The Republic of Indonesia
Directorate General of Human Settlements, Ministry of Public Works and Housing
DKI Jakarta
PD PAL Jaya

PROJECT COMPLETION REPORT
ON
THE PROJECT FOR
IMPROVING PLANNING CAPACITY
FOR THE SEWERAGE SYSTEM
IN DKI JAKARTA
IN THE REPUBLIC OF INDONESIA

February 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

JAPAN TECHNO CO., LTD.
YACHIYO ENGINEERING CO., LTD.
WATER AGENCY INC.

GE
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18-002

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The Project for Improving Planning Capacity for the Sewerage System in DKI Jakarta in the Republic of Indonesia

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Abbreviations

ADB	Asian Development Bank
AMDAL	Analisis Mengenai Dampak Lingkungan (Environmental Impact Assessment)
APBD	Anggaran Pendapatan dan Belanja Daerah (Local Government Budget)
APBN	Anggaran Pendapatan dan Belanja Negara (State Budget)
ASP	Activated Sludge Process
ASEAN	Association of South-East Asian Nations
AuAid	Australian Agency for International Development
BAPPEDA	Badan Perencanaan Pembangunan Daerah (Regional Development Planning Agency)
BAPPENAS	Badan Perencanaan Pembangunan Nasional (National Development Planning Agency)
BOD	Biochemical Oxygen Demand
BORDA	Bremen Overseas Research and Development Association
BPBUMD	Badan Pembina Badan Usaha Milik Daerah (Development of Regional- Owned Enterprises Agency)
BPKAD	Badan Pengelola Keuangan dan Aset Daerah (Regional Finance and Asset Management Agency)
Biro PKLH	Biro Penataan Kota dan Lingkungan Hidup (Spatial Planning and Environmental Bureau)
BPLHD	Badan Pengelola Lingkungan Hidup Daerah (Regional Environmental Management Agency)
BPS	Badan Pusat Statistics (Central Statistics Indonesia)
BPTSP	Badan Pelayanan Terpadu Satu Pintu (One-Stop Integrated Services Agency)
CA	Capacity Assessment
CAS	Conventional Activated Sludge Process
COD	Chemical Oxygen Demand
C/P	Counterpart
CSO	Combined Sewer Overflow
DAC	Development Assistance Committee
DED	Detail Engineering Design

DGHS	Directorate General of Human Settlements
DK	Dinas Kebersihan（Cleansing Office）
DKI Jakarta	Propinsi Daerah Khusus Ibu Kota Jakarta (Special Capital City Jakarta)
DLH	Dinas Lingkungan Hidup (Environment Office)
DO	Dissolved Oxygen
DPMPTSP	Dinas Penanaman Modal & Pelayanan Terpadu Satu Pintu (Investment & One-Stop Integrated Services Office)
DPU	Dinas Pekerjaan Umum (Public Works Office)
DSDA	Dinas Sumber Daya Air (Water Resources Office)
DTA	Dinas Tata Air (Water Management Office)
EIA	Environmental Impacts Assessment
ES	Engineering Service
FS	Feasibility Study
GCUS	Japan Global Center for Urban Sanitation
GDP	Gross Domestic Product
GNI	Gross National Income
GOI	Government of the Republic of Indonesia
GOJ	Government of Japan
HC	House Connection
IDR	Indonesian Rupiah
IEE	Initial Environmental Evaluation
IMB	Ijin Mendirikan Bangunan (Building Permit)
IMF	International Monetary Fund
INDII	Indonesia Infrastructure Initiative
Ir.	Insinyur (Engineer)
IsDB	Islamic Development Bank
ITB	Institute Technology Bandung
ITR	Interim Report
IWK	Indah Water Konsotium Sdn Bhd (National Sewerage Company)
JBIC	Japan Bank of International Cooperation
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
JSSP	Jakarta Sewerage and Sanitation Project
KEMENKO	Kementerian Koordinator Bidang Perekonomian (Coordinating Ministry for Economic Affairs)

KIC	Kyushu International Center
KLHK	Kementerian Lingkungan Hidup dan Kehutanan (Ministry of Environment and Forestry)
LA	Loan Agreement
LNG	Liquefied Natural Gas
MBBR	Moving Bed Bio-Reactor
MBR	Membrane Bio-Reactor
MM	Man-Month
MM	Minutes of Meeting
MP	Master Plan
MPA	Metropolitan Priority Area
MRT	Mass Rapid Transit
MST	Modified Septic Tank
NCICD	National Capital Integrated Coastal Development
NEXT11	Next Eleven (New 11 Countries)
NGO	Non-Governmental Organization
O&M	Operation and Maintenance
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
OJT	On the Job Training
OPEC	Organization of the Petroleum Exporting
PD PAL	Perusahaan Daerah Pengelolaan Air Limbah (Wastewater Management Enterprise)
PD PAM	Perusahaan Daerah Pengolahan Air Minum (Water Supply Enterprise)
PERDA	Peraturan Daerah (Regional Regulation)
PFI	Private Finance Initiative
PIU	Project Implementation Unit
PMU	Project Management Unit
PMD	Project Design Matrix
PO	Plan of Operation
PPP	Public–Private Partnership
PSO	Public Service Obligation
RBC	Rotating Biological Contactor
RD	Record of Discussion
R&D	Research and Development

RPJMD	Rencana Pembangunan Jangka Menengah Daerah (Provincial Medium Term Development Plan)
RT	Rukun Tetangga (Community)
SANIMAS	Sanitasi Berbasis Masyarakat (Community Based Sanitation)
Sat. Pol PP	Satuan Polisi Pamong Praja (Civil Service Police Unit)
SBR	Sequencing Batch Reactor
SOP	Standard Operation Procedure
SS	Suspended Solid
SS	Small Seminar
TIC	Tokyo International Center
UASB	Up flow Anaerobic Sludge Blanket
UKL-UPL	Upaya Pengelolaan Lingkungan (UKL) dan Upaya Pemantauan Lingkungan (UPL) (Environmental Management Efforts and Environment Monitoring Efforts)
USAID	United States Agency for International Development
VISTA	Vietnam, Indonesian, South Africa, Turkey and Argentina
WASH	Water, Sanitation and Hygiene
WB	World Bank
WG	Working Group
WSP	Water and Sanitation Program
WTO	World Trade Organization
WWTP	Wastewater Treatment Plant

CHAPTER 1
BASIC INFORMATION OF THE PROJECT

Chapter 1　Basic Information of the Project

1-1　Indonesia Country Information

(1) General Information

The Republic of Indonesia (hereinafter referred to as “Indonesia”) is a republic nation, which is located in the southern part of Southeast Asia. Its capital city is Jakarta in Java. The area of Indonesia is very long as 5,110 km between the east and west, and it has the largest number of islands in the world. The population is the fourth largest in the world of 255 million people (2015) (Ban Pusat Statistik) (hereinafter referred to as "BPS"), and it is the world's largest Islamic population country. And it is a leader of Association of South Asian Nations (hereinafter referred to as "ASEAN"), whose headquarters is also located in Jakarta, the capital city of Indonesia.

(2) Geography

Indonesia is the country with the largest number of islands in the world and its number is 13,466. Also, it constitutes a part of the Pacific Rim Volcanic Belt (the Pacific Rim Orogenic Belt) and there are numerous volcanoes throughout the country. Volcanic eruption has caused 150,000 of the dead in the past 300 years and this number is considered to be the world's largest. Furthermore, the earthquakes happens often, and severe damages were caused by the ones in the Indian Ocean off Sumatra (2004) and in Central Java (2006). All of these islands are located between the northern and southern circles and it is a tropical climate.

(3) Economy

According to the International Monetary Fund (hereinafter referred to as the "IMF"), Indonesia's Gross Domestic Product (hereinafter referred to as "GDP") in 2016 is $ 932.2 billion, which is the 16th place in the world. On the other hand, GDP per capita is 3,400 dollars, which is less than 40% of the world average. According to the data published by the Asian Development Bank (hereinafter referred to as "ADB") in 2015, the population of the poor group, which lives in less than 2 dollars a day, accounts for approximately 40% of the whole population in Indonesia.

Indonesia is basically an agricultural country. In the 1960s, the productivity of rice cultivation was strengthened, and rice self-sufficiency was achieved in 1984. And import of rice has increased since the latter half of the 1980s. As for agriculture and forestry, the production of

cacao, cassava, cabbage, coconut, rice, coffee beans, sweet potato, soybean, tobacco, tea, natural rubber, corn, pineapple, banana and peanut is high. Especially, the protection of coconuts is the largest volume in the world.

Indonesia has rich mining resources and there are large amount of mining of gold, tin, oil, coal, natural gas, copper and nickel. In the Official Development Assistance (hereinafter referred to as "ODA") from Japan, Asahan Dam was constructed with water of Asahan River flowing out of Lake Toba at the northern part of Sumatra and Asahan Aluminum Smelting Plant was built in Kuala Tanjung in 1982 and 1984. 80% of production of Nickel is exported to Japan.

Japan imports the most of Liquefied Natural Gas (hereinafter referred to as "LNG"), which is made from natural gas, from Indonesia.

As for the industry, light industry, food industry, textiles, oil refining, automobiles are thriving. Besides copra palm oil, industries such as chemical fiber, pulp, nitrogen fertilizer etc. are established. Many Japanese companies including Toyota, Honda, Panasonic, Omron, Bridgestone and others have a presence in Indonesia in the form of a subsidiary company or a joint venture.

After independence, the government of Indonesia nationalized major industries and has developed industries under the protective policy. In 1989, as an industry requiring strategic response, the government designated iron manufacture, aircraft manufacturing and firearms manufacturers etc., and launched the Strategic Industry Management Agency (Badan Pengelora Industri Strategis) as an administrative organization dealing with strategic industries. Then, the growth rate of GDP was maintained in relatively steady growth, and now Indonesia has become the essential component of the G20 (Group of Twenty). Also, it is an important member of Next Eleven same as Vietnam and Philippines of ASEAN countries, and of VISTA together with Vietnam. Therefore, the Indonesian economy is expected significantly.

In such situations, although Japanese companies are expanding their business in Indonesia, the business environments are delayed in terms of the development of hard infrastructure such as roads, railways and communications etc., and issues on the legal for software infrastructure are stated. Against the above mentioned issues, Japanese ODA has also been supporting the development of software infrastructure such as a support for governance capacity (Governance Support) in addition to a support for hard infrastructure development.

(4) Population

The total population in 2015 is approximately 255 million, which is the fourth largest in the world after China, India, and the United States. Since the estimated population in 2050 is about 300 million people and more than half of all the people live in Java, the population migration policy, which is called as Transmigration Program, has been enforced in order to settle inhabitants to Sumatra Island, Kalimantan Island, and Sulawesi Island, of which populations are relatively small.

(5) Other Information

Country information of Indonesia including the above mentioned is shown in the table below:

Table 1-1 Country Information of Indonesia

Area	Approximately 1.89 million square kilometers (about five times as large as Japan)
Population	Approximately 2.55 billion people (2015, BPS)
Capital City	Jakarta (Population 10.17 million people : 2015, BPS)
Ethnic Group	Most of the population is Malayan. (about 300 races such as Javanese and Sundanese)
Language	Indonesian
Religion	Muslim 87.2%, Christian 9.8%, Hindu 1.6%, Others 1.4 (2013, Statistics by Ministry of Religious Affairs)
Constitution	Presidential system, Republic system
Head of State	President Joko Widodo (accession on 20th October, 2014 and the terms of 5 years)
Main Industry	Industry (20.51%) : transportation equipment (motorcycles etc.), food etc. Agriculture, Forestry and Fishing (13.45%) : Palm oil, rubber, rice, cocoa, cassava, coffee beans etc. Commerce / Hotel / Food industry (16.11%) Mining industry (7.20%) : LNG, coal, nickel, tin, petroleum etc. Construction (10.38%) Transportation / Communication (8.84%) Finance / Insurance (4.20%) Administrative service / Military / Social security (3.86%) (In parentheses, the composition ratio of nominal GDP in 2016) (BPS)
GDP	932.2 billion dollars (2016、Statistics by WB[1])
GDP per capita	3,605.1 dollars (2016, BPS)
GNI[2] per capita	3,400 dollars (2016, Statistics by WB)
Economic Growth	5.0% (2016, BPS)

[1] World Bank (hereinafter referred to as "WB")

[2] Gross National Income (hereinafter referred to as “GNI”)

Rate	
Inflation Rate	3.0% (2016, BPS)
Total Trade Value	Exports 144.43 billion dollars, Import 135.65 billion dollars (2016, BPS)
Trade Item (the amount)	(1) Export Fat / Oil / Wax (13.0%), Mineral fuel / Oil (11.0%), Electronic device (6.0%) (2) Import General equipment (18.0%), Electronic device (13.0%), Plastics / Plastic product (6.0%) (2016, BPS)
Trade Partner / Region (the amount)	(1) Export China (11.6%), the United States (11.2%), Japan (11.1%) (2) Import China (22.7%), Singapore (10.7%), Japan (9.6%) (2016, BPS)
Major Donor Country	(1) Japan (25.9%) (2) German (20.6%) (3) Australia (20.2%) (4) France (11.6%) (5) the United States (10.7%) (2015, OECD/DAC[3] (Gross[4]), "%" accounts for bilateral aid.)
Actual Achievement of Japan's Aid	(1) Grant Aid 268 million Japanese Yen (Fiscal 2015) (2) Technical Cooperation 59.70 billion Japanese Yen (Fiscal 2015, Implantation by JICA[5] only)

1-2 Current Situations of Sewerage and Sewage Treatment Project in Indonesia

(1) Current Situations of Sewage Treatment in Indonesia

The service situations of wastewater treatment plants in Indonesia is indicated in "Table 1-2 Outline of Wastewater Treatment Plants in Indonesia" and "Figure 1-1 Issues on Sewerage Management in Indonesia".

In Indonesia, sewerage treatment plants are served in major cities over 1 million inhabitants, Jakarta, Medan City, Tangerang City, Bandung City and Batam City, and in regional major urban area, Cirebon, Surakarta (Solo), Yogyakarta, Balikpapan, Banjar Masin. Except Bandung City, Denpasar City, Baden Province (Bali State) and DKI Yogyakarta, those are small sewerages. Furthermore, Ministry of Public Works is concerned about maintenance and operation of sewerage against that the idle capacity of sewerage treatment plants exceeds 90% those plants, for example, the plant in Zone-0 in Propinsi Daerah Khusus Ibukota Jakarta (DKI Jakarta) (hereinafter referred to as "DKI Jakarta"). As for causes of idle of the plants, in Jakarta, Batam and Tangerang etc., the function is stopped due to the aging and breakdown of treatment

[3] OECD Development Assistance Committee (hereinafter referred to as "OECD/DAC")

[4] Total expenditure

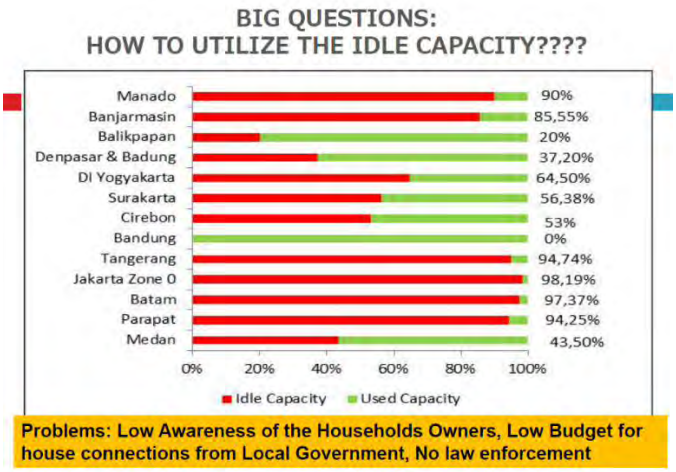
[5] Japan International Cooperation Agency (hereinafter referred to as "JICA")

facilities.

Table 1-2 Outline of Wastewater Treatment Plants

No.	City	No. of Wastewater Treatment plant (Unit)	Treatment Process	Treatment Capacity (m^3/day)	Idle Capacity (%)
1	Medan	1	UASB	10,000	43.5 %
2	Parapat	1	Aerated Ponds	2,000	94.25%
3	Batam	1	Oxidation Ditch	2,852	97.37%
4	Jakarta Zone-0	1	MBBR	38,880	98.19%
5	Tangerang	1	Aerated Ponds	2,800	94.4%
6	Bandung	1	Lagoons	80,835	0%
7	Cirebon	4	Lagoons	20,500	53%
8	Surakarta	3	Biofilter & Lagoons	14,000	56.38%
9	DI Yogyakarta	1	Aerated Ponds	15,500	64.5%
10	Denpasar & Badung	1	Aerated Ponds	51,000	37.2%
11	Balikpapan	1	Aerated Ponds	800	20%
12	Banjarmasin	7	RBC	18,000	85.55%
13	Manado	1	RBC	2.000	90%

Source : Sewerage Development in Indonesia, DGHS, Minister of Public Works and Housing



Problems : Low Awareness of the Households Owners
Low Budget for house connections from Local Government
No law enforcement

Source : Sewerage Development in Indonesia, DGHS, Minister of Public Works and Housing

Figure 1-1 Issues on Sewerage Management in Indonesia

(2) Current Situations of Sewerage Development

According to Medium-Term Planned External Loans (Bluebook) instituted by Badan Perencanaan Pembangunan National (Ministry of National Development Planning) (hereinafter

referred to as “BAPPENAS”), SANIMAS[6], sewerage in the prior city, Zone-1 and Zone-6 in Jakarta, sewerage in Denpasar (Phase III) and sewerage development in the Bandung metropolitan area with a budget of 3.58 billion USD, are approved by the Overseas Donors.

Table 1-3 Medium-Term Planned External Loans (Bluebook)

No.	Program / Project	Implementing Agency	Loan
Development of Waste Water Management Program			
a.	Community Based Sanitation Program (SANIMAS)	Ministry of Public Works and Housing	3,583,000,000 USD
b.	Jakarta Sewerage Development Project – Zone-1 and Zone-6		
c.	The Development of Wastewater Treatment Plant Facility in Priority Area		
d.	Sewerage System Development in Indonesia		
e.	Denpasar Sewerage Development Project - Phase III		
f.	The Development and Optimization of Wastewater Treatment in Greater Bandung		
g.	Engineering Service for Sanitation Improvement Project		

Source : Medium-Term Planned External Loans 2015-2019, 2016 Revision, BAPPENAS

Overseas Donors which are supporting sewerage in Indonesia and the cities supported by them are shown in "Table 1-4 Sewerage Project supported by Overseas Donors (in progress)". ADB has been mainly supporting sewerage deployment in the large cities such as Bandung, Medan and Yogyakarta. Also, it commission commercialization in five cities, utilizing grant aid from Australia (AuAid[7]). Australia has been supporting capacity development for managing operation and maintenance / supervising / management and public relations etc. in Banjarmasin, Balikpapan and Surakarta. Moreover, JICA has been supporting sewerage development in Jakarta, Denpasar (Bali Province) and Yogyakarta (Grant Aid).

[6] Sanitasi Berbasis Masyarakat (Sanitation for Community) : Community based on-site sanitation program in Indonesia

[7] Australian Agency for International Development (Overseas Aid Program)

Table 1-4 Sewerage Project supported by Overseas Donors (in progress)

Donor	Supported City
ADB	Single Loan : Bandung, Medan, Yogyakarta Co-financing with AuAid : Jambi, Palembang, Pekanbaru, Makassar, Chimahi
WB	Surakarta、Banjarmasin、Jakarta（Zone-0）
JICA	Jakarta, Denpasar (Bali Province), Yogyakarta (Wastewater Treatment Plant / Main Culvert)
Australia	Construction of Sewerage : Palembang Technical Assistance (Capacity Building) : Banjarmasin, Balikpapan, Surakarta Co-finance with ADB : Jambi, Pekanbaru, Makassar, Chimahi
South Korea	Batam

Source : Sewerage Development in Indonesia, WPA Workshop 2016, DGHS-MPWNH and Urban Sanitation Review Indonesia 2013, WB & AuAid 2013, edited by JICA Expert Team

(3) Sewerage Policy by Ministry of Public Works in Indonesia

As for the policy for sewage management, the direction of policy is set for Rencana Strategis Kementerian Pekerjaan Umum dan Perumahan Rakyat Tahun 2015-2019 (No. 13 / PRT / M / 2015): Indonesia National Medium-Term Development Plan 2015-2019). And based on this, so far the role of the government has been strengthened, the quality of the sanitation strategy plan improved and awareness improvement at the residents and management level enhanced. Also, in the medium - long term, sanitation strategic plans are formulated in 350 cities / areas supported by the central government. In addition to those activities, it is planned that 100% dissemination of the basic infrastructure is achieved in the targeted 2019 by resolving open defecation, improving the quality of sludge treatment by septic tank and dissemination of sewerage in the urban area.

Table 1-5 Direction of Sewerage Policy

Prior to 2015
・ Strengthening provincial government roles
・ Improving quality cities sanitation strategic plan
・ Promoting awareness of and proper attitude towards sanitation and hygiene at users and management
2015 onwards: focusing on implementation
・ Full support from the central national
・ More than 350 districts/cities with sanitation strategic plan
100% coverage of basic infrastructure, including sanitation in 2019
・ Continuing Open Defecation Free Program
・ Improving quality of septage *management*
・ *Increasing coverage of off-site system in urban areas*

Source : Sewerage Development in Indonesia, WPA Workshop 2016, DGHS-MPWNH and Urban Sanitation Review Indonesia 2013, WB & AuAid 2013, edited by JICA Expert Team

According to the Mid-Term National Development Plan (Rencana Pembangunan Jangka Menengah Nasional) (hereinafter referred to as “RPJMN”) in Indonesia on sewage management, 3 of cities of centralized sewage system of regional scale (newly Bandung metropolitan area besides Bali and Yogyakarta), from 7 to 9 of cities of centralized sewage system of city scale, 652 to 1,600 per year of cities of communal sewage system and 4,694 in 5 years of them are planned. It is planned that sludge treatment plant by septic tanks are developed in 24 to 65 sites yearly in 222 prefectures / cities.

