI	Manajemen Terpadu Penyakit Anak	Integrated Management of Childhood Illnesses
IPAL	Instalasi Pengolahan Air Limbah	Wastewater Treatment Plant
IPB	Institut Pertanian Bogor	Bogor Agricultural Institute
IPLT	Instalasi Pengolahan Limbah Tinja	Night Soil Treatment Plant
ISO	Standardisasi Organisasi Internasional	International Organization Standardization

Abbreviation	Definition in Indonesian	Definition in English
ISSDP	Program Pembangunan Sektor Sanitasi Indonesia	Indonesia Sanitation Sector Development Programme
ITB	Institut Teknologi Bandung	Bandung Institute of Technology
JAYA	Jakarta Raya	Great Jakarta
JICA	Badan Kerjasama Internasional Jepang	Japan International Cooperation Agency
JPY	Yen Jepang	Japanese Yen
KDP	Proyek Pengembangan Kecamatan	Kecamatan Development Project
KINPRASWIL	Departemen Permukiman dan Prasarana Wilayah	Ministry for Human Settlement and Regional Infrastructure
KIP	Program Perbaikan Kampung	Kampung Improvement Programme
KLH	Kementrian Lingkungan Hidup	The State of Ministry of Environment.
KSNP-SPALP	Kebijakan dan Strategi Nasional untuk Pengembangan Sistem Pengelolaan Air Limbah Permukiman	Policy and National Strategy for Development of Settlement of Sewerage Management System
L	Panjang	Length
LFL	Seperti untuk Seperti	Like-For-Like
LIBOR	Tingkat Rate Yang Ditawarkan Oleh London Inter-Bank	London Inter-Bank Offered Rate
LIPI	Lembaga Ilmu Pengetahuan Indonesia	The Indonesian Institute of Sciences
lit	Sampah	Litter
LLCR	Rasio Cakupan Pinjaman Kehidupan	Loan Life Coverage Ratio
LPKL	Laboratorium Penguji Kualitas Lingkungan Hidup	Testing Laboratory of Environmental Quality
MCH	Kesehatan Ibu dan Anak	Maternal and Child Health
MENPERA	Menteri Negara Perumahan Rakyat	Ministry of Housing
mill.	Juta	Million
min	menit	minute
Mpa	Megapascal	Mega Pascal
MSL	Permukaan Laut	Mean Sea Level
Musrenbang	Musyawarah Perencanaan Pembangunan	Development Planning Process
NGO	Lembaga Swadaya Masyarakat	Non-Government Organization
NRW	Air Tidak Terbayar	Non-Revenue Water
NSC	Nihon Suido Consultants Co., Ltd.	Nihon Suido Consultants Co., Ltd.
NSPM	Norma Standar Pedoman Manual	Guidance and Manual
NTT	Nusa Tenggara Timur	East Nusa Tenggara
O&M	Operasi dan Pemeliharaan	Operation and Maintenance
OJT	Pelatihan ditempat	On-the-Job Training
ORT	Terapi Rehidrasi Oral	Oral Rehydration Therapy
P2KP	Program Penanggulangan Kemiskinan di Perkotaan	Urban Poverty Alleviation Project
Pa	Pascal	Pascal
PAM JAYA	Perusahaan Air Minum Jakarta Raya	Water Supply Enterprise of Jakarta Raya
PAMSIMAS	Program Pengadaan Air Minum dan Sanitasi berbasis Masyarakat	Water Supply and Sanitation for Low Income Communities Project
PD PAL	Perusahaan Daerah Pengelolaan Air Limbah	Local Sewerage Management Enterprise
PD PAL JAYA	Perusahaan Daerah Pengelolaan Air Limbah Jakarta Raya	Jakarta Raya Local Sewerage Management Enterprise
PDAL	Perusahaan Daerah Air Limbah	Local Water Supply Enterprise
PDAM	Perusahaan Daerah Air Minum	Local Water Supply Enterprise
PE	Setara Populasi	Population Equivalent
PERDA	Peraturan Daerah	Regional Regulation
PERMEN	Peraturan Menteri	Minister's Regulation
Pers	Orang	Person
PERTAMBEN	Departemen Pertambangan dan Energi	Ministry of Mines and Energy
PF	Pour Flush	Pour Flush
PHBS	Perilaku Hidup Bersih dan Sehat	Clean and Healthy Life Behaviour
PI	Indikator Kinerja	Performance Indicator
PLCR	Rasio Cakupan Jatah Proyek	Project Life Coverage Ratio
PNPM	Program Nasional Pemberdayaan Masyarakat	National Community Empowerment Programme
PPLP	Direktorat Pengembangan Penyehatan Lingkungan Permukiman	Directorate of Environment and Sanitation Improvement
PPLP Bali	Pengembangan Penyehatan Lingkungan Permukiman Bali	Environment and Sanitation Development Agency of Bali Province
PPP	Kerjasama Pemerintah dengan Swasta (KPS)	Public-Private Partnership
PPSP	Peta Jalan untuk Percepatan Pembangunan Sanitasi Perkotaan	Roadmap to Acceleration of Urban Sanitation Development
ProAir	Penyediaan Air Bersih dan Sanitasi Pedesaan	Rural Water Supply and Sanitation Project
PS	Stasiun Pompa	Pumping Station

Abbreviation	Definition in Indonesian	Definition in English
PSI	Pound per Kotak Inci	Pounds per Square Inch
PSP	Partisipasi Sektor Swasta	Private Sector Participation
PT	Perseroan Terbatas	Limited (Liability) Company
PT SMI	Perseroan Terbatas Sarana Multi Infrastruckur	Multi Facility Infrastructure Limited Company
PUOD	Direktorat Jenderal Pemerintahan Umum dan Otonomi Daerah	Directorate General of Regional Development
QMS	Sistem Manajemen Mutu	Quality Management System
RBC	Biologis Berputar Kontaktor	Rotating Biological Contactor
REPLITA	Rencana Pambangunan Lima Tahun	Five Years Development Plan
RPJM	Rencana Pembangunan Jangka Menengah	Middle-Term Plan
RPJMN	Rencana Pembangunan Jangka Menengah	National Middle-Term Development Plan
rpm	Revolusi Per Menit	Revolution Per Minute
RT/RW	Rukun Tetangga/Rukun Warga	Neighbourhood Administrative Unit
RUTRW	Rencana Umum Tata Ruang Wilayah	Regional Spatial Planning
S/R	Laporan Survei	Survey Report
SANIMAS	Sanitasi Masyarakat	Community Based Sanitation
SANTIMADU	Sanitasi Masyarakat Terpadu	Integrated Community Sanitation
SAPI	Bantuan Khusus untuk Pelaksanaan Proyek	Special Assistance for Project Implementation
SAS	Sistem Air Bersih	Safe Water System
sec	Kedua	Second
SHSP	Program Kesehatan Sekolah Sumatera	Sumatra Health Schools Programme
SPM	Standar Pelayanan Minimal	Minimum Service Standard
SR	Sambungan Rumah	House Connection
STEP	Persyaratan khusus untuk Kemitraan Ekonomi	Special Terms for Economic Partnership
STF	Gugus Tugas Khusus	Special Task Force
SToPs	Sanitasi Total & Pemasaran Sanitasi	Total Sanitation and Sanitation Marketing
STP	Instalasi Pengolahan Air Limbah	Wastewater Treatment Plant
SUSEA	Sanitasi Yang Berkelanjutan di Asia Timur	Sustainable Sanitation in East Asia
SWITCH	Peningkatan Pengelolaan Air Berkelanjutan untuk Kesehatan Kota	Sustainable Water Management Improvement of Tomorrow's Cities' Health
THB	Baht Thailand	Thai Baht
TSSM	Total Sanitasi dan Sanitasi Pemasaran	Total Sanitation and Sanitation Marketing
TTPS	Tim Teknis Pembangunan Sanitasi	Sanitation Development Technical Team
UASB	Anaerobik-Endapan Upflow Selimut	Upflow Anaerobic-Sludge Blanket
UN	Persenkatan Bangsa-Bangsa	United Nations
UNDP	Badan Program Pembangunan Perserikatan Bangsa-Bangsa	United Nations Development Programme
UNICEF	dana Anak-Anak Perserikatan Bangsa-Bangsa	The United Nations Children's Fund
USAID	Amerika Serikat Badan Pembangunan Internasional	United States Agency for International Development
USD	Dolar Amerika Serikat	United States Dollar
UU	Undang Undang	Law
UUD	Undang Undang Dasar	Constitution
UV/VIS	Ultraviolet-Terlihat	Ultraviolet-Visible
UWSSP	Proyek Air Minum Perkotaan dan Sanitasi	Urban Water Supply and Sanitation Project
V	Volt	Volt
WALIKOTA	Walikota	Mayor
WASAP	Program Sektor Air dan Sanitasi	Water and Sanitation Sector Programme
WASH	Proyek Air dan Sanitasi untuk Kesehatan	Water and Sanitation for Health Project
WASPOLA	Perumusan Kebijakan dan Rencana Tindak Air dan Sanitasi	Water and Sanitation Policy Formulation And Action Planning
WB	Bank Dunia	World Bank
WEPA	Persekutuan Lingkungan Air di Asia	Water Environment Partnership in Asia
WES	Sanitasi Air dan Lingkungan	Water and Environmental Sanitation
WS&SSE	Perusahaan Pelayanan Air Bersih & Air Limbah	Water Supply & Sewerage Service Enterprise
WSP	Proyek Air dan Sanitasi	Water and Sanitation Project
WSSLIC / WSLIC	Air Minum dan Sanitasi bagi Masyarakat Penghasilan Rendah	Water Supply and Sanitation for Low Income Communities
WWTP	Instalasi Pengolahan Air Limbah	Wastewater Treatment Plant
φ	Phai	Phai

Units of Measurement

Abbreviation	Definition
%	percent
AC	alternating current
ºC	degree Celsius
cm	centimetre
cc	cubic centimetre
cm^2	square centimetre
ft	feet
ha	hectare
Hz	Hertz
IDR	Indonesian Rupee
in	inch
JPY	Japanese Yen
kg/d	kilogram per day
km	kilometre
km^2	square kilometre
kVA	kilovolt ampere
kW	kilowatt
kWh	kilowatt hour
lit	litre
lpcd	litre per capita per day
m	metre
m^2	square metre
m^3	cubic metre
m^3/d	cubic metre per day
m^3/h	cubic metre per hour
m^3/s	cubic metre per second
mg	milligram
mg/l	milligram per litre
ml	millilitre
mm	millimetre
min	minute
sec	second
MPa	megapascal
hr	hour
rpm	revolution per minute
THB	Thai Baht
MW	megawatt
N/cm^2	newton per square centimetre
NTU	nephelometric turbidity unit
Pa	pascal
ppm	parts per million
PSI	Pounds per Square Inch
φ	phai
V	volt
USD	united states dollar

Unit Conversion

1 ft = 12 in = 0.304800 m
1 in = 0.025400 m = 0.083333 ft
1 m = 3.280840 ft = 39.370079 in

1 yd^2 = 0.000084 ha = 0.836127 m^2
1 ha = 10,000 m^2 = 11,959.900463 yd^2
1 m^2 = 1.195990 yd^2 = 0.000100 ha
1 km^2 = 1,000,000 m^2 = 100 ha

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CHAPTER 1

INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 Background

Indonesia has set a target of eliminating all open defecation in Indonesia by 2014.[4] The development of large-scale sewerage systems in metropolitan areas has great significance in the elimination of open defecation. Currently, 12 metropolitan areas[5] have large-scale sewerage systems individually, which require expansion and improvements respectively in proportion to development of urban area. However, in spite of such necessity, these large-scale sewerage systems yet remain untouched due to the past economic recession.

Furthermore, the overall service rate of large-scale sewerage systems in Indonesia remains as low as 1.3 % to 3.0 % (the rate depends on documents). Taking this low wastewater collection and wastewater treatment rate into account, Ministry of Public Works, as part of its Middle-Term Development Plan (2010 - 2014), has set a target of attaining 20 % wastewater collection and wastewater treatment rate of large-scale sewerage system in selected 16 metropolitan areas (12 existing areas and 4 new areas[6]).

The development of new large-scale sewerage systems, and expansion and improvements of the existing systems are expected to take place in near future. Therefore it is necessary to make preparations for assuring the management and service quality of sewerage service provider. However, because sewerage services are newly provided by each respective municipality, the quality of sewerage service might differ to each municipality.

Recently, Indonesia has started to design and develop the management criteria for sewerage service providers as a part of Climate Change Programme Loan policy action for 2009. This survey, therefore, intends to assist the government and promote related activities of the Indonesian side to accomplish the policy actions.

1.2 Objective of the Survey

The objective of this survey is to assist in assuring an appropriate level of management and services of sewerage service providers through drafting of basic design of management criteria, such as corporate governance, service quality, technical guidance, tariff setting and so on, of sewerage service providers.

1.3 Target Area of the Survey

The target areas of the survey are Jakarta (Jakarta Special Capital Region Province), Bandung (West Jawa Province), and Denpasar (Bali Province).

1.4 Scope of Work

The survey team (hereinafter referred to as 'the Team') carried out data collection, analysis and deliberation of collected data, preparation of the survey report and draft management criteria for sewerage service providers, and discussion in collaboration with Indonesian side and the team.

[4] By Medium-Term National Development Plan (2010 - 2014) in Urban Areas and the Government, through Vice President Jusuf Kallareiterated, reiterated to rid Indonesia of open defecations practices by 2014 in a bid to increase public health quality in early 2009.
[5] Jakarta, Cirebon, Bandung, Tangerang, Yogyakarta, Surakarta, Balikpapan, Tarakan, Banjarmasin, Medan, Prapat and Denpasar
[6] Semarang, Surabaya, Makasar and Palembang

1.5 Schedule of the Survey

The Team consisted of Mr. HAYASHI Kiyohiko as Team Leader/Sewerage Management Expert and Mr. OKAZAKI Koichi as Sewerage Expert. The Team planned general work schedule of the survey shown in Inception Report and the original general work schedule is shown in ***Figure 1.5.1***.

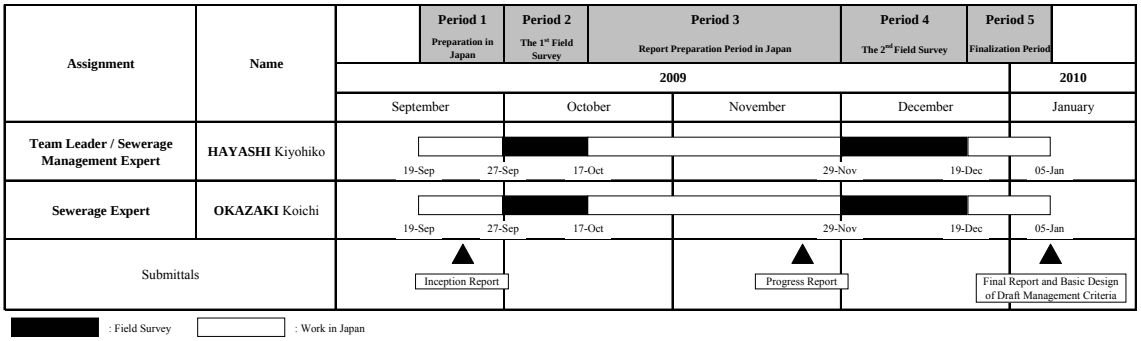


Figure 1.5.1 - Original General Work Schedule

However, because extra time was required for data collection in the Period 2 (the 1st field survey) and because schedule of workshop was modified and no seminar was decided to be held, Period 2 was extended for 10 days until October 27th 2009 and Period 4 was shortened for 10 days as shown in the ***Figure 1.5.2***.

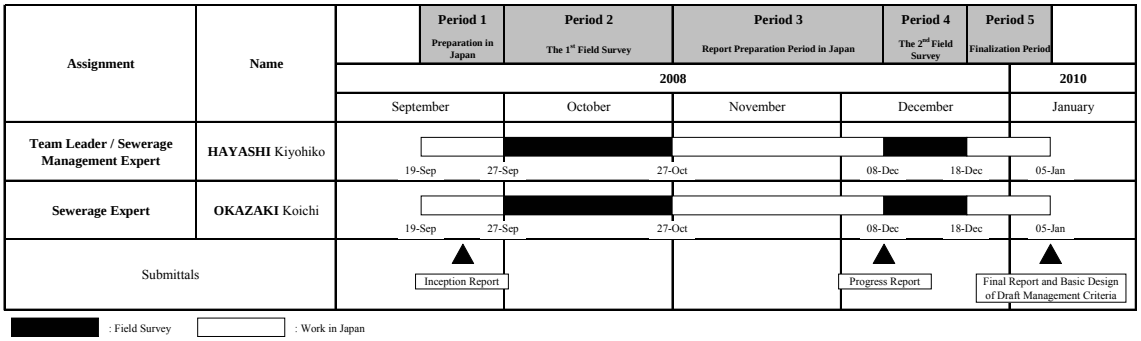


Figure 1.5.2 - Revised General Work Schedule

Appendix 1.5.1 and ***Appendix 1.5.2*** shows record of the 1st and the 2nd field surveys, and ***Appendix 1.5.3*** shows record of workshop held on 10th December 2009.

CHAPTER 2

CURRENT CONDITION OF CENTRAL GOVERNANCE OF SEWERAGE DEVELOPMENT IN INDONESIA

CHAPTER 2 CURRENT CONDITION OF CENTRAL GOVERNANCE OF SEWERAGE DEVELOPMENT IN INDONESIA

2.1 General

Indonesia had the 1st Long-Term Development Plan for 25 years (1969 - 1994) which consisted of 5 (five) Five Years Development Plans (REPELITAs) named REPELITA I to V. Sanitation improvement programme in Indonesia was started in REPLITA I in 1969 - 1974, from Kampong Improvement Programme (KIP) in Jakarta. In REPELITA III until V (1979 - 1994) the programme was continued focusing on the development of on-site sanitation facilities and rehabilitation of existing sewerage systems. Several pilot projects were undertaken in several cities such as Jakarta, Tangerang, Mataram, Balikpapan, and Banjarmasin.

In 1999 - 2000, Central Government conducted the policy of decentralization with shifting the authority of sewerage management to Local Government. Local Government had responsibility for development of sewerage management facilities after implementation of decentralization.

According to the Census 2007, coverage ratio of safe on-site system is 71.06 % in urban areas and 32.4 % in rural areas. Coverage ratio of off-site system is only 2.3 % in 12 cities.

2.2 National Policy, Target and Goal

2.2.1 Millennium Development Goal

The Government of Indonesia (GOI) had committed to the Millennium Development Goal (MDG) in 2015 prepared in United Nations Development Programme (UNDP). The goal of sanitation sector is listed in the "7.9 Proportion of population using basic sanitation facility" in the "Target 7c: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation"in the "Goal 7: Ensure environmental sustainability".

In December 2008, Minister of Public Works (DEPPU) instituted the "Regulation Number 16/PRT/M/2008 by Minister of Public Works" on "Policy and National Strategy for Development and Settlement of Sewerage Management System" (KSNP-SPALP), which indicated the target of MDGs in 2015 of sanitation sector in Indonesia as follows.

In the year of 2007, population of Indonesia using basic sanitation facilities had reached 67.15 %. According to MDGs it is expected that 75.34 % of the population of Indonesia or around 185 million people can use basic sanitation facilities in 2015. Detail schedule to reduce the proportion of population without basic sanitation by 2015 is indicated in KSNP-SPALP as shown in ***Table 2.2.1***.

Table 2.2.1 - Target of Sanitation Service Coverage in 2015 (Reference Year of 1990)

Year	Year to	Decreasing the Target	Urban				Rural				National			
			Access Target (%)	Population (Million)	Population Target to Access (Million)	Additional Access	Access Target (%)	Population (Million)	Population Target to Access (Million)	Additional Access	Access Target (%)	Population (Million)	Population Target to Access (Million)	Additional Access
1990	0	0	57.64	53.50	30.84	-	42.78	124.90	53.43	-	47.24	178.40	84.27	-
1995	5	10	61.88	67.80	41.95	1.11	48.50	124.90	60.58	7.15	53.21	192.70	102.53	18.26
2000	10	20	66.11	85.30	56.39	25.56	54.22	117.70	63.82	10.39	59.22	203.00	120.22	35.95
2005	15	30	70.35	102.30	71.97	41.13	59.95	120.60	72.29	18.86	64.72	222.90	144.26	59.99
2009	19	38	73.74	113.90	83.99	42.03	64.52	119.45	77.07	16.49	69.02	233.35	161.06	58.53
2010	20	40	74.58	116.80	87.11	56.28	65.67	118.30	77.69	24.25	70.10	235.10	164.80	80.53
2015	25	50	78.82	130.78	103.02	72.18	71.39	114.90	82.03	28.59	75.34	245.60	185.04	100.78

Source: Policy and National Strategy for Development of Settlement of Sewerage Management System (16/RPT/M/2008), Ministry of Public Works, December 2008

2.2.2 National Policy and Strategy

The "National Sanitation Summit Commitment" declaration was signed by 5 (five) ministers and numerous Governors, Mayors and Regents in November 2007. This public political commitment was the first national statement on the intention to improve sanitation at a high level. The commitment has been followed up by Inter-Ministerial Sanitation Development Technical Team of the National Development Planning Agency (BAPPENAS). Significant actions have subsequently been taken by the relevant implementing line ministries as outlined below. In early 2009, the Vice President reiterated the Governments commitment of ridding the country of open-defection practices and proposed the more realistic time frame of 2014 to achieve the MDG's goal.

In August 2008, the Ministry of Health (DEPKES) formalized a new National Strategy for Community Based Total Sanitation, with general and technical guidelines following for Regional Implementation. The strategy articulates the approach for implementing rural environmental sanitation programmes based on behaviour change principles including:

- Community led sanitation for open-defecation free villages with no-subsidy for individual households
- Promotion household water treatment and safe storage and hygiene food handling
- Hand-washing with soap
- Domestic solid waste management
- Safe domestic waste disposal

The strategy is based on the 2003 BAPPENAS led "Community Based Policy for Water and Environmental Sanitation" which addressed the need for household and community participation in water and sanitation development. The policy significantly led the design and decentralized implementation of major rural investments such as the WB's "Water Supply and Sanitation for Low Income Project (WSSLIC; 1, 2 and 3 called as PAMSIMAS [Water Supply and Sanitation for Low Income Communities Project])", ADB's "Community Water Services and Health Project" (CWSHP), German Government's Aid's (GTZ's) Rural Water Supply and Sanitation Project (ProAir) and other projects. Local Government have been convinced and encouraged to take up their roles and responsibilities in rural water and sanitation through community behaviour change, using locally available materials for cost effectiveness and maximum benefits.

In April 2009, the Minister of Public Works met the Governors, Mayors and Regents to outline the Ministries commitment to improving urban environmental sanitation (sanitation, solid waste and drainage) quoting the need to reduce the economic losses. The approach emphasizes:

- Sanitation responsibilities and obligations of Regional Government
- Decentralizing planning and the need to develop city sanitation strategies
- The integration of sanitation in the Middle-Term Development Plan (RPJM) process at all levels
- Meeting the MDGs by increasing access to sanitation of those who have no sanitation facilities

The Ministry of Public Works (DEPPU) committed to co-funding quality district and city sanitation strategies and proposals, the need for institutional development, capacity building and the involvement of the private sector in developing domestic sewerage systems. Cities will also develop on-site and decentralized community sanitation systems, and larger cities will plan the investments for centralized sewerage systems. The DEPPU has drafted Minimum Service Standards (SPM) for urban sanitation using incremental approaches. The SPMs are being used as the basis for developing the city, provincial and national sanitation monitoring system.

Directorate of Environmental Sanitation Improvement (PPLP) of Directorate General of Human Settlements (CIPTA KARYA) of DEPPU has recently focused annual budgets on developing decentralized sanitation services to poor urban communities by rolling the Community Based Sanitation (SANIMAS) approach co-funded by Local Government. CIPTA KARYA has now considerable expertise in sustainable SANIMAS in dense urban communities which do not have space for private household toilets.

KSNP-SPALP, "Policy and National Strategy for Development and Settlement of Sewerage Management System" aims to stipulate guideline and direction in arrangement of policy, plan, program, implementation, and management in development of sewerage management system, either for Central Government, Government institution, Local Government, or for community and private entities. KSNP-SPALP is attached in ***Appendix 2.2.1.***

2.2.3 National Middle-Term Development Plan

The target of National Middle-Term Development Plan (RPJMN) (2004 - 2009) indicated in "Government Rule - PP 7 2005" for domestic sanitation is free from open defecation in all cities in 2009, increasing the utilization of Integrated Sludge Treatment Plant and Wastewater Treatment Plant (WWTP) up to 60 % and decreasing river water pollution from faces up to 50 % based on 2004 condition and centralized sewerage system development in metropolitan city.

KSNP-SPALP shows the next Middle-Term Development Plan for the period of 2010 - 2014 which are shown as follows:

(1) Target

The target of the sanitation development is the increasing utilization of the existing wastewater treatment system up to minimum 65 % in 2014 and development of further wastewater disposal system, and reducing the contamination of river caused by discharge of excrement up to 45 % of the present level at the end of 2014. In addition to the above, stepwise development of sewerage systems in metropolitan and big cities is also targeted.

Access target to safe on-site sanitation system in 2014 is 80 % of population in urban areas and 60 % in rural areas.

(2) Policy and Strategy

Policy of the Settlement of Sewerage Management is formulated by answering strategic issue and problem in developing the Settlement of Sewerage Management. The policy is divided into 5 (five) groups namely:

a. To increase access to sewerage management system or facilities either on-site system or off-site system.
b. To increase community's role and private business field in the development of sewerage management system.
c. To develop regulation and law for development and running of sewerage management system.
d. To strengthen institutions and increase personnel capacity of sewerage management.
e. To increase fund for sewerage management facilities and system.

2.2.4 National Action Plan

The Sanitation Development Technical Team consists of National Development Planning Agency (BAPPENAS), Ministry of Public Works (DEPPU), Ministry of Finance (DEPKEU), Ministry of Health (DEPKES), Ministry of Home Affairs (DEPDAGRI), Ministry of Industry and Trade (DEPERINDAG) and The State of State Ministry of Environment. (KLH) are preparing the National Action Plan for Urban Sanitation Development in the period of 2010 - 2014. The proposed Roadmap to Acceleration of Urban Sanitation Development (PPSP) 2010 - 2014 is attached in ***Appendix 2.2.2*** and is summarized as follow.

The targets of sanitation development for 2010 - 2014 are:

- To be free from open and careless defecation in urban and rural areas of which details are to be decided later in accordance with 2010 - 2014 Sanitation Strategic Plans of each related department/agency at national level.

The targets are to achieve by:

- Increasing service of off-site sewerage network by 5 % of total urban population, or 5 millions people in 16 cities, and constructing the Community Based Sanitation facilities in each city; priority is given to selected 226 cities.

The target locations of the acceleration of Urban Sanitation Development are:

- Megapolitan, big and medium cities
- Provincial capitals
- Cities of autonomous status
- Town in the territories of district/city with vulnerable sanitation condition

2.3 Basic Law and Regulation

2.3.1 Basic Law of Sewerage Management

By the decentralization, the Local Government has responsibility for sanitation in provincial area as well as district level (Law 32 in 2004, article 13 and 14), and Law 32 in 2004 regulates the responsibility of Local Government for sanitation composed of designing, monitoring, construction, regional planning, providing facilities, and environmental management. The functions of Local Government are monitored and assisted by Central Government, as written in Law 32 in 2004 article 217. Central Government should deliver the norm, standard, guidance and manual (NSPM), and training. Functions of Local Government in assisting and monitoring by Central Government are coordinated by the Ministry of Home Affair (article 222 Law 32 in 2004), by the Governor in Province, Mayor in City and the Regent in Regency level.