Table 1-6 National Medium-Term Development Plan (RPJMN) by Ministry of Public Works

Activity	Performance Indicator	Unit	Target of Strategic Plan					
			2015	2016	2017	2018	2019	Total
Centralized Sewerage System with City, District and Communal Scale	No. of (Prefecture)/City of Centralized Sewage System of Regional scale	(Prefecture)/City	2	2	2	3	3	3
	No. of (Prefecture)/City of Centralized Sewage System of City Scale	(Prefecture)/City	7	8	10	9	9	9
	No. of (Prefecture)/City of Communal Sewage System	District	952	728	1,600	762	652	4,694
		(Prefecture)/City	209	103	141	165	89	438
	No. of (Prefecture)/City of District Sewage System	District	77	11	58	37	17	200
		(Prefecture)/City	67	11	31	24	17	150
Fecal Sludge Treatment Plant (IPLT[8])	No. of (Prefecture) /City of Fecal Sludge Treatment Plant (IPLT)	(Prefecture)/City	40	24	65	52	41	222

Source : Strategic Plan Year of 2015-2019、General Department of Human Settlement、Ministry of Public Works and Housing

(4) Support for Sewerage Project by Overseas Donors

4-1) Support by ADB and Australia

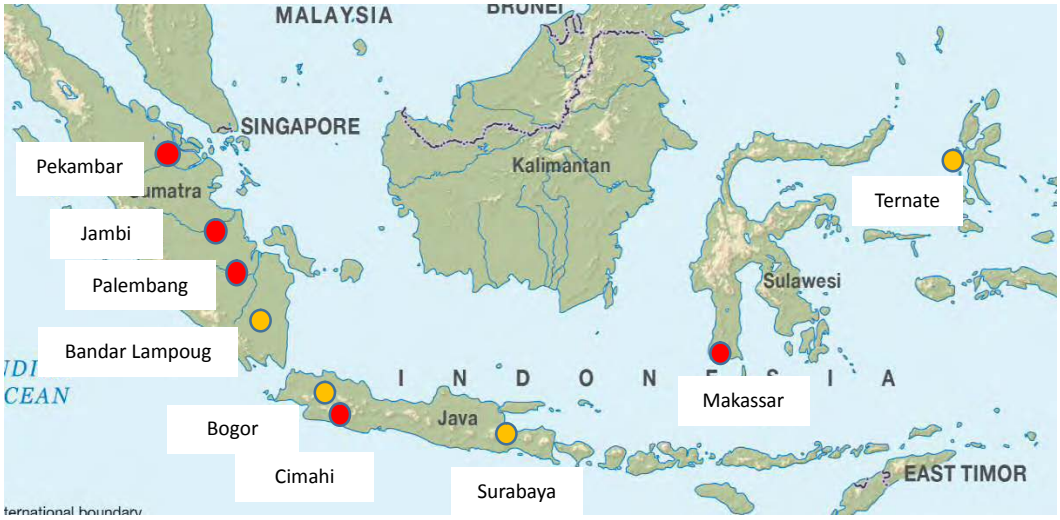
The Indonesia Infrastructure Initiative (hereinafter referred to as “INDII”) was established in 2008 supported by AuAid and has supported the transportation, water and sewerage / sanitation fields. It is reported that IND II ended the activities in July 2017 after 10 years of activities in the 2nd terms.

In order to support the commercialization of sewerage projects, ADB and INDII are supporting facility planning of sewerage project / project scope, the environmental improvement effect / impact on the water environment and environmental and social considerations such as resident relocation etc., through Initial Environmental Examination (hereinafter referred to as “IEE”). Indonesia also budgeted the cost of house connection and aims to connect 70,400 houses in 5

[8] Instalasi Pengolahan Lumpur Tinja (Installation of Stool Mud Processing)

cities.

Regarding sewage treatment, an aerated lagoon method (anaerobic pond - aerobic pond - maturing pond), which is low cost and easy to be operated and maintained, are recommended in the cities where the impact on urban water use on the downstream side is limited. In the area (Cimahi city, West Java Province) whose sewage treatment water is used for urban water in Jakarta metropolitan area, activated sludge process ((Sequencing Batch Reactor) (hereinafter referred to as "SBR")) is proposed. (Refer to Figure 1-2 Cities which commence new Sewerage Project, in Indonesia).



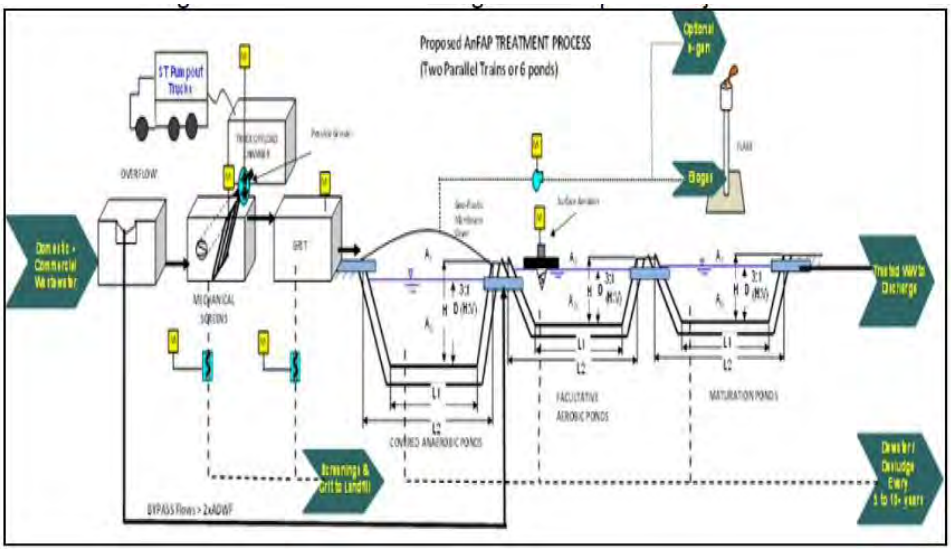
● Support by ADB and IND II
● City where FS / DD were implemented and the acquisition of wastewaer treatment plant is in progress
Source : Ministry of Public Works, edited by JICA Expert Team

Figure 1-2 Cities which commence new Sewerage Project, in Indonesia

Table 1-7 Sewerage Development Projects in 5 cities by ADB / IND II

City	Project Component by 2020			Wastewater Treatment Process
	Trunk mains & main sewers (km)	Household connection (HC)	WWTP (m^3/day)	
Cimahi	7.6	8,900	11,100	SBR
Jambi	14.6	17,700	15,000	Aerated Lagoon
Makassar	16.4	9,000	19,100	Aerated Lagoon
Palembang	13.9	19,000	23,100	Aerated Lagoon
Pekanbaru	13.6	15,800	14,700	Aerated Lagoon
Total	66.1	70,400	83,000	
	352,000 people and 12,800 businesses connected to sewerage and wastewater.			

Source : Proposed Loans Republic of Indonesia : Metropolitan Sanitation Management Investment Project, ADB 2014 and IEE Report, ADB, edited by JICA Expert Team



Source : Initial Environmental Examination - Pekanbaru City Off-Site Wastewater Collection System and Treatment, ADB 2013

Figure 1-3 An Aerated Lagoon Process

The resources to invest in sewerage projects in 5 cities are funded by grants from the Australian government, ASEAN infrastructure funds and funds of the government and state governments, in addition to the ADB loan. It is planned that the proportion of loans accounts for 48.4%.

Table 1-8 Funding Source Plan for ADB / IND II Projects (5 cities)

Source	Amount (USD million)	Share of Total (%)
Asian Development Bank（ADB） Ordinary Capital Resources (Loan)	80.00	32.3
ASEAN Infrastructure Fund (Loan)[a]	40.00	16.1
Government of Australia (Grant)[b]	48.83	19.7
Central Government	35.04	14.1
Local Government	44.15	17.8
Total	248.02	100.0
ASEAN = Association of Southeast Asian Nations a) administered by the Asian Development Bank b) through the Indonesia Infrastructure Initiative (IND II)		

Source : Proposed Loans Republic of Indonesia : Metropolitan Sanitation Management Investment Project, ADB 2014

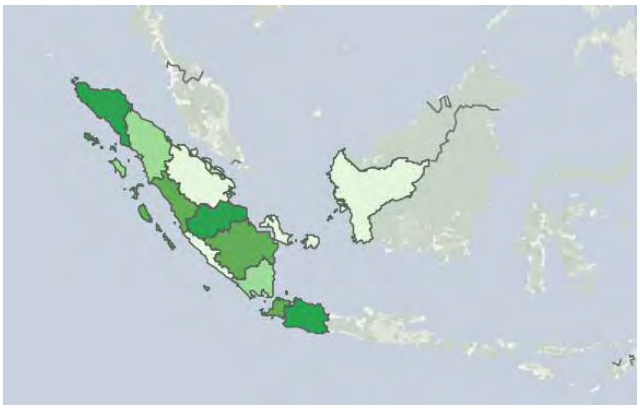
4-2) Support by BORDA

Bremen Overseas Research and Development Association (hereinafter referred to as “BORDA”),

a German NGO, established an office in Yogyakarta in 1988 and has been supporting decentralized and community-based projects on the field of sanitation (water supply, sanitation and waste substance). In such a field, it also has been trying to disseminate and improve SANIMAS in cooperation with the Ministry of Public Works, WB, USAID and so on.

4-3) Support by Isramic Development Bank (IsDB)

Isramic Development Bank (hereinafter referred to as “IsDB”) has been supporting Water Sanitation and Hygiene (WASH) (hereinafter referred to as “WASH”) to promote community-based education, in 13 provinces, such as Sumatra Island, the west part of Java (West Java Province, Banten Province, DKI Jakarta) and West Kalimantan Province in Indonesia, since 2013. It supports SANIMAS project in the field of sewage management.



Support Area (Province)	
Aceh	Sumatra Utara
Sumatra Barat	Riau
Jambi	Sumatra Selatan
Bengkulu	Lampung
Bangka Belitung	Jawa Barat
DKI Jakarta	Banten
Kalimantan Barat	

Source : Islamic Development Bank

Figure 1-4 Support Areas by IsDB

1-3 Title of the Project

The title of the Project is “The Project for Improving Planning Capacity for the Sewerage System in DKI Jakarta in the Republic of Indonesia” (hereinafter referred to as “the Project”).

1-4 Period of the Project

The period of the Project is 27 months from December 2015 to February 2018.

1-5 Background of the Project

(1) Current Status and Issues of Sewerage Sector / DKI Jakarta Area in Indonesia

In DKI Jakarta, as a result of the rapid urbanization with economic growth, its population became over 10 million people, however development of urban infrastructure such as transportation and water supply and sewerage has been delayed. Therefore, in order to cope with the environmental problems and health damage caused etc. by water pollution in public water area, such as frequent flooding damages caused by insufficient capacity of river and rainwater drainage path or serious water related problem of aggravation of the living environment caused by untreated drainage of domestic wastewater to existing drainage channels, sewerage development is urgently required.

In Indonesia, after the Asian currency crisis in 1997, decentralization advanced by the enforcement of the related law after 1999. And regarding infrastructure development such as sanitation facilities, its role has been shifting from the central government to the local government. Based on the National Development Plan or the guidelines, the local governments are required to formulate the detailed plans at the local level before implementing construction and operation and maintenance etc. of facilities. For that rules, as for Loan Aid “DKI Jakarta Sewerage Development. Project (E/S[9])” (signing L/A[10] in February 2014, approved amount about 2 billion yen) (hereinafter referred to as “Loan Project”), although DKI Jakarta is required for acting proactively the tasks which DKI Jakarta is responsible for, such as promotion of house connection, sewerage fee system, improvement of public awareness for sewerage project etc., those tasks are not able to be fully considered due to less experiences on sewerage projects.

(2) Relationship between Development Policy of Sewerage Sector / DKI Jakarta Area in Indonesia and Loan Project

The Government of Indonesia regards sewerage development as an important issue contributing to the environmental, sanitation and flood measures in "Indonesian RPJMN" from 2010 to 2014.

In “Revised Master Plan” (March 2012) instituted in “Project for Capacity Development of Wastewater Sector through reviewing the Wastewater Management Master Plan in DKI Jakarta” It is targeted that the percentage of sewered population is raised to 20% by 2020 and 80% by 2050. Also, further ahead of this plan, the plan that the wastewater treatment rate become 65%

[9] Engineering Service

[10] Loan Agreement

by 2022 (Governor Decree No. 41/2016) is considered.

In the concept “Jakarta Metropolitan Priority Area (MPA) (hereinafter referred to as “MPA”) (December 2010), development of water supply and sewerage is regarded as one of the priority areas. And, both Ministers agreed that, in “MPA Master Plan” (October 2012), sewerage Development Project in Zone-1 is regarded as one of the "Priority Implementation Projects" aiming for completion by 2020, and is considered as "Flagship Project" which is a symbolic project that the public and private sectors of both countries (Indonesia and Japan) cooperate with.

(3) Japan's and JICA's Aid Policies and Achievements for Sewerage Sector / DKI Jakarta Area

In Japan’s “Country Assistance Policy for the Republic of Indonesia” (April 2012), "Support for further economic growth", that is support for infrastructure development around the Jakarta metropolitan area, become one of the priority areas. Also, according to JICA Country Analysis Paper for Indonesia, development of the urban environment in the metropolitan area is listed as a priority support area, and Loan Project is consistent with these policies and analyzes.

Furthermore, as for the sewerage sector, numbers of supports are implemented as is shown in the following table.

Table 1-9 Achievement of Japan’s Aid on Sewerage Sector in DKI Jakarta

Project Name	Aid Form	Period etc.
Project for Capacity Development of Wastewater Sector through reviewing the Wastewater Management Master Plan in DKI Jakarta	Technical Cooperation	Completion in June 2012
MPA Support Facility.	Technical Cooperation	Commencement in May 2014
DKI Jakarta Sewerage Development Project (E/S)	Loan Aid	Signing L/A in February 2014
Sewage Management Advisor	Individual Expert	From September 2012

(4) Other Donors

WB provided $ 22.4 million loan as “Jakarta Sewerage and Sanitation Project (hereinafter referred to as “JSSP”)” in June 1983. The main purpose of this project is to improve protection measures of public health by improvement of the urban environment, and 80 public toilets were constructed in addition to sewerage development in Zone-0. Moreover, in currently undergoing "Water and Sanitation Program" (hereinafter referred to as "WSP"), the sanitation environment

plans to be improved with Septic tank[11], which treats sewage at mainly on-site[12] in urban area such as Jakarta.

(5) Conclusion

In such a background, in September 2012, the Government of Indonesia requested the Japanese Government for technical cooperation to improve water related issues related to water quality, floods, water resources and ground subsidence in DKI Jakarta. Then, with regard to the sewerage area among each water area, L/A of “DKI Jakarta Sewerage Development Project (E/S)” was signed in February 2014 and it was urgently necessary to strengthen the sewerage sector structure within DKI Jakarta. In response to this, JICA consulted with the relevant organizations in a direction to preferentially tackle the capacity development on planning for sewerage development, summarized the contents of the consultation as Minutes of Meeting (hereinafter referred to as “M/M”) in July 2014, and agreed with the Indonesian side. Afterwards, Record of Discussion (hereinafter referred to as "R/D") of the Project was signed on 10 December, 2014 by the executing agency, DKI Jakarta and JICA, and based on the R/D JICA expert (chief advisor) was dispatched and started activities from June, 2015.

1-6 Current States of Sewerage Sector in DKI Jakarta

1-6-1 Current States of Sewage Treatment in DKI Jakarta

Regarding sewage treatment in DKI Jakarta, it is estimated that the percentage of sewered population is 4% (around 400 thousand people), as shown in “Figure 1-5 Present Situations of Wastewater Treatment in DKI Jakarta.” The percentage of Individual Treatment Plant (ITP) (hereinafter referred to as “ITP”) is 25% and the one of Septic Tanks is 64%. The remaining 9% is supposed as open defecation in slum area.

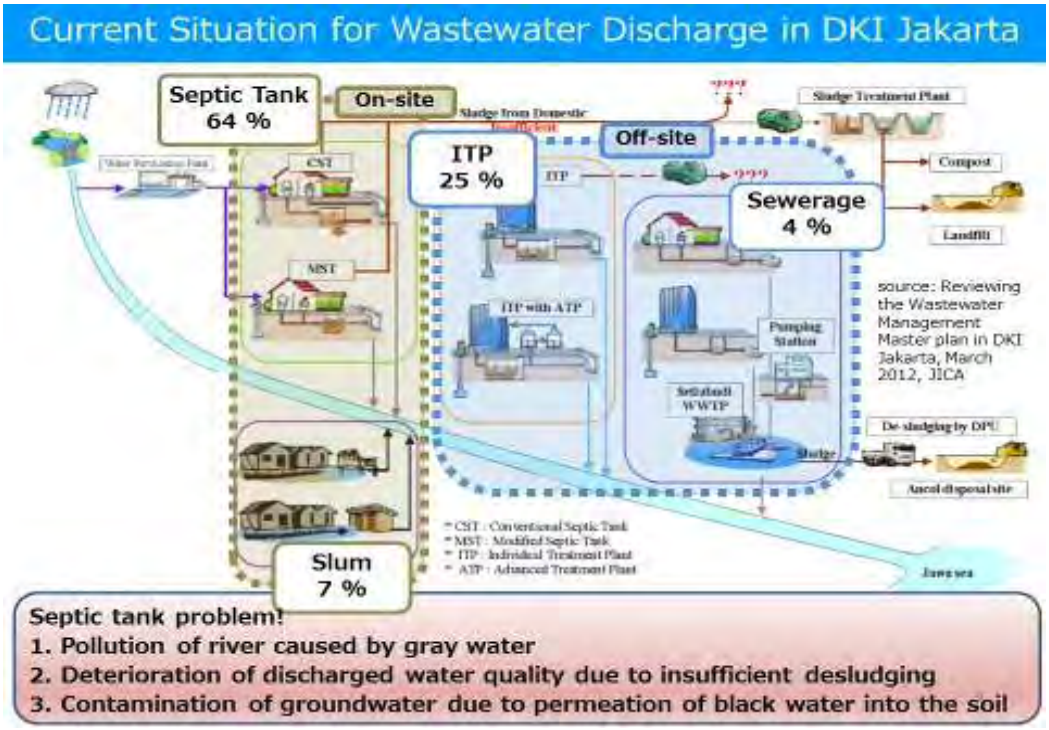
Wastewater treatment plant in Setia Budi[13] does not demonstrate its adequate treatment performance with the aerated lagoon method. Even for individual treatment plants, there are few plants that are properly operated and maintained, for example, leaving anaerobic treatment plants and breakdowns. Especially, Septic Tanks notes that the miscellaneous wastewater

[11] One of the purification facilities which stores drainage from toilet in a tank and leaves it as it is to carry out anaerobic treatment

[12] Wastewater treatment system for detached houses and commercial facilities in sewerage undeveloped areas. Septic tanks are also classified as on-site systems.

[13] District in the southern part of Jakarta

discharged untreated is water pollution source, that sludge extraction is insufficient and groundwater contamination due to underground penetration of the urine. Low performance of the treatment plant and untreated miscellaneous wastewater cause poor water pollution and hygiene environment.



Source : Wastewater Management in Jakarta, Special Seminar on May 23, 2017, Mr. Matsumoto JICA Experts (Chief Advisor)

Figure 1-5 Current States of Sewage Treatment in DKI Jakarta

In the following table, the number of house connected to the wastewater treatment plant in DKI Jakarta by Wastewater Management Enterprise City of Jakarta (Perusahaan Daerah Pengelolaan Air Limbah Jaya) (hereinafter referred to as “PD PAL Jaya”) is indicated. In DKI Jakarta, sewerage services are provided to customers in 2,602 houses / buildings as is shown in "Figure 1-6 Conversion of the Number of House Connection" and "Figure 1-7 the Target of Sewerage Development in Jakarta." For the present target of sewerage development, sewerage services have to be provided for about 1,000 times customers in a short period of about 5 years for the amount of development over the past 25 years.