For the development of sewerage management, basic law which regulates following issues is necessary:

(1) **Purpose of sewerage works:** Purpose of sewerage works like improvement of public sanitation, preservation of public water bodies is mentioned.
(2) **Definition of terms:** Terms regarding sewerage works like wastewater management, wastewater treatment plant and wastewater collection system etc. are defined.
(3) **Items of consideration for obtaining permission of national government:** Respects which are required for obtaining permission of implementation of sewerage works by central government are mentioned.
(4) **Technical standard to which sewerage facilities have to conform:** Structural standards of which sewerage facilities have to follow are mentioned.
(5) **Technical standard to which effluent of wastewater treatment plants have to meet:** Quality standards of which effluent of wastewater treatment plant has to keep are mentioned. Effluent standard has to be set for every treatment process. Effluent standard for aerated lagoon process has to be set low level than that for conventional activated sludge process. In case when sewerage system accepts industrial wastewater, wastewater quality discharged from factories also has to be mentioned.
(6) **Duties of installation of house connection and pre-treatment of factories:** Duties of which users of sewerage system have to follow, like installation of house connection and pre-treatment facilities of factories or restaurants are mentioned.
(7) **Service charges:** Principle of setting service charge is mentioned.
(8) **Operation and maintenance of wastewater treatment plants:** Necessity of analysis of effluent water quality and appropriate operation and maintenance is mentioned.
(9) **Certifications which are required to carry out sewerage works:** Qualifications required for designing, supervision of construction, operation and maintenance of sewerage works are mentioned.
(10) **Penalty clauses:** Penalties against damage for sewerage system, obstruction to discharge of sewerage, false notification etc. is mentioned.
(11) **Other necessary issues**

Note: Comments on each item are based on Japanese Sewerage Law as an example.

However, in the current situation in Indonesia;

”National Sewerage Law”
is not exist at present

On the other hand, there are already exisitng sewerage systems and management structures, and related laws and regulations by Local Governments based on following related laws and regulations by Central Government.

Based on Law 32 in 2004, responsibility of domestic wastewater management is ascribed to Local Government at provincial level as well as city level. Several laws are regulating the importance of domestic wastewater management in terms to protect environmental health and to prevent water pollution.

Law 7 in 2004 describes the water quality management and water pollution control in order to endure and recover water resources. Article 24 (Law 7 in 2004) regulates that people and business organization are prohibited to do any activities that may degrade the water resources.

Government Decree No. 16 in 2005 regulates development of the drinking water system which says protecting raw water, potency of solid and liquid waste to pollute the raw water.

Law 23 in 1992 regulates responsibility of Ministry of Health (KEPMENKES) in securing the solid waste as well as liquid waste in attempting environmental health as stated in article 22 that: "The environmental health is conducted to create the quality of the healthy environment in the public place, settlements, working environment, public transport and other environments including effort for a better water and air, preventing from solid waste, liquid waste, gas emission, radiation and noise, controlling diseases vectors and other efforts or security on the above matters".

Civil-Rights for welfare and environmental health are regulated by Law 23 in 1997 article 5, chapter V which regulates the conservation of environmental function and chapter VI which regulates the requirement of environmental arrangement.

In terms of financial arrangement, Local Governments have their authorities to manage their finance as stated in Law 25 in 1999, Financial Balance between Central and Local Government including the determination of the health development priority.

Government Decree No. 82 in 2001 regarding the water quality management and control of water pollution, states sanction for any activity which may pollute water and the issue of permission by the authority of the Prefectural Governor/Mayor on liquid waste utilization.

A set of Decrees in ministry level has also been developed, including: Decree of Ministry of Health No. 907/2002 regarding qualification and control of drinking water quality, which need further Local Regulation (PERDA) to follow up.

Decree No. 1457/2003 by Ministry of Health regarding Minimal Standard of Health Services in City/Regency states prevention and mitigation of diarrhea, dengue fever, environmental health and hygiene service at public place as well as appointed Prefectural Governor/Mayor in charge of the health service in accordance with this Minimum Services Standards.

Strategic Plan of Ministry of Health regarding the availability of healthy environment programme, which includes provision of clean water facilities and basic sanitation, maintaining and control of environmental quality, control of environmental pollution and healthy community development is stated in Decree No. 1274/2005 by Ministry of Health.

In addition, technical guidelines or manuals have been developed, some of which developed in cooperation with other ministries financed by international institution, like Community Led

Total Sanitation (CLTS) equipped with module and the team, Methodology Participation Assessment (MPA) Movement, and Participatory Hygiene Transformation (PHAST), Guidelines on SANIMAS (Community based Sanitation), Technical Guideline on air and liquid waste quality assessment, and Guidelines on Installation of Hospital Liquid Waste Management.

Ministry of Public Works is responsible for national sewerage management and ***Appendix 2.2.1*** shows Regulation No. 16/PRT/M/2008 by Minister of Public Works on Policy and National Strategy for Development and Settlement of Sewerage Management System. And;

The first National Sewerage Law is currently under preparation by Ministry of Public Works

However, it is not sure that when the National Sewerage Law will be prepared.

The other related laws/regulations are shown in ***Table 2.3.1***.

Table 2.3.1 - Law and Regulation Relating to the Sanitation

No	Law/Regulation	Stipulation
1	Constitution (UUD) No. 45 : Article 33 Clause 3	'Land, water and wealth beneath governed by state and utilized for the greatest benefit of people welfare'
2	Law (UU) No.23 Year 1992:	Health
	Chapter IV, Article 9	Government has tasks to mobilize community participation in administering and finance of health
	Article 10	Efforts to realize optimum health for community as a preventive approach
	Chapter V,	Environmental health covering water and air pollution control, protection against solid waste, liquid waste, gas emission, radiation, and noise, control of diseases vector, and other protection.
	Fifth Part. Article 22	Environmental health, diseases abatement and health education represent part of health efforts.
	Article 38	Health education for improvement of knowledge, awareness, willingness, and capacity for health life
3	Law No. 23 Year 1997	Environmental Management
	Chapter III, Article 5 Clause 1	Privilege of well being and health environment for all people
	Chapter V, Article 14 - 17	Protection of environmental function
	Chapter VI	Requirement for environmental arrangement
4	Law No. 22 Year 1999	Local Government: Province, Kabupaten, and Kota have authority to govern and administer local community interest according to their own aspiration based on community aspiration.
5	Law No. 25 Year 2000	National Development Programme (2000 - 2004) on health environment, health behavior, and community empowerment. Settlements of infrastructure and facilities development programme at local level.
6	Law No. 32 Year 2004	Local Autonomy
7	Government Regulation No. 25 Year 2000	Government and provincial authority as autonomous district
8	Government Regulation No. 82 Year 2001	Water Quality Management and Water Pollution Control
9	Government Regulation No. 7 Year 2005	Rural development Acceleration of infrastructure development
10	Government Regulation No. 16 Year 2005	Development of Water Supply System which integrated with sanitation infrastructure and facilities development sewerage infrastructure and facilities Solid waste infrastructure and facilities related to raw water source protection
11	Ministry of Health Decree No. 907 Year 2002	Requirement for Healthy Drinking Water by type
12	Ministry Public Work Decree No. 409 Year 2002	Administration of KPS (Government-Private Sector Cooperation) in administration and/or management of water supply and sanitation
13	State Ministry of Environment Decree No. 111 year 2003	Requirement and procedure for permission of wastewater discharge
14	State Ministry of Environment Decree No. 112 Year 2003	Domestic wastewater quality standard

Source: Domestic Sewerage Services and Facilities in Indonesia: Policy and Regulation Role, WEPA: Water Environment Partnership in Asia, July 2007

It appears that the current laws and regulations of sanitation shown in ***Table 2.3.1*** are not functioned well for sewerage works because there is no essential Sewerage Law by Ministry of Public Works which has the responsibility for sewerage works. Laws and regulations by other

ministry should be faultless for external supervision of performance of sewerage works.
Identified related laws and regulations in domestic sewerage management phases are as follows:

(1) Central Government Policy:

- Decentralization - Local Government Autonomy (2004)
- Development of Community Based Water Supply and Environmental Sanitation (2003), by National Development Board
- Development of Institutional Based Water Supply and Environmental Sanitation (2004), by National Development Board
- National Action Plan in Sewerage (2003), by Ministry of Public Works
- Healthy Indonesia 2010 (2003), by Ministry of Health

(2) Planning: No specific law available in planning stages of domestic wastewater management, so far the planning are based on:

- Law 32 in 2004 (Local Government autonomy): article 13 and 14 regulate the responsibility of Local Government in development of public service and environmental management, furthermore article 217 stated that Local Government function are monitored and assisted by Central Government
- Law 23 in 1997: Environmental Management
- Law 7 in 2004 (Water Resources Management): article 23 - 25 regulates the water pollution control
- Law 23 1992 (Ministry of Health): article 22 stated the protecting community from sewerage

(3) Design and Construction:

No specific regulation for designing and construction of sewerage management system is identified while norm, guideline and manual set up by Central Government are found. Therefore regulations of sewerage management in Local Government are limited. Law 7 in 2004 regulates that development of sewerage management system should be integrated with water supply, and included in housing development.

(4) Operation and Maintenance:

No regulation of institutional mechanism in operation and maintenance of sewerage management system are identified. Several cities such as Bandung set the sewerage service tariff in relation to water supply consumption by their regulations (State own water supply enterprise). There is no specific institution which supplies technical assistance to the construction of sewerage management facilities.

(5) Monitoring:

Laws and regulations which restrain performance of sewerage management works are shown in ***Table 2.3.1***, such as Government Decree 82 in 2001: water quality management and water pollution control, State Ministry of Environmental Decree 111 in 2003: procedure of sewerage disposal permit to surface water, State Ministry of Environmental Decree 112 in 2003: effluent standard for domestic sewerage.

Regulation regarding responsibilities of Local Government in sewerage management works is not clearly identified.

Degradation of surface and ground water quality is an indication of poor sewerage management, especially monitoring on construction and performance of constructed facilities (effluent standards, surface water standards, etc).

2.3.2 Basic Law of Environment Management

There is "Law of the Republic of Indonesia - Number 23 of 1997 Regarding Environmental Management" published by State Ministry of Environment in 1997. This law declares the targets listed below:

a. Achievement of harmony and balance between humans and the environment;
b. Formation of the Indonesian person as an environmental being disposed toward and acting to protect and foster the environment;
c. Guaranteeing of the interests of present and future generations;
d. Achievement of preservation of environmental functions;
e. Prudent control of the exploitation of resources;
f. Protection of the Unitary Indonesian Republic against impacts of business and/or activity outside the national region which causes environmental pollution and/or damage.

"Criteria of Water Quality based on Class" in "The Government Regulation Number 82 of 2001 Regarding Water Quality Management and Water Pollution Control" stipulated by State Ministry of Environment is shown in ***Table 2.3.2***.

The State Ministry of Living Environment states "Standard Quality of Domestic Waste" on the Decree Number 112 in 2003 which is attached in ***Appendix 2.3.1***.

Table 2.3.2 - Criteria of Water Quality based on Class

NO	PARAMETER	UNIT	CLASS				REMARKS
			I	II	III	IV	
	PHYSICS						
1	Temperature	^{O}C	Deviation 3	Deviation 3	Deviation 3	Deviation 5	Temp. Deviation from the natural condition
2	Dissolved Solid	mg/l	1,000	1,000	1,000	4,000	
3	Suspended Solid	mg/l	50	50	400	400	
	ANORGANIC CHEMICAL						
1	pH	mg/l	6 - 9	6 - 9	6 - 9	5 - 9	If in naturally out of that range than determined based on natural condition
2	BOD	mg/l	1	5	10	20	
3	COD	mg/l	10	25	50	100	
4	DO	mg/l	6	4	3		Minimum limit value
5	Total Phosphate as P		0.20	0.20	1.00	5.00	
6	NO_3-N	mg/l	10	10	20	20	For fishery free ammonia content for sensitive fish <= 0.2 mg/l as NH_3
	NH_3-N	mg/l	0.50	(-)	(-)	(-)	
7	Arsenic	mg/l	0.05	1.00	1.00	1.00	
8	Cobalt	mg/l	0.20	0.20	0.20	0.20	
9	Barium	mg/l	1	(-)	(-)	(-)	
10	Boron	mg/l	1	1	1	1	
11	Selenium	mg/l	0.01	0.05	0.05	0.05	
12	Cadmium	mg/l	0.01	0.01	0.01	0.01	
13	Chromium (VI)	mg/l	0.05	0.05	0.05	0.01	
14	Cuprum	mg/l	0.02	0.02	0.02	0.02	For conventional treatment plant Cu <= 1 mg/l
15	Iron	mg/l	0.30	(-)	(-)	(-)	For conventional treatment plant Fe <= 5 mg/l
16	Plumbum	mg/l	0.03	0.03	0.03	0.03	For conventional treatment plant Pb <= 0.1 mg/l
17	Manganese	mg/l	1	(-)	(-)	(-)	
18	Hydrargyrum	mg/l	0.001	0.002	0.002	0.005	
19	Zink	mg/l	0.05	0.05	0.05	2.00	For conventional treatment plant Zn <= 5 mg/l
20	Chloride	mg/l	1	(-)	(-)	(-)	
21	Cyanide	mg/l	0.02	0.02	0.02	(-)	
22	Fluoride	mg/l	0.50	1.50	1.50	(-)	
23	Nitrite as N	mg/l	0.06	0.06	0.06	(-)	For conventional treatment plant No2 N <= 1 mg/l
24	Sulfate	mg/l	400	(-)	(-)	(-)	
25	Free Chlorine	mg/l	0.03	0.03	0.03	(-)	For raw water for drinking water is not requirement
26	Sulfur as H2S	mg/l	0.02	0.02	0.02	(-)	
	MICROBIOLOGY						
1	Fecal Coliform	MPN/100 ml	1,000	1,000	1,000	2,000	Fecal coliform <= 2,000/100 ml
2	Total Coliform	MPN/100 ml	1,000	5,000	10,000	10,000	Total coliform <= 10,000/100 ml
	RADIOACTIVITY						
1	Gross - A	bg/L	0.10	0.10	0.10	0.10	
2	Gross - B	bg/L	1.00	1.00	1.00	1.00	
	ORGANIC CHEMICAL						
1	Oil and Grease	µg/L	1,000	1,000	1,000	(-)	
2	Detergent as MBAS	µg/L	200	200	200	(-)	
3	Phenol compound	µg/L	1	1	1	(-)	
4	As Phenol						
5	BHC	µg/L	210	210	210	(-)	
6	Aldrine/Dieldrine	µg/L	17	(-)	(-)	(-)	
7	Chlordane	µg/L	3	(-)	(-)	(-)	
8	DDT	µg/L	2	2	2	2	
9	Heptachlor and Heptachlor epoxide	mg/l					
10	Lindane	mg/l	56	(-)	(-)	(-)	
11	Methoxyctor	mg/l	1	4	4	(-)	
12	Endrine	mg/l	1	4	4	(-)	
13	Toxaphan	mg/l	5	(-)	(-)	(-)	

Note:
Class I : Water which can be used for nominal water uses and/or other uses reques the same water quality
Class II : Water which can be used for cultivating of freshwater fish, cattle, irrigation and/or other uses reques the same water quality
Class III : Water which can be used for cultivating of freshwater fish, cattle, irrigation and/or other uses reques the same water quality
Class IV : Water which can be used for irrigation and/or other uses reques the same water quality

Source: The Government Regulation Number 82 of 2001 Regarding Water Quality Management and Water Pollution Control, The State Ministry of Environment, 2001

2.4 Relationship between Central Governance and Local Government

2.4.1 Related Organizations

Policy and regulatory responsibilities for the water and sanitation sector are shared among several ministries namely Ministry of Public Works (DEPPU), Ministry of Home Affairs (DEPDAGRI), Ministry of Finance (DEPKEU), Ministry of Health (DEPKES), State Ministry of Environment (KLH), Ministry of Industrial and Trade Affairs (DEPERINDAG), Ministry of Mines and Energy and etc.

National Government is responsible for sanitation policy and strategy, regulation, minimum standards and monitoring, and overall coordination of the sector. The BAPPENAS, the DEPPU, the DEPKES, the DEPDAGRI (the latter is responsible for Local Government) and the KLH have a role in urban sanitation, and BAPPENAS plays the lead role in decision-making. In contrast to this, responsibility for promoting rural sanitation lies with the DEPKES.

Responsibilities of ministries related to water and sanitation sector are summarized bellow.

(1) Ministry of Public Works

Ministry of Public Works (DEPPU) has the responsibility for determining policies and standards in the water sector, including water supply and sanitation, at a national level. As a technical department, DEPPU, formerly Ministry of Settlements and Regional Infrastructure or Ministry for Human Settlement and Regional Infrastructure (KINPRASWIL) is responsible for the development of water resources, roads and bridges, water supply and sanitation, and spatial planning. Under the previous Unity Cabinet (2004 - 2009), its organization was restructured. Besides policy making functions, the DEPPU also issues and publishes technical regulations, covering Norms, Standards, Guidelines and Manuals (NSPM). These products are used as references to be complied by the construction industries engaged in the development of public works sector, in order to ensure implementation of good operating practices in all public works. The DEPPU established a Supervisory Support Agency for Water Supply System (BPPSPAM) responsible for the giving recommendations to the Minister of Public Works on the development of water supply provision system.

(2) Ministry of Home Affairs

Under the Low No. 22 Year 1999 regarding Regionally Owned Companies, its has issued guidelines on: (i) drinking water tariffs; (ii) Water Supply Enterprise (PDAM) management; (iii) management of loans; (iv) accounting systems; and (v) financial performance assessment and monitoring. The Ministry of Home Affairs (DEPDAGRI) through its Directorate General of Regional Development (PUOD) is responsible for the supervision and monitoring of Local Governments and the performance of their principal personnel. A second important function of PUOD is the overall management and support of the local water works enterprises.

(3) Ministry of Finance

The Ministry of Finance (DEPKEU) with respects to water supply development is actually the owner of all assets under the State-Owned Regional Water Works Enterprises that enjoyed state funding either in the form of foreign loan (debt) or government equity. These enterprises are then obliged to pay its debt to the DEPKEU. Any transfer or disposal of state assets therefore must be approved by the DEPKEU. The DEPKEU through its Directorate General Budget is responsible for allocating funds for sector's development projects and through its Directorate General Financial Institution manages subsidiary loan agreements, whereby Local Governments and their incorporated businesses (such as a water works enterprise) can borrow money provided through externally assisted project financing at the central level.

(4) Ministry of Health

In the water supply sector, the Ministry of Health (DEPKES) is responsible for the issuance of the quality standards for clean water and portable water. The water provided shall comply with these standards, and the DEPKES has the right to inspect and monitor the clean and potable water produced by water treatment plant.

(5) Ministry of Industry

The Ministry of Industry (DEPERINDAG) is responsible for pollution control of effluent from industrial sector to avoid the serious impacts to the environment and lives health, monitor and control of effluent through its Directorate of Oil and Gas.

(6) Ministry of Energy and Natural Resources

The Ministry of Energy and Natural Resources (PERTAMBEN) is responsible for groundwater exploration and its relevant data collection, as well as the granting of exploration permits through its Directorate of Environmental Geology under Directorate General of Geology and Mineral Resources.

(7) State Ministry of Environment

The State Ministry of Environment (KLH) establishes policies on water pollution control and environmental issues. It also plans the implementation of environmental programmes, support public participation in environmental affairs, and coordinates the operational activities of the Environmental Impact Management and Control Agency (BAPPEDAL). The BAPPEDAL, established in 1990, is directly responsible to the President, but its operation is coordinated by the KLH. It assists in policy formulation regarding the implementation of pollution control, including toxic and hazardous waste management. The ministry also acts as reference centre on environment pollution, and promotes public participation in environmental impact assessment.

(8) National Development Planning Agency

The National Development Planning Agency (BAPPENAS) is responsible for preparation of long and Middle-Term national development programmes, and in particular the sectoral target and its budget. Other functions are programme coordination, evaluation of project effectiveness and proposal for future programme planning.

(9) Provincial Governments

The 2001 reorganization established no hierarchical relationship between province and municipalities, though it stipulated that provincial government had a responsibility to monitor and enforce national minimum standards including effluent standards, and was responsible for trans-boundary environmental issues such as the control of river pollution. The need to establish the role of provincial government is becoming urgent since the provinces now receive significant funds from national government that could be used for urban sanitation improvements, but no mechanisms are in place for developing them.

(10) Local Governments

Local Government have overall responsibility for the provision of urban sanitation services, but the assignment of specific roles to municipal departments and other city-based agencies varies greatly from one city to another (See ***Table 2.3.2***). Typically, 6 (six) to 9 (nine) offices have a role to play, though as many as 16 are involved in some cities. Quite often, the Cleaning Agency (Dinas Kebersihan) or the Environmental Services Agency (Dinas Lingkungan Hidup) takes a lead role, though no agency has a specific responsibility to promote household toilets. In the case of sewerage (where it exists) responsibility may lie with the sewerage management utility (PD PAL etc.), the water utility (PDAM), the water resources department (DLH), or the department of public works (DPU).

Typical allocation of responsibilities at city level is summarized in ***Table2.4.1***. These agencies employ a substantial number of graduate and postgraduate staff in larger cities, but expertise in urban sanitation planning and service delivery is quite limited.

To improve coordination and collaboration between these agencies, in 2007 the Government of Indonesia established a national multi-departmental sanitation working group known as Sanitation Development Technical Team (TTPS), headed by BAPPENAS. The group provides the vehicle for Indonesia Sanitation Sector Development Programme (ISSDP) to support the national sanitation policy and strategy

The focus of development planning at municipal level is the local Medium-Term Development Plan, which has a five-year vision. This is compiled through a series of development planning process (MUSRENBANG), beginning at sub-district level and continuing via district to city level. The process is coordinated by the Regional Development Planning Agency (BAPPEDA) and the plan provides the framework for the municipality's annual activities and budget. Individual departments also provide input, and some have their own strategic plans. These should be related to the local plan, but must also fit with sectoral initiatives from line department at provincial and national level.

Table 2.4.1 - Urban Sanitation in Indonesia: Typical Allocation of Responsibilities at City Level

	Local Policy and Strategy	Infrastructure Development and Service Delivery					
		Sewerage, Wastewater Treatment	Sludge Treatment	Communal Toilets	Urban Community Based Sanitation System (SANIMAS)	Household Toilets, Septic Tanks	Drainage
Local Government Enterprises							
Sewerage Utility (PD PAL etc.)							
Water Utility (PDAM)							
Municipal Department							
Cleaning and Landscaping Agency (DKP)							
RT/RW (Neighbourhood Administrative Units)							
Environmental Services Agency (DLH)							
Public Service Agency (DPU)							
Other Government Bodies							
BAPPEDA (Regional Development Planning Agency							
Non-Government Stakeholders							
Private Sector			Pit Emptying				
Non-Government Organizations (NGOs) / Commercial Group							
Community-Based Organizations (CBOs)							
Individuals							Tertiary

Source: Urban Sanitation in Indonesia: Planning for Progress - Field Note, WSP, April 2009

2.4.2 Relationships

The related organizations for sewerage management are shown in ***Table 2.4.2*** and their relationship is depicted in ***Figure 2.4.1*** and ***Figure 2.4.2***.

Table 2.4.2 - List of Relevant Organizations for National Sewerage Management

No.	RELEVANT ORGANIZATION		
1	Ministry of Public Works (DEPPU)	Directorate General of Human Settlement (CIPTA KARYA)	Directorate of Environment and Sanitation Improvement (PPLP)
2	Ministry of Health (KEPMENKES)		
3	The State Ministry of Environment (KLH)		
4	The Ministry of Home Affairs (DEPDAGRI)	Directorate General of Regional Development	
5	The Ministry of Finance (DEPKEU)		Directorate General Budget
6	The Ministry of Industrial and Trade (DEPERINDAG)		Directorate of Oil and Gas
7	The Ministry of Mines and Energy (PERTAMBEN)	Directorate General of Geology and Mineral Resources	Directorate of Environmental Geology
8	National Development Planning Agency (BAPPENAS)		
9	Provincial Development Planning Agency (BAPPEDA Propinsi)		
10	Provincial Public Works Service Office (DPU Propinsi)		
11	Provincial Environment Agency		
12	City / Regency Development Planning Agency (BAPPEDA Kota / Kabupaten)		
13	City / Regency Public Works Service Office (DPU Kota / Kabupaten)		
14	Organization of Environment and Sanitation Development		
15	City / Regency Environment Agency		

And, ***Figure 2.4.3*** shows organization structure of Ministry of Public Works (DEPPU). Directorate of Environment and Sanitation Development (PPLP) under Directorate General of Human Settlements manages sanitation in Indonesia manages sanitation in Indonesia.