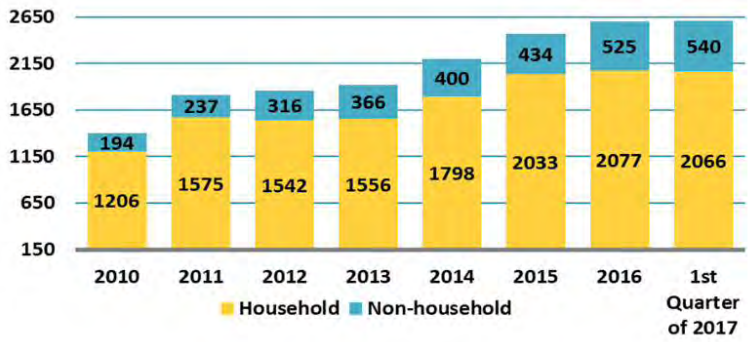
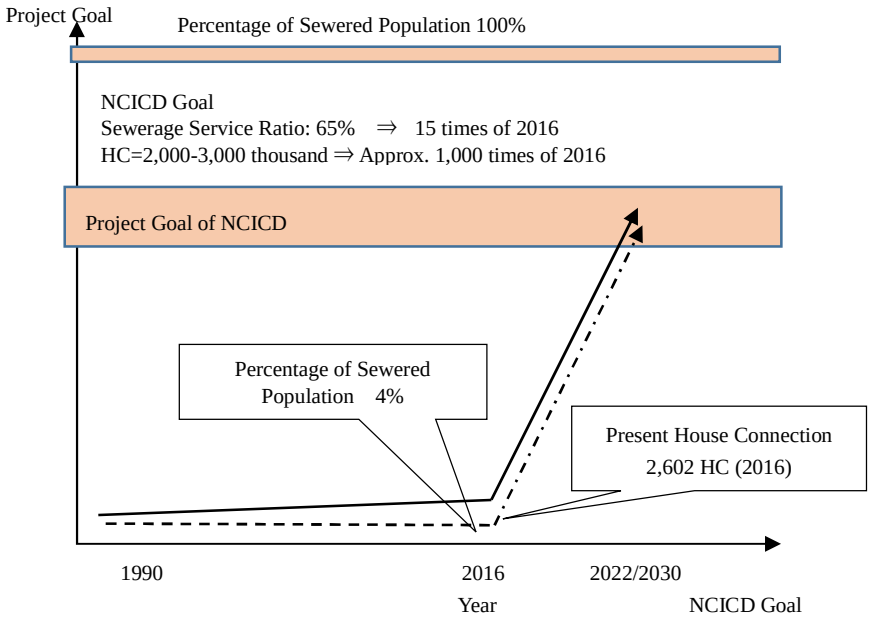


Figure 1-6 Conversion of the Number of House Connection



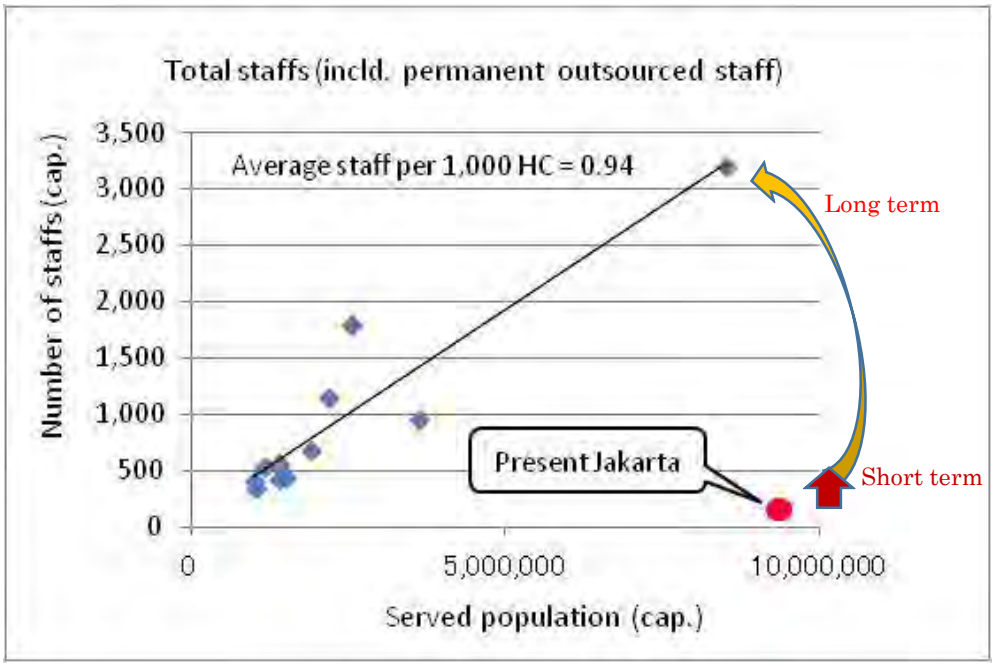
Source : JICA Expert Team

Figure 1-7 the Target of Sewerage Development in Jakarta

Furthermore, regarding the implementation structure of sewerage project, it is an extremely small implementation structure compared to the one in the large cities in Japan, as is described in “Figure 1-8 Implementation Structure of Sewerage Project.” The sewerage implementation structure in Japan and the other developed countries requires about 200 staffs in Zone-1 (Refer to “1-6-3 Sewerage Development Plan in DKI Jakarta”), and 3,500-4,000 staffs in case 100% of percentage of sewered population is reached in the future, even if there is 1 staff for Japan's same population-sized cities and 1,000 house connections.

In order to build a large scale implementation structure, in addition to the formulation and implementation of assured sewerage development plan, human resource development,

clarification of services and business plan are required. It is not easy to increase the number of the government officials and establish a new public sector. The roles taken by the public should be clarified and appropriate methods for Jakarta should be applied referring to the specific good practices by Public Private Participation (hereinafter referred to as “PPP”) to utilize external resources. In the case of Japan, external resources have been utilized by various means such as private consignment of operation and maintenance, comprehensive management consignment, designated manager system, PFI[14] / PPP project and Sewerage Corporation etc.



Reference : the number of required staffs in Jakarta (Concept)
200 staffs in Zone-1 Zone 1 (Administrative Population 1-1.2 million)
3,500-4,000 staffs in all DKI Jakarta (9.59 million (BPS 2010))

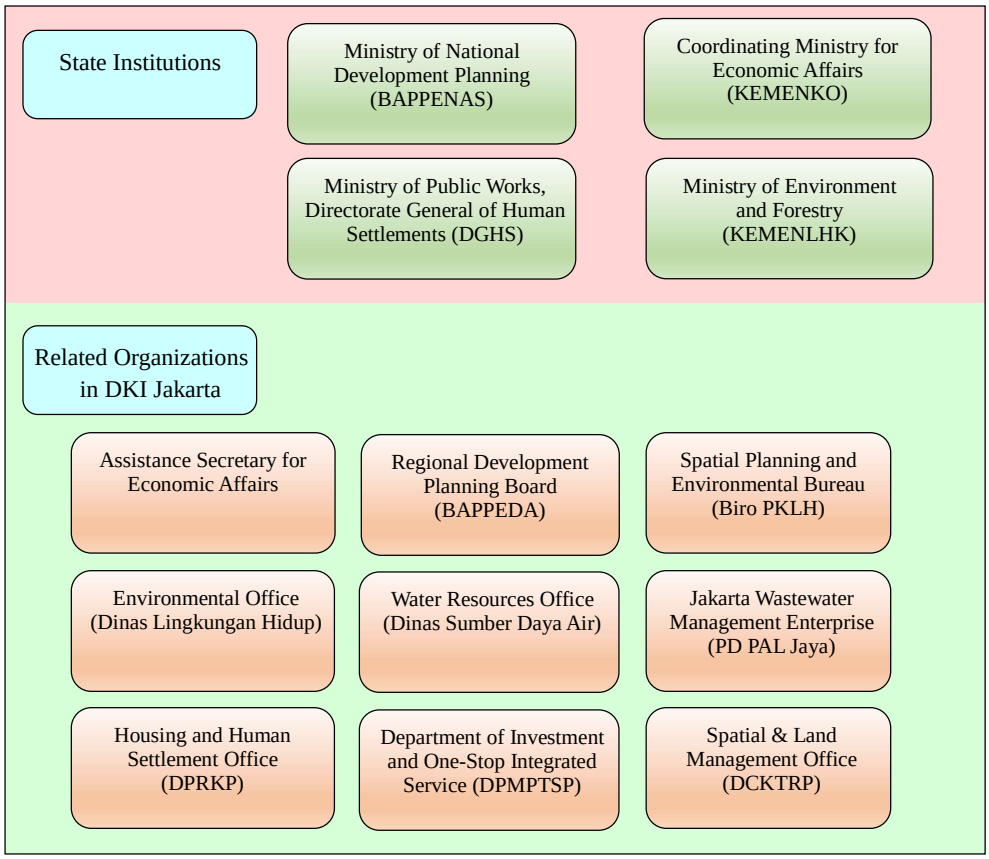
Resource : Statistics of Sewerage (2010), edited by JICA Expert Team

Figure 1-8 Implementation Structure of Sewerage Project

1-6-2 Related Institutions of Sewage Sector in DKI Jakarta

A number of the related institutions of sewage sector in DKI Jakarta are existing as is shown in the following figure:

[14] Private Finance Initiative : a way of creating "public–private partnerships" (PPPs) where private firms are contracted to complete and manage public projects.



(as for December, 2017)

Figure 1-9 Related Organizations to Sewerage Sector in DKI Jakarta

(1) The State Institutions

The state institutions related to sewerage sector are 1) Ministry of Public Works and Housing, Directorate General of Human Settlements (hereinafter referred to as “DGHS”), 2) BAPPENAS, 3) Coordinating Ministry for Economic Affairs (Kementerian Koordinator Bidang Perekonomian) (hereinafter referred to as “KEMENKO”), which is responsible for coordinating large-scale national projects such as NCICD etc., and 4) Ministry of Environment and Forestry (Kementerian Negara Lingkungan Hidup dan Kehutanan) (hereinafter referred to as “KEMENLHK”).

1) Ministry of Public Works and Housing, Directorate General of Human Settlements (DGHS)

DGHS, which is the responsible institution of the Project, is one of 4 Directorate Generals (Directorate General of Spatial Planning, Directorate General of Highways, Directorate General of Human Settlements and Directorate General of Water Resources). As shown in the table below, DGHS consists of 5 directorates (Directorate of Program Development, Directorate of

Settlement Development, Directorate of Building & Neighborhood Development, Directorate of Water Supply Development and Directorate of Environmental Sanitation Development.) Among them, Directorate of Environmental Sanitation Development is responsible for wastewater treatment including sewerage and rainwater drainage, and Directorate of Program Development performs comprehensive planning and management for water supply, housing, wastewater treatment / rainwater drainage and waste management.

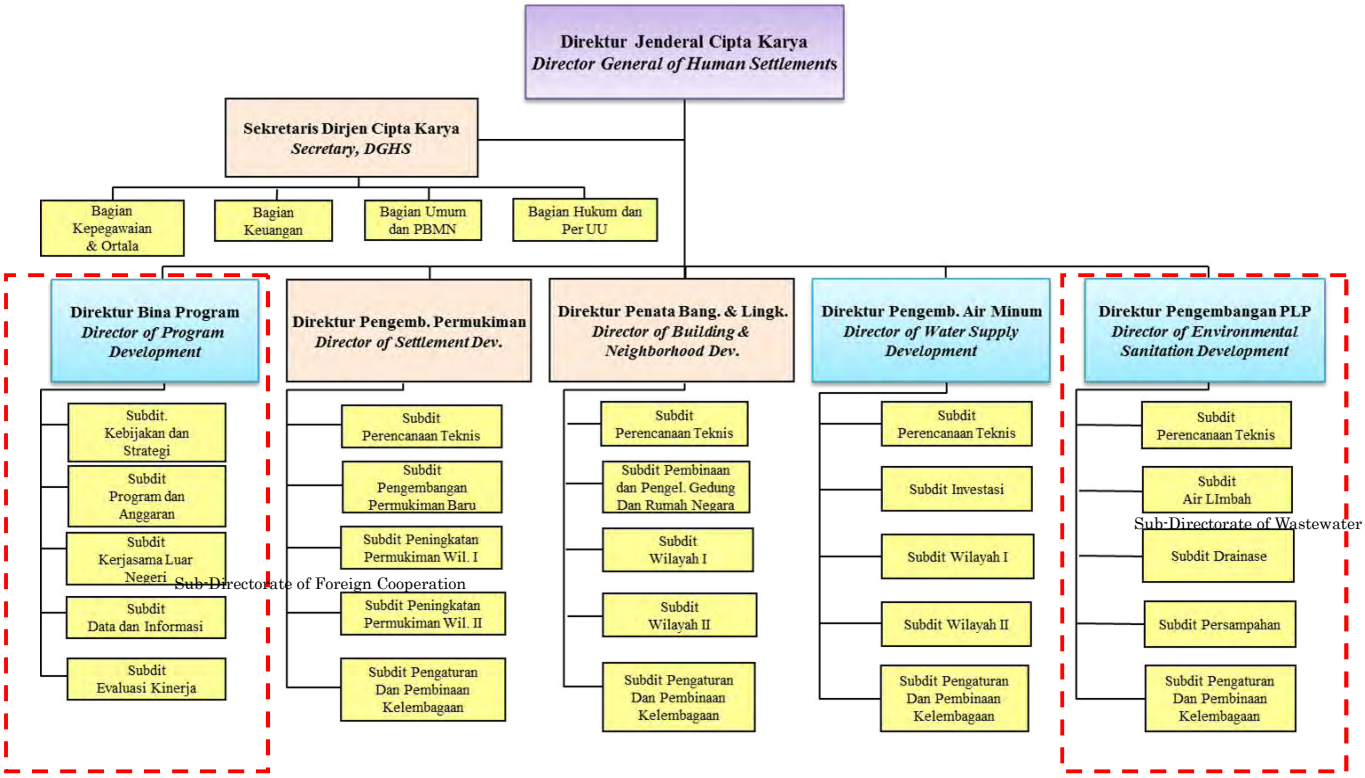


Figure 1-10 Organizational Diagram of DGHS (as for December, 2017)

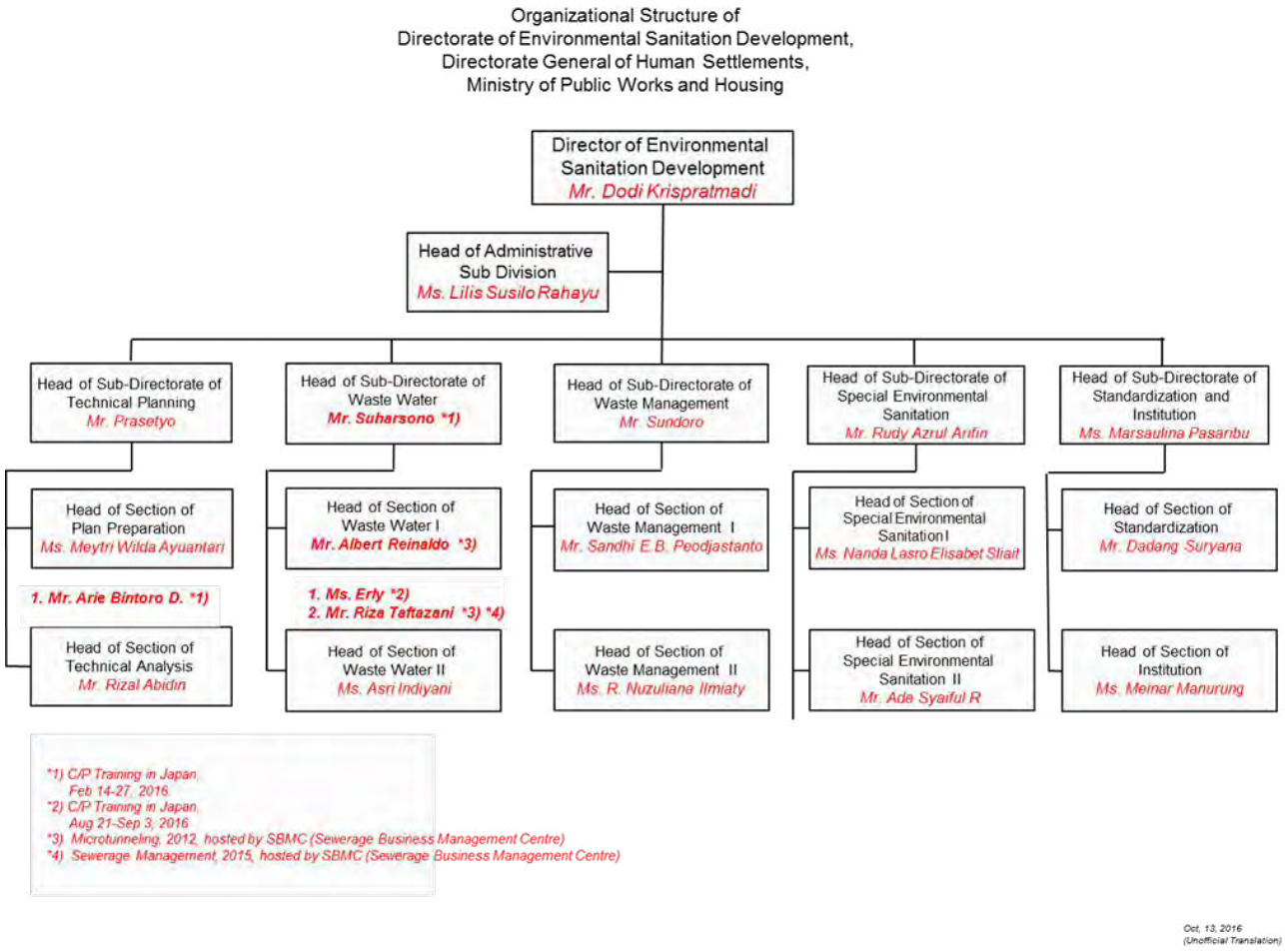


Figure 1-11 Organizational Diagram of Directorate of Environmental Sanitation Development (as for December, 2017)

2) Ministry of National Development Planning (BAPPENAS)

BAPPENAS is an organization that establishes the policy of sewerage development as a part of the national development plan.

3) Ministry of Environment and Forestry (KEMENLHK)

KEMENLHK is responsible for protecting the environment such as water and the atmosphere, and conservation of forest. Regarding water quality management, (1) the central government for water area over the country or the cross-border, (2) the provincial government for water area over prefecture or city and (3) the prefecture or the city for water area within prefecture or city, perform the administrative authority (From the website of the Ministry of the Environment of Japan).

(2) Related Organizations in DKI Jakarta

For the related organizations to the sewerage sector in DKI Jakarta, Assistance Secretary for Economic Affairs and 6 institutions as is shown in the following organizational diagram are shown:

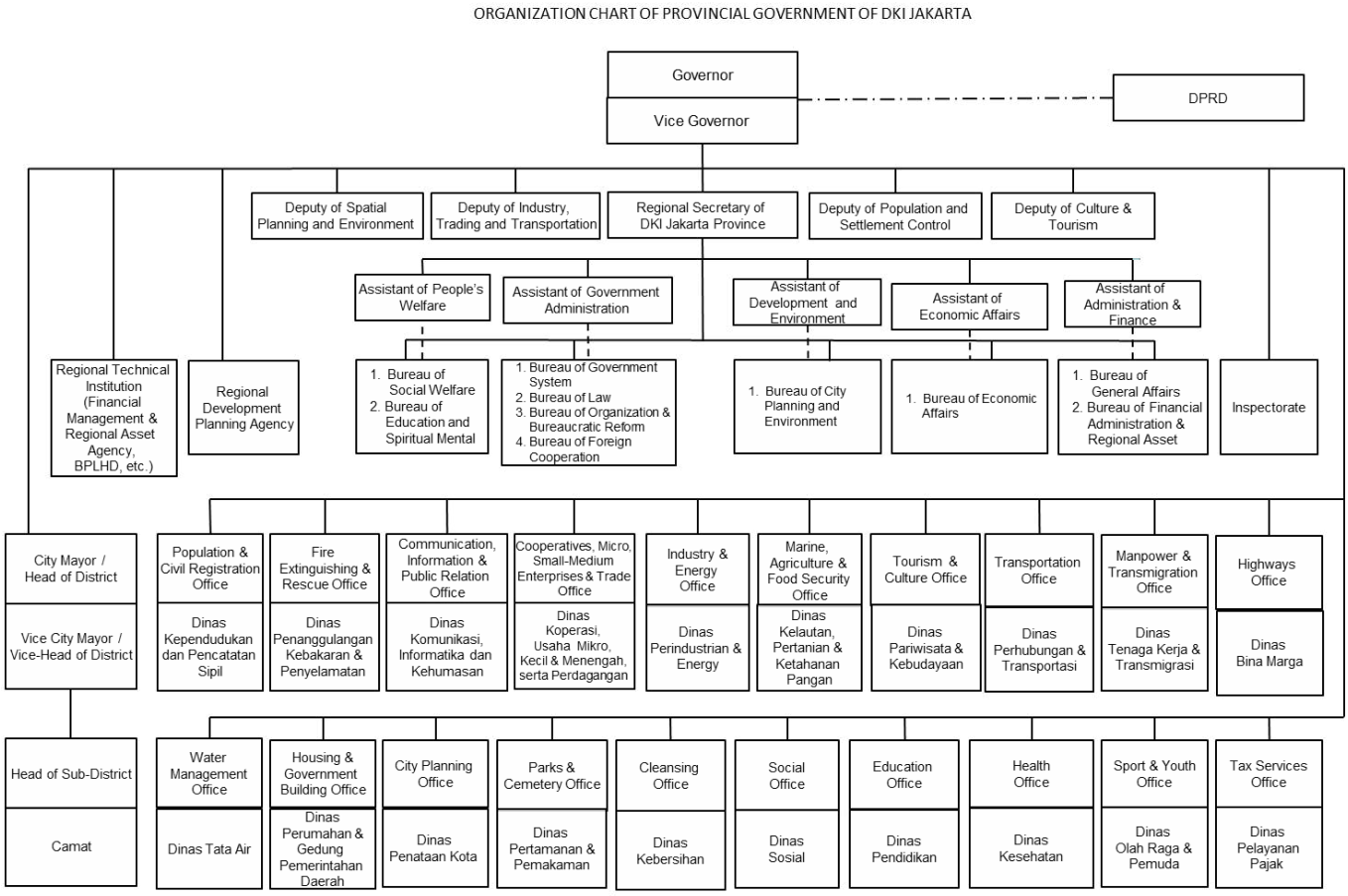


Figure 1-12 Organizational Diagram of Related Organizations in DKI Jakarta
(as for December, 2015)

Furthermore, the organization of the government of DKI Jakarta was reorganized in January, 2017 and the current organizational diagram of related organizations in DKI Jakarta is set as is shown below:

Major changes by the reorganization are as follows.

1) Former Water Management Office (Dinas Tata Air) related

・Water Management Office (Dinas Tata Air) (hereinafter referred to as “Dinas Tata Air”) was renamed to Water Resource Office (Dinas Sumber Daya Air) (hereinafter referred to as

"Dinas Sumber Daya Air").

・Groundwater related works of the former Dinas Tata Air were transferred to Industry & Energy Office (Dinas Perindustrian & Energy).

2) Related to former Cleaning Office (Dinas Kebersihan) and former Regional Environmental Management Bureau (BPLHD)

・ Cleaning Office (Dinas Kebersihan) (hereinafter referred to as "DK") and Regional Environmental Management Agency (Badan Pengelolaan Lingkungan Hidup Daerah) (hereinafter referred to as "BPLHD") were integrated and Environment Office (Dinas Lingkungan Hidup) (hereinafter referred to as "DLH") was newly established.

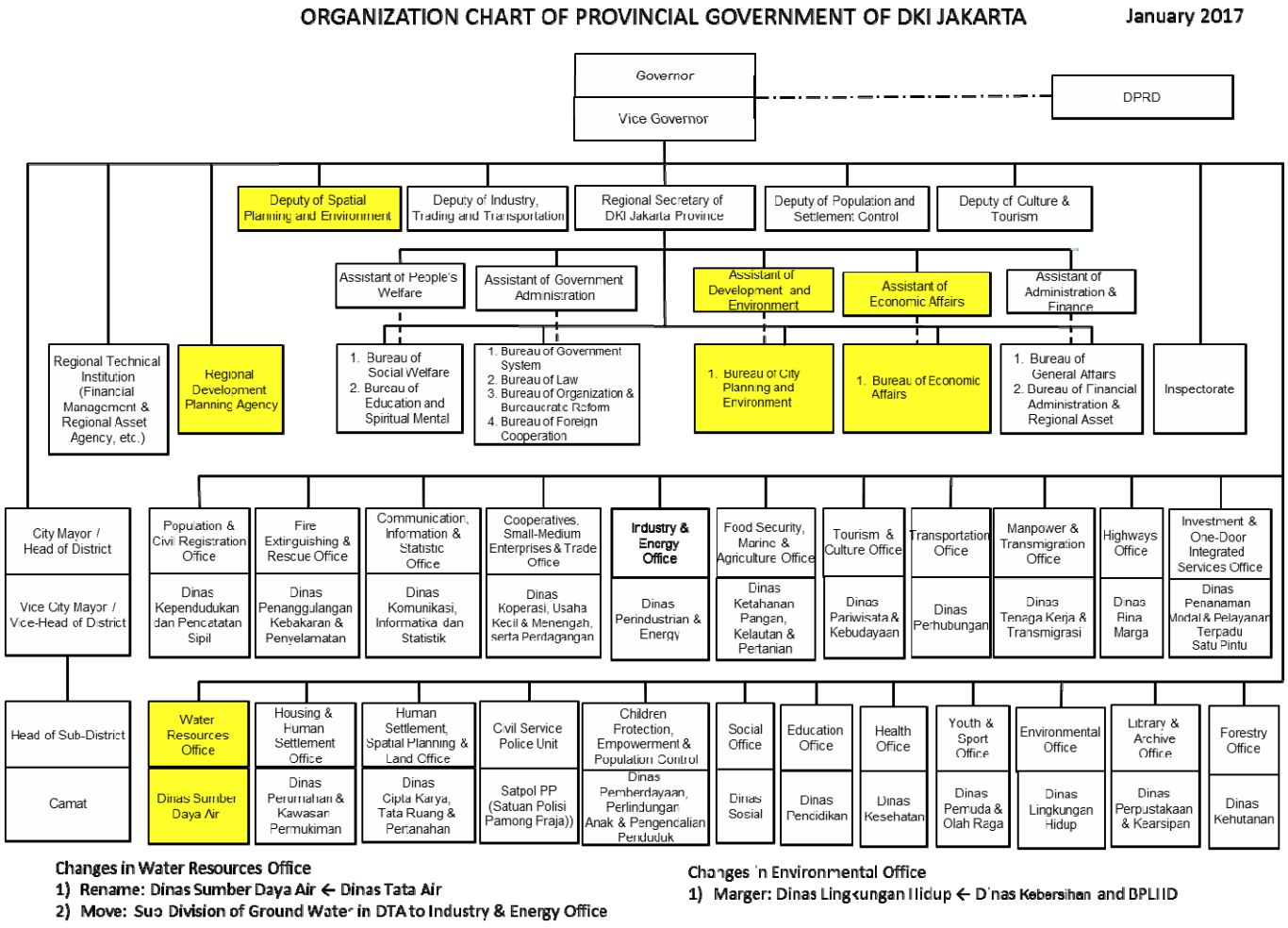


Figure 1-13 Organizational Diagram of Related Organizations in DKI Jakarta (as for December, 2017)

In sewerage project, many departments/offices in DKI Jakarta are involved to sewerage planning, assessment of sewerage effects / environmental impacts, investment planning, land use planning / occupation permission on sewerage development plan and operation of sewerage, etc. In the stages of sewerage development plan and legal system development, the main counterpart institutions are Regional Development Planning Board (Badan Perencanaan Pembangunaan Daerah) (hereinafter referred to as "BAPPEDA") and Dinas Sumber Daya Air. As superior organizations, Deputy of Spatial Planning and Environment and Assistant of Development and Environment are in charge of main decision making on sewerage project.

Assistant of Economic Affairs which is responsible for investment of economical infrastructure and management including the public corporation, takes charge of PD PAL Jaya. Therefore, it was involved in decision making regarding sewerage projects until PD PAL Jaya was stipulated in PIU (Project Implementation Unit) concerning sewerage projects throughout DKI Jakarta. However, the former Dinas Tata Air (the current Dinas Sumber Daya Air) was established by the reorganization in January, 2015 and PIU throughout DKI Jakarta except Zone 0 transferred to the former Dinas Tata Air. After that, Assistant of Economic Affairs has no involvement in sewerage projects.

Assistant of Government Administration, which is in charge of the legal system and organizational regulations, is deeply involved in the provision and establishment of sewerage regulations. However, at the stage of drafting the sewerage regulation, it is important for the departments which practically engages in sewerage to examine and make decisions on the way of sewerage development / mana, so Assistant of Government Administration cannot be a main counterparts in the Project. Bureau of Law will be responsible for making the regulations at the stage when the structure of sewerage administration and the framework of regulations are solidified.

① Assistance Secretary for Economic Affairs

Assistance Secretary for Economic Affairs is an aide directly to the governor, who coordinates the economic fields including infrastructure development, transportation and markets, etc. In DKI Jakarta in a comprehensive manner.

② Regional Development Planning Board (BAPPEDA)

BAPPEDA is in charge of development plan of various master plans etc. Which are performed in DKI Jakarta. It is also the responsible department for the policy of DKI Jakarta. In regard to sewerage development / sewage treatment, BAPPEDA takes charge of policies such as

development plan, budget and institutions etc., and has authorization of decision regarding sewerage administration including sewerage development policy, budget, regulations / institutions. As for sewerage, City Infrastructure and Environment Division, which administrates public facilities, and Sub-Division of Water Management, Hygiene & Environment are in charge of it. The main counterparts are 3 staffs of the director, the section manager and the person in charge.

Moreover, as for the organizational structure of BAPPEDA, there is no change from the Project start (December 2015) until December 2017.

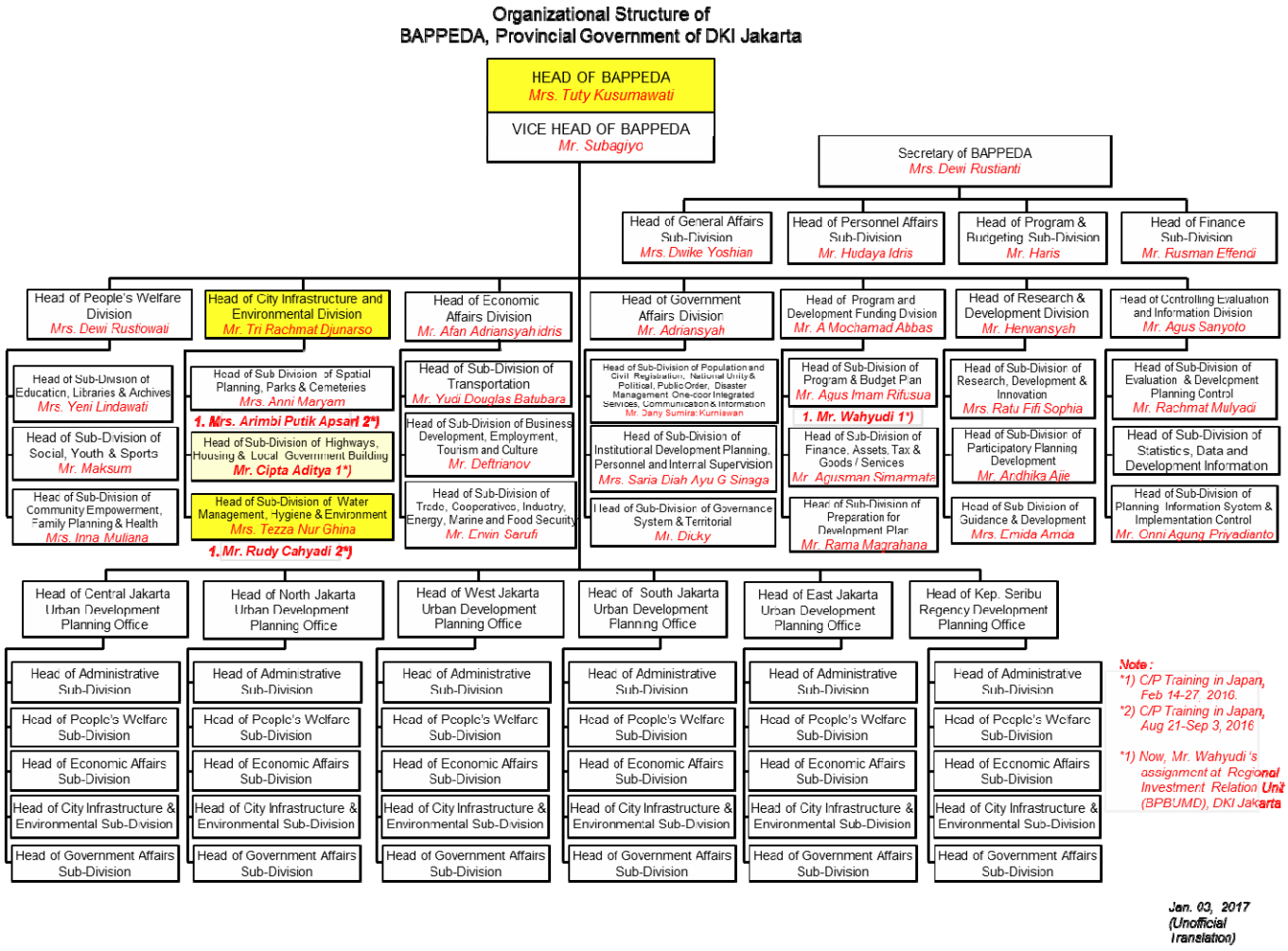


Figure 1-14 Organizational Diagram of BAPPEDA (as for December, 2017)

③ Spatial Planning and Environmental Bureau (Biro PKLH)

Spatial Planning and Environmental Bureau (Biro Penataan Kota dan Lingkungan Hidup)

(hereinafter referred to as "Biro PKLH") was formulated in 2016 after integration of Spatial Planning Bureau and Environment Policy Department in BPLHD. Biro PKLH involves in sewerage planning from the viewpoint of space planning (urban planning) on sewerage and water environment management / environmental hygiene. Therefore, it is responsible for important decision making from the viewpoint of environmental administration, such as the role of sewerage regulations stipulated in the sewerage regulations, the sewerage system (methods of wastewater collection and the quality of discharge water etc.), the effect of improvement of water environment, and the effect of improvement of sanitization.

Division of City Spatial Structure Control, which is in charge of permission of urban facilities, is the administrative agency responsible for determining the sites for treatment plant and permitting occupancy of underground space and roads at the stage of implementation of sewerage project.

Division of City Spatial Pattern Control which is in charge of the urban spatial planning and urban development projects is involved in determining the location of treatment plant and reviewing private development projects. This department is necessary to be collaborated with at the stage of operating sewerage regulations, such as the provision of obligation for connection to sewerage for private development projects proposed in the Project.

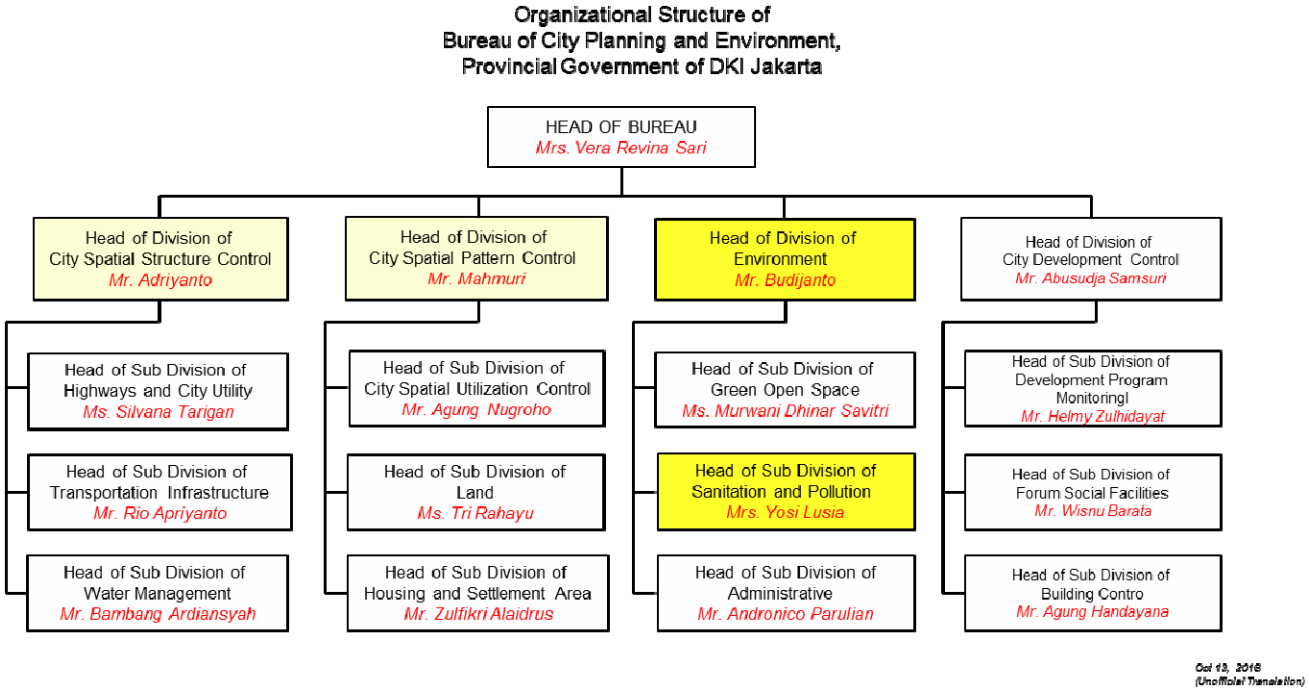


Figure 1-15 Organizational Diagram of Biro PKLH (as for December, 2017)

④ Environment Office (Dinas Lingkungan Hidup)

The former BPLHD and the former DK were integrated and DLH was newly established by reorganization in January, 2017.

・Former Regional Environmental Management Bureau (Bidang Pengendalian Dampak Lingkungan)

Environmental Impact Control Committee is a department responsible for the environmental administration, and conducts water environment management / drainage control in the water field.

The main tasks of drainage regulation for DLH are shown below:

Table 1-10 DLH's main Tasks of Drainage Regulations

1) Formulation and implementation of the policies for environmental management
2) Formulation of legal system and technical standards
3) Determination of environmental standards / drainage standards
4) Development of water quality monitoring method / evaluation method
5) Creation of water pollution inventory
6) Implementation / evaluation of environmental monitoring
7) Guidance / order for company
8) Technical guidance / management / supervision of Environmental Impact Assessment (EIA)
9) Monitoring of pollution sources and reduction of pollutant load
10) Management of moving pollution sources

Source : Publication from DLH, edited by JICA Expert Team

As stated above, DLH is responsible for environmental management plan and Environmental Impact Assessment (EIA / AMDAL) and plays a leading role in environmental improvement effect of sewerage. As for sewerage project, basically negative impact on the environment has to be minimized (technological measures are taken), and the sewerage project contributes to improvement of sanitation / water environment and the status of gender and the poor. Therefore, at the stage of examining the sewerage development plan / sewerage administrative and financial system, the relationship as a counterpart is weak and it is essential to share information.

・Former Cleaning Office (Dinas Kebersihan)

DK is one of the service departments of DKI in charge of management of garbage and raw sewage. Regarding sludge treatment by septic tank, DK has been engaged in sludge removal and operation and maintenance of sludge treatment plant until now. However, sludge treatment service in Zone 0 was transferred to PD PAL Jaya from 2014 and the service and sludge treatment plant throughout Jakarta was done to PD PAL Jaya in January, 2016.

Cleaning of garbage in rivers / waterways / roadside gutters and marine areas has been carried out by Public Works Office. This work was unified into the jurisdiction of DK from January, 2016 at the organization reform by the Governor of DKI Jakarta. Regarding sedimentary soil, it is the responsibility of Dinas Sumber Daya Air.

⑤ Water Resource Office (Dinas Sumber Daya Air)

With the reorganization of the DKI government in January, 2015, the former Dinas PU (Ministry of Public Works) was devided with Road Office, and Dinas Tata Air was launched. Thereafter, through the reorganization in January, 2017, the following changes were made:

- ・The former Dinas Tata Air (Water Management Office) was renamed to Dinas Sumber Daya Air (Water Resources Office)
- ・Groundwater works of the former Dinas Tata Air was transferred to Dinas Perindustrian & Energy (Industrial and Energy Office)

Dinas Sumber Daya Air is Project Implementation Unit (PIU) of sewerage project in Zone-1 to 14 (refer to "1-6-3 Sewerage Development Plan in DKI Jakarta"), and is in charge of planning sewerage / implementing sewerage project and sewerage administrative and financial system. In other words, Dinas Sumber Daya Air is the executing agency (Investor) of sewerage / wastewater management projects and it also bears the functions as a Regulatory Body to appropriately manage sewerage / sewage management. Moreover, as for the Mid-Term Sewerage Development Plan, BAPPEDA, which manages the budget / development plan, is responsible for it primarily, and regarding sewerage related works in BAPPEDA, Sub-Division of Water Management, Hygiene and Environment of City Infrastructure and Environmental Division takes responsibility on them with one full-time staff. Therefore, the capacity of BAPPEDA to formulate sewerage plans is very limited, and the role of Dinas Sumber Daya Air is extremely important.