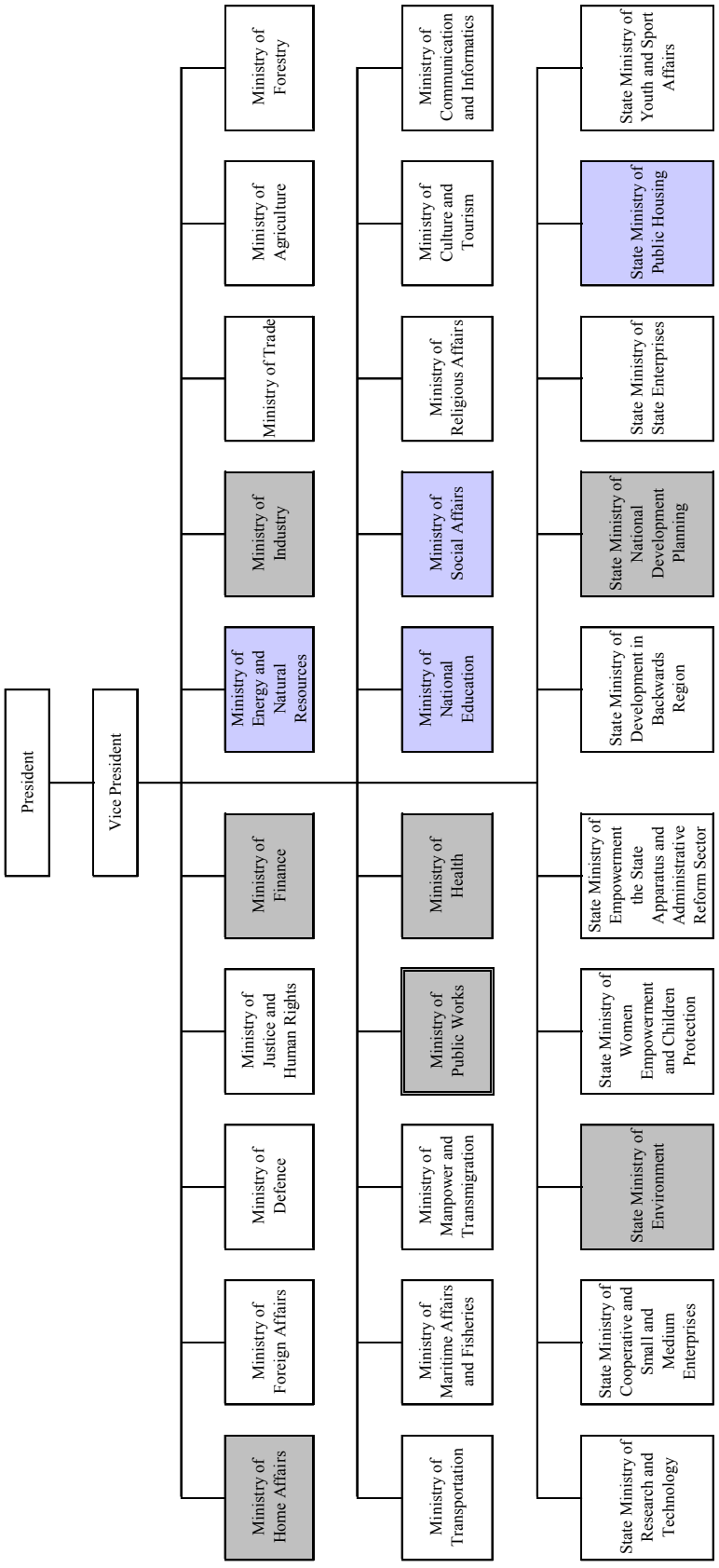


Figure 2.4.1 - Cabinet Organization Structure of Republic of Indonesia
Source: Government of Indonesia

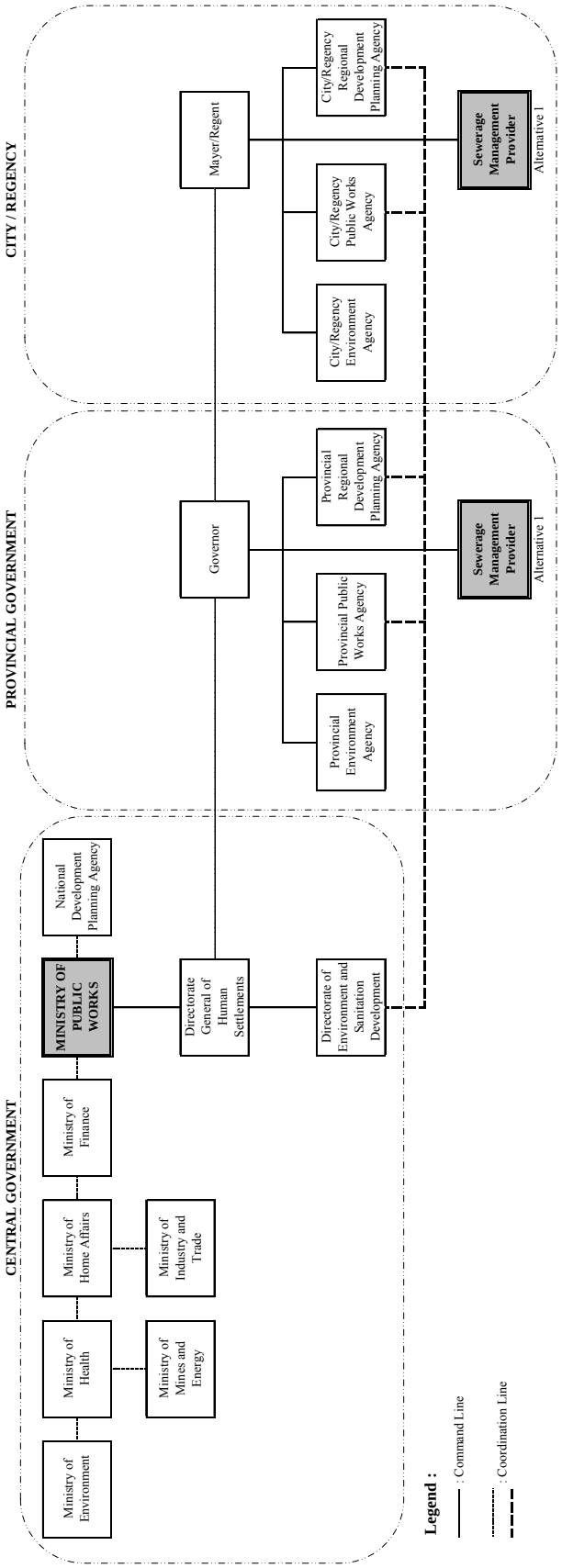


Figure 2.4.2 - Relationship of Governance Organization for Sewerage Planning, Design and Construction

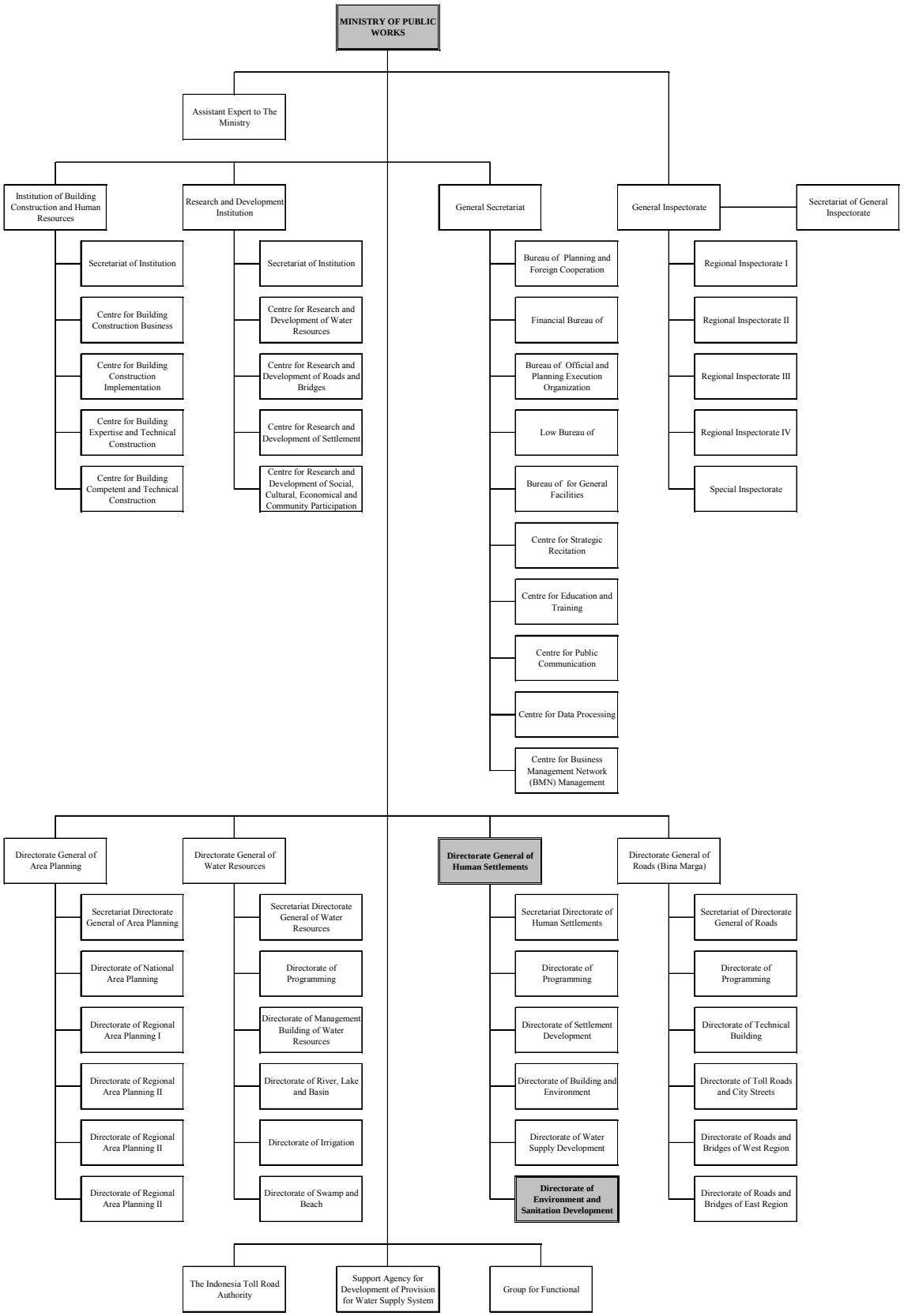


Figure 2.4.3 - Organization Structure of Ministry of Public Works
Source: Ministry of Public Works

The sector of sewerage is managed by Sub Directorate of Sewerage System Development under Directorate of Environment and Sanitation Development (PPLP) as shown in ***Figure 2.4.4***.

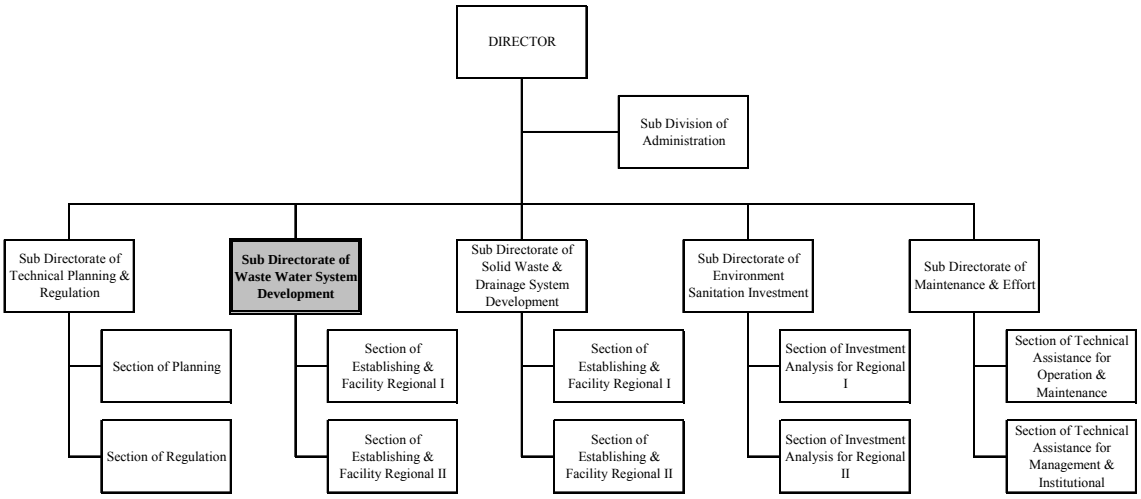


Figure 2.4.4 - Organization Structure of Directorate of Environment and Sanitation Improvement
Source: Ministry of Public Works

2.5 Existing Sewerage Service Providers

The institutional framework in handling wastewater treatment at 12 major cities in Indonesia is shown below. These 12 major cities are: Jakarta (Great Jakarta Special Capital Region Province), Cirebon, Bandung and Tangerang (West Java Province), Yogyakarta and Surakarta/Solo (Central Java Province), Balikpapan (East Kalimantan Province), Banjarmasin and Tarakan (East Kalimantan Province), Medan and Prapat (North Sumatra Province) and Denpasar (Bali Province).

The location map and personality of these 12 cities are introduced in ***Figure 2.5.1*** and ***Table 2.5.1***.

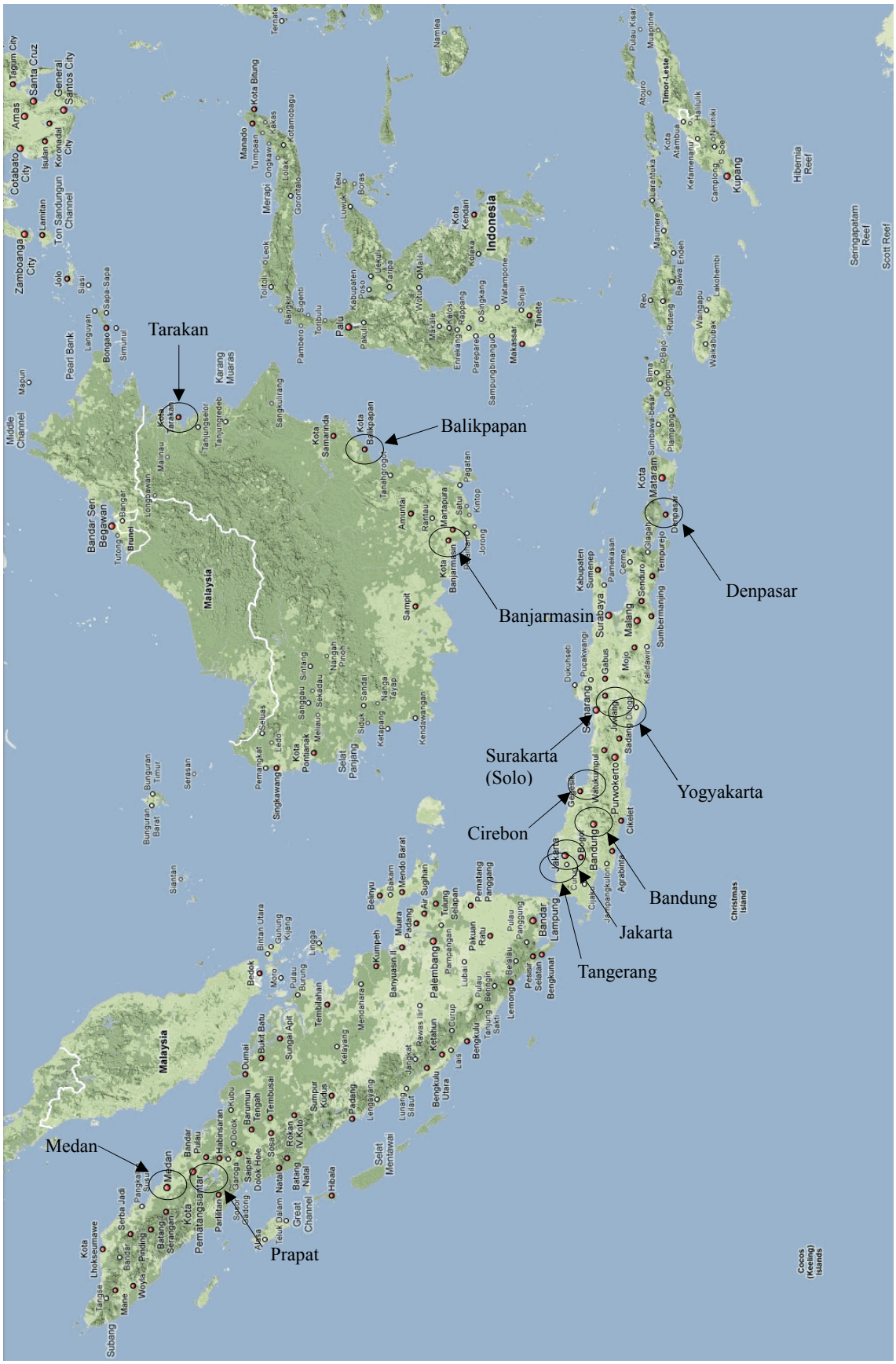


Figure 2.5.1 - Location Map of 12 Cities

Table 2.5.1 - The Personality of 12 Cities

Province	City / Regency	Area (km^2)	Population (Person)	Population Density (Person/ha)	Personality
Bali	**Denpasar**	32.50	511,744 (2004)	157.46	Denpasar is the capital city of the province of Bali and was the capital of the kingdom of Badung. Denpasar is the famous city of International Tourism and has various attractions. The white sandy beaches are famous all over the island. Some of the famous surfing beaches are Kuta Beach, Legian Beach and Canggu Beach.
Central Java	**Yogyakarta**	123.98	491,500 (2002)	39.64	Yogyakarta is provincial city in the Yogyakarta Special Region. It is renowned as a center of classical Javanese fine art and culture such as batik, ballet, drama, music, poetry, and puppet shows. It is also famous as a center for Indonesian higher education. Yogyakarta was the Indonesian capital during the Indonesian National Revolution from 1945 to 1949.
	Surakarta (Solo)	44.03	572,345 (2004)	129.99	Surakarta is also known by the name "Solo" which was the capital of the Sultanate of Mataram. Previous to the Indonesian nation being formed it was one of two areas ruled by local leaders. During Dutch occupation, the two areas were known as the Vorstenland - the Yogyakarta and Surakarta principalities. Rivalry between the two has been endemic since their founding in the 1700s and was a deliberate ploy by the Dutch colonial powers to distract the attention from the presence of the Dutch colonial power. The ruler of the main court within the city is known as a hereditary king with title of Pakubuwono. The present king(s) is Pakubuwono XIII. The ruler of Mangkunegaran, a small principality inside Kasunanan is called Mangkunegoro, with Mangkunegara IX as the present monarch.
East Kalimantan	**Banjarmasin**	72.00	627,245 (2008)	71.08	Banjarmasin is the capital of Province of South Kalimantan. It is located on a delta island near the junction of the Barito and Martapura rivers. As a result, Banjarmasin is sometimes called the "River City" Banjarmasin is served by the Syamsudin Noor Airport. A fairly important deepwater port, Pelabuhan Trisakti Banjarmasin is the trade centre of the Barito basin; exports include rubber, pepper, timber, petroleum, coal, gold, and diamonds. Passenger ships and ferries to and from Java also carry their operation here.
	Balikpapan	503.30	780,000 (2007)	15.50	Balikpapan is a seaport city on the eastern coast of Borneo island in the East Kalimantan province, a resource-rich region well known for its timber, mining and petroleum export products. Two harbours, Semayang and Kariangau - ferry harbour, and the Sepinggan International Airport are the main transportation ports to access the city.
	Tarakan	250.80	169,951 (2006)	6.78	Tarakan is a city in East Kalimantan province. Tarakan has an airport called Juwata Airport. The surrounding area of Tarakan is producing oil.
Great Jakarta Special Capital Region	**Jakarta**	661.00	8,490,000 (2008)	128.44	Jakarta is the capital and largest city of Indonesia and is the country's economic, cultural and political centre. It is the most populous city in Indonesia and Southeast Asia, and is the twelfth-largest city in the world. The metropolitan area, Jabodetabek, is the second largest in the world.
North Sumatra	**Medan**	265.10	2,083,156 (2007)	78.58	Medan is the capital of the province of North Sumatra and is the fourth largest city in Indonesia. There are many old buildings in Medan that still retain their Dutch architecture, and several historic places such as Maimun Palace, where the Sultan of Deli still lives, and the Great Mosque of Medan built in 1906.
	Prapat				Prapat (Parapat) is a small town in North Sumatra province on the edge of Lake Toba, on the Uluan Peninsula where it forms the narrowest eastern link to Samosir Island. It is the primary transit point by ferry for visitors going to Samosir Island.
West Java	**Cirebon**	37.54	277,000 (2003)	73.79	Cirebon is a city on the north coast of the Indonesian island of Java in the province of West Jawa.
	Bandung	167.27	2,290,464 (2005)	136.93	Bandung is the capital of West Java province, and the third largest city and second largest metropolitan area in Indonesia. Bandung is located 750 - 800 m above sea level, and has relatively year-around cooler temperature than most other Indonesian cities. The city lies on a river basin and surrounded by volcanic mountains. This topography provides the city with a good natural defence system, which was the primary reason of Dutch East Indies government's plan to move the colony capital from Batavia to Bandung. Bandung was developed as a resort city and dubbed as "The Paris of Java". After Indonesian independence on 1945 onwards, the city experienced a rapid development and urbanization that has transformed Bandung from idyllic town into metropolitan area. Although the city has encountered many problems (ranging from waste disposal, floods to chaotic traffic system, etc), Bandung however still has its charm to attract people flocking into the city, either as weekend travellers or living in.
	Tangerang	164.54	1,537,244 (2005)	93.43	Tangerang is the capital of the province of Banten. It is located about 20 km west of Jakarta, and the third largest urban centre in the Jabotabek region after Jakarta and Bekasi. The Soekarno-Hatta International Airport is located in the city.

Source: Wikipedia (http://en.wikipedia.org/)

(1) PDAM (Local Government Water Supply Service Enterprise)

In Surakarta (Solo), Medan, Prapat/Parapat, Balikpapan, Banjarmasin, Bandung and Cirebon, the wastewater treatment and sewerage system falls under the responsibility of the local PDAM. An advantage of this framework is that PDMA often possesses competence to handle a sewerage installation for the organizational and technical side. The billing system is already in place with the customer database. PDAM is used to treat water, and piping systems are utilized. Billing can be combined which is far more efficient than separate billing

(2) PD PAL (Local Government Sewerage Service Enterprise)

Only in Jakarta, a PD PAL organizational form is applied, separate from municipal Water utility. An advantage is the independency from the Government and PDAM. They have their own responsibility and can work independently. Disadvantages are that they do not have the backing of PDAM.

Billing through PDAM and fees based on water usage will not be so easy anymore. PD PAL drives its business successful, but it cannot be compared with other areas, because it serves mostly high rise buildings in the centre of Jakarta and can apply tariffs which cross-subsidize lower tariffs of households.

Also the existed industrial treatment plants in Bandung and Medan which are owned or partly owned by the Government; do not have a convincing framework to achieve cost recovery and good operational performance.

(3) Dinas (Local Government Sewerage Service Enterprise)

In Tangerang, Tarakan and Yogyakarta, the facilities are managed by the Local Government (Dinas).

Some of the other cities were managed by Dinas before they had shifted the managements to PDAM (e.g. Medan and Balikpapan). Most systems operated by Dinas suffer from budget problems and insufficient billing efficiency (if any billing at all). Only in Yogyakarta commitment by the management could be existed. However, budget problems at the beginning of every year and losing support in Local Council (DPRD) for subsidies will threaten the performance in the medium-term.

(4) BLUPAL (Local Government Public Service Organization of Sewerage Management)

Only in Denpasar, a BLUPAL Organizational form is applied. Public Service Organization of Sewerage Management (BLUPAL) was established by Denpasar Sewerage Development Project (DSDP), which manages the sewerage system in Denpasar and Badung together with DSDP. BLUPAL is an institution under Provincial Public Works Service Agency of Bali (DPU Bali), and the owner of BLUPAL is Governor of Bali Province, Mayor of Denpasar and Regent of Badung. Assets of sewerage system belong to DSDP. DSDP-Is an institution under Provincial Environment and Sanitation Development Agency of Bali (PPLP Bali).

(5) Condition of Existing Sewerage Service Providers

A summary table of existing sewerage service providers in Indonesia (March 2009) is shown in ***Table 2.5.2.*** And more details of current condition in 3 areas which are Jakarta, Bandung and Denpasar are introduced in later Chapters.

Table 2.5.2 - Summary of Existing Sewerage Service Providers in Indonesia

City / Regency	Location	Treatment System	Design Capacity (m^3/day)	Installed Capacity (m^3/day)	Used Capacity (m^3/day)	Idle Capacity (m^3/day)	Pipe Length (km)		Total Inhabitant (Persons)	House Connection (HC)	Beneficiary Number (Persons)	Managing Institution
							Primary	Secondary				
Banjarmasin	Lambung Mangkurat	Rotating Biological Contactor (RBC)	500	500	500	0	3.704	12.119	602,725	1,000	10,150	PD PAL Banjarmasin
	Pekapuran Raya	Rotating Biological Contactor (RBC)	2,500	2,500	400	2,100	1.713	522.000		1,000		
	Hasan Basri	Rotating Biological Contactor (RBC)	100	100	100	0	2.383	324.000		700		
Cirebon	Ade Irma	Stabilisation Pond	12,960	12,960	6,480	6,480	1.506	19.168	288,530	1,808	9,040	PDAM Cirebon
	Komplek Perumnas Utara	Stabilisation Pond	13,900	13,900	6,950	6,950		0.496		1,419	7,095	
	Komplek Perumnas Selatan	Stabilisation Pond	3,475	3,475	1,740	1,735		3.992		4,738	23,690	
	Kasenden	Stabilisation Pond	3,475	3,475	500	2,975	1.618	2.125		171	855	
Bandung	Bojongsoang	Stabilisation Pond	234,000	80,000	31,387	48,613	14.000	175.000	2,639,835	98,350	590,100	PDAM Bandung
Yogyakarta	Desa Pendowoharjo, Sewon, Bantul	Aerated Lagoon	15,500	15,500	6,500	9,000	34.129	113.695	1,458,039	2,109	10,545	Joint Secretariat Kartamantul
Balikpapan	Keluarahan Margasari, Balikpapan	Extended Aeration	800	800	302	498	3.373	5.039	535,829	1,452	7.260	PDAM Balikpapan
Tarakan	Kelurahan Sebengkok	Bio Filter	200	200	100	100	15.800	20.000		100	500	Dinas Kebersihan Tarakan
Surakarta	Kelurahan Mojosongo	Combination of Aerated And Facultative Pond	2,000	2,000	2,000	0	5.000	20.500	556,054	4,554	22,770	PDAM Surakarta
(Solo)	Kelurahan Semanggi	Bio Activated Sludge	2,500	2,500	2,500	0	7.000	37.800		6,210	31,050	
Medan	Pulo Brayan Bengkel, Medan	Upflow Anaerobic-Sludge Blanket (UASB)	60,000	20,000	16,000	4,000	9.600	86.110	16,800	11,300	56,500	PDAM Tirtanadi Medan
Prapat	Kec. Ajibata	Aerated Lagoon	2,000	2,000	200	1,800				229	1,374	
Jakarta	Setiabudi	Aerated Lagoon	43,000	43,000				2.700		1,316	6,580	PD PAL JAYA
	Malaka Sari	Rotating Biological Contactor (RBC)	400	400						463	2,315	
Denpasar	Suwung	Aerated Lagoon	51,000	51,000				130.000		8,674	43,370	BLUPAL Bali
Tangerang	Sukasari	Oxydation Ditch	5,500	5,500								

Source: Ministry of Public Works

2.6 Financial Support

The Central Government supports sewerage service provider through Local Government. ***Figure 2.6.1*** shows flow chart of financial support.

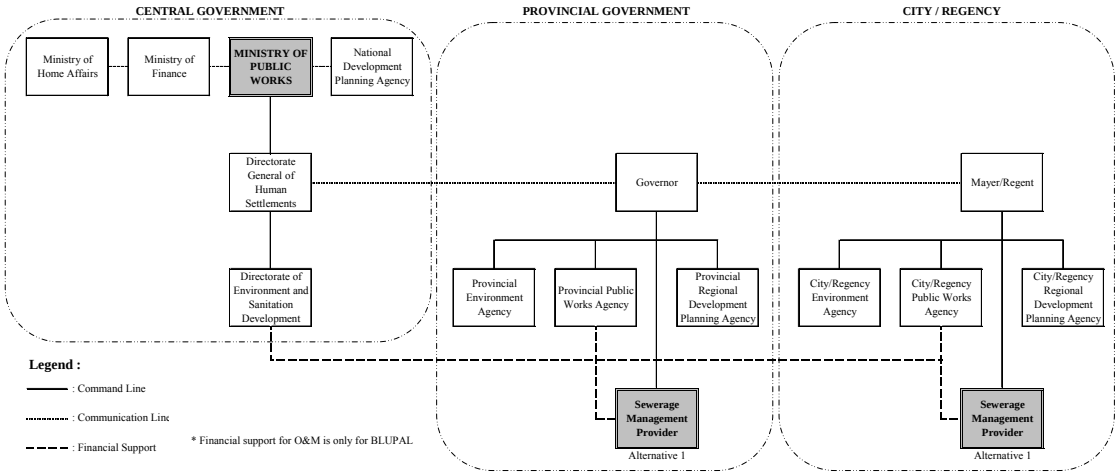


Figure 2.6.1 - Financial Support Diagram for Design, Construction and O&M

2.7 Monitoring System of Effluent from Wastewater Treatment Plant

The State Ministry of Environment (KLH) is responsible of water qualities; however there is not specified law and regulation on monitoring of effluent from Wastewater Treatment Plant (WWTP). However, Regional Environment Agency monitors sewerage effluent quality. ***Figure 2.7.1*** shows monitoring system for environment impact and effluent quality. And ***Figure 2.7.2*** shows organization structure of State Ministry of Environment.