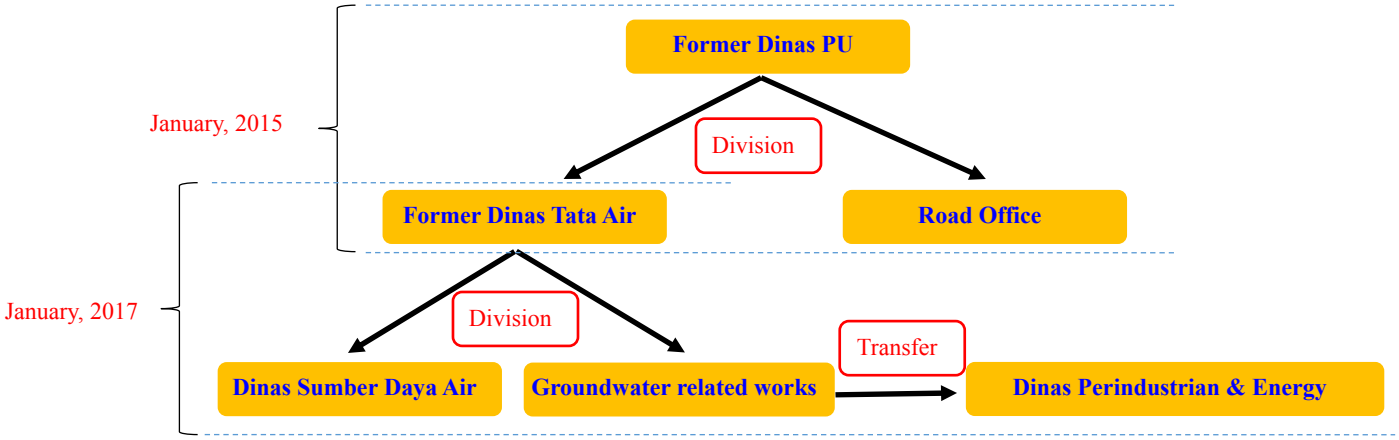


Figure 1-16 Organizational Transformation of Dinas Sumber Daya Air (as for December, 2017)

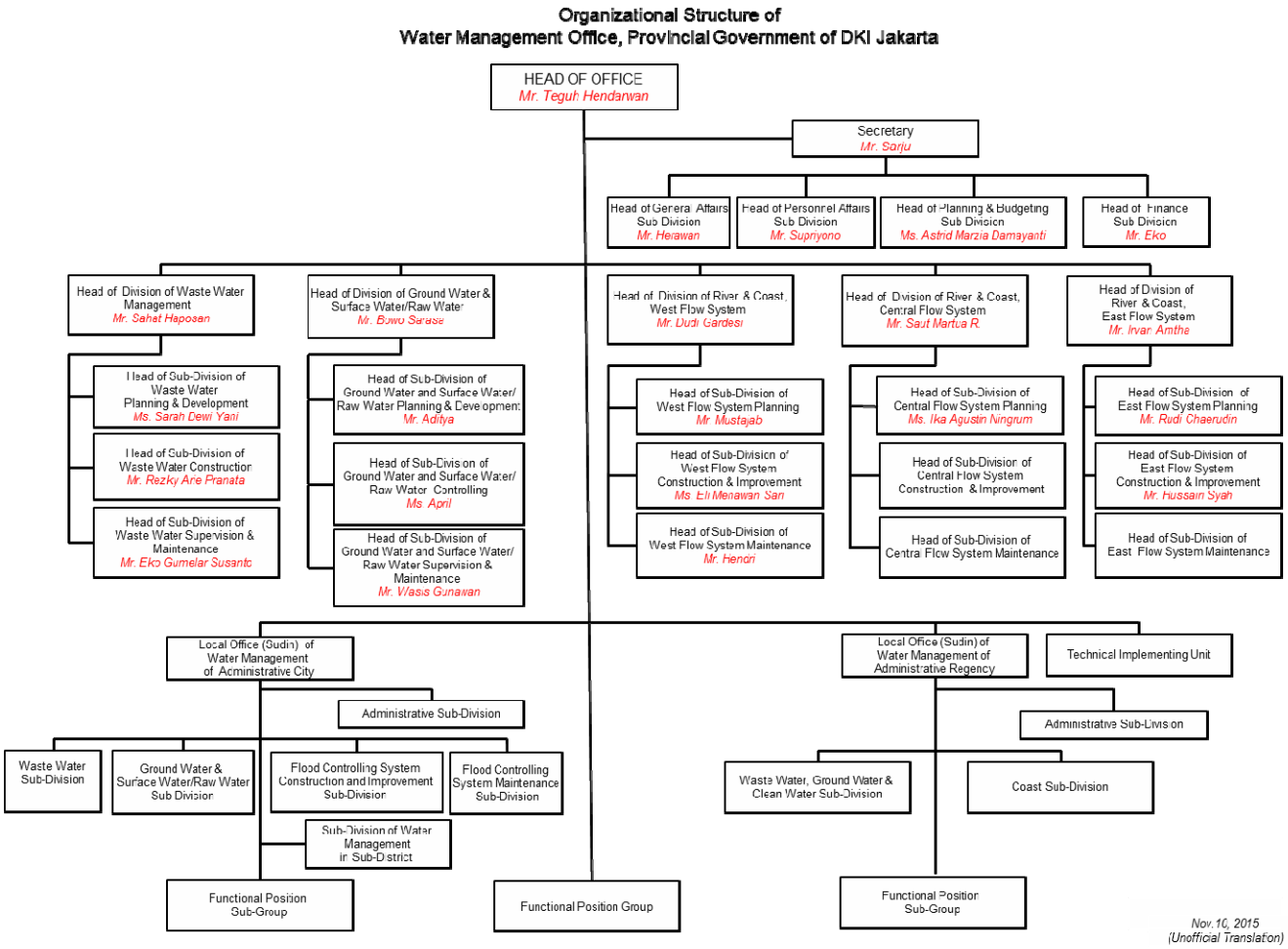


Figure 1-17 Organizational Diagram of Dinas Tata Air (as for December, 2015)

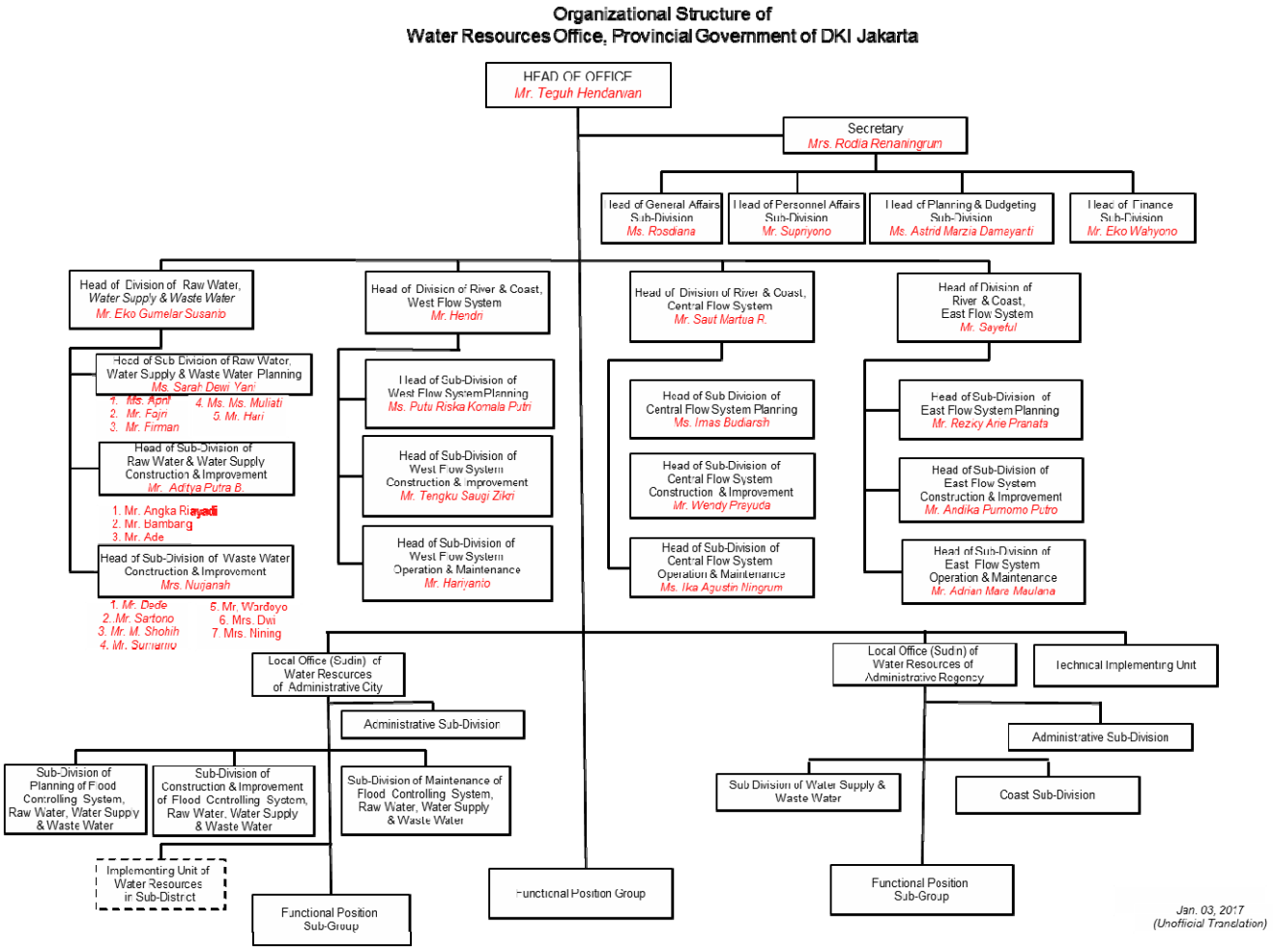


Figure 1-18 Organizational Diagram of Dinas Sumber Daya Air (as for December, 2017)

・Former Ministry of Public Works (Dinas PU)

The former Dinas PU is responsible for the development and operation and management of public facilities related to roads, water resources / rainwater drainage. The jurisdiction of channel is classified as Macro, Sub-macro, Collector and Micro. Department of Water Resources Management of Dinas PU is responsible for Macro and Sub-macro except the jurisdiction of the State. Collector is under the jurisdiction of regional department of Dinas PU (Sub-dinas of Wali Kota (municipal level local government). Micro is under the jurisdiction of the road administrator (directly under the government, or Dinas PU) as a road structure.

・Former Water Management Office (Dinas Tata Air)

In January, 2015 the former Dinas PU divided with the road office and Dinas Tata Air was launched. It is responsible for management of rivers and channels, and construction of sewage pipeline.

⑥ Spatial Planning Office (Dinas Tata Ruang)

The Spatial Planning Bureau is responsible for spatial planning (Spatial Planning : works equivalent to urban planning in Japan) including population, land use, and underground space information.

⑦ Jakarta Wastewater Management Enterprise (PD PAL Jaya)

PD PAL Jaya (Perusahaan Daerah Pengelolaan Air Limbah DKI Jakarta) was established in 1991 as a public corporation that is responsible for operation and management, with the start of sewerage service in Jakarta, after wastewater management office (Badan Pengelola Air Limbah: BPAL) was reorganized. It is under the control of Assistance Secretary of Economic Affairs. The organization, under the president (President Director), was composed of 2 Departments (Department of Technology / Business and Department of General Affairs / Accounting), 6 Sections (Section of Operation and Management, Section of Techniques, Section of Marketing, Section of General Affairs, Section of Finance and Section of Business Development), and 4 Units in charge of septic tank sludge treatment facility.

As the executing agency of sewerage project (Project Implementation Unit) (hereinafter referred to as “PIU”) in the Zone-0, PD PAL Jaya carries out operation and maintenance of sewerage treatment plants, pumping stations and pipeline facilities, collection fees, construction of secondary & tertiary pipes and house connections. Also, with regard to septic tanks throughout DKI Jakarta, PD PAL Jaya implements the service of septic tank installation and sludge removal, and operation and maintenance of sludge removal facilities. In addition, PD PAL Jaya is outsourced for operation and maintenance works of small-scale treatment plant in the private office building by that building. It is an independent corporation (company).
Main counterparts targeted by the Project are the President, manager of each department, and Section of Techniques, Section of Operation and Maintenance, Section of Marketing and Section of Business Development.

Moreover, as for the organization structure of PD PAL Jaya, there is no change from the project start (December, 2015) until December, 2017.

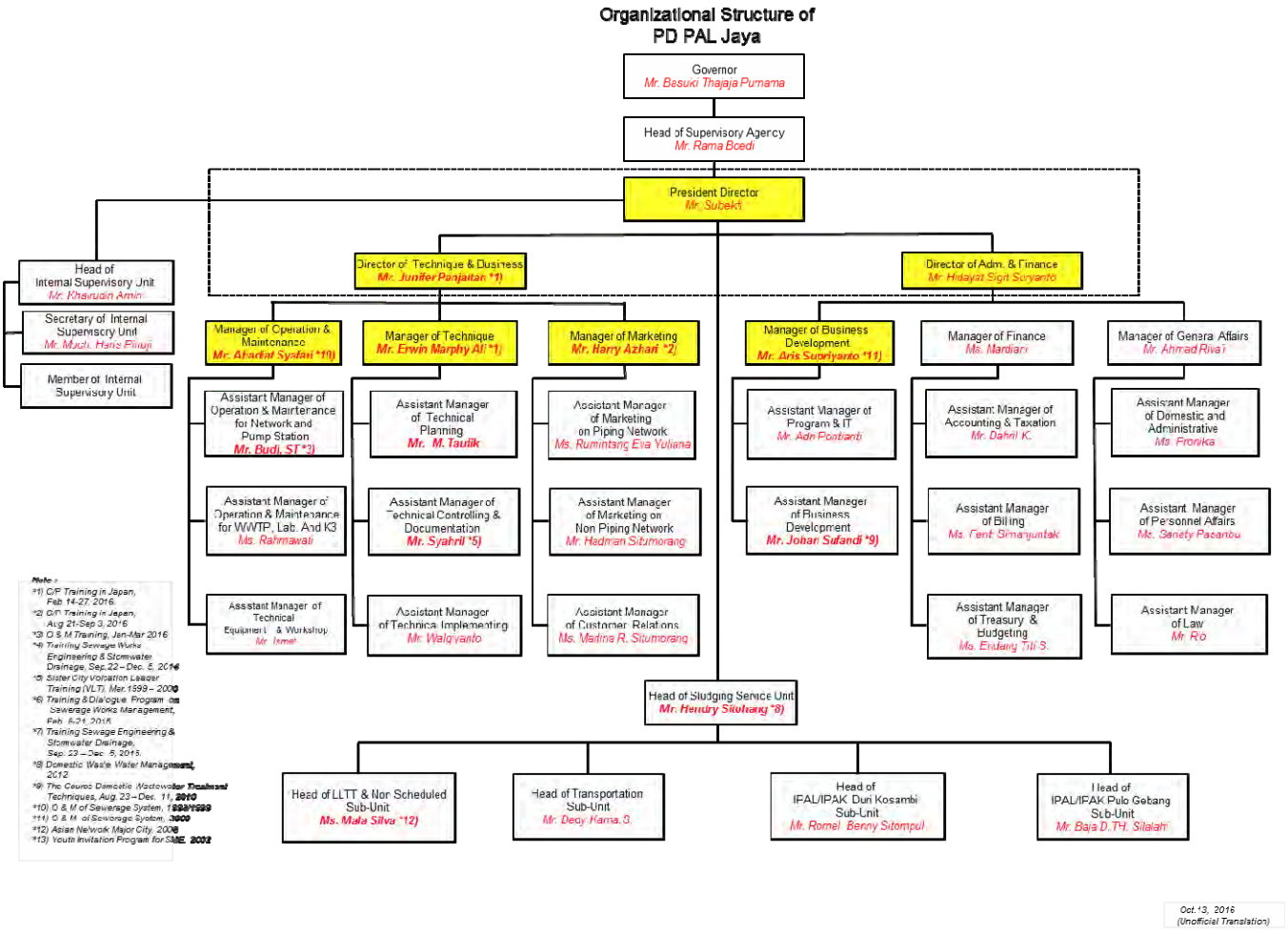


Figure 1-19 Organization Chart in PD PAL Jaya (as of May 2017)

1-6-3 Sewerage Development Plan in DKI Jakarta

Sewerage Development Plan in DKI Jakarta is based on “Revised Master Plan” (hereinafter referred to as “Revised Master Plan”) (March 2012) instituted in “Project for Capacity Development of Wastewater Sector through reviewing the Wastewater Management Master Plan in DKI Jakarta.” As is described in “Figure 1-20 Sewerage Development Zone in DKI Jakarta,” the city area is divided into 14 wastewater treatment zones (excluding Zone-0), and it is set as short-term development plan targeting fiscal 2020, medium-term development plan targeting fiscal 2030, and long-term development plan targeting fiscal 2050.

As for the percentage of sewered population, it aims 20% and 15% connection rate in short-term plan and 80% in the target year of 2050. Regarding the percentage of sewered population of

on-site treatment plant, it targets to decline from the current 85% to 20% in the target year of 2050 by development of sewerage development.

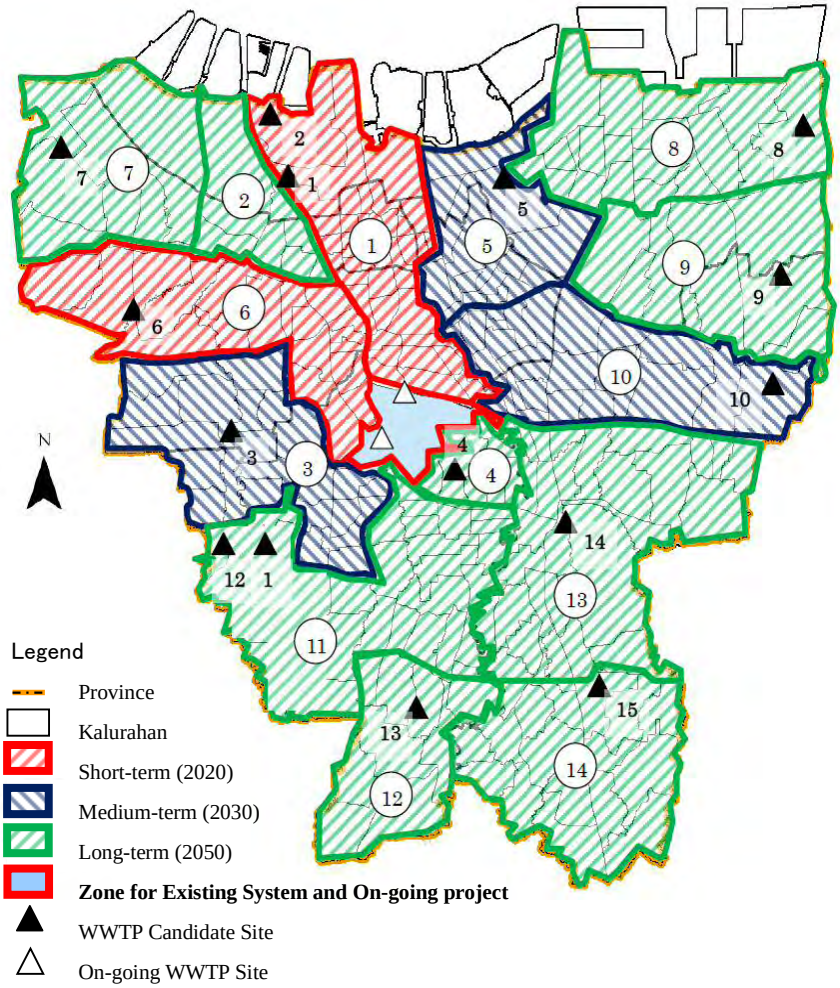
In “Revised Master Plan,” Revised Master Plan, it is planned that the central part of Jakarta (Zone-1) and the West (Zone-6) are selected as the priority projects and developed at an early stage. As of December 2017, additional survey for the existing Feasibility Study (F/S) are conducted to implement E/S in Zone-1 and loan aid project in Zone-6.

- Short Tem Plan 2012-2020 2 Prioritized Projects (Zone -1 and -6)
- Medium Term Plan 2021-2030 Zone-3, -5 and -10
- Long Term Plan 2031-2050 Zone-2, -7, -8 ,-9, -11,-12,-13 and -14

Table 1-11 Sewerage / Sanitation Facility Development Plan

Year	Short Term 2012-2020			Medium Term 2021-2030		Long Term 2031-2050			
	2012	2014	2020	2025	2030	2035	2040	2045	2050
Served Population (1,000 cap.)	12,665	12,665	12,665	12,665	12,665	12,665	12,665	12,665	12,665
Planned Population (1,000 cap.)	10,035	10,361	11,284	11,994	12,665	12,665	12,665	12,665	12,665
Sewerage Service									
Served Ratio (%)	2	7	20	30	40	50	65	75	80
HC Ratio (%)	2	4	15	25	35	45	55	70	80
Wastewater Flow (1,000 m^3/day)	34	77	337	577	896	1,133	1,404	1,692	2,011
Sewered Population (1,000 cap.)	168	387	1,685	2,884	4,478	5,775	7,130	8,572	10,166
On-site Sanitation									
On-site Sanitation Ratio (%)	85	96	85	75	65	55	45	30	20
CST facility (%)	83	81	64	47	32	20	11	4	0
MST served (%)	2	15	21	28	32	34	33	28	20
On-site Sanitation Population (1,000 cap.)	8,567	9,974	9,599	9,110	8,188	6,890	5,535	4,093	2,500
River Water Quality (BOD mg/l)	61	54	33	29	24	21	17	14	10

Source : Revised Master Plan



Sub-Zone No.	Site No.	Name of WWTP Candidate Site	Area [ha]
①	1	Pejagalan	7
②	2	Muara Angke	4 - 17
③	3	Srengseng City Forest Park	6
④	4	Tebet (PD PAL Jaya and Krukut)	2 - 5
⑤	5	Sunter Pond	5 - 11
⑥	6	STP Duri Kosambi	11
⑦	7	Kamal - Pegadungan	5 - 10
⑧	8	Marunda	7.5 - 17
⑨	9	Rorotan	4 - 7.5
⑩	10	STP Pulo Gebang	10
⑪	11	Bendi Park	3
	12	Waduk Ulujami (Pond Planning)	6 - 15
⑫	13	Ragunan Land	4 - 8
⑬	14	Waduk Kp. Dukuh (Pond Planning)	7 - 15.5
⑭	15	Waduk Ceger RW 05 (Pond Planning)	4 - 9

Source : Revised Master Plan

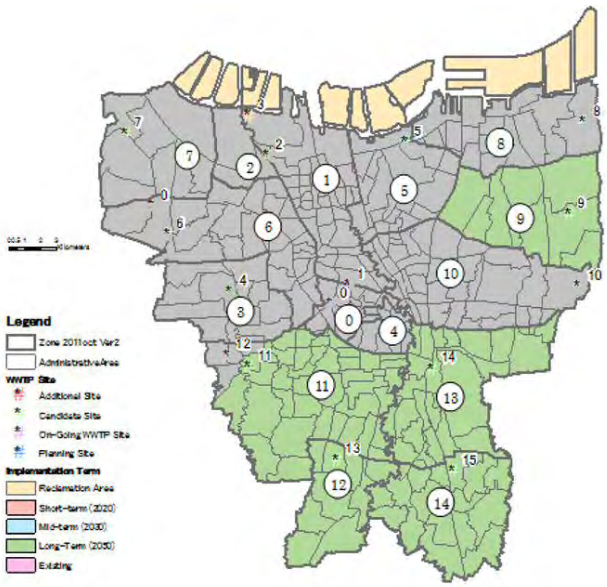
Figure 1-20 Sewerage Development Zones in DKI Jakarta

After that, the Government of Indonesia launched National Capital Integrated Coastal Development Project[15] (hereinafter referred to as "NCICD") as the national program in order to mainly reduce flood damage in the northern part of Jakarta, and planned closing with the large embankment off Jakarta Bay and construction of a huge reservoir by it. According to NCICD Program, improvement of water quality of rivers and groundwater flowing into the Gulf of Jakarta is an urgent issue, and DKI Jakarta is required to promptly implement sewerage development and appropriate sewage management efforts for the purpose of processing domestic wastewater / sewage.