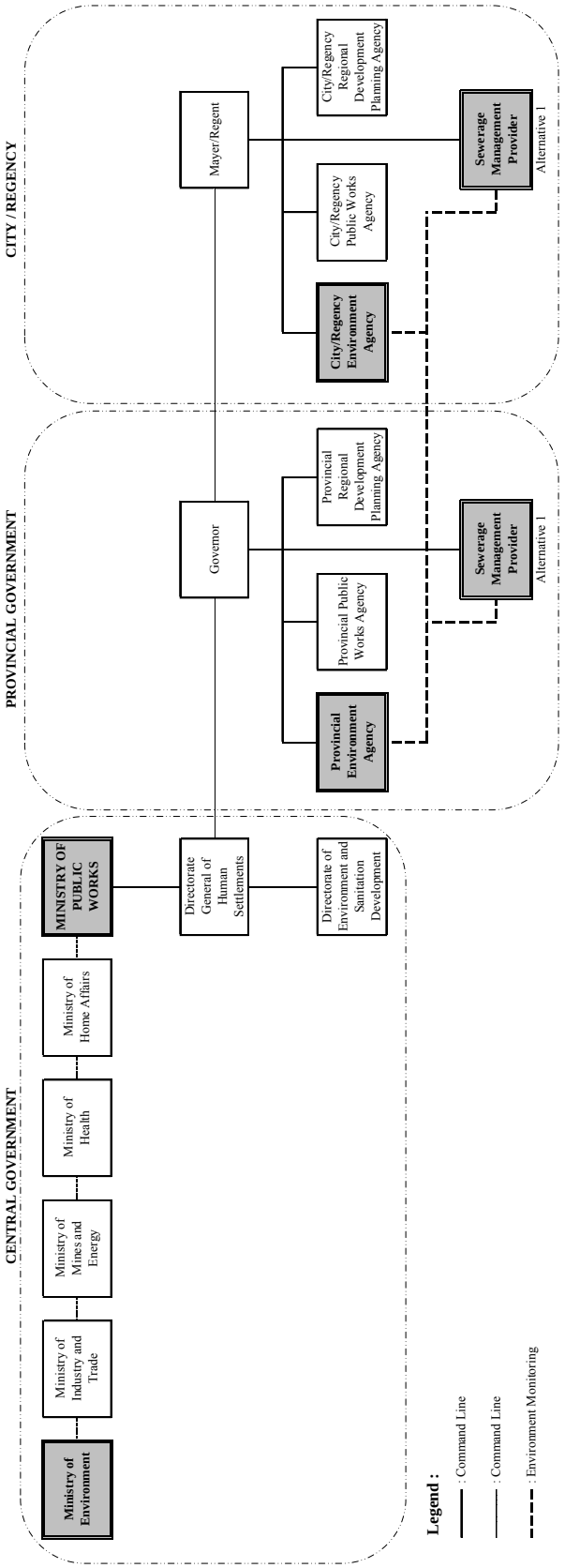


Figure 2.7.1 - Monitoring System for Environment Impact and Effluent Quality

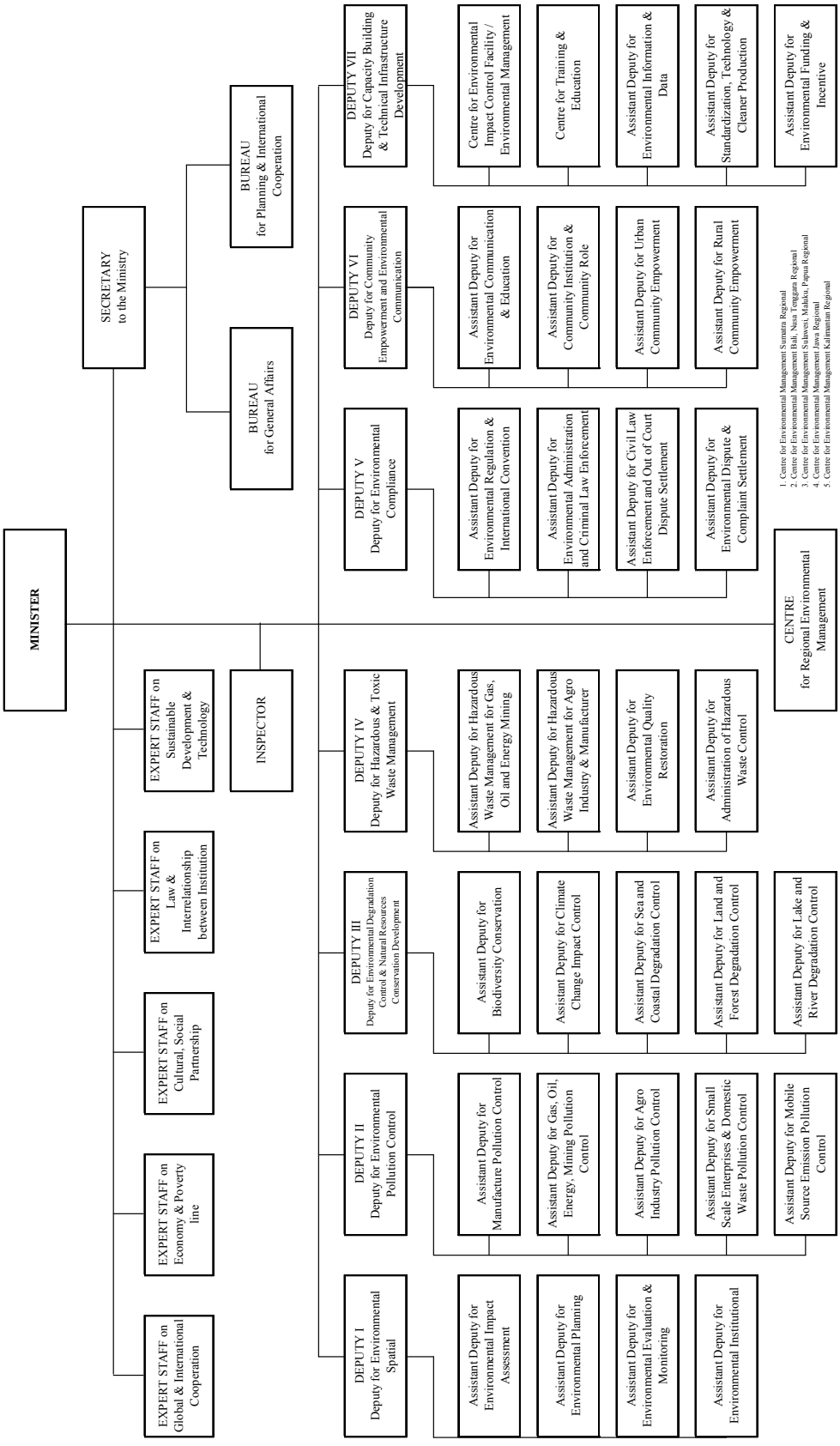


Figure 2.7.2 - Organization Structure of State Ministry of Environment
Source: KLH

2.8 Related Projects and International Supports

2.8.1 Indonesian Sanitation Sector Development Programmes

In 2005, the Government of Indonesia (GOI) and the World Bank (WB) Water and Sanitation Programme (WSP) started four-year Indonesian Sanitation Sector Development Programme (ISSDP). Its purpose was the integrated promotion of safe excreta disposal, sewerage disposal, solid waste management, drainage and hygiene at national and city level.

ISSDP was financed by Dutch Trust Fund to the WB and by the Government of Sweden for Sewerage, drainage and solid waste management (SUSEA [Sustainable Sanitation in East Asia] agreement). ISSDP links support to an enabling national environment to demand-base city strategy development and implementation.

The national component involved development a national enabling framework for urban satiation and design national campaigns on sanitation awareness and hand-washing. The city component was to strengthen the capacities of the 6 (six) pilot cities that had come forth first to plan and implement improvements in urban sanitation (see ***Table 2.8.1***)

Table 2.8.1 - ISSDP Pilot Cities

Name of Town	Personality	Population Size	Population Density (Person/km^2)
Banjarmasin	Capital of Kalimantan	572,200	8,816
Blitar	Agricultural Centre in East Java	126,388	3,880
Denpasar	Capital of Bali	562,907	4,550
Jambi	Spread-Out Town in Sumatra	419,920	2,045
Payakumbuh	Agricultural Centre in Sumatra	121,500	1,510
Surakarta (Solo)	Larger Industrial City in Central Java	552,542	12,546

Source: Making Urban Sanitation Strategies of Six Indonesian Cities More Pro-Poor and Gender-Equitable: The Case of ISSDP - A Case Study on Social Inclusion for SWITCH, SWITCH, May 2009

During the first 2 (two) years a consortium of Indonesian and Dutch consultants was contracted to help develop the national framework, build the capacities of 6 (six) cities to develop urban sanitation strategies and plans, and prepare 3 (three) campaigns (to raise leadership awareness of sanitation, make the poor more aware of sanitation solutions and promote women's hand-washing habits). In the second 2 (two) years, support will be given to strategy implementation at national and city level. A team of about 50 long and short-term international and national specialists provide inputs such as: studies and reviews, sanitation policy consolidation, strategy development, advocacy, capacity building, and guidelines & manuals development.

And, recently there are several GOI initiatives and programmes which directly or have the potential to address water, sanitation & hygiene needs, and progress further efforts to achieve the MDGs as shown in ***Table 2.8.2***.

Table 2.8.2 - GOI Initiatives and Activates (1/2)

Ministry/Agency	Initiative	Role/Objective
National, Provincial and District Planning Agency (BAPPENAS / BAPPEDA)	Water and Sanitation Working Group (Pokja AMPL)	• Central level policy coordination of water, sanitation and hygiene efforts - includes the Ministries of Public Works, Health, Home Affairs, Finance, Environment and Industry, National Planning Agency (BAPPENAS) • Coordination of Ministry, Agency and other stakeholder efforts at central, provincial and district levels • Coordination of ISSDP, including coordination of City Sanitation Strategies development
Ministry of Public Works (DEPPU)	Directorate of Environmental Sanitation Improvement	• Provides technical support for sanitation initiatives and development of national guidelines and regulations • Promotion of 3R (Reuse, Recycle and Reduce) programme • Advocacy - concerning capacity building, institutional strengthening in terms of sanitation to Local Government • EcoDrain Programme - community participative approach programme to improve capacity for maintenance of drain and grey water
	Directorate of Water Supply (SPAM)	• Provides technical support for water initiative and development of national guidelines and regulations • Advocacy - to PDAM and private investors • Provide infrastructure at community level including wells, tap stands, public toilets, footpaths
	Urban Poverty Alleviation Project (P2KP)	• Aims to promote economic growth at community level through development and implementation of projects which are co-funded by communities, and the private and public sector
	SANIMAS (Community Based Sanitation)	• Central level matches funds from local level for Community Based Sanitation (CBS), technical and software • Target of 200 CBS locations reached per year until 2015
Ministry of Health (DEPKES)	National Strategy for Community Based Total Sanitation (STBM)	• Launched in August 2008 by Minister of Health • Target of 10,000 open defecation free villages and total sanitation over 5 years • Total sanitation includes utilization of STBM methodology which includes the five pillars: ➢ Open Defecation Free Environment ➢ Hand-Washing with Soap ➢ Safe Household Water Management ➢ Safe Food Handling ➢ Safe Solid Waste Management • The STBM strategy is considered and planned to be applicable for health and hygiene behaviour in both rural and urban settings • Includes National Hand-Washing Initiative with the development of Public Private Partnerships (various ministries, organizations and private sector) and support to Hand-Washing with Soap (CTPS) Team • Establishment of National Network for Household Water Treatment and Storage
	Other Linked Programmes	• Maternal Child Health Programme - including early initiation of breastfeeding, Integrated Management of Childhood Illnesses (IMCI) including treatment of diarrhea with Oral Rehydration Technology (ORT), zinc, breastfeeding/child feeding, hygiene and hand-washing promotion • Healthy Cities Programme, Healthy Markets Programme, Healthy Schools Programme, Health Promotion (PHBS - promotion of 10 key behaviours including 3 directly related to water, sanitation and hygiene)

Support on Water and Sanitation Sector Analysis and Programme (Final) 2009 - 2014, USAID, January 2009

Table 2.8.2 - GOI Initiatives and Activates (2/2)

Ministry/Agency	Initiative	Role/Objective
State Ministry of Environment (KLH)		• Prepare environmental regulations and Environmental Impact Assessments (EIAs) • Water source protection • Develop and socialize 3R module
Ministry of Social Affairs	National Project for Community Environment (PNPM)	• Chair of PNPM working group and steering committee • Provision of block grants directly to community organizations to support achievement of MDGs, including access to improved water supply and sanitation though expanded poverty reduction Community-Based Development (CDD) projects • Includes the Urban Poverty Project (UPP) to be executed by the Ministry of Public Works in urban areas • Includes the Kacematan Development Project (KDP) to be executed by the Ministry of Home Affairs in rural area
Ministry of Education		• Implementation of Green School Extra curriculum - promote 3R, washing hands with soap and use of toilet
Ministry of Housing (MENPERA)	Low Cost Housing Scheme	• Targets low income groups and the poor • Jointly implemented with Local Governments and sometimes the private sector

Support on Water and Sanitation Sector Analysis and Programme (Final) 2009 - 2014, USAID, January 2009

2.8.2 Related Projects and Supports

(1) Asian Development Bank

Asian Development Bank (ADB) has been implementing 3 (three) years sewerage development project which consists of technical and financial aid and promotion activity for house connection in Medan, Yogyakarta and Makassar since December 2008. In the project education about sanitation has been also carried out. After accomplishment of the project, another 3 years project regarding aid for house connection is planned in other cities.

(2) World Bank

According to the fact-finding in World Bank (WB), they have been implementing Water and Sanitation Project (WSP) for many years in Indonesia and currently the project which includes sanitation in slum area is carried out in 14 cities. As one of the provision for prevention of inundation in Jakarta, dredging of channels at 2011 sites also has been implemented.

(3) Other Related Projects and Supports (Including ADB and WB)

Table 2.8.3 demonstrates the efforts by donors and investors to assist the GOI to realize the sanitation and water MDGs, improve health and hygiene outcomes, and contribute to improved economic and environmental productivity as a result of water, sanitation and hygiene investments in Indonesia. Although there are many local and international NGOs and CBOs contributing to water, sanitation and hygiene improvements in Indonesia, the following data serves to provide an overview of major investments in the sector.

Table 2.8.3 - Other Supports and Projects by the Other Donors and Investors (1/4)

Donor / Investor / Agency / NGO	Programme	Technical & Programmatic Areas
ADB	Community Water Service and Health Project	• Low income communities • Rural focus + Aceh and Nias • Water, sanitation and hygiene
	Metropolitan Sanitation Management and Health Project	• Environmental sanitation and health management in 3 (three) metro cities

Source: Support on Water and Sanitation Sector Analysis and Programme (Final) 2009 - 2014, USAID, January 2009

Table 2.8.3 - Other Supports and Projects by the Other Donors and Investors (2/4)

Donor / Investor / Agency / NGO	Programme	Technical & Programmatic Areas
AusAID	Water and Sanitation Policy Formulation and Action Planning Project Phase-2 (WASPOLA 2)	• Water and sanitation sector focus • Capacity building in policy implementation and policy reform • Emphasis on demand responsive and participatory process
	The Second Water and Sanitation for Low Income Communities Project (WSLIC-2)	• Grant co-funding to World Bank Loan • Low income communities • Community-based approaches, including CLTS
	Initiative Access to Clean Water and Sanitation (ACWSI)	2 year regional initiative to commence in 2009 which will include: • Contribution to ADB and WB programmes to support assistance to PDAMs • Contribution to development of facilitators and infrastructure within PAMSIMAS • Assistance to GOI for PNPM initiative • Assistance to ProAir (GTZ watsan programme in NTT) • Assistance to other AusAID funded programmes including ANTARA, ACCESS, Nias Reconstruction, and provision of water and latrines to schools through the Basic Education Programme
Borda	Sustainable Management of Natural Resource in SEA	• Expansion of coverage rate of sewerage system in Denpasar, Sanur and Kuta areas • Focus on improvement in O&M by Local Government
GTZ	Sustainable	• Eastern Island Focus • CLTS approach to sanitation
JICA	Urban Environmental Improvement Programme	• Sanitation and Wastewater Treatment
	Denpasar Sewerage Development Project II (DSDP-II)	• Expansion of coverage rate of sewerage system in Denpasar, Sanur and Kuta areas • Focus on improvement in O&M by Local Government
Mercy Corps	SENYUM (Health and safety for Communities)	• Focus on health of mothers and children under 5-years thorough improved access to water supply and sanitation facilities and improved hygiene practices
	Health Places Prosperous People (HP3)	• Water supply, sanitation and solid waste services • Economic benefit focus
	Sumatra Health Schools Programme (SHSP)	• School children • Nutrition and hygiene behaviour interventions • Water supply and sanitation infrastructure • Behaviour change promotion and training in school facilities
Netherlands Embassy	Embassy Water Resources Programme	• Contribute to WASAP (trust fund managed by WB) • Contribute to UNICEF's WES Programme in the eastern provinces • Contribute to ISSDP
PLAN Indonesia	Community Water and Environmental Sanitation Project	• Community based hygiene promotion, including households, schools and village delivery posts • Community-based water supply and waste disposal (solid waste and wastewater) • O&M focus • Contribute to development of Local Government policies and implementation of Government health, hygiene and sanitation programmes

Source: Support on Water and Sanitation Sector Analysis and Programme (Final) 2009 - 2014, USAID, January 2009

Table 2.8.3 - Other Supports and Projects by the Other Donors and Investors (3/4)

Donor / Investor / Agency / NGO	Programme	Technical & Programmatic Areas
UNICEF	Water and Environmental Sanitation (WES) Programme	• Water, sanitation and hygiene practices in Eastern Provinces • Village, school and urban with focus on the poor • Rain water harvesting • Hygiene education implemented through Care
USAID	Environmental Services Programme (ESP)	• Improved water resources, protection and watershed management • Expanded access to clean water and sanitation services • Increasing production and distribution of clean water • Capacity building in advocacy skills among communities, governments, private sector, local institutions and NGOs • Expand opportunities for intersectional participation • Strengthen biodiversity conservation • Water supply, sanitation and hygiene promotion • Innovative financing solutions and sustainable market oriented activities
	Health Services Programme (HSP)	• Enhanced diarrheal disease control through pairing prevention (hand-washing, hygiene and breastfeeding) with treatment of diarrheal (IMCI, ORT zinc and breastfeeding/child feeding) • Promotion of 10 key DEPKES behaviours (PHBS) and capacity building of (Behaviour Change in Communication) BCC teams - including hand-washing with soap, clean water and sanitation • Strengthen political commitment and funding for MCH through advocacy coalitions and engagement in Musrenbang • Community mobilization • Focus on reduction in diarrheal disease
	Safe Water System (SWS)	• Promotion of Household Water Treatment and Storage (HWTS) • Creation of commercial model for a Point of Use Product • Creation of market for point of Use Product • Establish Public-Private Partnership (PPP) • Creation of Enabling policy environment for HWTS • Establishment of National Network for HWTS • Community mobilization
World Bank	The Second Water and Sanitation for Low Income Communities Project (WSLIC-2)	• Rural Poor in underserved rural villages • Support to local health services • Community based behaviour change, including CLTS • Water supply and sanitation
	Third Water Supply and Sanitation for Low Income Communities Project (PAMSIMAS)	• Rural and peri-urban poor • Hygiene behaviour focus • Scaling up of nation-wide community driven approach including CLTS methodology
	Support to GOI PNPM Initiative	Provision of a three-year WB loan along with management of a trust fund to support the PNPM initiative
	Urban Water Supply and Sanitation Project (UWSSP)	• Urban Water Supply and Sanitation Project in three cities
	Water and Sanitation Sector Programme (WASAP)	• Promotes sectoral and institutional reform • Focus on water utilities, river basins, cities and towns • Integrated Water Resources Management • Provision of Technical Assistance • Capacity Building • Sector Performance Monitoring • Sector Investment Imitative • Sanitation Sector Development

Source: Support on Water and Sanitation Sector Analysis and Programme (Final) 2009 - 2014, USAID, January 2009

Table 2.8.3 - Other Supports and Projects by the Other Donors and Investors (4/4)

Donor / Investor / Agency / NGO	Programme	Technical & Programmatic Areas
World Bank	The Second Water and Sanitation for Low Income Communities Project (WSLIC-2)	• Rural Poor in underserved rural villages • Support to local health services • Community based behaviour change, including CLTS • Water supply and sanitation
	Third Water Supply and Sanitation for Low Income Communities Project (PAMSIMAS)	• Rural and peri-urban poor • Hygiene behaviour focus • Scaling up of nation-wide community driven approach including CLTS methodology
	Support to GOI PNPM Initiative	Provision of a three-year WB loan along with management of a trust fund to support the PNPM initiative
	Urban Water Supply and Sanitation Project (UWSSP)	• Urban Water Supply and Sanitation Project in three cities
	Water and Sanitation Sector Programme (WASAP)	• Promotes sectoral and institutional reform • Focus on water utilities, river basins, cities and towns • Integrated Water Resources Management • Provision of Technical Assistance • Capacity Building • Sector Performance Monitoring • Sector Investment Imitative • Sanitation Sector Development
WSP	Indonesian Sanitation Sector Development Project (ISSDP)	• Urban focus • Development enabling environment for improved sanitation • Development framework for city wide sanitation strategies with a focus on un-served communities • Develop coordination frameworks for sanitation development • Sanitation and hygiene promotion
	Economics of Sanitation Initiative	• Impact study of economic losses from poor sanitation and benefits gained by improving sanitation • Operation study of different sanitation management models through the Economics of Sanitation Initiative (ESI)
	Total Sanitation and Sanitation Marketing (TSSM/SToPS)	• Create large scale demand for sanitation and hygiene • Conduct road show and stakeholder advocacy workshops • Develop catalogue of affordable sanitation options • Create large scale supply for sanitation and hygiene • Strengthen supply capacity of the private sector • Establish learning about the most effective approaches to scaling up and sustaining sanitation programmes • Strengthen knowledge of health and socio-economic impact of large scale sanitation programmes
	Hand-Washing Initiative (CTPS)	• Provision of technical support to the DEPKES's National Hand-Washing Initiative • Support to the Hand-Washing with Soap Team (CTPS) • Support to the establishment of Public-Private Partnerships (PPP) to accelerate the CTPS initiative

Source: Support on Water and Sanitation Sector Analysis and Programme (Final) 2009 - 2014, USAID, January 2009

2.9 Others

(1) Human Resources Development

In the Bakasi Training Centre funded by JICA, training programme is implemented for 5 - 7 times in a year. The training courses are for the sector of sewerage, water supply, environment, finance, management, etc. The Ministry of Public Works selects the training candidate from the Local Government. However the seats of training are maximum 20 persons and it is difficult to satisfy the entire request for the training from Local Governments. Additionally, the Bakasi Training Centre sometime implements on-site trainings.

(2) Seminar

The seminar for the guidelines and technical conditions is held for all the Local Governments once in a year by the Ministry of Public Works.

CHAPTER 3

CURRENT SEWERAGE CONDITION IN JAKARTA

CHAPTER 3 CURRENT SEWERAGE CONDITION IN JAKARTA

3.1 General

Sewerage system in Jakarta is managed by Jakarta Raya Local Sewerage Management Enterprise (PD PAL JAYA). The short history of PD PAL JAYA is shown as follows

SHORT HISTORY OF PD PAL JAYA

Year 1977
Feasibility study has been completed by Nihon Suido Consultants Co., Ltd. on Jakarta Master Plan for Sewerage and Sanitation.

Year 1983
Setiabudi district and Tebet Manggarai were chosen as pilot project areas in Jakarta capital city for infrastructure sewer piping network.

Year 1986
With the development cost of national revenue and expenditure budget (APBN) of Ministry of Public Works, and the loan from World Bank, part of the project has been completed and has been functioning.

Year 1987
To manage the completed project, sewerage management body for Jakarta special authority was established (BPAL DKI Jakarta), based on the Public Works Minister stipulation number 510/KPTS/1987 which functions as temporary institution.

Year 1991
As status is advanced based on the local regulation (PERDA) Provincial special authority Jakarta Number 10 of 1991, BPAL DKI Jakarta is converted into PD PAL JAYA which authorizes to manage sewerage in the area of Setiabudi - Tebet which is stipulated on the Home Affairs Minister decree number 658.313.1 - 1165 of 1991.

Year 1997
In reaching the target and to develop services it is substantively needed to change local regulation (PERDA) number 10 of 1991 into local regulation number 14 of 1997 which especially includes area expansion of only 2 (two) districts formerly, now has covered all districts of the DK I Jakarta province which impact is expanding investment and improving enterprise activities. This change and the impact of it is stipulated in the Decree No. 539.311234 in 1997 by Minister of Home Affair.

Source: PD PAL JAYA

The current condition of this organization and sewerage system are shown in next sections.

3.2 Sewerage Management Organization

3.2.1 Organizational Policy and Strategy

The Organizational Policy and Strategy of PD PAL JAYA are shown as follows:

(1) General

Rapid population growth and upgrading of living standard have increased wastewater disposal and pollution load to the existing drainage system caused adverse impact to the environment.

This condition became worse and worse by the permeable soil to absorb wastewater. To solve the problem the Government initiated sewerage management by developing infrastructure of wastewater management.

Local enterprise of wastewater management of DKI Jakarta Province (PD PAL JAYA) was established to help, support public policy for improving society welfare. The services of PD PAL JAYA included development and management of sewerage system and on-site wastewater management facilities.

(2) Vision

The Vision is to be a competent enterprise in improving environmental quality by healthy and proper wastewater management.

(3) Mission

Provide the services of sewerage system and on-site system including wastewater treatment.

(4) Target

1) Wastewater management and control by off-site system in Jakarta capital city on the caliber of international cities in the world.
2) Improving sanitary environment to grade up society's clean and healthy standard of living condition.

(5) Future Hope

1) To improve living environment quality and reducing contamination of ground water and surface water in channels, creeks, and rivers.
2) To change Jakarta community's attitude to not discharge wastewater to public water body.
3) To restore drainage system for storm water disposal to reduce and prevent the danger of flooding.
4) To prevent vector diseases proliferated by mosquito, fly, mouse, and to prevent the epidemic contagious diseases such as typhus, diarrhea to spread.
5) To support Jakarta to become Metropolitan and Service city.

3.2.2 Organization Structure

Figure 3.2.1 shows organization structure of PD PAL JAYA. Total number of staff is 121 including 15 temporary workers.

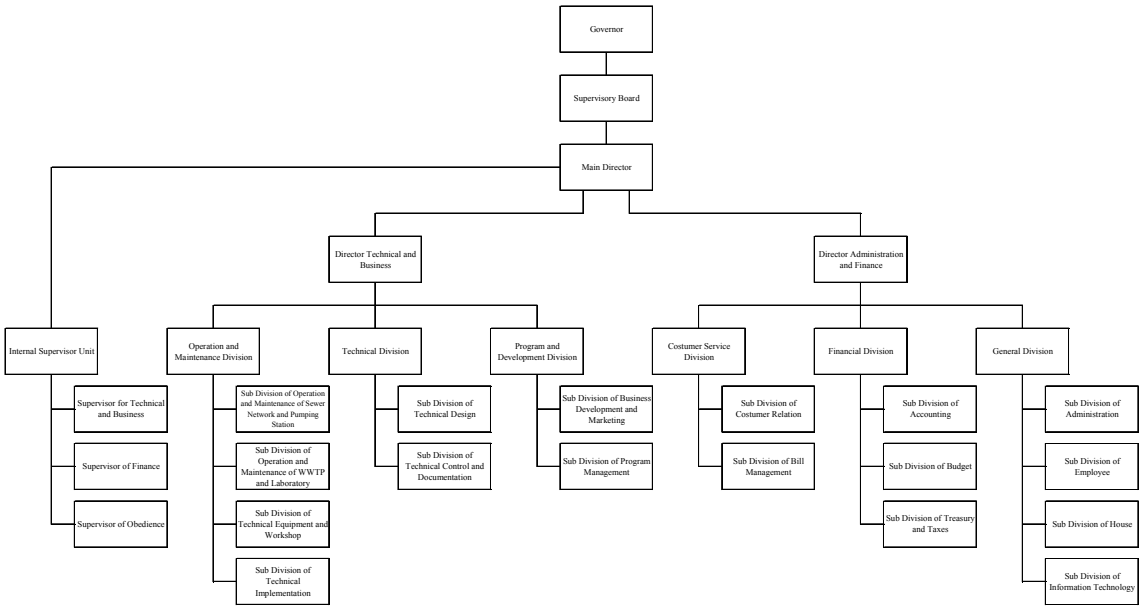


Figure 3.2.1 - Organization Structure of PD PAL JAYA
Source: PD PAL JAYA

3.2.3 Duty and Work

The services which PD PAL JAYA provides are shown as follows:

(1) Sewer Connection

Every building owner along the road in which public sewer with inspection chamber exists should connect house connection pipe to the chamber and dispose wastewater to public sewer. (Stipulation of Governor of DKI Jakarta Province No. 45 in 1992).