In response to NCICD Program, PD PAL Jaya formulated Sewerage Development Promotion Plan called “Acceleration Plan”. In the Acceleration Plan, it is aimed that 14 treatment plants are to be built in 14 treatment areas by 1420, in Zones-0, -1 and -6, development of main culvert by interceptors is completed from 2015 to 2022, and also implement development of the main culvert of the prioritized treatment area, Zone-2, -3, -4, -5, -7, -8, -10, by 2020. This promoting plan was reflected in the Governor Ordinance No. 41/2016 issued in 2016. And then, the laws stipulated the goal of expanding the sewerage development area to 65% by 2022 and setting the appropriate sewage management for on-site treatment to 35%.

[15] It was determined that NCICD project, in the Jakarta city where inundation damage is normalized, a large embankment (Giant Sea Wall) is built off the Jakarta Bay and highly reliable flood control facilities are constructed instead of the past supportive measures to build embankment and drain sewage to the Jakarta bay by pump drainage, is advanced as the national project.

Jakarta has various problems such as inadequate traffic congestion / East-West traffic access, port congestion, shortage of business center and urban environmental deterioration, etc. In order to solve these issues comprehensively, NCICD project builds landfill in Jakarta Bay, secures business center and urbanization land, constructs network of East-West traffic, secures water supply source, making good urban environments and make economic countermeasure business function, in combination.



System	P hase	Zones
Off-Site	-2022 (65%)	0, 1, 6 2, 3, 4+10, 5, 7, 8
	2023-2030	9, 11, 12, 13, 14
On-Site	-2022 (35%)	All zones where off-site system is undeveloped

(Source: PD PAL Jaya)

Figure 1-21 Sewerage Development Plan by Acceleration Plan

Therefore, sewerage / sanitation Facility Development Plan in Jakarta is required to be consistent with the development plan formulated with Revised Master Plan, NCICD and Acceleration Plan, and to be reviewed extensively (advanced) along with the purposes of this Project, 1) enhancement of implementation structure of sewerage projects and 2) early achievement of improvement of planning capacity of sewerage project.

And, mid-term development plan in DKI Jakarta is explained in detail in “2-1-3-2-3 Activity 2-3 DKI Jakarta drafts mid-term sewerage development plan in DKI Jakarta in consultation with JICA experts”, since its formulation support is one of the outputs of this project.

1-7 Overall Goal, Project Purpose and Output

Overall goal, project purpose and output of the Project are shown below:

Table 1-12 Overall Goal, Project Purpose and Output

Overall Goal	Administrative capacity of sewerage management is improved.
Project Purpose	Implementation structure of sewerage works in DKI Jakarta is strengthened.
Output	Output 1 Job allocation among relevant organizations in DKI Jakarta is clarified. Output 2 Planning capacity of staffs for sewerage system is enhanced.

1-8 Implementing Agency

The related organizations of the Project are responsible agency and implementing agency as is referred below:

Table 1-13 Related Organizations of the Project

Responsible Agency	Ministry of Public Works and Housing, Directorate General of Human Settlements (DGHS)
Implementing Agency	・The Special Capital Region of Jakarta (DKI Jakarta) ・DKI Regional Development Planning Board (BAPPEDA) ・DKI Water Management Office (Dinas Tata Air) changed the name to DKI Water Resources Office (Dinas Sumber Daya Air) by organization restructure in January 2017 ・PD PAL Jaya

Also, implementation structure diagram, which was approved in R/D, is shown as follows:

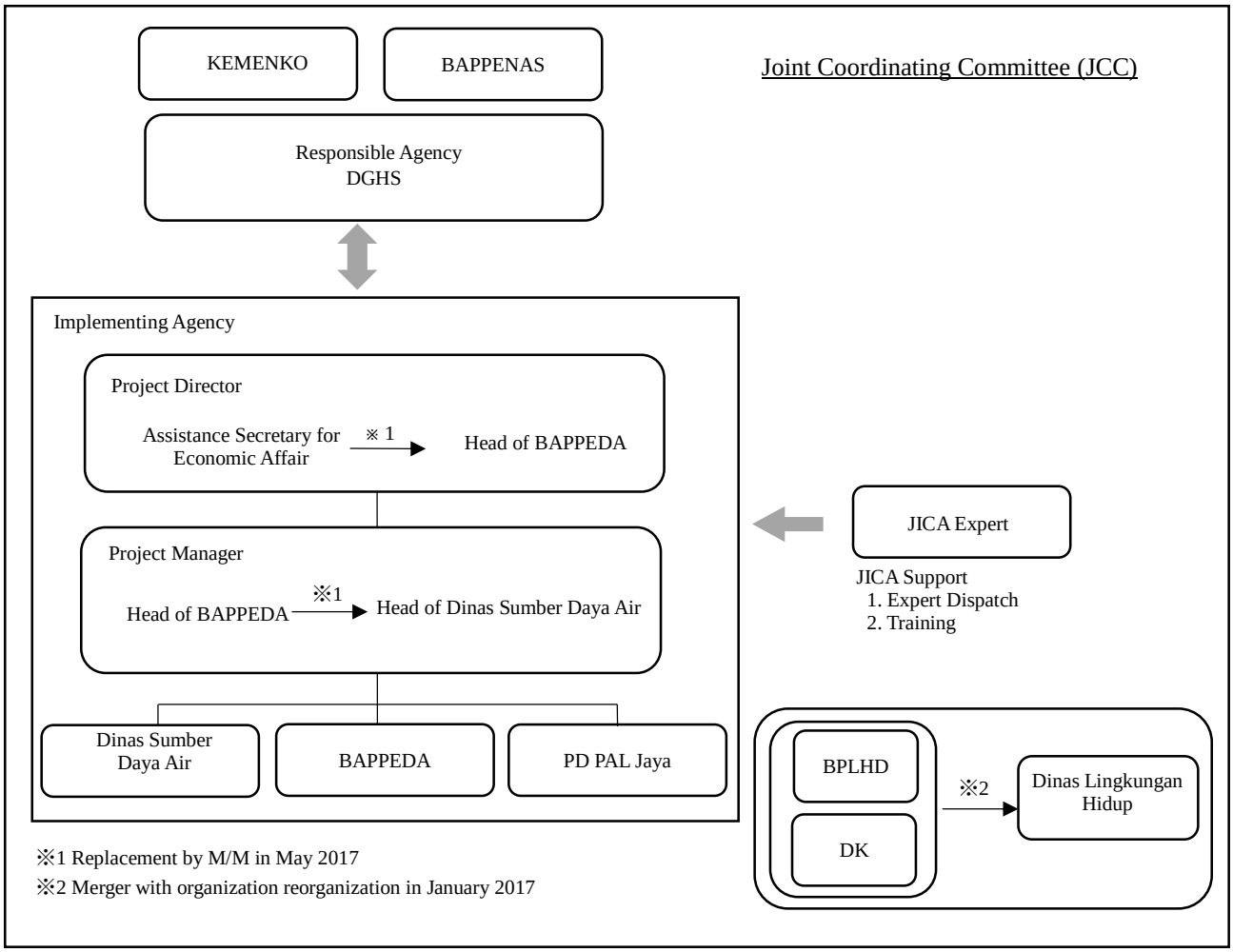


Figure 1-22 Implementation Structure Diagram of the Project

In the implementation structure of the Project, Assistance Secretary for Economic Affairs, BAPPEDA, Dinas Sumber Daya Air and PD PAL Jaya in DKI Jakarta are implementing agencies. DGHS, BAPPENAS and KEMENKO guide and supervise the implantation agency in a position of the Indonesian government. Also, as a department related to sewerage / water environment at the government of DKI Jakarta, Dinas Lingkungan Hidup participates in the counterpart group. JICA supports the Project with implementation of dispatch of long- / short-term expert dispatch and trainings.

Moreover, Chief Adviser, who is dispatched from JICA, performs his tasks in close cooperation with Dinas Sumber Daya Air and PD PAL Jaya as main counterpart, and also DGHS and the policy decision body in DKI Jakarta of Assistance Secretary for Economic Affair and BAPPEDA, with project implementation structure in mind.

1-9 Implementing Structure of the Project

The Project constitutes of 3 parties, (i) Chief Advisor and Project Coordinator (Long-Term Expert), (ii) Sewerage Plan (Short-Term Expert) and (iii) Expert Team (Consultant) (hereinafter referred to as "JICA Expert Team"). And cooperation efforts as JICA towards achieving the Project Purpose of the Project is carried out through collaboration of these 3 parties under the overall supervise by Chief Advisor.

Table 1-14 Implementation Structure of the Project (Task and Period)

No.	Title of Expert	Period
(i)	Chief Advisor and Project Coordinator (Long-Term Expert)	Chief Advisor : June 2015 to March 2018 Project Coordinator : December 2015 to March 2018
(ii)	Sewerage Plan (Short-Term Expert)	From January 2017 (Total 3.0 M/M assumed)
(iii)	JICA Expert Team (Consultant)	December 2015 to February 2018

・Chief Advisor (Long-Term Expert)

Chief Advisor conducts command / coordination / project management for the entire Project, as a conductor / Supervisor of it.

・Project Coordinator (Long-Term Expert)

Under the direction of Chief Adviser, Project Coordinator coordinates the entire Project and supports the establishment of organizational system for enhancement of implementation structure, and executes supports / progress management of the Project activities in the absence of the other experts.

・Sewerage Plan (Short-Term Expert)

Under the direction of Chief Adviser, the expert conduct cooperation on the field of sewerage plan.

・JICA Expert Team (Consultant)

In the implementation of the Project, JICA Expert Team is mainly in charge of the activities related to Output 2 and assists Chief Advisor on the activities related to Output 1.

The concept of the Project implementation is shown below:

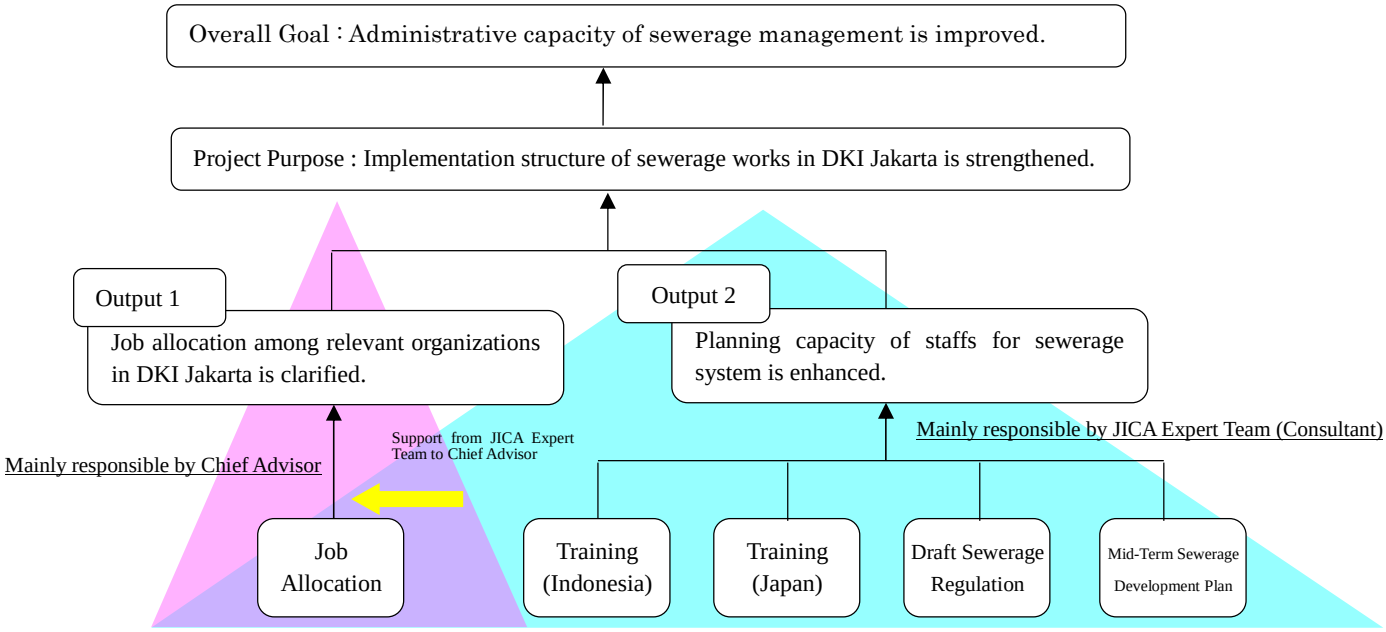


Figure 1-23 Conceptual Diagram of the Project Implementation

CHAPTER 2
RESULTS OF THE PROJECT

Chapter 2 Results of the Project

2-1 Results of the Project

In this section, inputs from the Japanese side and the Indonesian side, and the Project activities are mentioned.

2-1-1 Input from Japanese Side

Input from the Japanese side consists of 1) dispatch of experts, 2) training in Japan and 3) local cost.

(1) Dispatch of Experts

The record of dispatch of experts in the Project is shown in the following table. There were 13 experts and the total 26.43 M/M[16] (activities in Indonesia 19.85 M/M, in Japan 6.58 M/M). The details of the dispatch record of each expert are described in "Table 2-2 Dispatch Record of Expert."

[16] Man-Month

Table 2-1 Dispatch Record of Experts (Days / M/M)

Name (Position)	Organization		No. of Days (Day)	M/M	
				Indonesia / Japan	Total
Shigeo KANAI (Chief Advisor / Sewerage Service Policies and Sewerage Development Plan)	Japan Techno Co., Ltd.	Indonesia	111	3.70	4.10
		Japan	8	0.40	
Kiyoko TAKAMIZAWA (Vice Chief Advisor / Sewerage Service Policies and Sewerage Development Plan)	Japan Techno Co., Ltd.	Indonesia	103	3.43	3.77
		Japan	6.8	0.34	
Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)	Japan Techno Co., Ltd.	Indonesia	118 (6)	3.93 (0.20)	4.23
		Japan	6	0.30	
Kazuaki SATO (Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)	Yachiyo Engineering Co., Ltd.	Indonesia	49	1.63	1.93
		Japan	6	0.30	
Kazushi HASHIMOTO (Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)	Yachiyo Engineering Co., Ltd.	Indonesia	50	1.67	2.31
		Japan	12.8	0.64	
Kim HYEONYEOUL (Operation and Management of Facilities)	Water Agency Inc.	Indonesia	59	1.97	2.95
		Japan	19.6	0.98	
Takafumi OHASHI (Public Relations and Project Coordination)	Japan Techno Co., Ltd.	Indonesia	61	2.03	2.47
		Japan	8.8	0.44	
Takehiko KAWAI (Training Lecturer (Operation structure of sewerage systems))	Sewerage Business Management Centre	Indonesia	9	0.30	1.33
		Japan	20.6	1.03	
Shizuka ONO (Training Coordinator in Japan)	Sewerage Business Management Centre	Indonesia	0	0.00	1.75
		Japan	35	1.75	
Makoto KURODA (Training Lecturer (Sewerage Systems (Local Agency))	Kitakyushu City Water and Sewer Bureau	Indonesia	0	0.00	0.20
		Japan	4	0.20	
Takayuki NAKAMURA (Training Lecturer (Sewerage Systems (Local Agency))	Kitakyushu Water Service Co., Ltd.	Indonesia	16	0.53	0.73
		Japan	4	0.20	
Akira MORITA (Decentralized Wastewater Management 2)	Japan Environmental Sanitation Center	Indonesia	10	0.33	0.33
		Japan	0	0.00	
Shinhi KUMOKAWA (Decentralized Wastewater Management 3)	Japan Education Center of Environmental Sanitation	Indonesia	10	0.33	0.33
		Japan	0	0.00	
Total		Indonesia	596	19.85	26.43
		Japan	131.6	6.58	

Table 2-2 Dispatch Record of Expert

1. Activities in Indonesia

	Position	Organization		No. of Trips	2015 / Fiscal Year 2015 Dec	2016 / Fiscal Year 2016 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2017 / Fiscal Year 2016 Jan	Feb	Mar	Fiscal Year 2017 Apr	May	Jun	日数合計	人月合計
Activities in Indonesia	Shigeo KANAI (Chief Advisor / Sewerage Service Policies and Sewerage Development Plan)	Japan Techno Co., Ltd.	Plan	9	(10 days)				(14 days)	(21 days)		(7 days)			(11 days)	(21 days)		(7 days)			(10 days)	(10 days)		111	3.70
			Achievement	9	9–18 Dec (10 days)				27 Mar–9 Apr (14 days)	17 May–4 Jun (19 days)		31 Jul–5 Aug (6 days)			2–8 Oct (7 days)	23 Nov–10 Dec (18 days)		8–13 Jan (13 days)	22–28 Jan		19–26 Mar (8 days)		17 May–1 Jun (16 days)	111	3.70
	Kiyoko TAKAMIZAWA (Vice Chief Advisor / Sewerage Service Policies and Sewerage Development Plan)	Japan Techno Co., Ltd.	Plan	7	(10 days)				(14 Days)	(21 Days)					(11 Days)	(21 Days)					(14 days)	(10 days)		101	3.37
			Achievement	10	9–18 Dec (10 Days)			6–11 Mar (6 Days)	6–15 Apr (10 Days)	17 May–5 Jun (20 Days)				26 Sep–8 Oct (13 days)	24–28 Oct (5 days)	29 Nov–9 Dec (11 days)		8–17 Jan (10 days)		12–18 Mar (7 days)		17–27 May (11 days)		103	3.43
	Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)	Japan Techno Co., Ltd.	Plan	9	(10 days)				(14 Days)	(21 Days)		(7日)			(11日)	(21日)		(7日)			(14 days)	(10 days)		115	3.83
			Achievement	9	9–18 Dec (10 Days)				30 Mar–9 Apr 20–23 Ap (15 days)	23 May–4 Jun (13 days)		31 Jul–5 Aug (6 days)		28 Sep–8 Oct (11 days)		21 Nov–9 Dec (19 days)		8 Jan–4 Feb (28 days)		19–24 Mar (6 days)		17–26 May 27 May–1 Jun (6 days) (10 days)		118 (6)	3.93 (0.20)
	Kazuaki SATO (Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)	Yachiyo Engineering Co., Ltd.	Plan	5	(10 days)				(10 Days)	(10 Days)						(10日)					(10 days)			50	1.67
			Achievement	5	9–18 Dec (10 Days)				29 Mar–6 Apr (9 Days)	24 May–2 Jun (10 Days)						24 Nov–3 Dec (10 days)		25 Jan–3 Feb (10 days)						49	1.63
	Kazushi HASHIMOTO (Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)	Yachiyo Engineering Co., Ltd.	Plan	4						(13 days)					(7 days)	(20 days)				(10 days)				50	1.67
			Achievement	4						23 May–4 Jun (13 days)					2–8 Oct (7 days)	23 Nov–4 Dec (12 days)		22 Jan–8 Feb (18 days)						50	1.67
	Kim HYEONYEOUL (Operation and Management of Facilities)	Water Agency Inc.	Plan	5	(10 days)				(21 days)			(10 days)				(21 days)							(10 days)	72	2.40
			Achievement	5	9–18 Dec (10 days)				27 Mar–8 Apr (13 days)							27 Nov–10 Dec (14 days)		23 Jan–4 Feb (13 days)		3/19–27 (9 days)				59	1.97
	Takafumi OHASHI (Public Relations and Project Coordination)	Japan Techno Co., Ltd.	Plan	4	(10 days)					(21 days)						(21 days)						(10 days)		62	2.07
			Achievement	4	9–18 Dec (10 days)				27 Mar–9 Apr (14 days)	15 May–4 Jun (21 days)												17 May–1 Jun (16日)		61	2.03
	Takehiko KAWAI (Training Lecturer (Operation structure of sewerage systems))	Sewerage Business Mangement Centre	Plan	4	(7 days)					(7 days)						(7 Days)						(7 days)		28	0.93
			Achievement	2	9–13 Dec (5 days)																	17–20 May (4 days)		9	0.30
	Takayuki NAKAMURA (Training Lecturer (Sewerage Systems (Local Agency))	Kitakyushu Water Service Co., Ltd.	Plan	4	(4 days)					(4 Days)						(4 Days)						(4 days)		16	0.53
			Achievement	2											10/1–8 (8 days)			28 Jan–4 Feb (8 days)						16	0.53
	Akira MORITA (Decentralized Wastewater Management 2)	Japan Environmental Sanitation Cener	Plan	1												(10 days)								10	0.33
			Achievement	1												24 Nov–3 Dec (10 days)								10	0.33
	Shinhi KUMOKAWA (Decentralized Wastewater Management 3)	Japan Education Center of Environmental Sanitation	Plan	1												(10 days)								10	0.33
			Achievement	1												24 Nov–3 Dec (10 days)								10	0.33
																						Total in Indonesia	Plan	625	20.83
																							Achievement	596	19.85

2. Activities in Japan

	Position	Organization		2015 Dec	2016 Jan	2016 Feb	2016 Mar	2016 Apr	2016 May	2016 Jun	2016 Jul	2016 Aug	2016 Sep	2016 Oct	2016 Nov	2016 Dec	2017 Jan	2017 Feb	2017 Mar	2017 Apr	2017 May	2017 Jun	日数合計	人月合計
				Fiscal Year 2015				Fiscal Year 2016												Fiscal Year 2017				
Activities in Japan	Shigeo KANAI (Chief Advisor / Sewerage Service Policies and Sewerage Development Plan)	Japan Techno Co., Ltd.	Plan	(4 days)																(4 days)		8	0.40
			Achievement	12/3-8 (4 days)																	5-8 Jun (4 days)	8	0.40
	Kiyoko TAKAMIZAWA (Vice Chief Advisor / Sewerage Service Policies and Sewerage Development Plan)	Japan Techno Co., Ltd.	Plan	(4 days)																(4 days)		8	0.40
			Achievement	12/7-8, 21-22 (4 days)																	29-31 May (2.8日)	6.8	0.34
	Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)	Japan Techno Co., Ltd.	Plan	(4 days)																(4 days)		8	0.40
			Achievement	12/3-8 (4 days)																	5-6 Jun (2日)	6	0.30
	Kazuaki SATO (Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)	Yachiyo Engineering Co., Ltd.	Plan	(6 days)																		6	0.30
			Achievement	12/3-6, 21-22 (6 days)																		6	0.30
	Kazushi HASHIMOTO (Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)	Yachiyo Engineering Co., Ltd.	Plan																	(12 days)		12	0.60
			Achievement																	15-27 May (12.8日)		12.8	0.64
	Kim HYEONYEOUL (Operation and Management of Facilities)	Water Agency Inc.	Plan	(5 days)																(6 days)		11	0.55
			Achievement	12/3-8, 21 (5 days)				29 Apr-5 May (2 days) (4 days)													16-19, 22-26 May (8.6 days)	19.6	0.98
	Takafumi OHASHI (Public Relations and Project Coordination)	Japan Techno Co., Ltd.	Plan	(4 days)																(4 days)		8	0.40
			Achievement	12/3-8 (4 days)																	5-9 Jun (4.8 days)	8.8	0.44
	Takehiko KAWAI (Training Lecturer (Operation structure of sewerage systems))	Sewerage Business Mangement Centre	Plan	(4 days)																(4 days)		8	0.40
			Achievement	12/7-8, 21-22 (4 days)									5-8 Sep (5 days)								5-16 May (11.6 days)	20.6	1.03
	Shizuka ONO (Training Coordinator in Japan)	Sewerage Business Mangement Centre	Plan			(20 days)							(15 days)									35	1.75
			Achievement			8-27 Feb (20 days)						20-29 Aug. (15 days)	2, 6-9 Sep									35	1.75
	Makoto KURODA (Training Lecturer (Sewerage Systems (Local Agency))	Kitakyushu City Water and Sewer Bureau	Plan	(4 days)																(4 days)		4	0.20
			Achievement		18-21 Jan (4 days)																	4	0.20
	Takayuki NAKAMURA (Training Lecturer (Sewerage Systems (Local Agency))	Kitakyushu Water Service Co., Ltd.	Plan																	(4 days)		4	0.20
			Achievement																	8-11 May (4 days)		4	0.20
																				Total in Japan	Plan	112	5.60
																					Achievement	131.6	6.58

Legend : Achievement / Plan / Own Expense / The number of trips is one, with a period of hollowing out to the other projects.