PD PAL JAYA provides wastewater treatment plant for both domestic wastewater and non-domestic wastewater from offices, high-rise buildings, hotels, amusement centers, markets, schools, hospitals, apartment, industries, and so on.

(2) Treatment

Setiabudi ponds, which formerly functioned for flood control, also serve wastewater treatment for areas of Tebet, Setiabudi as Wastewater Treatment Plant (WWTP).

(3) Quality Checking

To measure performance of Setiabudi WWTP, PD PAL JAYA has laboratory to monitor water quality of influent and effluent periodically.

The effluent characteristic of Setiabudi WWTP should meet water quality standard stipulated in the Governor decree of Provincial Government DKI Jakarta number 582 of 1995 on water quality standard of river/water body and liquid waste in the region of DKI Jakarta.

Monitoring of wastewater quality entering into public sewer is conducted to protect the function of Setiabudi IPAL.

If the monitoring result shows violation of standard quality stipulated in the Governor decree of DKI Provincial Jakarta number 1040 of 1997 on standard quality of sewerage system in the region of DKI Jakarta, preventive measures would be taken.

(4) Maintenance

PD PAL JAYA has maintenance equipment for sewer network to overcome disturbances of sewer system such as desludging, pipe cleaning, flushing, pipe lifting, pumping, and so forth.,

Maintenance works are conducted periodically to guarantee smooth flow and accidentally when disturbances take place in the sewer system.

3.2.4 Law and Regulation

PD PAL JAYA has legal basis principles for sewerage management such as:

Table 3.2.1 - Related Regulations and Decrees for Sewerage Management of PD PAL JAYA

Regulation/Decree	Number	Content
Governor's Regulation of DKI Jakarta	No. 10 in 1991	Establishment of PD PAL JAYA
Governor's Regulation of DKI Jakarta	No.14 in 1997	First Amendment on Regional Regulation No. 10 in 1991 Regarding PD PAL JAYA
Governor's Regulation of DKI Jakarta	No. 43 in 2007	Organization and Work Procedure of PD PAL JAYA
Governor's Decree of DKI Jakarta	No. 45 in 1992	Wastewater Management in Sewerage System in DKI Jakarta
Governor's Decree of DKI Jakarta	No. 1,040 in 1997	Quality Standard in Sewerage System in DKI Jakarta
Governor's Decree of DKI Jakarta	No. 122 in 2005	Management of Domestic Wastewater in DKI Jakarta
Governor's Decree of DKI Jakarta	No. 1,470 in 2006	Decision of Adjustment Tariff for Service of Wastewater Disposal and the Cost of Sewerage Service Connection of PD PAL JAYA

Source: PD PAL JAYA

3.3 Sewerage System

3.3.1 Covered Area and Sewered Population

PD PAL JAYA focuses on central business district in Jakarta with many high-rise buildings. The sewer system covers approximately 560 ha or 1 % of the city area in the Phase I of master plan (planned total covered area is approximately 1,800 ha). The connections of 1,444 in December 2009 are about 0.05 % of the population. Assumed served population of PD PAL JAYA is shown in ***Table 3.3.1***. (A total number of connections shown in the report are not latest.)

Table 3.3.1 - Assumed Served Population of PD PAL JAYA

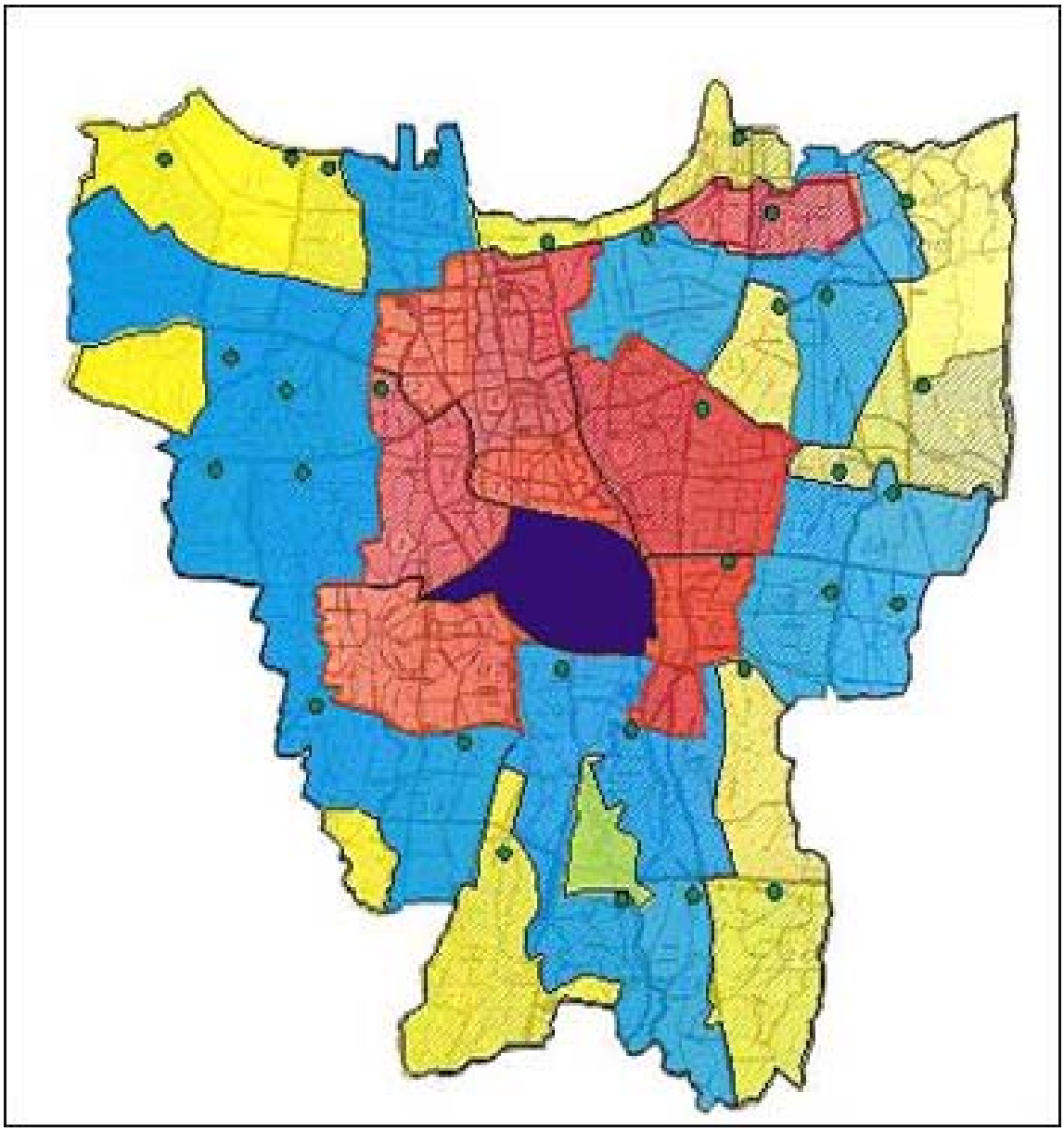
No.	Type of Customer	Number of Customer	Assumption (m^2/person)	Floor Area of Customer (m^2)	Number of Person	Assumption of Water Consumption (m^3/pers/day)	Water Capacity (m^3/day)	Wastewater Capacity (m^3/day)	Wastewater Capacity (lit/sec)
1	Household Type A,B,C Type D	1,146	10	125,397	12,540	0.09	1,129	790.00	9.14
2	Office	100	12	2,352,511	196,043	0.02	3,921	2,744.60	31.77
3	Big Commerce (Apartment, Hotel, Hospital	40	10	1,524,421	152,442	0.15	22,866	16,006.42	185.26
4	Small Commerce	10	10	23	2,270	0.02	45	31.78	0.37
5	Social	28	10	230	22,984	0.09	2,069	1,448.00	16.76
6	Industrial	1	12	400	33	0.02	1	0.47	0.01
TOTAL		**1,325**		**4,255,269**	**386**		**30.03**	**21,021.26**	**243.30**

Note: Assumption: Percentage of wastewater from water consumption is 70%

Category of Household Customer of PD PAL JAYA:
Type A: Household with electric power installed up to 900 Watt
Type B: Household with electric power installed up to 1300 Watt
Type C: Household with electric power installed up to 2200 Watt
Type D: Household with electric power installed over 2200 Watt

Source: PD PAL JAYA

And, ***Figure 3.3.1*** shows covered service area of PD PAL JAYA, and ***Figure 3.3.2*** shows current sewer service area by PD PAL JAYA.



: Sewer Pipe Network System Zone

: On-Site Modification System Zone

: On-Site System Zone

Figure 3.3.1 - Covered Service Area of PD PAL JAYA
Source: PD PAL JAYA

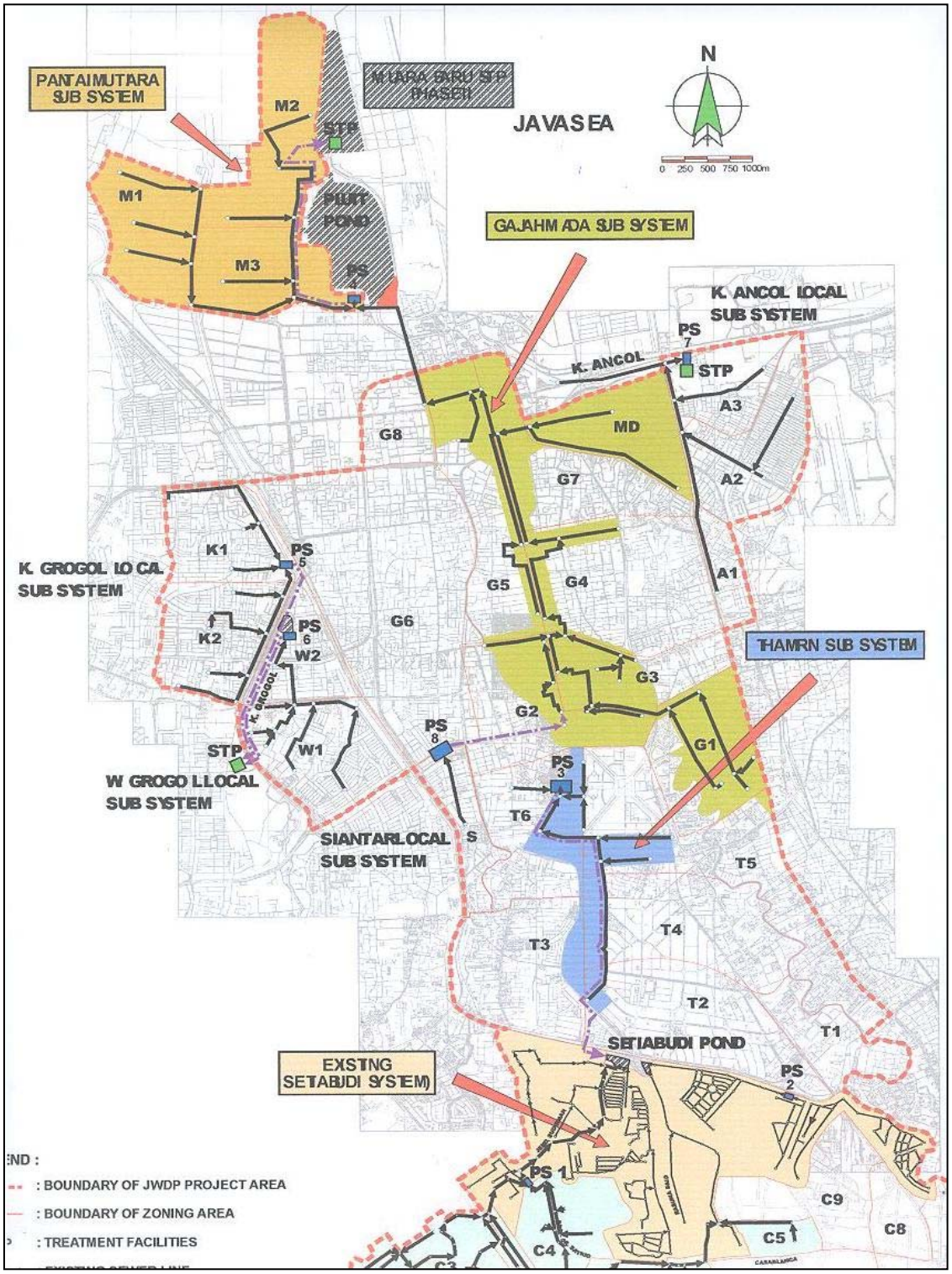


Figure 3.3.2 - Current Sewer Service Area of PD PAL JAYA
Source: PD PAL JAYA

3.3.2 Sewerage Generation

PD PAL JAYA assumed the wastewater generation volume as shown in ***Table 3.3.2***.

Table 3.3.2 - Wastewater Generation Volume

NO	TYPE OF BUILDING	WATER CONSUME (lit/day)	FLOW RATE OF WASTEWATER (lit/day)	UNIT	PE	REFERENCE
1.	Good Housing	250	200	lit/member/day	1.67	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
2.	General Housing	150	120	lit/member/day	1.00	JICA Study (Prediction of 2010)
3.	Apartment	250	200	lit/member/day	1.67	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
4.	Apartment for low income people	100	80	lit/member/day	0.67	
5.	Dormitory	120	96	lit/member/day	0.80	
6.	Small Hospital/Clinic	3.0	2.7	lit/visitor/day	0.02	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
7.	Good/high class Hospital	1,000	800	lit/no. of bed/day	6.67	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
	Middle class Hospital	750	600	lit/no. of bed/day	5.00	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
	Public Hospital	425	340	lit/no. of bed/day	2.83	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
8.	Primary School	40	32	lit/student/day	0.27	SNI 03-7065-2005
9.	Secondary School	50	40	lit/student/day	0.33	SNI 03-7065-2005
10.	High School	80	64	lit/student/day	0.53	SNI 03-7065-2005
11.	University/Education Institution	80	64	lit/student/day	0.53	SNI 03-7065-2005
12.	Shop-House/Office-House	100	80	lit/member and employee/day	0.67	SNI 03-7065-2005
13.	Office Building	50	40	lit/employee/day	0.33	SNI 03-7065-2005
14.	General Store (Shop, mall, department store)	5.0	4.5	lit/m^2 floor area/day	0.04	SNI 03-7065-2005
15.	Factory/Industry	50	40	lit/m^2 floor area/day	0.33	SNI 03-7065-2005
16.	Terminal	3.0	2.7	lit/m^2 floor area/day	0.02	SNI 03-7065-2005
17.	Airport	3.0	2.7	lit/m^2 floor area/day	0.02	SNI 03-7065-2005
18.	Restaurant	15.0	13.5	lit/seat/day	0.11	SNI 03-7065-2005
19.	Entertainment house	10	9	lit/seat/day	0.08	SNI 03-7065-2005
20.	Movie	10	9	lit/seat/day	0.08	SNI 03-7065-2005
21.	Inn and Non Star to 2 Stars Hotel	150	120	lit/bedroom/day	1.00	SNI 03-7065-2005
22.	3 Stars Hotel and higher	250	200	lit/bedroom/day	1.67	SNI 03-7065-2005
23.	Praying House	5.0	4.5	lit/person/day	0.04	SNI 03-7065-2005
24.	Library	25.0	22.5	lit/visitor/day	0.19	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
25.	Bar	30	24	lit/visitor/day	0.20	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
26.	Social Organization	30	27	lit/visitor/day	0.23	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
27.	Night Club	235	188	lit/seat no/day	1.57	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
28.	Meeting Room	25	20	lit/seat/day	0.17	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
29.	Laboratory	150	120	lit/staff no/day	1.00	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System
30.	Traditional/Modern Market	40	36	lit/unit/day	0.30	Soufian M. Noerbambang and Takeo Morimura, Design and Maintenance of Plumbing System

Source: PD PAL JAYA

3.3.3 Facilities and Equipment

(1) Wastewater Collection System

The summary of sewerage collection system of PD PAL JAYA is listed in ***Table 3.3.3***.

Table 3.3.3 - Summary of Wastewater Collection System

Item	Quantity
Sewer Pipe	45,030.57 m
Manhole	1,872 units
Inspection Chamber	4,548 units
Inlet Point for Flushing	2 points
Pumping Station	2 units

Source: PD PAL JAYA

Existing sewer system is gravity flow by installing manholes in main sewer every 60 - 100m in distance. The manholes are functioning as instruments to maintain wastewater flow through pipe maintenance and to overcome the wastewater flow disturbance.

Inspection chambers are installed at all the points where wastewater flows into public sewer through house connection and functioning as instruments for controlling wastewater flow from building to public sewer network.

(2) Wastewater Treatment System

Wastewater collected through sewers flows into Setiabudi ponds with aeration process for wastewater treatment. 7 (seven) units of aerators equipped with sprayer for removing foam provide biological treatment.

At present aerators are operated average 6 (six) hours per day with oxygen (O_2) supply capacity of 48 kg/hour/unit. This process can reduce BOD content up to 80 % and effluent quality meets required water quality standard.

The summary of Setiabudi aerated ponds is shown in ***Table 3.3.4***.

Table 3.3.4 - Summary of Wastewater Treatment System

Item	East Dam	West Dam
Surface Area	1.73 ha	2.61 ha
Capacity	33,300 m^3	50,900 m^3
Number of Aerator	3 units	4 units
Inlet for Wastewater	2 units	4 units
Inlet for Drainage	2 units	2 units
Mechanical Screen	2 units	0 unit

Source: PD PAL JAYA

Figure 3.3.3 shows general plan of Setiabudi Ponds.

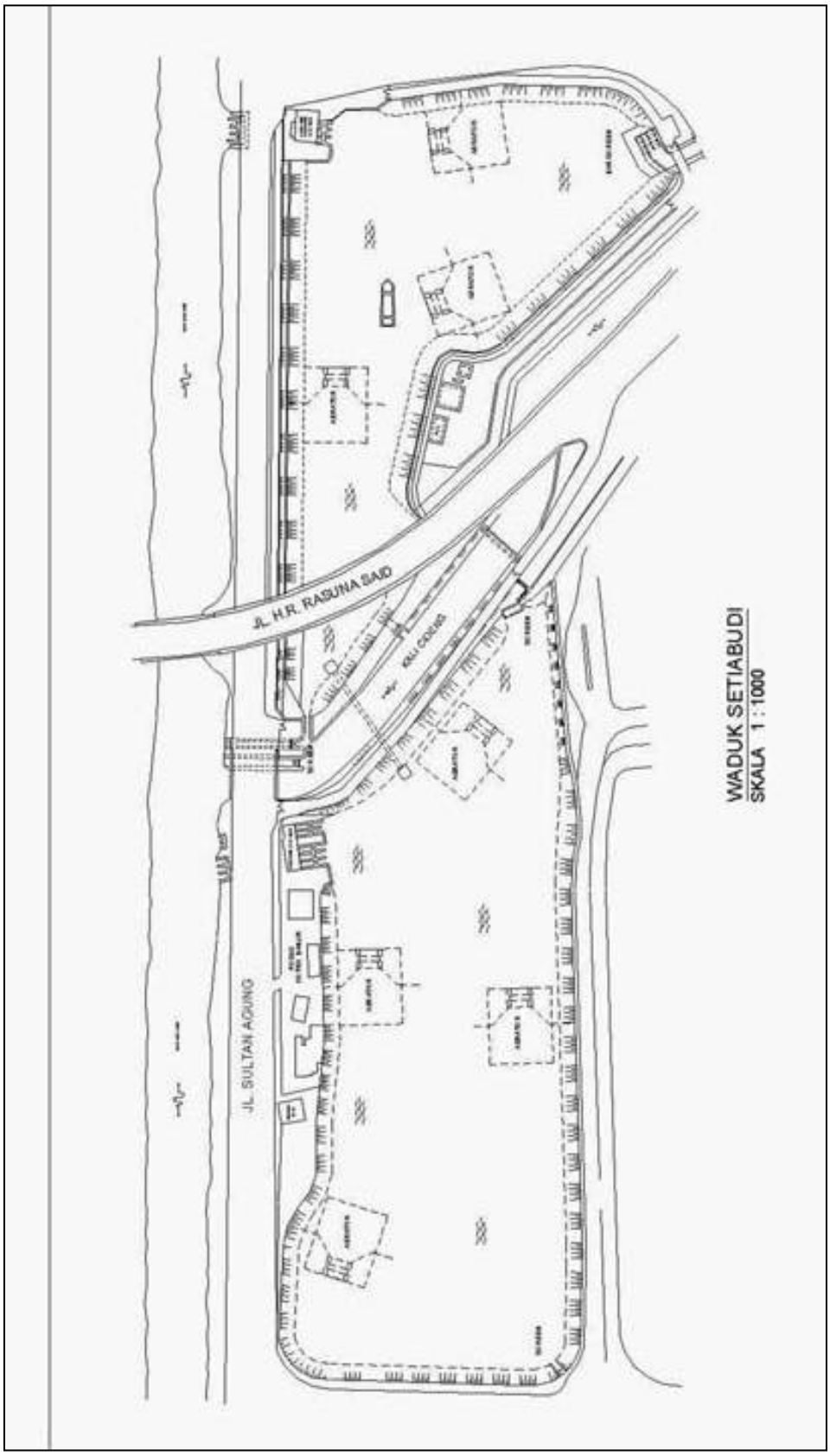


Figure 3.3.3 - General Plan of Existing Setiabudi Ponds
Source: PD PAL JAYA

Picture 3.3.1
Setiabudi Aerated Ponds

Setiabudi Pond

Note: The Pond consist of 2 dams which are East Dam and West Dam

Picture 3.3.2
Setiabudi Aerated Ponds

Inlet Screen

Note: Installed in 2008 (budgeted by Central Government)

Picture 3.3.3
Setiabudi Aerated Ponds

Working Aerator

Note: There are 7 aerators in the pond, however 6 aerators are currently not working, and only 1 aerator is available.

3.3.4 Water Quality Control

Table 3.3.5 shows water quality records of Setiabudi ponds during October to September in 2009 on the Third Quarterly Report 2009, 14th October 2009.

Table 3.3.5 - Water Quality Records of Setiabudi Ponds

Third Quarterly Report 2009, 14th October 2009

		EAST	WEST
A	**Based on Criteria Design**		
Common for July, August, and September 2009			
1	Treatment process	Aerated Lagoon	Aerated Lagoon
2	Maximum capacity (m^3/day)	16,848.40	
3	BOD Removal Efficiency	80 - 90	80 - 90
4	BOD Influent max (mg/l)	400	400
5	Effluent quality (mg/l)	75	75
6	Power rating (kW)	111	148
7	Mechanical Equipment	Aerator 3 unit	Aerator 4 unit
8	Space area (m^2)	16,000	26,100
B	**Actual Data**		
July 2009			
1	Average capacity (m^3/day)	13,815.18	
2	BOD Influent (mg/l)	73.67	74.50
3	BOD Effluent (mg/l)	30.00	58.00
August 2009			
1	Average capacity (m^3/day)	13,815.18	
2	BOD Influent (mg/l)	69.17	77.00
3	BOD Effluent (mg/l)	29.00	50.00
September 2009			
1	Average capacity (m^3/day)	13,815.18	
2	BOD Influent (mg/l)	66.00	82.00
3	BOD Effluent (mg/l)	39.50	60.00

Source: PD PAL JAYA

3.3.5 Laboratory

For detecting wastewater quality entering the sewer system and quality of Setiabudi ponds before discharging to the water body, PD PAL JAYA has a laboratory equipped with modern instruments such as Atomic Absorption Spectrometry (AAS), Ultraviolet-Visible (UV/VIS), Spectrophotometer, Trace Element Analyzer, Oil Content Analyzer, and portable instruments which is used to make the job simple in the field such as: Portable Water Quality Checker etc

A chemist and a worker who works in sampling and cleaning of apparatus are assigned to the laboratory. Because influent of the Setiabudi Pond contains not only wastewater but also storm water, influent water quality is not analyzed in the laboratory. Because discharge of treated water is carried out only a few hours a day, which depends on the water level of the pond, therefore effluent water quality is not analyzed neither. ***Table 3.3.6*** shows the laboratory works of PD PAL JAYA.

Table 3.3.6 - The Laboratory Works of PD PAL JAYA

Staff	Chemist 1, Worker 1
Analyzing Parameters	pH, SS, BOD (Manometric method), COD (Titration method), NH_4^+ (Spectrophotometric method), Detergent (Spectrophotometric method), $KMnO_4$ consumption (Titration method)
Samples	3 Samples in East Pond, 3 Samples in West Pond
Frequency of Analysis	Once/week

3.3.6 Operation and Maintenance

PD PAL JAYA implements the maintenance of all sewers every 3 months and repair works of road for installed manholes 20 cases in a year. And PD PAL JAYA removes the garbage of screens and suspended garbage in setiubdi ponds by using a boat.

3.3.7 Operation and Maintenance Equipment

PD PAL JAYA has operation and maintenance (O&M) equipment listed in ***Table 3.3.7***.

Table 3.3.7 - Summary of O&M Equipment

Item	Function	Capacity
Vacuum Truck	Vacuuming the night soil	4 m^3 and 3 m^3, Reach: maximum 80 m
Jetting Truck	Flushing of pipe with high pressure	1,500 PSI
Roding Truck	Pipe clogging forcefully	Diameter: 100 - 400 mm
Water Tank Truck	Flushing of sewer	3,000 and 6,000 litters
Crane Truck	Installing and lifting pipe	5 ton
Vacuum Trailer	Vacuuming the sludge or night soil	3 m^3, Reach: maximum 25 m
Trailer Roding	Forcefully flushing pipe at narrow and difficult location	Diameter:100 - 400 m, Reach: 100 m
Mini Roding	Flushing forcefully sludge in sewer pipe in the building	Reach: 25 m
Rotan Roding	Flushing forcefully sludge in sewer pipe in the building	Reach: 2.5 m each stick
Bucket Machine	To remove sludge from the pipe	Diameter: 100 - 200 m, Reach: 12 m
DIP Balling and DIPD Plug	To plug the sewer	Diameter: 100 - 400 mm

Source: PD PAL JAYA

3.3.8 Disposal of Waste, Sludge and Garbage

Provincial regional public works agency is responsible for desludging of Setiabudi Ponds, and last dredging was executed in 2005. The dredged sludge in the dam and desludged garbage are transported to integrated garbage disposal site.

Picture 3.3.4
Setiabudi Aerated Ponds

Garbage Conveyor and Temporary Storage

3.3.9 Ledger

PD PAL JAYA has customer database. And current service area is shown in ***Table 3.3.8*** and ***Table 3.3.9*** shown as follows;

(A) Household Service

Table 3.3.8 - Service Area for Household

No.	Sewer Network	Service Area
1.	Package 1	Sub District (Kelurahan) Guntur
2.	Package 2	Kelurahan Setiabudi
3.	Package 3	Kelurahan Setiabudi
4.	Package 4	Kelurahan Karet Kunimgan
5.	Package 5	Kelurahan Setiabudi
6.	Package 6	Kelurahan Karet
7.	Package 7	Kelurahan Guntur
8.	Package 8	Kelurahan Manggarai
9.	Package 9	Kelurahan Pasar Manggis
10.	Package 10	Kelurahan Pasar Manggis

Source: PD PAL JAYA

(B) High-Rise Building Service

Table 3.3.9 - Service Area for High-Rise Building

No.	Sewer Network	Service Area
1.	Package 3	HR. Rasuna Said street
2.	Package 4	HR. Rasuna Said street
3.	Package 13	Sultan Agung street
4.	Package 18	Jenderal Sudirman street
5.	Lower A	Jenderal Sudirman street
6.	Sewer Masdahid	KH. Mas Mansyur street
7.	Sewer Masjaman	KH. Mas Mansyur street
8.	Sewer E	HR. Rasuna Said street
9.	Sewer F	HR. rasuna Said street
10.	Sewer D	Rasuna Yard & Festival Market
11.	Sewer Casablanca	Casablanca street

Source: PD PAL JAYA

3.4 Current Water Supply Condition

The service area of Jakarta water supply is divided into 2 areas which are operated and maintained by private companies of "PALYJA" and "aetra". And Jakarta JAYA Local Water Supply Enterprise (PD PAM JAYA) has responsibility to supervise and monitor the performance and activities of the private companies, and their programme to meet the entire target stipulated in their Contract Agreement and pay their water charges to the companies in volume base.

Non-Revenue Water (NRW) ratio is approximately 47 % at present. The Governor's regulation of DKI Jakarta Province Number 11/2007 dated 15 January 2007 regarding Automatic Tariff Adjustment of Water Supply Semester I Year 2007, stated water tariff.

3.5 Socio-Economic Survey

There was no socio-economic survey on customer satisfaction for sewerage service of PD PAL JAYA. PD PAL JAYA is planning to execute customer satisfaction survey near future by itself, and sample questionnaire of this survey is shown in ***Appendix 3.5.1***.

3.6 Tariff Structure

Decree No. 1470/2006 by governor of DKI Jakarta Province defines the tariff of wastewater disposal services and fee for sewer connection of PD PAL JAYA., and tariff is shown in ***Table 3.6.1*** as follows;

Connection cost of sewer consists of:

A. Connection cost of service pipe to inspection chamber for each category of customer that they have the individual treatment facilities like septic tank

Table 3.6.1 - Sewer Connection Tariff of PD PAL JAYA (1/2)

Group	Costumer Category	Tariff (IDR)
I	**Household**	
1	Household type A	90
2	Household type B	113
3	Household type C	135
4	Household type D	158
II	**Small Business/Commercial**	
1	Shop	135
2	Office (Building up to 3 floors)	135
3	Salon	158
4	Catering	180
5	Small Restaurant	225
6	Cheap Hotel	225
7	Others small business	225
III	**Big Business/Commercial**	
1	High Building Office	450
2	High Building Office (include of Restaurant/Fitness centre)	495
3	Department Store/Mall/Super Market/Show Room	495
4	1 to 3 Stars Hotel	495
5	Apartment/Condominium	675
6	4 Stars Hotel	675
7	Amusement Centre/Big Restaurant/Cafe	720
8	Private Hospital	720
9	5 Stars Hotel	720
10	Others large business	720
IV	**Social**	
1	Praying House	50
2	Local Government Clinic	135
3	School	180
4	Government Institution	180
5	Other Institutions	180
6	School include dormitory	180
7	Swimming Pool	225
8	Government Hospital	270
9	Clinic	270
V	**INDUSTRY**	
1	Small Industry	180
2	Middle Industry	540
3	Big Industry	585

Type A = Household with electric power installed up to 900 Watt
Type B = Household with electric power installed up to 1300 Watt
Type C = Household with electric power installed up to 2200 Watt
Type D = Household with electric power installed over 2200 Watt
Source: PD PAL JAYA

B. Connection cost of service pipe to the special inspection chamber for customer group of big commercial that don't have the individual treatment facilities like septic tank

Table 3.6.1 - Sewer Connection Tariff of PD PAL JAYA (1/2)

Group	Costumer Category	Tariff (IDR)
III	**Big Business/Commercial**	
1	High Building Office	450
2	High Building Office (including Restaurant/Fitness center)	495
3	Department Store/Mall/Super Market/Show Room	495
4	1 to 3 Stars Hotel	495
5	Apartment/Condominium	675
6	4 Stars Hotel	675
7	Amusement House/Big Restaurant/Cafe	720
8	Private Hospital	720
9	5 Stars Hotel	720
10	Others large business	720

Source: PD PAL JAYA

A. Supervision cost for connection of service pipe from inspection chamber up to the building.

1.	Design fee	=	7 %	× Q
2.	Administration fee	=	4 %	× Q
3.	Supervision fee	=	4 %	× Q
	Total	=	15 %	× Q

Note: Q (IDR): Construction cost for installation of connection pipe from inspection chamber to the building.
Source: Brochure of PD PAL JAYA, 2009

Tariff structure is normally revised every 3 (three) years and will be revised in 2010. (It was originally planned in 2009, but was postponed because of recent economic crisis)

The sewerage bills for large scaled offices are basically paid through a bank transfer. 2 % of the billing amount of their payment will be surcharged as commission. A customer will be disconnected in case of 3 (three) months arrears.

3.7 Financial Condition

The financial condition of PD PAL JAYA in 2008 is shown in ***Table 3.7.1***. The bill correction rate from high-rise buildings is approximately 97 % and from households is approximately 50 %. According to PD PAL JAYA, bill revenue from households is quite smaller than that from high-rised buildings; therefore, low collection rate from households is not serious problem.

Table 3.7.1 - Financial Condition of PD PAL JAYA in 2008

Billing Collection (IDR)	Other Revenue (IDR)	Total Revenue (IDR)	O&M Cost (IDR)
24,960,685,664	2,695,710,458	27,656,396,122	17,699,829,050

Note: Other revenue consists of connection fee, cleaning of septic tank, O&M service fee and etc.
Source: PD PAL JAYA

3.8 Current Problem

Setiabudi Ponds belongs to Provincial Development Planning Agency DKI Jakarta (BAPPEDA Prop DKI Jakarta) and PD PAL JAYA does not manage it.

3.9 Master Plan / Long-Term Plan

Provincial Development Planning Agency DKI Jakarta (BAPPEDA Prop DKI Jakarta) has sewerage master plan prepared in 1991; however it should be reviewed because long time has passed after preparation and the current situation is far from the conditions at the time, and BAPPEDA Prop DKI Jakarta requested technical support to JICA in early 2009.
The executive summary of existing master plan conducted by JICA in 1991 is shown in ***Appendix 3.9.1***.

3.10 Middle-Term Plan

There is Middle-Term plan for city development for 2004 - 2009, however the content of plan for sewerage development is very limited. The new Middle-Term city development plan including sewerage sector is under preparation at present. PD PAL JAYA is planning to construct wastewater treatment plant with a treatment process of Activated Sludge Process beside Pluit Pond near the sea near future.

On the other hand, integrated sanitation development for small community with target scale of 20 - 40 households in slam area has been implemented since 1995.

3.11 Action Plan

PD PAL JAYA is planning to overhaul the drainage pumps in the Setiabudi ponds which has been worked since 1989 as first time total maintenance.

3.12 Current Programme or Project

There is no specific programme for sewerage development, operation and maintenance at present.

3.13 Relevant Organization

The PD PAL JAYA is managing sewerage system by association with several organizations.
The major relevant organizations and relationships are shown in ***Figure 3.13.1***.

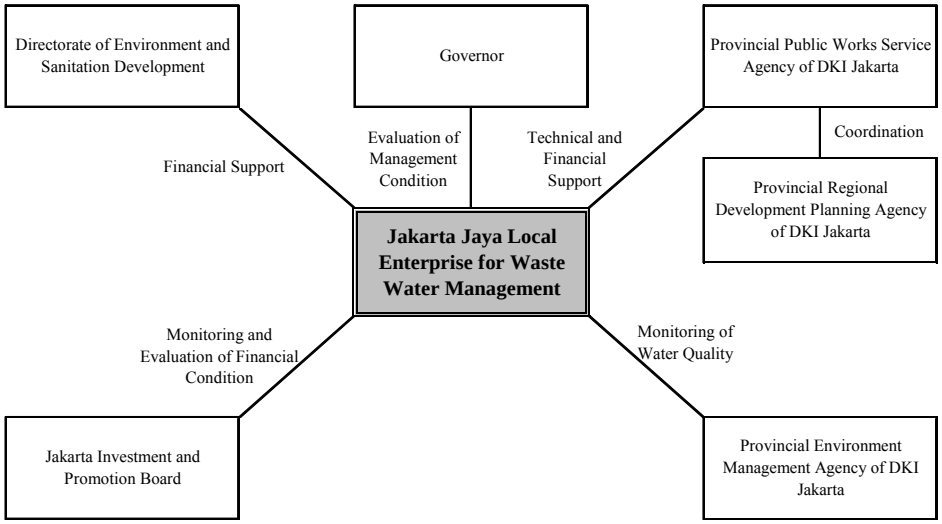


Figure 3.13.1 - Relevant Organizations with PD PAL JAYA

(1) Provincial Development Planning Agency of DKI Jakarta

The Provincial Development Planning Agency (BAPPEDA - Prop) of DKI Jakarta coordinates all provincial development strategies, plans, programmes and projects. The organization structure of BAPPPEDA - Prop DKI Jakarta is shown in ***Figure 3.13.2***.

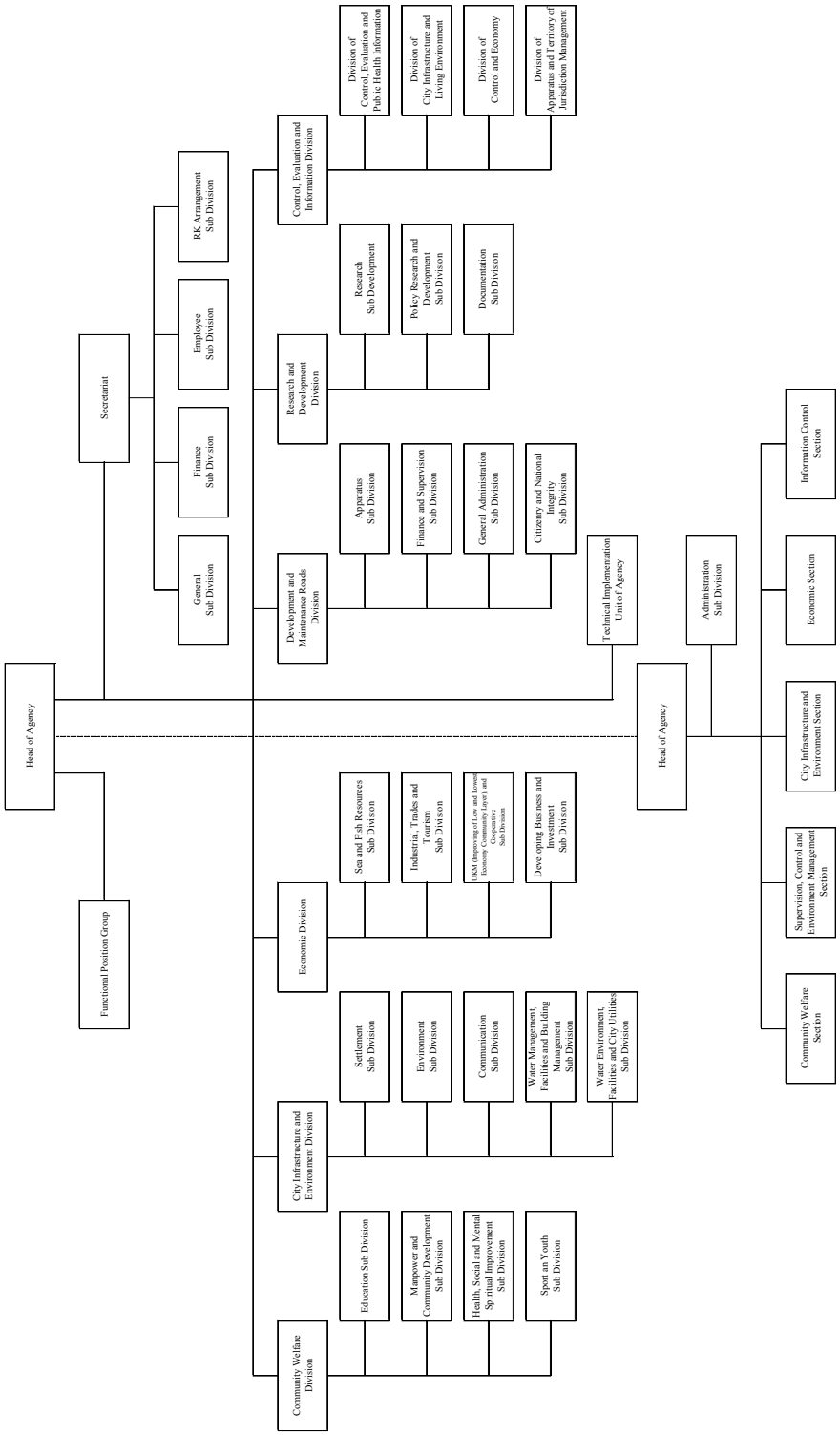


Figure 3.13.2 - Organization Structure of BAPPEDA - Prop DKI Jakarta
Source: BAPPEDA - Prop DKI Jakarta

The Policy of BAPPPEDA - Prop DKI Jakarta is described as follows:

VISION
1) To create Local Government plan, which is capable of meeting the society needs

MISSION
1) To develop Local Government competency of professional planning
2) To arrange Local Government plan with stakeholder(s)
3) To evaluate, research and coordinate for cross-sector and cross-region

OBJECTIVE
1) To arrange Local Government plan, which is comprehensive, transparent, accountable, and participative

TARGET
1) To arrange the Local Government plan, which covers 8 (eight) development sectors.

TASK
1) To manage the Local Government in local planning development sectors
2) To manage the research and development
3) To monitor and evaluating the implementation of local planning development

FUNCTION
1) To formulate technical policy in planning sector development
2) To coordinate the arrangement of long term, mid term planning, direction and general policy APBD (local budgeting) annually
3) To coordinate planning policy in sector of economy, physical development, public health development, working division task and apparatus, and finance
4) To coordinate and integrate the programme arrangement between local officials, local regions, sectors and other cross-region
5) To coordinate technical policy in the scope of local planning development
6) To arrange the local budgeting planning in one budgeting team which is coordinated by secretary of Local Government
7) To coordinate and implement the research and local planning development
8) To monitor the preparation and development of local planning implementation
9) To coordinate the evaluation of local planning
10) To manage the technical and administrative supports

(2) Provincial Public Works Agency of DKI Jakarta

The Provincial Public Works Agency (DPU - Prop) of DKI Jakarta manages Setiabudi ponds mainly for flood control. DPU - Prop DKI Jakarta is institutionally above PD PAL JAYA, and is responsible for sanitation in un-covered area of PD PAL JAYA in DKI Jakarta. And, DPU - Prop DKI Jakarta manages the Regional Drainage System and Garbage & Solid Waste Collection, Disposal and Treatment System. ***Figure 3.13.3*** introduced the organization structure of DPU - Prop DKI Jakarta.

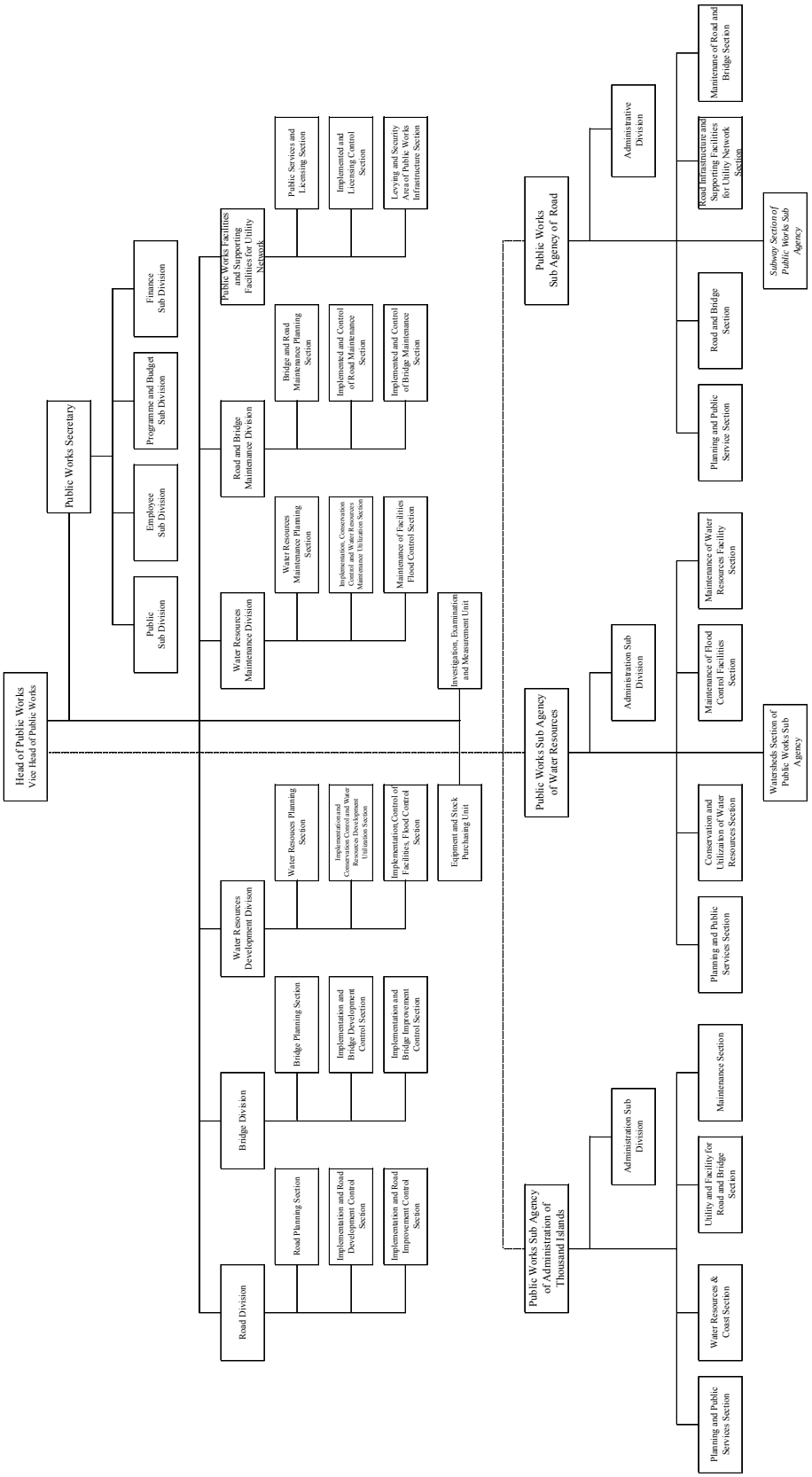


Figure 3.13.3 - Organization Structure of DPU - Prop DKI Jakarta
Source: DPU - Prop DKI Jakarta

Road and River Agency

Road and River Agency of DPU - Prop DKI Jakarta manages drainage system in DKI Jakarta area. They conduct unscheduled dredging and cleaning works of drainage system.

Collected sludge, garbage and solid waste are carried to the disposal site in Ancol, however, the Ancol disposal site is almost full, therefore they are trying to find new disposal site now.

During rainy season, all the technical staffs (only men staff) from the water resources division work for the flood monitoring 24 hours, and 7 - 8 staffs work for flood monitoring everyday. When the heavy rain comes, all the technical staffs from road/bridge division also are involved in flood monitoring. They monitor the inundation/ flood by using radio, communicate with all the water gate/pumps staff, and sometimes receive reports from citizen, and they reports the hourly water levels and rainfalls.

(3) Provincial Cleaning Service Enterprise

The frequency of road cleaning is twice a day in certain area of Jakarta. The number of staff excluding workers from private company is 3,005.

3.14 Related Project

World Bank is researching the publication of Local Government debt.

On the other hand, JICA will conduct Study on Review of Jakarta Master Plan Study and Data Collection Survey & Confirmation Study for Improvement of Water Environment by Low Cost Wastewater Treatment System in DKI Jakarta in 2010.

CHAPTER 4

CURRENT SEWERAGE CONDITION IN BANDUNG

CHAPTER 4 CURRENT SEWERAGE CONDITION IN BANDUNG

4.1 General

Sewerage system in Bandung is managed by Sewerage Department in Bandung Water Supply Enterprise (PDAM Bandung). The wastewater treatment system is operated by PDAM as Local Owned Government Company (BUMD), based on Local Government regulation Regional Regulation (Perda) 08/1987.

The first part of the wastewater system was built by the Dutch, including sewer system and an Imhoff tank. Between 1979 and 1994 the system was extended to wider sewerage system and a treatment plant in Bojongsoan under the Bandung Urban Development Project (BUDP) I and II with ADB and Central Government loans.

The sewerage system in Bandung City consists of sewerage, and septic tank and direct disposal to river as shown in ***Figure 4.1.1*** as below;

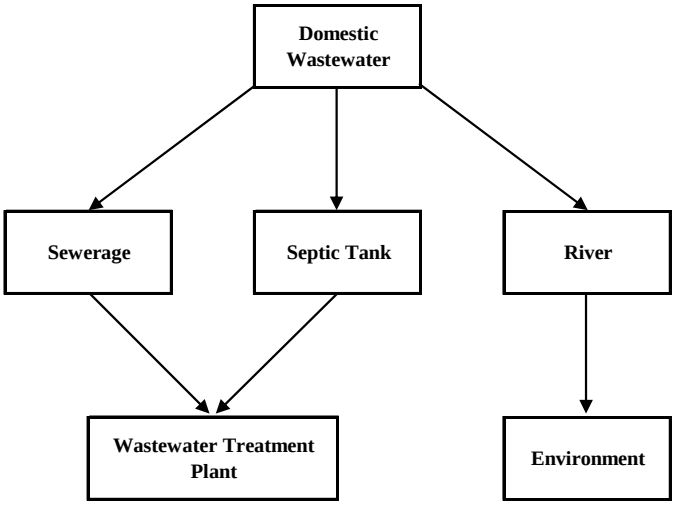


Figure 4.1.1 - The Sanitation System in Bandung City
Source: PDAM Bandung

Domestic wastewater through sewerage and septic tank are finally flow into WWTP and a part of domestic wastewater is directly discharged to the rivers.

4.2 Sewerage Management Organization

4.2.1 Organizational Policy and Strategy

PDAM Bandung has clearly defined mission, vision and policy which include also the issue of domestic wastewater treatment. Aim of the wastewater treatment is to increase hygiene conditions of citizens, and to reduce the impacts of wastewater on water resource and environment which also affect the water treatment costs.

4.2.2 Organization Structure

Figure 4.2.1 and ***Figure 4.2.2*** shows organization structure of Sewerage Department and Wastewater Treatment Division of Sewerage Department of PDAM Bandung.

A total number of staff of PDAM is 147 including 10 engineers at present. And 38 staffs (2 engineers, 1 chemist, 12 operators [4 staffs × 3 crews], and 23 maintenance staffs including site maintenance staffs) are working for WWTP. The working shift is once in 3 days (48 hours holiday after 24 hours working).

	***Picture 4.3.1*** ***Bojongsoang WWTP*** Garbage Conveyer
	***Picture 4.3.2*** ***Bojongsoang WWTP*** Grit Chamber

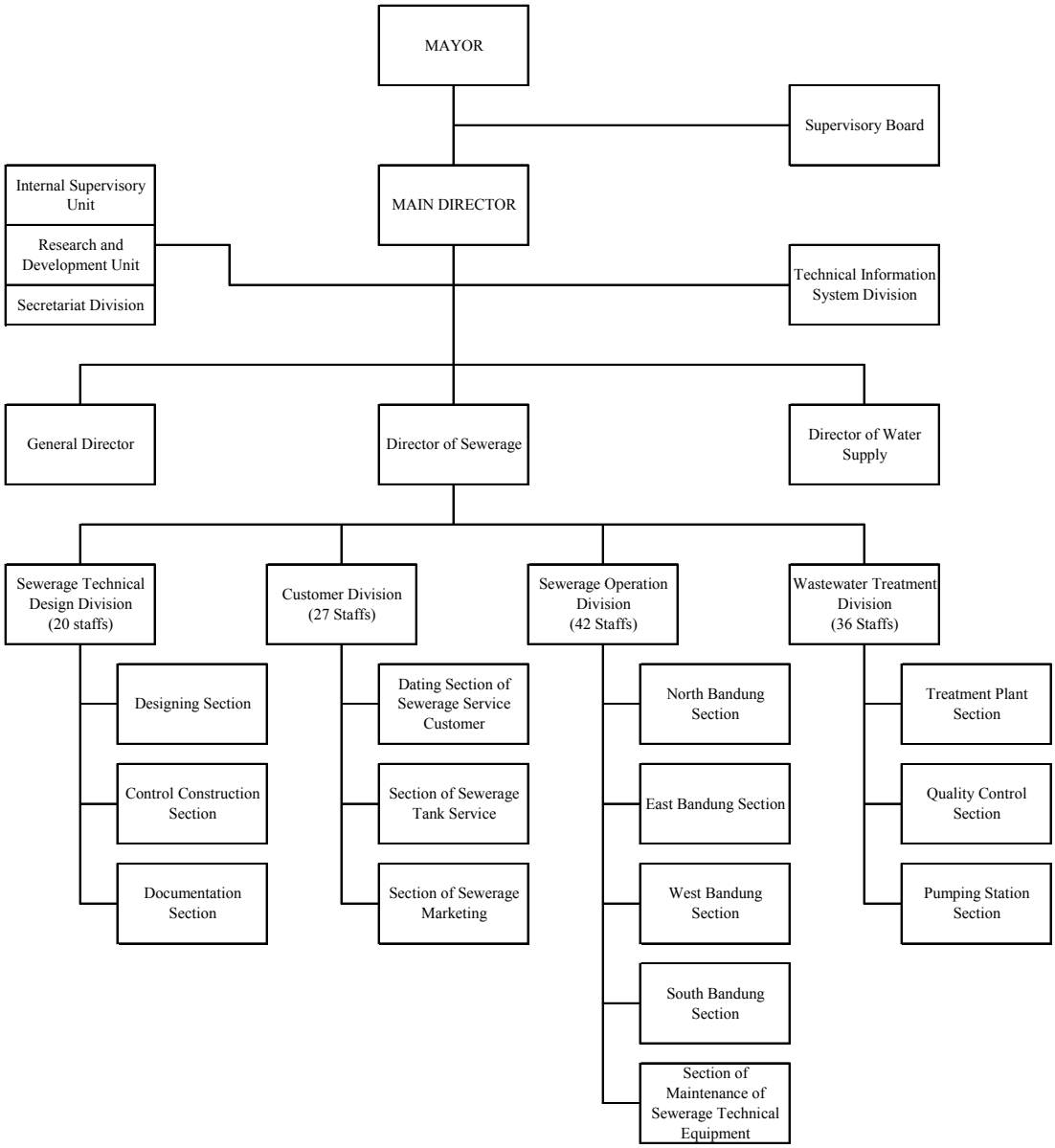


Figure 4.2.1 - Organization Structure of Sewerage Department in PDAM Bandung
Source: PDAM Bandung

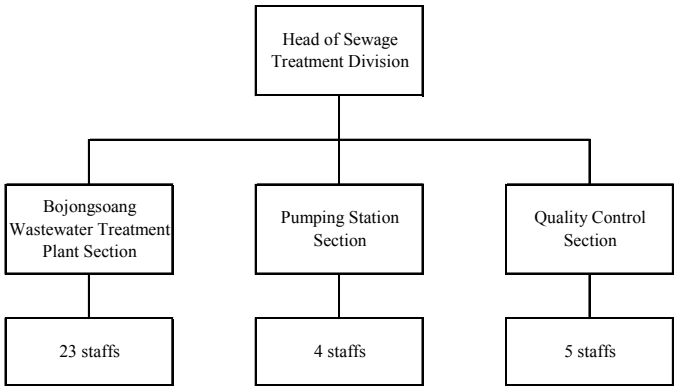


Figure 4.2.2 - Organization Structure of Wastewater Treatment Division in Sewerage Department
Source: PDAM Bandung

4.2.3 Duty and Work

The duties and works of sewerage technical division, Wastewater Treatment Division and Sewerage Operation Division in the Directorate of sewerage stipulated in number 3 of 2009 - Management Regulation of PDAM Bandung, are explained as follows:

(1) Sewerage Technical Design Division

a. To assist the Sewerage Director in his task.
b. To plan, coordinate, direct and control the execution of tasks of Planning Section, supervision section of construction, Documentation and Mapping Section.
c. To direct and control the arrangement of detailed planning for investment programme and maintenance at Sewerage Division.
d. To evaluate the capacity of sewer system in wastewater flow.
e. To direct and control the arrangement of detailed plans covering technical drawing, technical specification, and the estimation of engineering works and project costs.
f. To manage and compile documentations of detailed engineering design for construction.
g. To arrange and control implementation of construction work which is conducted by contractor or by self management.
h. To manage the preparation of technical documentations for construction;
i. To coordinate with sections/units relating to the project for executing the task without any problems.
j. To submit the reports relating with the responsibility of Sewerage Director at regular and as required.
k. To carry out the other task assigned by the Sewerage Director based on their task.