Total	Plan	26.43
	Achievement	26.43

Submision of Reports	
Plan of Operation	△ 2015 Dec
Work Plan	△ 2016 Jan
Monitoring Sheet Ver. 1	△ 2016 Feb
Monitoring Sheet Ver. 2	△ 2016 Aug
Draft Completion Report	△ 2017 May
Completion Report	△ 2017 Jun

(2) Training in Japan

In the Project, training in Japan was conducted each in February and August, 2016, total twice times. In the first training 8 trainees, including 3 sub high class staffs, were accepted at the superior level. And 9 trainees at the working level in the second training. The places of the training are 3 cities, Tokyo / Osaka / Kitakyushu in each training. The outline of the training is described as follows:

Table 2-3 Outline of Training in Japan

Item	1st time	2nd time
Training Period	14 to 27 February, 2016	21 August to 3 September, 2016
Number of Trainee	8 trainees (including semi high-level staffs) (DGHS, BAPPEDA, Dinas Sumber Daya Air, PD PAL Jaya)	9 trainees (DGHS, BAPPEDA, Dinas Sumber Daya Air, PD PAL Jaya)
Place	Tokyo, Osaka, Kitakyushu	Tokyo, Osaka, Kitakyushu
Main Lecture	Sewerage Administration, Sewerage Management (Finance / Asset Management[17]), Sewerage Training, Flood Measure, Sewerage Project in Kitakyushu City	Sewerage Administration, Sewerage Management (Finance), Sewerage Training, Septic Tanks[18], Sewage Sludge Treatment / Utilization Technology, Sewerage Project in Kitakyushu City
Main Lecturer	Ministry of Land, Infrastructure and Transport, Sewerage Business Management Centre, Japan Sewage Works Agency, Kitakyushu City Water and Sewer Bureau	Ministry of Land, Infrastructure and Transport, Sewerage Business Management Centre, Japan Sewage Works Agency, Kitakyushu City Water and Sewer Bureau
Main place of site visit / event	Indonesia-Japan Construction Vice-Ministerial Level Meeting, Training on Operation and Management of Drain, Wastewater Treatment Plant in urban areas, Purification Center, Construction site of Drain laying	Wastewater Treatment Plant in urban areas, Purification Center (Sewerage Treatment Plant), Construction site of Drain laying

[17] As for Asset Management (in sewerage facilities), it is defined a series of activities in PDCA cycle that make a plan (P), do (D) design, construction and operation and maintenance on the basis of the plan, check (C) it in the operation and maintenance, and do improvement action (A) against anything which happens if any.
Asset management is a series of management process to grasp and evaluate conditions of a facility objectively, and manage it systematically / efficiently from the mid- to long-term perspective while predicting it, for the target of the entire project (renovation renewal project, new construction project and maintenance (operation / repair) management), in order to achieve the goal set with consideration of social conditions.

[18] A septic tank is a facility which treats faces and urine, and miscellaneous drainage (domestic wastewater) and discharges them to the one except the final sewage treatment facility. (by Private Sewerage System Law)

Then, the details of the Training in Japan is explained in “2-1-3-2-1-2 Training in Japan” and “2-1-3-2-2-2 Training in Japan.”

(3) Local Cost

As the costs to be appropriated in this project, 1) expenses for hiring local staffs and 2) expenses for transportation of JICA experts were allocated.

2-1-2 Input from Indonesian Side

Input from the Indonesian side consists of 1) human resources, 2) facilities and 3) local cost.

(1) Human Resources

As personnel and administrative personnel, the staffs on 1) Sewerage Policy, 2) Financial Management, 3) Sewerage Planning and 4) Facility Management were concerned with the Project.

Summary of counterparts is that main counterpart is BAPPEDA, and the others are Dinas Sumber Daya Air (former Dinas Tata Air), PD PAL Jaya and DGHS.

And, since DGHS is in the position to supervise DKI Jakarta, the technology transfer in the Project is provided to DKI Jakarta (BAPPEDA, Dinas Sumber Daya Air and PD PAL Jaya) directly, and basically the results of that transfer are reported to DGHS, which a part of transfers is provided to.

Table 2-4 Summary of Counterparts

Main Counterpart	BAPPEDA
Counterpart	Dinas Sumber Daya Air PD PAL Jaya DGHS (Supervising of DKI Jakarta manly)

And, the detailed members of counterpart are referred to “Table 2-9 Working Group Members.”

(2) Facilities

As facilities of the Project, project offices, which were 1 seat at BAPPEDA and office space at Dinas Sumber Daya Air, were provided. JICA Expert Team (Consultant) shared the office space

of Chief Advisor at each time dispatched.

(3) Local Cost

The local cost of the Project corresponds to 1) expenses necessary for counterpart personnel including fee of transportation and accommodation and 2) running expenses necessary for the implementation of the Project.

2-1-3 Activities of the Project

This project is made up of 2 achievements, and each result consists of activities shown in the following figure. In this section, the result for each activity is explained.

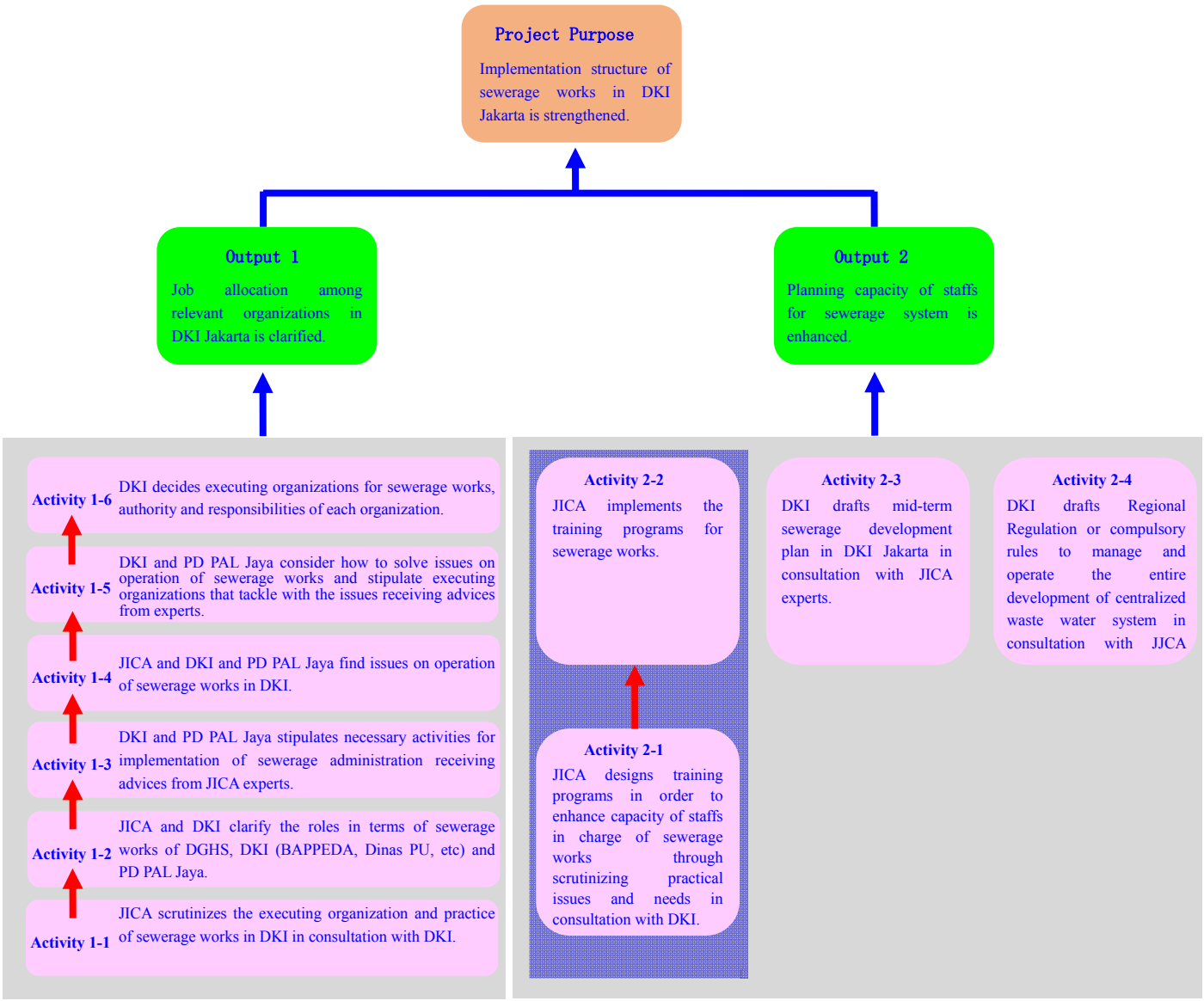


Figure 2-1 Outline of the Project (Project Purpose, Outputs and Activities)

2-1-3-1 Output 1 “Job allocation among relevant organizations in DKI Jakarta is clarified.”

The activities to achieve “Output 1 Job allocation among relevant organizations in DKI Jakarta is clarified.” consists of the following 6 activities:

Table 2-5 Contents of Activities on Output 1

No. of Activity	Contents of Activities
1-1	JICA scrutinizes the executing organization and practice of sewerage works in DKI in consultation with DKI.
1-2	JICA and DKI clarify the roles in terms of sewerage works of DGHS, DKI (BAPPEDA, Dinas PU, etc.) and PD PAL Jaya.
1-3	DKI and PD PAL Jaya stipulates necessary activities for implementation of sewerage administration receiving advices from JICA experts.
1-4	JICA and DKI and PD PAL Jaya find issues on operation of sewerage works in DKI.
1-5	DKI and PD PAL Jaya consider how to solve issues on operation of sewerage works and stipulate executing organizations that tackle with the issues receiving advices from experts.
1-6	DKI decides executing organizations for sewerage works, authority and responsibilities of each organization.

As is explained in “1-9 Implementing Agency,” the structure is taken that Chief Advisor is in charge of the activities related to this Output 1, and JICA Expert Team assists the activities of Chief Advisor.

(1) “Activity 1-1 JICA scrutinizes the executing organization and practice of sewerage works in DKI in consultation with DKI,” “Activity 1-2 JICA and DKI clarify the roles in terms of sewerage works of DGHS, DKI (BAPPEDA, Dinas PU, etc) and PD PAL Jaya.” and “Activity 1-3 DKI and PD PAL Jaya stipulates necessary activities for implementation of sewerage administration receiving advices from JICA experts.”

Through Activity 1-1 to Activity 1-3, implementation structure and status of projects related sewerage in DKI Jakarta were confirmed, and as the result of this, roles and duties of the counterparts were clarified.

The roles and duties confirmed at the present is shown below (as of December, 2017):

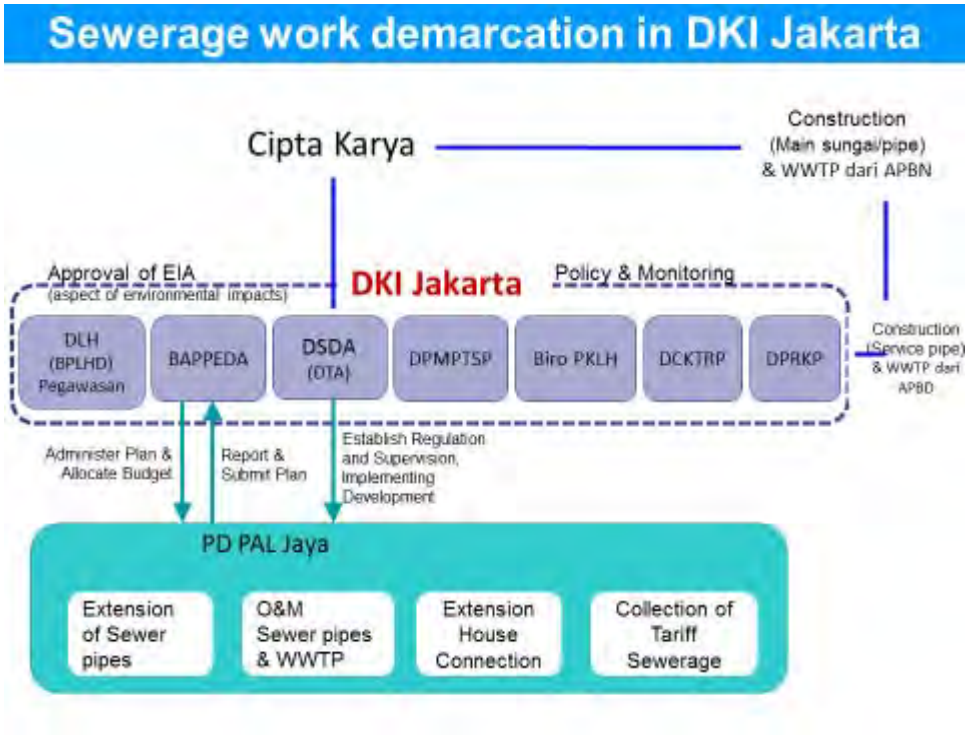


Figure 2-2 Implementation Structure related Sewerage Project in DKI Jakarta

Table 2-6 Roles and Duties of each Organization related Sewerage Project in DKI Jakarta (Administrative Part)

Public Administration					
		Policy	Regulation or Standard	Construction Permit	Monitoring / Inspection
Water Environment Control		DHL			
Offsite	Sewerage user	Biro PKLH	DSDA*	DSDA* via DPMPTST	DSDA*
Onsite	Modified Septic Tank / Jokaso	Biro PKLH	DSDA*	DSDA* via DPMPTST	DSDA*
	Conventional Septic Tank	**	**	**	**
	Desludging and Sludge treatment	Biro PKLH	DSDA*	DSDA* via DPMPTST	**

* Dinas Sumber Daya Air
** Any organization for the role is not cleared yet.

Table 2-7 Roles and Duties of each Organization related Sewerage Project in DKI Jakarta (Implementation Part)

Implementation Procedures for Offsite System / Sewerage									
	Master Plan / Feasibility Study	Detailed design. Tender Document.	Environmental Impact Assessment ⇒ EIA	Land acquisition	Budgeting for Planning. Construction Assets Construction and O&M	Construction	Assets	Operation & Maintenance	Audit
Local Government Budget / APBD	[Administer] BAPPEDA [Formulate] DSDA*	[Check] BKPKD [Prepare] DSDA*	[Approval] DLH [Apply] DSDA*	DSDA*	[Implement] BPKD [Request] DSDA*	DSDA*	DSDA*	[Regulator] DSDA* [Operator] PD PAL Jaya	[Auditor] BKPMD [Auditee] DSDA*
Central Government Budget / APBN		[Prepare] PUPR	[Approval] DLH [Apply] DSDA*	DSDA	[Request] PUPR	PUPR	[Transfer to DKI]		[Auditee] PUPR

* Dinas Sumber Daya Air

Also, one of the outcomes of Output 1 is an establishment of Working Group (WG) can be cited. The outline will be explained below:

・ Establishment and holding of Working Group

In March, 2016, Working Group (WG) was formed by initiative of the Indonesian side to aim at coordinating the implementation of sewerage projects, and was officially approved by DKI Jakarta. This Working Group was composed of the representatives from BAPPEDA, DLH, Biro PKLH, Dinas Sumber Daya Air and PD PAL Jaya. And Working Group's meetings were hold every two weeks and, consultations and studies to comprehensively collaborate the activities related to sewerage development in Jakarta City were conducted in the meetings. As the result of those meetings, the final goal was set that "Project Implementation Guideline" was established to implement the future sewerage projects.

Then, in addition to the existing Working Group' members, participation of Dinas Penanaman Modal Dan Pelayanan Terpadu Satu Pintu (hereinafter referred to as "DPMPTSP") (former One-Stop Integrated Service Agency (Badan Pelayanan Terpadu Satu Pintu) (hereinafter referred to as "BPTSP")), and also the Residential and Human Settlement Bureau (Profil Dinas Perumahan Rakyatan Daw Kawasan Permukiman) (hereinafter referred to as "DPRKP") were decided.

The implementation Structure Diagram of Working Group is shown as follows:

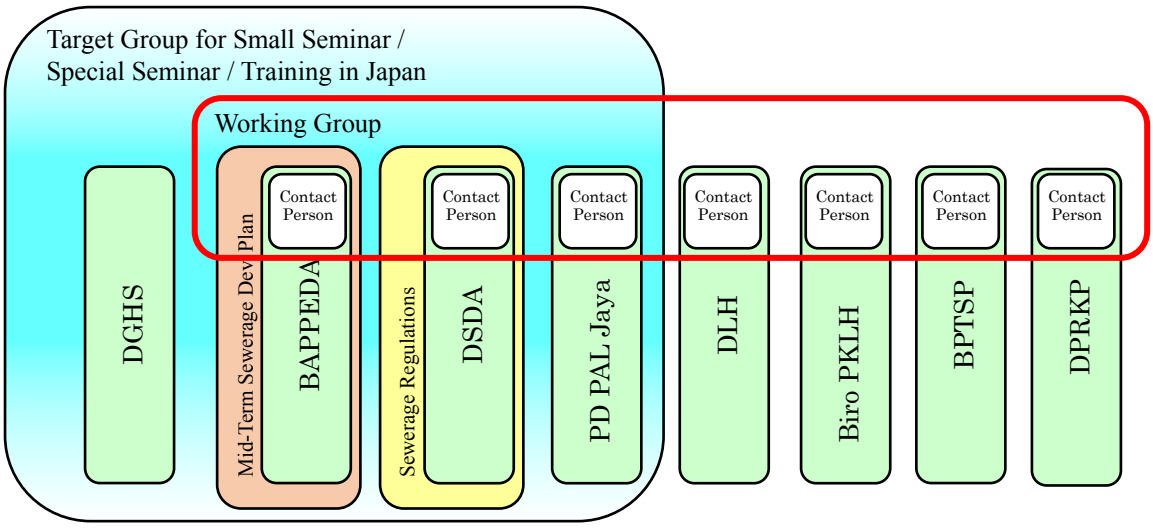


Figure 2-3 Implementation Structure Diagram of Working Group

Next, the outline of Working Group was organized.

Table 2-8 Outline of Working Group

Item	Contents
Reason for Establishment	To promote project activities effectively by strengthening the relationships of the related organizations through cross-sectional information sharing among them. The purposes are stated below: Purpose 1: To support the opinions from the Project and the relevant organizations to be reflected effectively in various activities through adjustment by Working Group Purpose 2: As the final goal of Working Group, to summarize "Project Implementation Guideline" which is useful for the future project activities. This guideline is summarized by Working Group through its activities / experiences in the future. Purpose 3: As the center of activities, to support the development of sewerage related ordinances and standards that are suitable for Indonesia, taking both of the current activity and the future activities (planned) into consideration.