(2) Wastewater Treatment Division

a. To assist the Sewerage Director in his task.
b. To plan, coordinate and control the execution of tasks of Bojongsoang WWTP Section, Pumping Station Section, and Quality Control Section.
c. To direct and control the wastewater treatment process and physical, chemical and biological analysis; therefore, the effluent quality can be controlled.
d. To control the physical, chemical and biological wastewater quality at Pumping Station and Wastewater Collection System including open channels.
e. To evaluate water qualities and treatment operations to determine the alternative wastewater treatments.
f. To manage procurement for chemicals, and other materials which are required in treatment process and in monitoring of wastewater quality.
g. To evaluate and proposing the suggestions for relative plans.
h. To direct and control the maintenance activities of Electrical and Mechanical (E&M) equipments in Wastewater Treatment Section in order to operate treatment process well.
i. To coordinate with other sections/units for executing the task without any problems.
j. To give direction to the employee regarding improvement of discipline, performance, attitude and ethics of works.
k. To submit the report of tasks to the Sewerage Director periodically and as required.
l. To carry out the other tasks assigned by the Sewerage Director based on their task.

(3) Sewerage Operation Division

a. To assist the Sewerage Director in his task.
b. To plan, coordinate and control the execution of tasks in Operation Section of Northern Area, Mid-Southern Area, Western Area and Eastern Area, and in Maintenance Section of Sewerage Technical Equipment.
c. To direct and control the execution of sewer maintenance and development for the whole operational area.
d. To direct and control the management activities of sewer for the whole operational area.
e. To direct and control the maintenance activities and the repair of technical equipments in order to work well.
f. To coordinate with other sections/units for executing the task without any problems
g. To give direction to the employee regarding improvement of discipline, performance, attitude and ethos of works.
h. To submit the report of tasks to the Sewerage Director periodically and as required.
i. To carry out the other tasks assigned by the Sewerage Director based on their task.

(4) Customer Service Division

a. To assist the general director in his task.
b. To plan, coordinate and controlling the activities of Administration Section and Customer Service, Complaint Service Section and Customer Data Management Section.
c. To give the information and carrying out socialization to the customer and applicant.
d. To organize customer administration, preparing the guidance of technical service and directing his subordinate to optimize the service.
e. To coordinate and controlling execution of customer service to achieve the customer satisfaction.
f. To control the service of connection application, new customer, mutation, activation and stoppage of customer status in accordance with prevailing stipulation.
g. To control the service of customer complaint in writing or direct complaint.
h. To coordinate with related division/unit to smoothness the task execution.
i. To give direction to the employee regarding improvement of discipline, performance, attitude and ethos of works.
j. To submit the report of task execution to the general director in periodically and as required.
k. To carry out the other task offered by the general director based on their task.

4.2.4 Law and Regulation

There are the decrees and a regulation on sewerage services by PDAM Bandung shown as follows:

- The Decree of West Jawa Governor No.658.31/Kep.829-Binprod/2001 on Submission of Permission letter of wastewater to be disposed to Citarum River in Bojongsari Village of Bojongsoang District of Bandung Regency to PDAM Bandung.
- The Decree of West Jawa Governor No.658.31/SK.637-HUK/99 states on the formation of Quality Control Technical Team of waste liquid which is discharged to the water source in the provincial Government of West Java.
- The Decree of Ministry of Living Environment No.112 in 2003 defines domestic wastewater quality standards.
- Local regulation No.17/PD/1986 and Mayer's regulation No.194.2002 defines tariff for sewerage services by PDAM.

4.3 Sewerage System

4.3.1 Covered Area and Sewered Population

Figure 4.3.1 shows a general plan of sewerage covered area in Bandung City.

Total number of connection is approximately 98,350 in December, 2009. And total coverage rate of sewerage service is 58 % at present.

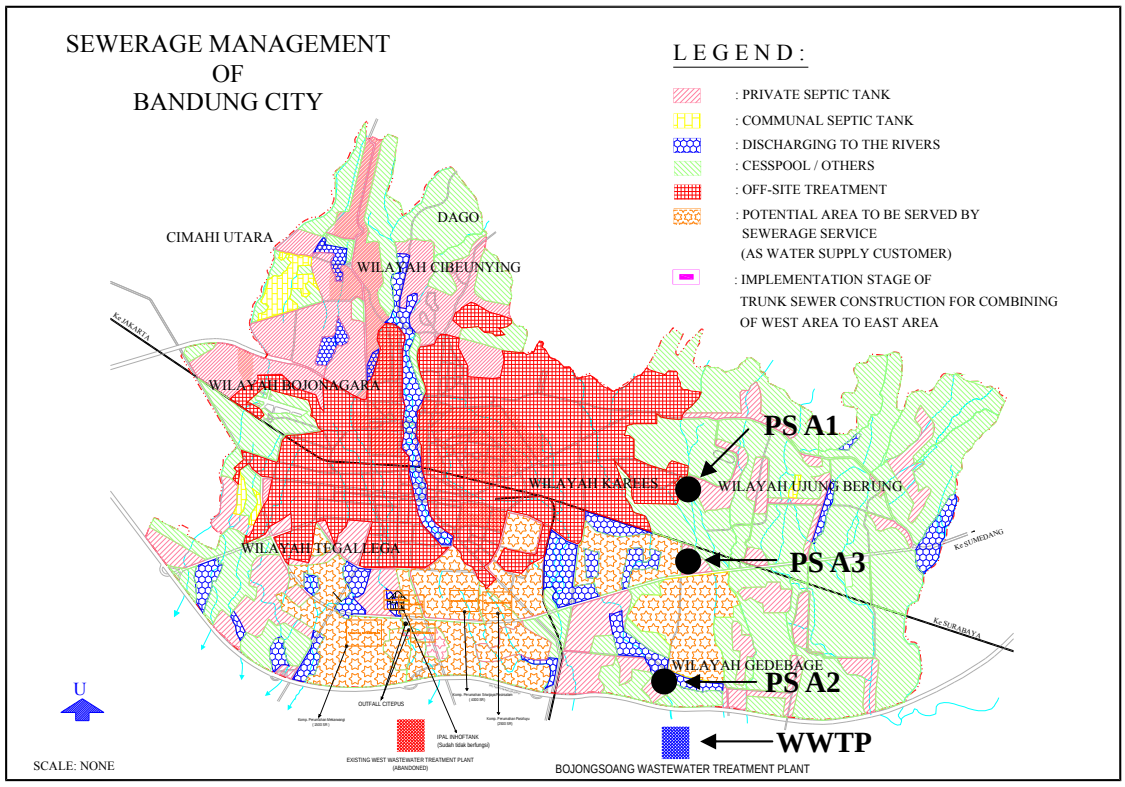


Figure 4.3.1 - General Plan of Sewerage Covered Area in Bandung City
Source: PDAM Bandung

4.3.2 Sewerage Generation

PDAM estimates that domestic wastewater generation is 70 % of water consumption which is 100 litter/day/capita (lpcd). It means 70 litter/day/capita.

4.3.3 Facilities and Equipment

(1) Wastewater Collection System

The wastewater collection system consists of West System and East System. The total length of sewer in West System is approximately 67 km of combine sewer, and East System has approximately 318 km which consists of 304 km of pipe sewer with 2,602 manholes, 4,761 inspection chambers and 21 interceptors which are installed by Bandung Urban Development Project (BUDP) assisted by ADB during 1978 - 1995 (BUDP-I: 1978 - 1986, BUDP-II: 1987 - 1995) and 14 km of old existing open channel collection system with width of 30 to 150 cm. Therefore, total length of wastewater collection system of Bandung City is approximately 385 km.

West System has been disconnected to wastewater treatment facilities after operation-off of old Imhoff system, and domestic wastewater is disposed directly into the Cikapundung River. East System transports wastewater to the Bojongsoang wastewater treatment plant through 2 pumping stations.

Beside the sewerage system, PDAM also cleans septic tanks and treats septage in the wastewater treatment plant together with wastewater. PDAM is also operating 26 communal septic tanks in two public real estates.

(2) Wastewater Treatment System

PDAM has a Bojongsoang WWTP which is located in out of Bandung City as shown in ***Figure 4.3.1*** in **Section 4.3.1**. ***Figure 4.3.2*** shows a general plan of Bojongsoang WWTP, and ***Figure 4.3.3*** and ***Figure 4.3.4*** shows a scheme and biological process of treatment. (Oxidation Pond)

Figure 4.3.2 - General Plan of Bojongsoang WWTP
Source: PDAM Bandung

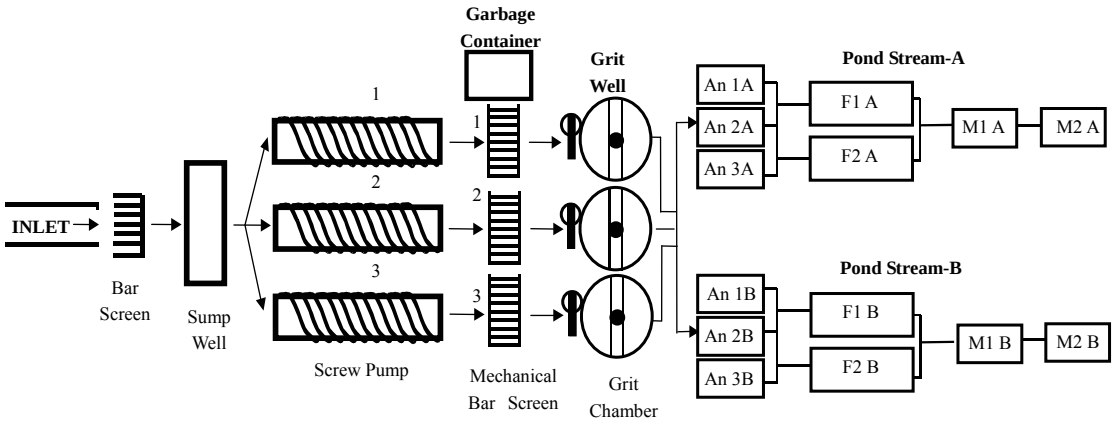


Figure 4.3.3 - Scheme Process of Treatment
Source: PDAM Bandung

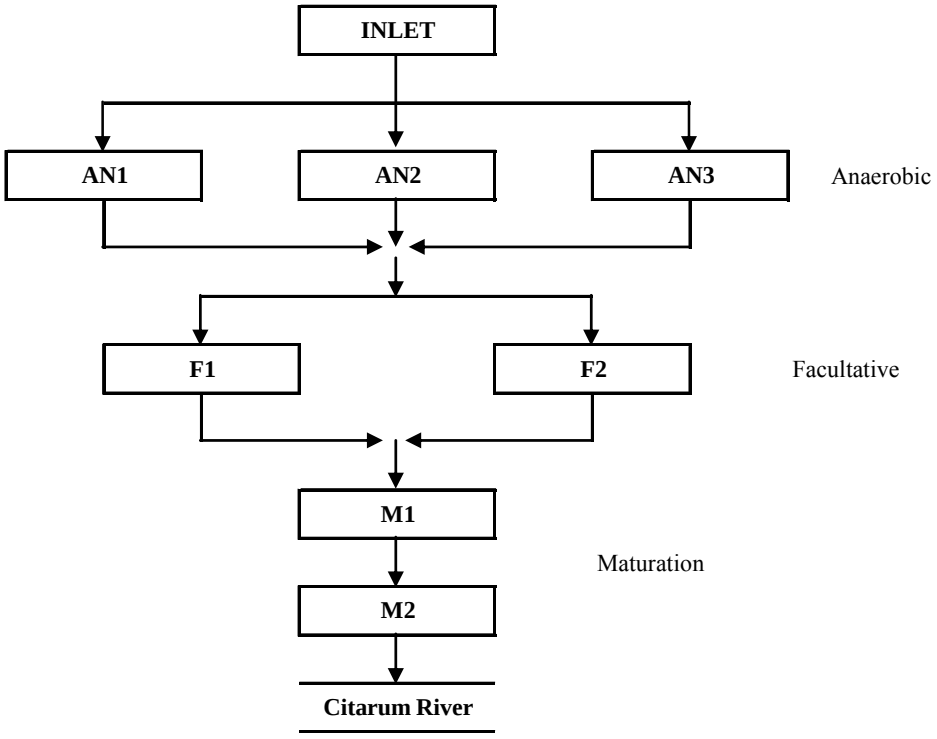


Figure 4.3.4 - Biological Treatment Process
Source: PDAM Bandung

Operation of Bojongsoang WWTP is changed by seasonal conditions, and seasonal operation procedures are shown in ***Figure 4.3.5*** as follows;

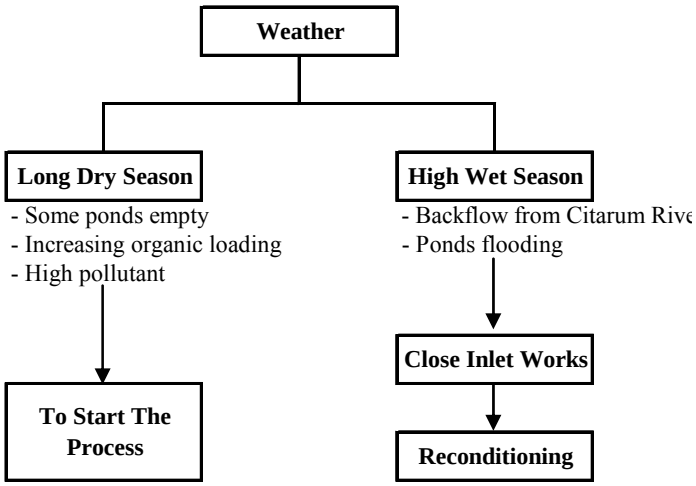


Figure 4.3.5 - Seasonal Operation Procedure
Source: PDAM Bandung

Designed treatment capacity of WWTP is 80,000 m^3/day and volume of pond is 243,000 m^3 (designed retention time is 3 days). However, actual inflow is around 40,000 m^3/day at present and the retention time becomes 6 (six) days at the moment.

A Venturi type flow meter is installed at the outlet of grit chamber, however, an Ultra-Sonic Level Meter has been broken down, and it is not possible to measure the flow rate.

	***Picture 4.3.3*** ***Bojongsoang WWTP*** Anaerobic Pond
	***Picture 4.3.4*** ***Bojongsoang WWTP*** Facultative Pond
	***Picture 4.3.5*** ***Bojongsoang WWTP*** Maturation Ponds

4.3.4 Water Quality Control

PDMA Bandung carries out water quality analysis in their laboratory to monitor the water quality. The samples are taken at several points in the WWTP, rivers and sewers. The report of water quality analysis is submitted to city and head of regency environmental management agency in every 3 (three) months.

Table 4.3.1 shows records of treated wastewater in WWTP (2004 - 2009).

Table 4.3.1 - Treated Wastewater in Bojongsoang WWTP (2004 - 2009)

NO	MONTH	AVERAGE TREATED WASTEWATER (m^3/day)					
		2004	2005	2006	2007	2008	2009
1	January	15,028	17,827	21,094	32,852	30,233	33,065
2	February	17,477	18,533	22,346	48,488	32,000	33,827
3	March	19,070	31,979	18,210	49,066	35,903	40,465
4	April	23,789	28,979	17,754	79,763	38,749	37,466
5	May	24,726	27,060	29,273	54,283	25,000	35,340
6	June	25,662	27,969	24,199	41,663	16,784	35,750
7	July	26,905	21,610	20,778	25,943	7,329	24,569
8	August	20,983	18,040	10,633	29,564	8,000	10,032
9	September	11,763	18,172	6,400	13,421	8,040	10,614
10	October	9,336	17,793	8,483	38,645	18,830	24,019
11	November	18,671	11,573	6,612	32,955	38,320	52,430
12	December	26,163	25,278	43,609	35,218	52,368	34,775
TOTAL		**239,573**	**26,813**	**229,391**	**481,861**	**311,556**	**251,096**
AVERAGE		**19,964**	**22,069**	**19,116**	**40,115**	**25,963**	**31,387**

Source: PDAM Bandung

A part of report of water quality analysis of the WWTP and sewers in August - 2009 is shown in ***Table 4.3.2*** and ***Table 4.3.3*** shown as follows as a sample.

Picture 4.3.6
Bojongsoang WWTP

Drying Beds

Table 4.3.2 - Sample Water Quality in WWTP (August 2009)

NO.	PARAMETER	UNIT	INLET	An 1B	An 2B	An 3B	F1B	F 2B	M 1B	M 2B	Remarks
I	**Physical (12 August 2009)**										
1	Temperature	^{O}C	25.50	31.50							
2	Colour		disturb	disturb	disturb	disturb	greenesh	greenesh	greenesh	greenesh	
3	Odor		smelly	smelly	smelly	smelly	not smelly	not smelly	not smelly	not smelly	
4	SS	mg/l	2.50	tt	tt	tt	tt	tt	tt	tt	
5	TSS	mg/l	700.00	tt	tt	tt	tt	tt	tt	tt	
II	**Chemical**										
1	pH		6.68	7.14	7.04	6.37	7.85	8.85	8.81	8.18	
2	Ammoniac	mg/l	6.02	19.12	9.63	19.61	11.14	tt	tt	tt	
3	Nitrate	mg/l	1.33	1.22	1.57	0.87	0.06	tt	tt	0.25	Dry season flowrate is decrease
4	Nitrite	mg/l	0.02	0.02	0.02	0.02	0.06	0.01	0.05	tt	
5	Sulfate	mg/l	11.84	12.24	15.47	tt	0.86	tt	2.19	1.63	
6	Phosphate	mg/l	1.85	0.24	1.45	2.00	1.89	1.21	1.11	0.65	
7	Chromium	mg/l	0.16	0.05	0.12	0.06	0.01	tt	tt	tt	
8	DO	mg/l	0.45	0.84	0.48	0.06	8.18	8.61	6.75	6.76	
9	BOD	mg/l	111.00	74.00	67.00	70.00	63.00	56.00	51.00	48.00	
10	COD	mg/l	286.00	197.00	170.00	161.00	160.00	57.00	129.00	104.00	
III	**BACTERIOLOGY**										
1	Coliform	MPN/100ml	1.1E+10	1.1E+0.9	1.1E+0.9	2.9E+0.8	2.1E+0.6	2.1E+0.6	1.4E+0.5	2.9E+0.6	
2	Faecal Coliform	MPN/100ml	1.1E+10	1.1E+0.9	1.1E+0.9	2.9E+0.8	2.1E+0.6	2.1E+0.6	1.4E+0.5	2.9E+0.6	

Source: PDAM Bandung

Table 4.3.3 - Sample Water Quality in Sewers (August 2009)

NO.	PARAMETER	UNIT	jl. BBK. Ciparay 188 Wash Cloth Jeans	jl. Sukamulya 4 (BBK. Ciparay) Factory knew Yun-yi	Factory Baso Cihampelas Jl. Syriac in 48)	RS. Rajawali	Combined Network BBK. Tarogong	Remarks
			05/08/2009	05/08/2009	06/08/2009	07/08/2009	07/08/2009	
I	**Physical (12 August 2009)**							
1	Temperature	^{O}C	25.50	31.50				
2	Colour		disturb	disturb	disturb	disturb	greenesh	
3	Odor		smelly	smelly	smelly	smelly	not smelly	
4	SS	mg/l	2.5	tt	tt	tt	tt	
5	TSS	mg/l	700.00	tt	tt	tt	tt	
II	**Chemical**							
1	pH		6.68	7.14	7.04	6.37	7.85	
2	Ammoniac	mg/l	6.02	19.12	9.63	19.61	11.14	
3	Nitrate	mg/l	1.33	1.22	1.57	0.87	0.06	
4	Nitrite	mg/l	0.021	0.02	0.02	0.024	0.06	
5	Sulfate	mg/l	11.84	12.24	15.47	tt	0.86	
6	Phosphate	mg/l	1.85	0.24	1.45	2.00	1.89	
7	Chromium	mg/l	0.16	0.05	0.12	0.06	0.010	
8	DO	mg/l	0.45	0.84	0.48	0.06	8.18	
9	BOD	mg/l	111.00	74.00	67.00	70.00	63.00	
10	COD	mg/l	286.00	197.00	170.00	161.00	160.00	
III	**BACTERIOLOGY**							
1	Coliform	MPN/100ml	1.1E+10	1.1E+0.9	1.1E+0.9	2.9E+0.8	2.1E+0.6	
2	Faecal Coliform	MPN/100ml	1.1E+10	1.1E+0.9	1.1E+0.9	2.9E+0.8	2.1E+0.6	

Source: PDAM Bandung

And, ***Table 4.3.4*** show recorded water quality (COD & BOD_5) at inlet and outlet in Bojongsoang WWTP in 2008 and 2009, and ***Table 4.3.5*** shows, recorded water quality (COD & BOD_5) in the process in Bojongsoang WWTP in 2009

Table 4.3.4 - Water Quality (COD &BOD_5) at Inlet and Outlet in Bojongsoang WWTP

NO	MONTH	2008				2009			
		Inlet		Outlet		Inlet		Outlet	
		COD (mg/lit)	BOD_5 (mg/lit)	COD (mg/lit)	BOD_5 (mg/lit)	COD (mg/lit)	BOD_5 (mg/lit)	COD (mg/lit)	BOD_5 (mg/lit)
1	January	115	90	35	20	139	85	56.5	33.5
2	February	235	145	32.5	20	185	84	61	31.5
3	March	130	95	86	26.5	63	48	38	20.5
4	April	152	75	114	30	199	117	78	46
5	May	170	100	116	41	146	95	66.5	43
6	June	218	80	96	44	166	86	67	34
7	July	212	-	82	-	165	102	62	37
8	August	-	-	-	-	286	111	104	48
9	September	197	-	280	-	-	-	-	-
10	October	212	-	82	-	-	-	-	-
11	November	64	40	41	25	-	-	-	-
12	December	125	65	38	28	-	-	-	-
AVERAGE (mg/lit)		**166.4**	**86.3**	**91.1**	**29.3**	**168,6**	**91**	**66,6**	**36,7**

Source: PDAM Bandung

Table 4.3.5 - Water Quality (COD &BOD_5) in the Process of Bojongsoang WWTP in 2009

NO	MONTH	COD (mg/lit)				BOD_5 (mg/lit)			
		INLET	ANAEROBIC POND	FACULTATIVE POND	MATURATION POND	INLET	ANAEROBIC POND	FACULTATIVE POND	MATURATION POND
1	January	139	124.3	83.5	56.5	85	60.3	39	33.5
2	February	185	141	87.5	61	84	52.3	45.5	31.5
3	March	63	41	40	38	48	22.3	21.7	20.5
4	April	199	133.7	123	78	117	79.3	52.5	46
5	May	146	126	118.5	66.5	95	77.3	64	43
6	June	166	141.3	127	67	86	63	53	34
7	July	165	142	104	62	102	85.7	61	37
8	August	286	176	158	104	111	70	59	48
9	September	-	-	-	-	-	-	-	-
10	October	-	-	-	-	-	-	-	-
11	November	-	-	-	-	-	-	-	-
12	December	-	-	-	-	-	-	-	-
AVERAGE (mg/lit)		156	128	105	67	91	64	49	37

Source: PDAM Bandung

4.3.5 Laboratory

Sewerage Division of PDAM Bandung has own laboratory in urban area of the city separately from WWTP. 2 (two) chemists and 1 (one) biologist are assigned in the laboratory and analyze not only samples in WWTP but also samples in discharging river and wastewater in main sewers. ***Table 4.3.6*** shows the laboratory activities in Sewerage Division of PDAM Bandung.

Table 4.3.6 - Laboratory Works in PDAM Bandung

Staff	Chemist 2, Biologist 1
Analyzing Parameters	pH, SS (Glass filter method), Alkalinity (Titration method), COD_{Cr} (Titration method), DO (Galvanic Electrode method), BOD (Manometric method), SO_4^{2-}, PO_4^{3-}, NH_4^+, NO_3^-, NO_2^-, S^{2-}, Cr, Mn, Fe, Cu, Zn, Mg (Spectrophotometric method), Fecal Coliform, Coliform Bacteria (MPN method)
Samples	Influent, Inflow and Outflow of Each Pond and Effluent of WWTP, Inflow of Pumping Station, 4 Points of Main Sewer in East Area, 3 Points of main Sewer in West Area, the Citlrum River (discharging water body)
Frequency of Analysis	Once/week for samples of WWTP Once/month for other samples

4.3.6 Operation and Maintenance

No preventive maintenance such as cleaning pipe or dredging the open channel for wastewater collection system has been carried out since 2003.

4.3.7 Operation and Maintenance Equipment

Sewerage Division of PDAM Bandung has 3 vacuum tank-cars (ref. private sector has 22 vacuum tank-cars). PDAM Bandung can desludge only 160 households per month by these 3 vacuum tank-cars, and it is not enough to satisfy the customers' demands to clean their septic tanks. Then, people hire the private desludging service companies to clean their septic tanks, although the cost od private companies are much more expensive than those of PDAM.

4.3.8 Disposal of Waste, Sludge and Garbage

Sludge generated in WWTP is treated in drying bed in WWTP, and sludge removed from septic tank is disposed to sewer. Garbage removed in sewer, Pumping Station (PS) and WWTP are transported to Sarimukti disposal site located in Rajamandala area of West Bandung Regency.

4.3.9 Ledger

The customer database and information are combined with the system of water supply services.

4.3.10 Others

Human Resource Development

Table 4.3.7 shows recorded training programmes for Sewerage Division Staff.

Table 4.3.7 - List of Recorded Training Programmes for Sewerage Division Staff

NO	YEAR	NUMBER OF PARTICIPANTS	SECTION	TYPES OF TRAINING	PLACE	FACTS
1.	1997	12 staffs	- BPAK BPAP	Analysis in Laboratory	Workshop Antapani	Level of Analyst
2.	2001	20 staffs	AK Processing	E&M Training	Installation of Bojongsoang WWTP	Level of Operator
3.	2004	3 staffs	- Planning Division - BPAK BPAT-AK	Water Management	Jakarta	Level of Section Head
4.	2006	2 staffs	- BPAK Operations Section	Sewerage Field	Bakasi	Level of Section Head
5.	February 2007	3 staffs	- BPAK LPKL	Bacteriological Analysis	LIPI	
6.	2007	1 staff	BPAK	Operator	Bakasi	Level of Operator
7.	June 2008	2 staffs	BPAK	Analysis of bacteria anaerobes	IPB	

Note:
BPAK: Wastewater Treatment Department
BPAP: Water Supply Department
AK: Sewerage
BPAT-AK: Sewerage Technical Design Department
LPKL: Testing Laboratory of Environmental Quality
LIPI: The Indonesian Institute of Sciences
IPB: The Institute Pertanian Bogor
Source: PDAM Bandung

Picture 4.3.7
Bojongsoang WWTP

Outlet Weir

	***Picture 4.3.8*** ***Discharge of Effluent from Bojongsoang WWTP*** Discharge to Channel
	***Picture 4.3.9*** ***Discharge of Effluent from Bojongsoang WWTP*** Discharge Point to Citarum River
	***Picture 4.3.10*** ***Discharge of Effluent from Bojongsoang WWTP*** Citarum River

	***Picture 4.3.11 Laboratory of Sewerage Department*** Water Quality Analysis Equipment
	***Picture 4.3.12 Laboratory of Sewerage Department*** Chemicals and Glassware for Water Quality Analysis
	***Picture 4.3.13 O&M Equipment*** Mobile Toilets

4.4 Current Water Supply Condition

The water supply in Bandung is served by PDAM Bandung, and its covered area is 65 % of Bandung city. Some part of un-covered area by PDAM Bandung is served by ground water system of DPU Bandung. Non-Revenue Water (NRW) ratio is approximately 40 % at present, and the capacity of water supply system is not satisfied with the demands.

4.5 Socio-Economic Survey

The Willingness to Pay Survey was carried only once in 2001 for the master thesis of Bandung Institute of Technology (ITB). As the result, it was 3,000 IDR for "Willingness to Pay".

4.6 Tariff Structure

Tariff for sewerage service of the Sewerage Division of PDAM Bandung has been defined in local regulation No. 17/PD/1986 in which customer connected to water supply service should pay a 30 % of water charges. Mayor's regulation No.194, 2002 has stipulated the bill for non water supply customer who should pay 5,000 IDR/month.

4.7 Financial Condition

Table 4.7.1 shows the summary of recent financial situation of Sewerage Department, and ***Table 4.7.2*** shows expense for electric power charge of WWTP in 2007 as a sample.

The west catchment programm was implemented to expand the service area for west area of Bandung city, and new pumping station was started the operation in 2008. Therefore, cost for investment in was increased in 2007 and O&M cost was increased in 2008.

Table 4.7.1 - Summary of Recent Financial Situation of Sewerage Department of PDAM Bandung

Year	Revenue (IDR)	O&M Cost (IDR)	Cost for Investment (IDR)
2005	13,326,589,000	4,000,641,831	1,424,328,900
2006	20,991,784,000	4,631,283,256	1,417,207,350
2007	21,417,406,500	5,724,341,471	3,424,457,575
2008	21,506,644,000	8,623,229,671	767,906,000

Source: PDAM Bandung

Table 4.7.2 - Record of Electrical Power Charge of Bojongsoang WWTP in 2007

NO	Month	Flow Rate (m^3)	Rainfall (number of rainy day)	Electrical Cost (IDR)
1	January	32,852	20	19,674,900
2	February	48,488	12	20,898,004
3	March	49,066	21	22,831,475
4	April	79,763	9	21,520,886
5	May	54,283	30	26,632,264
6	June	41,663	26	22,067,885
7	July	25,943	31	18,371,982
8	August	29,564	31	18,241,017
9	September	13,421	30	16,454,112
10	October	38,645	20	18,200,467
11	November	32,955	20	19,984,438
12	December	35,218	16	22,279,722

Source: PDAM Bandung

4.8 Current Problem

Sewerage Division of PDAM Bandung has problems about management as listed below:

- The people still has low care for water environment
- Human resources are very limited to serve sewerage system in whole catchments area in Bandung
- The maintenance equipment for sewerage system is still limited
- Many sewer facilities cannot work because of technical problem on site
- Process needs to be modified because the condition of process is not good recently

Major and technical problems about the WWTP are listed as follows:

Major Problems

- Illegal connections of Industrials to the sewer
- Heavy metal accumulations on the sludge
- Public obstructions to the WWTP
  - Fish farming in the ponds
  - Water extraction by pump from the ponds
  - Damaging to the facilities (fence etc.)

Technical Problems

- Un-optimal operation of WWTP
- Facilities required repaire and replace
- Process improvement by additional mechanical units
- Hydrological system in the ponds
- Limited facilities and equipment for maintenance of the ponds
- Limited facilities and equipment for quantity measurement (flow meter etc.)
- Low quality of effluent

4.9 Master Plan / Long-Term Plan

Currently there is no specified sewerage master plan. However, Government of Korea (GOK) will prepare the Master Plan for Metropolitan Bandung and capacity building for Bojongsoang wastewater treatment plant upon East Asia Climate Partnership Programme. The summary of the programme is attached in ***Appendix 4.9.1***.

4.10 Middle-Term Plan

Sewerage Division of PDAM Bandung has Medium-Term Plan for Integrated Wastewater Management Development Programme for 2010-2014, and ***Appendix 4.10.1*** shows draft agreement between Department of Public Works, West Jawa Provincial Government, Government of Bandung City, and Sewerage Division of PDAM Bandung. The summary of draft Medium-Term Plan is introduced below.

The goal of the Cooperation

(1) To implement the development of centralized sewerage system and to increase utilization capacity of sewerage process to 39,600 m^3/day (49.8 %) from 24,000 m^3/day (30 %).
(2) To repair the condition of sewerage instrument to improve environment quality and Bandung communities' heath.
(3) To enlarge the sewerage service area of Bandung city from 97,952 housing connections to 107,950 house connections.

The scope of the Cooperation

(1) To reach the cooperation goal mentioned in the above agreement, the scope of activities for developing integrated wastewater management includes:

A. Planning, budgeting, and implementing the infrastructure development in the field of the Bandung wastewater management in the time of 5 (five) years (2010 - 2014).
B. To improve the professionalism of Bandung wastewater management organization.
C. To publish Local Government regulations on wastewater management.
D. To improve the capability of human resources of wastewater management in Bandung.
E. Monitoring and evaluating the developing activities of the wastewater management in Bandung.

The Implementation of Cooperation

(1) All Parties joint cooperative plan for the integrated wastewater management for 5 (five) years from 2010 to 2014 will be included in RPIJM documents, which will be completed by working division according to the PP No. 38 of 2007 (Table of programme is in the attachment).
(2) All parties have to prepare fund of required development based on the stipulation of the agreement.
(3) The stipulation of activities, personnel, working division, rights, obligation, activity schedule and so forth will be arranged in details and agreed by all parties.

Time span for implementation

This cooperation will last for 5 (five) years, effective from 2010.

And ***Table 4.10.1*** shows the Medium-Term investment programme for national budget.

Picture 4.3.14
O&M Equipment

Water Tanks for Water Jet

Table 4.10.1 - Middle-Term Investment Programme for National Budget (2010 - 2014)

NO.	Programme	Location	Amount (IDR)	Year of Budget Programme				
				2010	2011	2012	2013	2014
A	**Physical**							
I	**Westwater management in west Bandung**							
1	Construction of Pumping Station and river crossing pipe	Settlement area (Cikapundung Kolot river/STIS), river crossing of Citepus, Cijantra, Cikapundung and Cikapundung kolot.	20,000,000,000	20,000,000,000				
II	**Sewer Expansion**							
1	*Sewer construction of 6 km length in west Bandung service area which is priority for water supply costumers of 7,500 connection* Approximately	Settlement of Mekarwangi, Kembar, Pasirluyu, Pasirsalam and Sekejadi	30,000,000,000		5,000,000,000	5,000,000,000	10,000,000,000	10,000,000,000
III	**Procurement of Supporting Facilities**							
	Procurement of Operation and Maintenance Equipment							
1	Hanger for Water Jetting Car		2,500,000,000			2,500,000,000		
2	Rodding machine including 4 rodding sticks		6,000,000,000		6,000,000,000			
IV	**Optimalization of Bojongsoang STP**							
	Revitalization of Bojongsoang STP							
1	Procurement of Sludge pump	Bojongsoang	2,000,000,000	2,000,000,000				
2	Rehabilitation of pond's protection	Bojongsoang	12,000,000,000		2,500,000,000	2,500,000,000	3,500,000,000	3,500,000,000
3	Restraining of area along open channel		5,000,000,000			2,500,000,000	2,500,000,000	
4	Restraining of Bojongsoang STP area	Bojongsoang	7,500,000,000		7,500,000,000	2,500,000,000		
5	Construction and rehabilitation of sludge Drying bed	Bojongsoang	6,000,000,000			6,000,000,000		
	Total		91,000,000,000	22,000,000,000	21,000,000,000	21,000,000,000	16,000,000,000	13,500,000,000
V	**Non Physical**							
1	Land acquisition for pumping station and construction of river crossing. Proposed Budget is IDR 7,000,000,000 and realized budget in 2009 is IDR 3,400,000,000	Settlement area (Cikapundung Kolot river/STIS), river crossing of Citepus, Cijantra, Cikapundung and Cikapundung kolot.						
2	Review Master Plan	Bandung city	3,000,000,000	3,000,000,000				
	Total		3,000,000,000	3,000,000,000				
	Grand Total		94,000,000,000	25,000,000,000	21,000,000,000	21,000,000,000	16,000,000,000	13,500,000,000

Source: PDAM Bandung

4.11 Action Plan

As mentioned in **Section 4.9**, GOK will prepare master plan study in 2010. PDAM Bandung will cooperate with this study on preparation of master plan.

4.12 Current Programme or Project

Environmental Services Programme (ESP) in Bandung area for the promotion of Communal Septic Tank, Hygiene with Hand Soap Washing, and Education on Environmental Conservation in School, conducted by United States Agency for International Development (USAID) has just finished in November 2009.

PDAM Bandung supported this ESP in analysis of river water qualities.

4.13 Relevant Organization

The Sewerage Division of PDAM Bandung is operating the management by association with several organizations. The major relevant organizations and relationships are shown in ***Figure 4.13.1*** shown as follows.

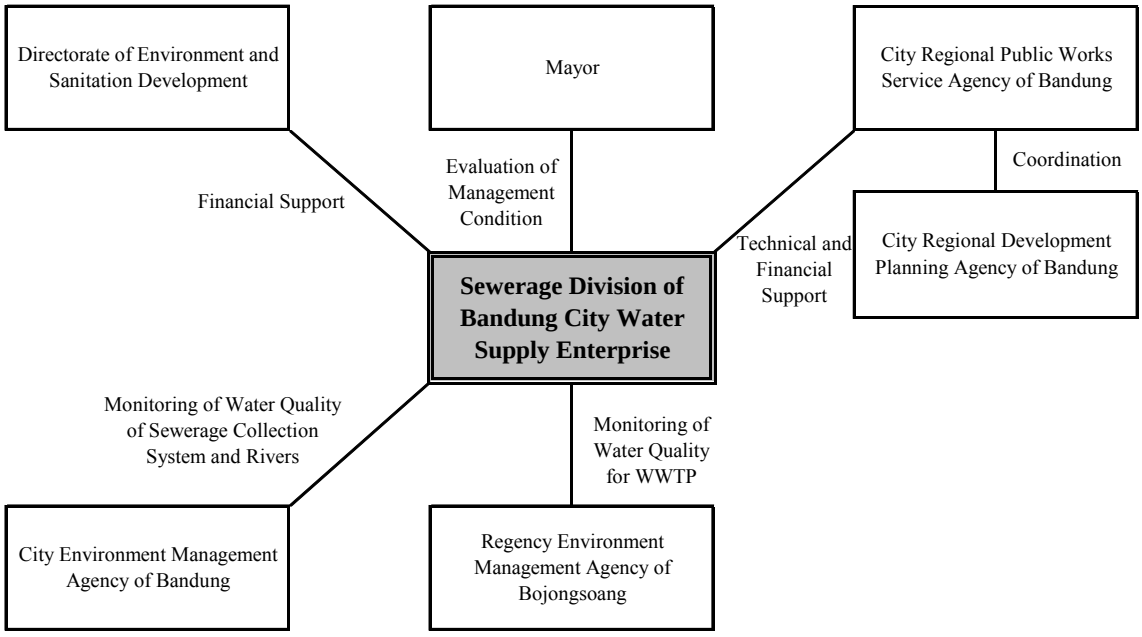


Figure 4.13.1 - Relevant Organizations with Sewerage Division of PDAM Bandung

(1) City Regional Development Planning Agency of Bandung

City Regional Development Planning Agency of Bandung (BAPPEDA Kota Bandung) coordinates all city development strategies, plans, programmes and projects, and prepared Middle-Term city development plan (2009 - 2014). ***Figure 4.13.2*** shows land-use plan in 2013.

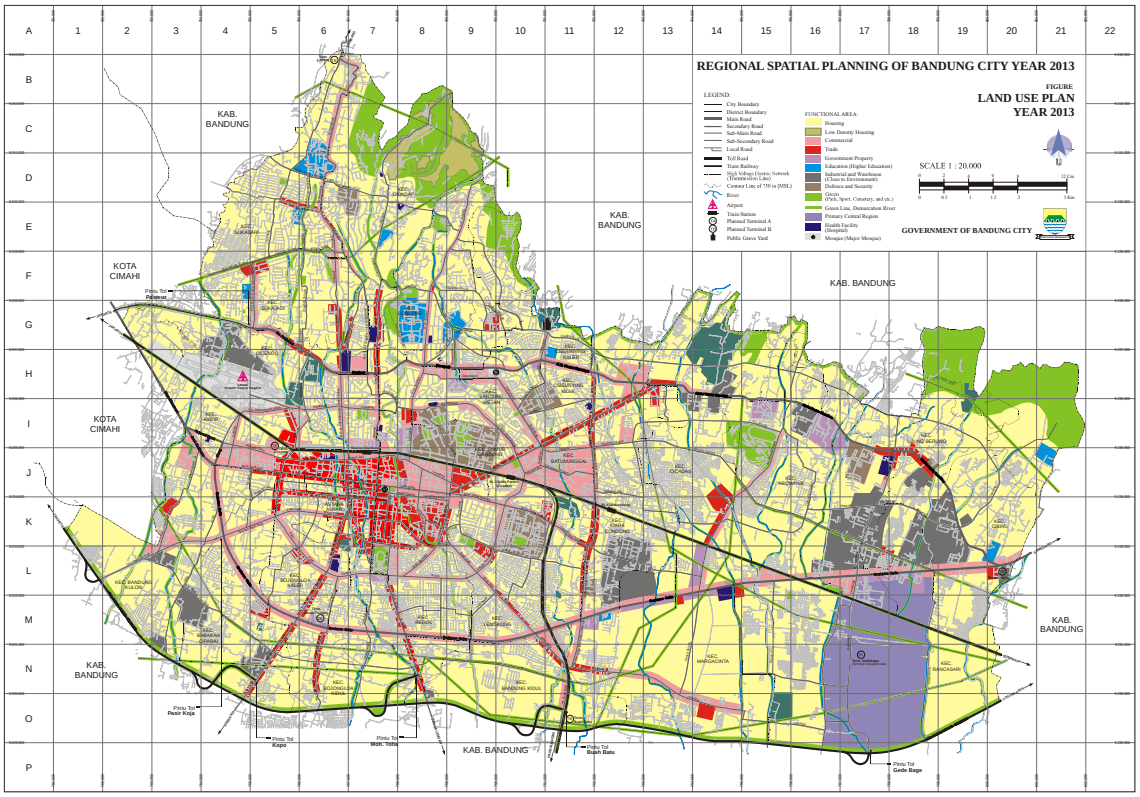


Figure 4.13.2 - Land-Use Plan of Bandung City in 2013
Source: BAPPEDA Kota Bandung

(2) Public Works Service Agency of Bandung

The City Public Works Agency (DPU - Kota) of Bandung manages Setiabudi Dam mainly for flood control, regional drainage system and garbage & solid waste collection, disposal and treatment.

(A) Road and River Agency

Road and River Agency of Bandung manages river drainage and irrigation channel. However, Old Drainage System constructed under the Kingdom of the Netherlands is managed by PDAM Bandung.

Dredging and cleaning of drainages is implemented by both captive teams (by manual) and outsourcing (by machine). Collected Garbage and solid wastes is transported to disposal site of Road and River Agency of Bandung, and sludge is given away for free to developers after drying around the sites.

Figure 4.13.3 shows the organization structure of DPU - Kota Bandung

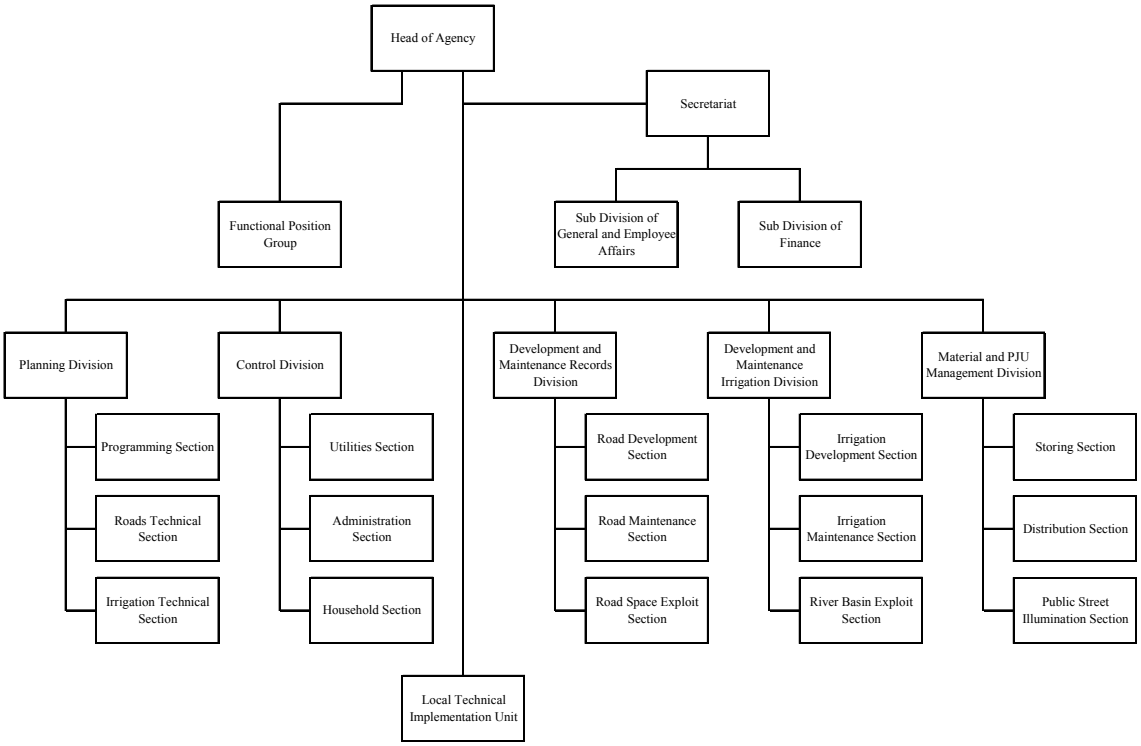


Figure 4.13.3 - Organization Structure of Road and River Agency
Source: DPU - Kota Bandung

(3) Cleaning Service Enterprise

Cleaning Service Enterprise of Bandung cleans main roads twice in a day by 2 (two) crews (05:00 ~ 11:00 and 11:00 ~ 17:00) and ordinary roads once in a day by 1 (one) crew (05:00 ~ 11:00). The number of staff is 840 including 22 staffs using motor bikes and 150 staffs using wheelbarrows. The capacity of wheelbarrow is 120 litters, and Cleaning Service Enterprise of Bandung has 400 wheelbarrows. Total length of cleaning service is 224 km in Bandung City.

PDAM Bandung carries the garbage and solid wastes collected in the sewerage system of which volume is approximately 84 m^3/month.

Figure 4.13.4 shows the organization structure of Cleaning Service Enterprise of Bandung.

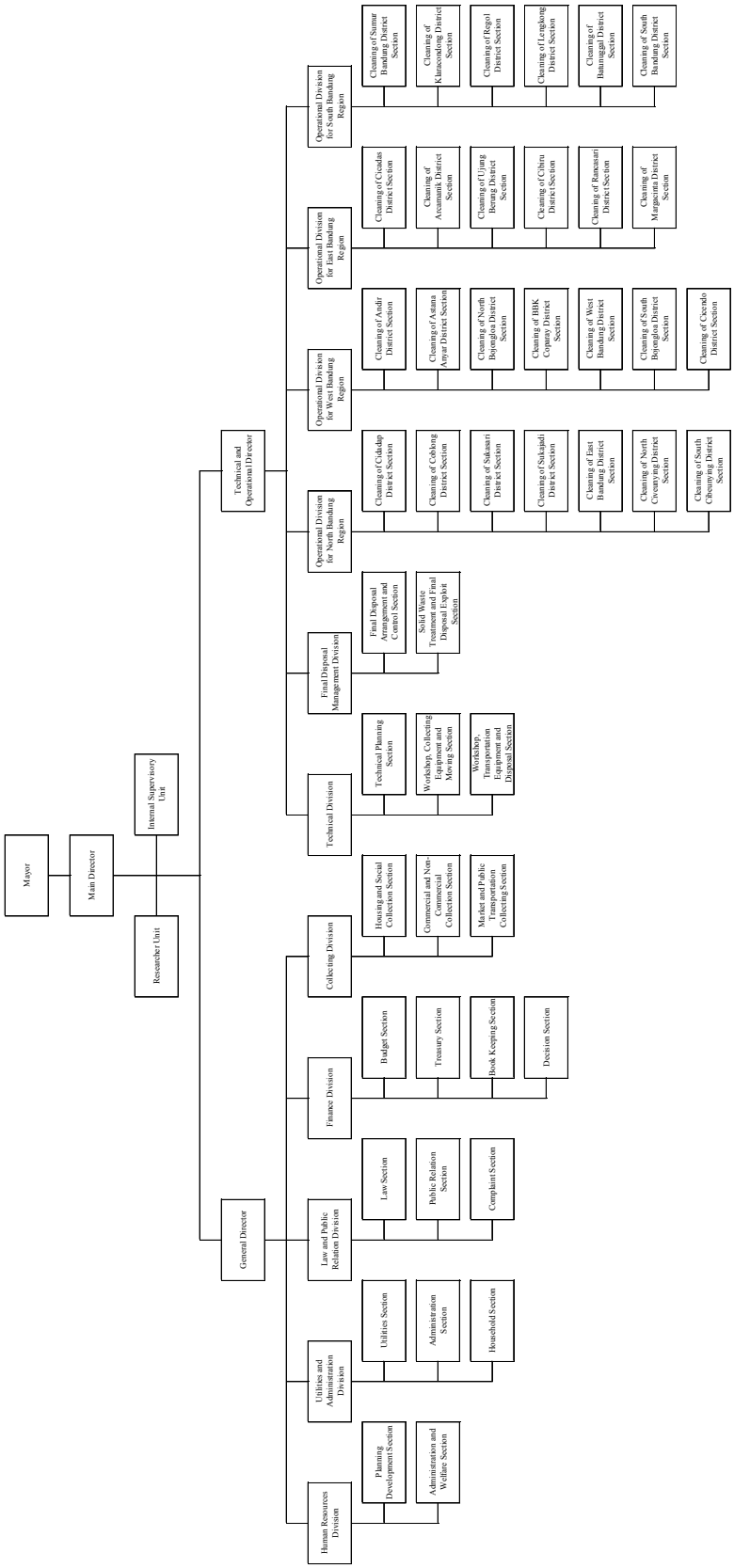


Figure 4.13.4 - Organization Structure of Cleaning Service Enterprise of Bandung
Source: City Cleaning Service Enterprise of Bandung

(4) Provincial Environment Management Agency of West Java

Figure 4.13.5 presents the organization structure of Provincial Environment Management Agency of West Java (BPLHD Propinsi Jawa Barat). Sewerage service area is mainly in Bandung city; however, WWTP is located in Bojongsoang regency. Therefore, Provincial Environment Management Agency of West Java is monitoring the water quality by the reports submitted from City Environmental Management Agency of Bandung and Regency Environmental Management Agency of Bojongsoang.

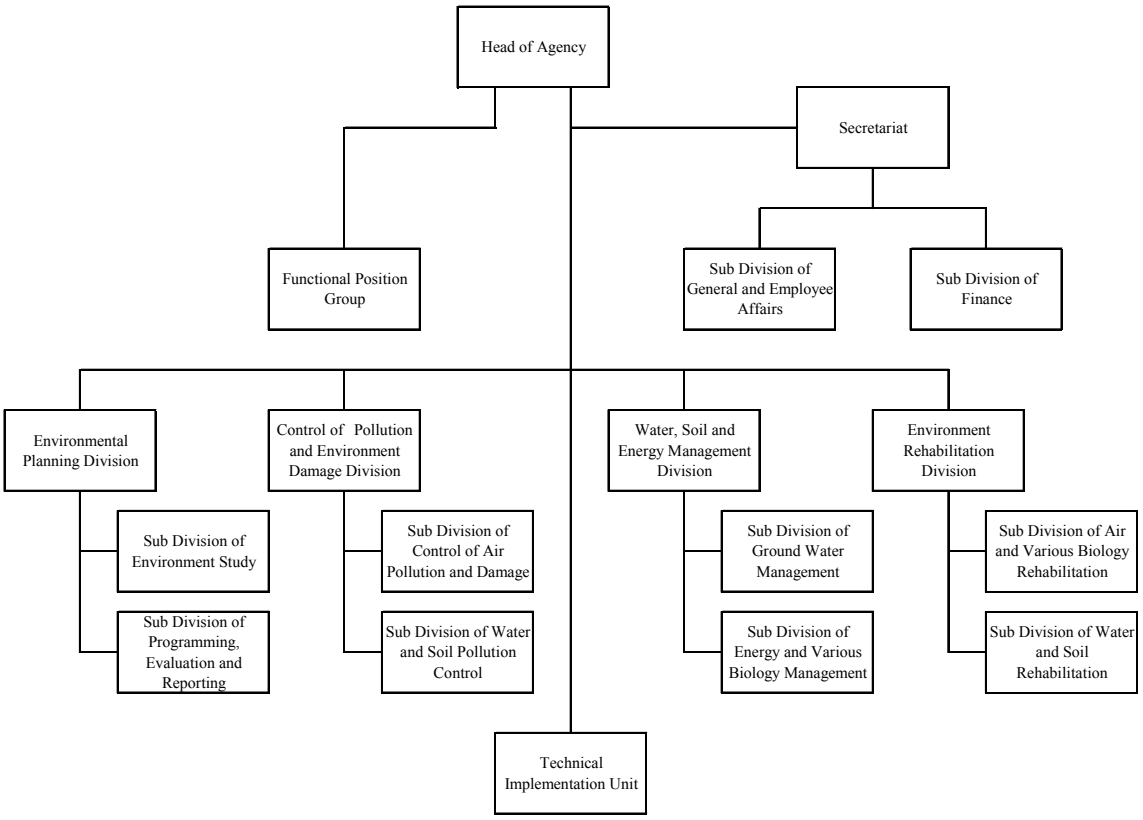


Figure 4.13.5 - Organization Structure of Provincial Environment Management Agency of West Java
Source: BPLHD Propinsi Jawa Barat

(5) City Environment Management Agency of Bandung

PDAM submits the monthly report on water quality to City Environment Management Agency of Bandung every 3 (three) months.

(6) Regency Environment Management Agency of Bojongsoang

Bojongsoang WWTP is located in Bojongsoang regency. Therefore, monthly water quality report is submitted to Regency Environment Management Agency of Bojongsoang every 3 (three) months.

4.14 Related Project

As mentioned in **Section 4.12**, Environmental Services Programme (ESP) in Bandung area conducted by United States Agency for International Development (USAID) has just finished in November 2009.

And as mentioned in **Section 4.9** and **Section 4.11**, GOK will conduct master plan study in 2010.

CHAPTER 5

CURRENT SEWERAGE CONDITION IN DENPASAR