Item	Contents
Participant Organization	1) BAPPEDA 2) DLH 3) Dinas Sumber Daya Air 4) PD PAL Jaya 5) Biro PKLH 6) BPTSP 7) DPRKP ※ BAPPEDA considers this meeting as the one at the project implementation level, and regards DGHS, which is an observer-like role, as not-targeted by Working Group. Reports to DGHS, however, are made as appropriate.
Participant Member	As for members of Working Group, 2 officials at the working level are selected from each organization, and not replaced during the period. (2 persons attend from each organization.) Members are positioned as contact person for each organization.
Frequency of Meeting	Once in 2 weeks
Place of Meeting	Meeting in Dinas Sumber Daya Air
Chairman	Head of Division of Raw Water, Water Supply & Waste Water

Thus, the members of Working Group that was established as an official committee of DKI Jakarta are indicate as follows:

Table 2-9 Member of Working Group

		Organization	Position	Name
Main Member	1	BAPPEDA	Head of City Infrastructure and Environmental Division	Mr. Tri Rachmat Djunarso
	2	BAPPEDA	Head of Sub-Division of Water Resources & Environment	Ms. Anii Maryam ↓ (relocation) Ms. Tezza Nur Ghina
	3	BPLHD ↓※ DLH	Head of Division of Environmental Impact Prevention & Sustainable Resources ↓※ Head of Division of Environmental Impact Control	Mr. Andono Warih
	4	BPLHD ↓※ DLH	Head of Sub Division of Sustainable Resources Control ↓※ Head of Sub Division of Environmental Impact Prevention	Ms. Susana Ms. Rina Suryani
	5	Dinas Tata Air ↓※ Dinas Sumber Daya Air	Head of Sub Division of Wastewater, Water Supply & Wastewater Planning	Mr. Eko Gumelar Susanto
	6	Dinas Tata Air ↓※ Dinas Sumber Daya Air	Head of Sub Division of Wastewater, Water Supply & Wastewater Planning	Ms. Sarah Dewi Yani
	7	Biro PKLH	Head of Environmental Division	Mr. Budijanto
	8	Biro PKLH	Head of Sub Division of Sanitation and Pollution	Ms. Yosi Lusia
	9	PD PAL Jaya	Manager of Business Development	Mr. Aris Supriyanto
	10	PD PAL Jaya	Manager of Technique	Mr. Erwin Marphy Ali
		Organization	Position	Name
Sub Member	11	BAPPEDA	Staff, Sub-Division of Water Resources & Environment	Mr. Fadly Haley Tanjung
	12	BPLHD ↓※ DLH	Staff of Division of Surveillance and Pollution Control ↓※ Staff, Division of Environmental Management and Hygiene	Mr. Dermawan Sembiring
	13	Dinas Tata Air ↓※ Dinas Sumber Daya Air	Staff, Sub Division of Wastewater, Water Supply & Wastewater Planning	Mr. M. Fajri
	14	Dinas Tata Air ↓※ Dinas Sumber Daya Air	Staff, Sub Division of Wastewater, Water Supply & Wastewater Planning	Mr. A. Sodikin
	15	Biro PKLH	Staff, Sub Division of Sanitation and Pollution	Ms. Retno
	16	PD PAL Jaya	Staff, Technical Planning	Mr. Rachmadi Saleh
	17	DGHS、 Ministry of Public Works and Housing	Staff, Sub Directorate of Wastewater, Directorate of Environmental Sanitation Development	Ms. Erly Silalahi ↓ (relocation) Ms. Olsa Riharsya
	18	DGHS	The Commitment Maker Official、PPLP Jabodetabek	Mr. Albert
	19	DGHS	Staff、Working Unit of PPLP JABODETABEK	Mr. Dwiky

※ changed by reorganization in January, 2017

Working Group Meeting
(10 March, 2016)

Working Group Meeting
(10 March, 2016)

Working Group Meeting
(30 March, 2016)

Working Group Meeting
(30 March, 2016)

Next, the results on Activity 2-1 and Activity 2-2 related to Output 2 are shown in the figure below.

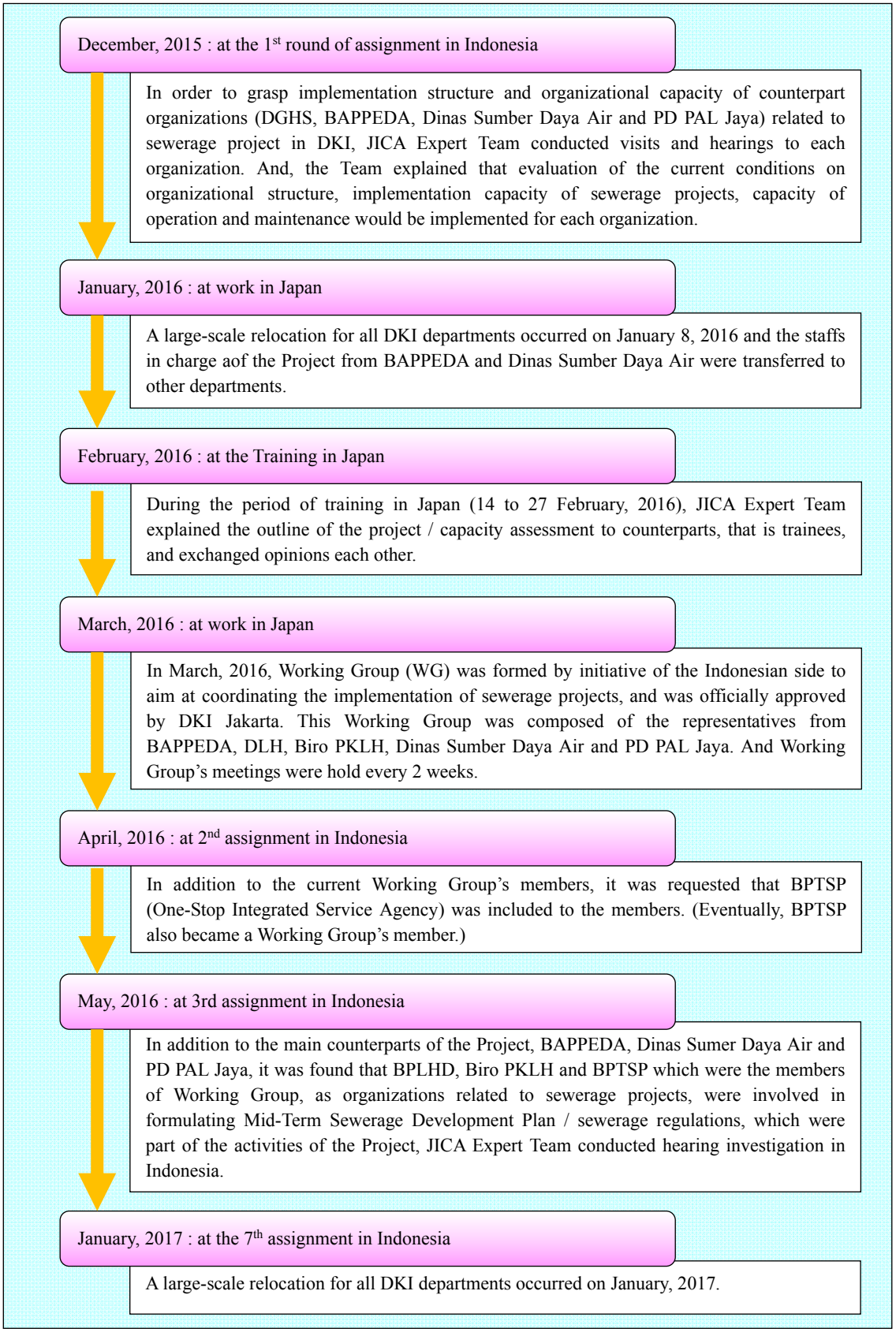


Figure 2-4 Results of the activities related to Activity 1-1 and 1-2

Consultation with the Officials (BAPPEDA)
(16 December, 2015)

Consultation with the Officials (PD PAL Jaya)
(14 December, 2015)

・ Confirmation / Selection of Organization in charge of Activity 2-3 and Activity 2-4 in DKI Jakarta

As is described in the above figure, as outcomes of the activities, job allocation in DKI Jakarta was examined and the organizations in DKI Jakarta in charge of "Activity 2-3 DKI drafts mid-term sewerage development plan in DKI Jakarta in consultation with JICA experts." and "Activity 2-4 DKI drafts Regional Regulation or compulsory rules to manage and operate the entire development of centralized waste water system in consultation with JJCA experts," which are indicated later, were confirmed. Through confirmation of the organizations, JICA Expert Team started each of the activity specifically. Refer to "2-1-3-2-3 Activity 2-3 DKI drafts mid-term sewerage development plan in DKI Jakarta in consultation with JICA experts." and "2-1-3-2-4 Activity 2-4 DKI drafts Regional Regulation or compulsory rules to manage and operate the entire development of centralized waste water system in consultation with JJCA experts." for the detailed activities after confirming organization in charge.

JICA Expert Team confirmed BAPPEDA is responsible for Mid-Term Sewerage Development Plan and Dinas Sumber Daya Air is in charge of sewerage regulations and ordinances regarding responsible organization for each work, through 1st (10 March, 2016) and 2nd (30 March, 2016) meetings of Working Group.

Table 2-10 Organizations responsible for Activity 2-3 and 2-4 in DKI Jakarta

Activity		Responsible Organization in DKI Jakarta
2-3	DKI drafts mid-term sewerage development plan in DKI Jakarta in consultation with JICA experts.	Mainly, BAPPEDA Partially, Dinas Sumber Daya Air
2-4	DKI drafts Regional Regulation or compulsory rules to manage and operate the entire development of centralized waste water system in consultation with JJCA experts	Dinas Sumber Daya Air

(2) "Activity 1-4 JICA and DKI and PD PAL Jaya find issues on operation of sewerage works in DKI."

Field survey was conducted for the target of Malakasari from September to November, 2016 and of Zone-0 from January to April 2017 in order to extract issues of each organization.

(3) "1-5 DKI and PD PAL Jaya consider how to solve issues on operation of sewerage works and stipulate executing organizations that tackle with the issues receiving advices from experts."

Based on the results of the above-mentioned field survey, the methods to solve problems are considered with the related organizations in the future.

(4) "1-6 DKI decides executing organizations for sewerage works, authority and responsibilities of each organization."

This activity will be carried out in the future.

2-1-3-2 Output 2 "Planning capacity of staffs for sewerage system is enhanced."

Here, as for the results of the activities of "Output 2 Planning capacity of staffs for sewerage system is enhanced," which are explicated from the next section, its composition is explained.

The activities to achieve "Output 1 Job allocation among relevant organizations in DKI Jakarta is clarified," as shown on the left, consists of the following 4 activities:

Table 2-11 Contents of Activities on Output 2

No. of Activity	Contents of Activities
2-1	JICA designs training programs in order to enhance capacity of staffs in charge of sewerage works through scrutinizing practical issues and needs in consultation with DKI.
2-2	JICA implements the training programs for sewerage works.
2-3	DKI drafts mid-term sewerage development plan in DKI Jakarta in consultation with JICA experts.
2-4	DKI drafts Regional Regulation or compulsory rules to manage and operate the entire development of centralized waste water system in consultation with JJCA experts.

As is explained in "1-9 Implementing Agency," JICA Expert Team implement the activities related to this Output 2.
Result of each activity is explained from the next.

2-1-3-2-1 Activity 2-1 "JICA designs training programs in order to enhance capacity of staffs in charge of sewerage works through scrutinizing practical issues and needs in consultation with DKI."

2-1-3-2-1-1 Training in Indonesia

① Background

As is described in "1-5 Background of the Project," in DKI Jakarta, in progress of the rapid urbanization with economic growth, it is urgent to develop urban infrastructure such as water supply and sewerage etc. In Indonesia, however, decentralization advanced and the role regarding infrastructure development such as sanitation facilities has been shifting from the central government to the local government. Based on the National Development Plan or the guidelines, the local governments are required to formulate the detailed plans at the local level before implementing construction and operation and maintenance etc. of facilities. Under such a background, Japanese Loan Aid "DKI Jakarta Sewerage Development. Project (E/S)" (signing L/A in February 2014, approved amount about 2 billion yen) was adopted. Although DKI Jakarta is required for acting proactively the tasks which DKI Jakarta is responsible for, such as promotion of house connection, sewerage fee system, improvement of public awareness for sewerage project etc., those tasks are not able to be fully considered due to less experiences on sewerage projects. Therefore, it was urgently needed to strengthen the structure of sewerage

field structure in DKI Jakarta. In response to this, it was decided that "Planning and implementation of trainings on sewerage project in Indonesia" was carried out for the purpose of improving the planning capacity for sewerage development in the Project. Here, it led to implement trainings to learn broad range of basic knowledge including financial aspects etc. but technical ones of planning, design and construction management and so on concerning sewerage development, for the target of DKI Jakarta and PD PAL Jaya etc. in order to establish implementation structure of sewerage projects.

② Study Contents / Results (Current Situations)

With the above background, it was decided that in the Project, for the purpose of establishment of implementation structure regarding sewerage projects, lecture-type trainings to learn broad wide basic knowledge, and field trainings by OJTs to formulate the drafts of Mid-Term Sewerage Development Plan and the one of Sewerage Regulations and Ordinances through practical works, for stakeholders of Counterparts' organizations.

JICA Expert Team visited the training target organizations assumed in Indonesia (in Japan at "training in Japan"), explained training programs and examined their training needs at the 1st round of assignment in Indonesia in December, 2015, at the training in Japan in February, 2016 and at the 2nd round of assignment in Indonesia in April, 2016. Meanwhile, including the period of work in Japan, JICA Expert Team reflected those results to the specified training plan and finalized that plan in May, 2016.

The results on Activity 2-1 are shown in the figure below.

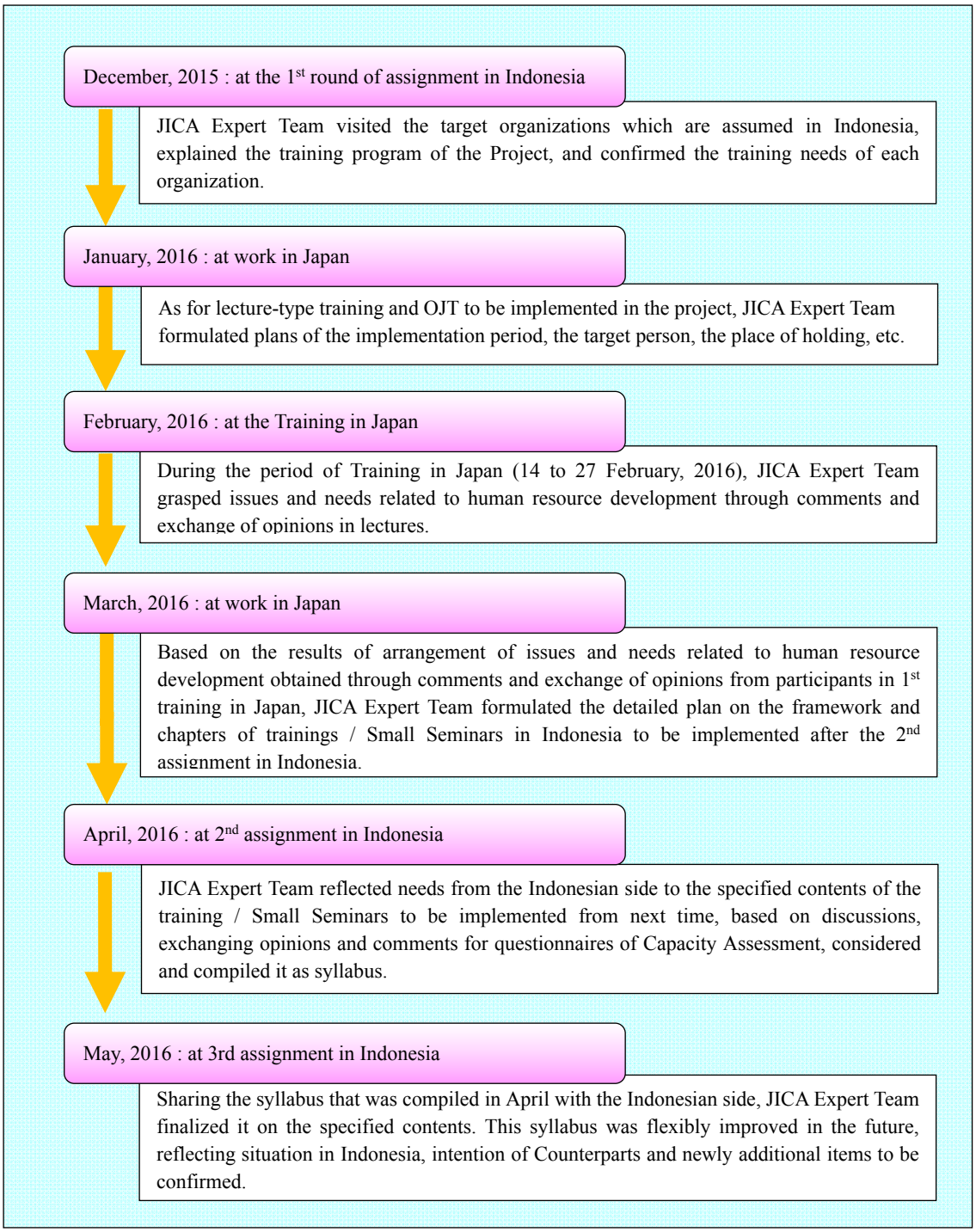


Figure 2-5 Results of the activities related to Activity 2-1

③ Policy (Strategy)→Plan

(1) Technology Transfer Schedule

In conducting training in Indonesia, it was decided to hold that seminar with the following 2

styles (Small Seminar and Special Seminar). The summary for each seminar is indicated as follows:

Table 2-12 Summary of Seminars in Indonesia

Classification of Seminar	Summary of Seminar
Small Seminar（SS）	・ Seminars to be conducted by JICA Expert Team in Indonesia site are collectively called “Small Seminar”. ・ The Seminar will be held once or twice a month. ・ In the seminar, 1) Training, 2) Support for preparing for the draft of the Mid-Term Sewerage Development Plan, and 3) Support for preparing for the regulations / ordinances on sewerage are conducted. ・ The targets are 1) BAPPEDA, 2) Dinas Sumber Daya Air, 3) PD PAL Jaya, 4) DGHS and the related organizations and the seminar is hold at each organization. But, each participant can participate at any time for certain reasons. ・ It is assumed that about 10 to 20 participants participate in the seminar each time. ・ Each time discussions with counterparts are included and the lecture consists of not only communicating information from JICA Expert Team but also obtaining input from Counterparts.
Special Seminar	・ Special Seminar is conducted before and after JCC. ・ The targets are 1) BAPPEDA, 2) Dinas Sumber Daya Air, 3) PD PAL Jaya, 4) DGHS and the related organizations. ・ The content of lecture includes flexibly those which are leant more directly and deeply for the Project works, are more advanced, and are indirect but can be acquired a little broad knowledge.

Technical transfer schedule of the Project including Small Seminar, Special Seminar, JCC, the above explained Working Group, and the following described training in Japan is shown as follows:

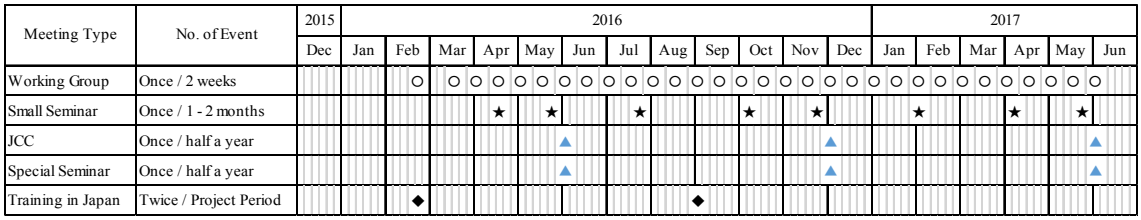


Figure 2-6 Technology Transfer Schedule in the Project

(2) Document for Training Plan in Indonesia

On the basis of the result of the above study, JICA Expert Team created “Document for Training Plan in Indonesia”. (Refer to “Annex 6 Document for Training Plan in Indonesia”). The contents

of that document is explained as follows:

2-1) Outline of Training in Indonesia

Outline of the training in Indonesia is organized as is mentioned below:

Table 2-13 Outline of Training in Indonesia

Items	Training Concept / Methods of Practice
Training Goal	In order to establish an implementation structure of sewerage works, staffs of DKI Jakarta and PD PAL Jaya etc. are able to acquire a wide range of basic knowledge concerning planning, design and construction management etc. on sewerage development from not only technical aspects but also financial ones.
Target Trainee	Executive Staffs and Engineers in BAPPEDA, Dinas Sumber Daya Air (Previous Dinas Tata Air), PD PAL Jaya and DGHS
Training Subject	1) Sewerage Overview 2) Institutional Organizations for Sewerage Works in Japan 3) Case Study from Local Government 4) Methodology for Sewerage System Development (Case Study) 5) Sewerage System Operation (Case Studies from Japan and other countries) 6) Strategies for Improvement of O&M Planning Capacity and Promotion of Privatization 7) Management of Sewerage System 8) Public Relations 9) Improvement of Decentralized Wastewater Management System
No. of Times for Training	Each lecture is conducted several times. (The details are referred to “Table 2-16 Detailed Achievement of Training / Seminar” and “Annex 6 Document for Training Plan in Indonesia.”)
Training Place	Conference room of BAPPEDA, Dinas Sumber Daya Air, PD PAL Jaya, DGHS etc.
Lecturer	JICA Expert Team (Consultant Team)

Source : JICA Expert Team

2-2) Conceptual Diagram of the entire Training

Conceptual Diagram of the entire Training is described in the next page.

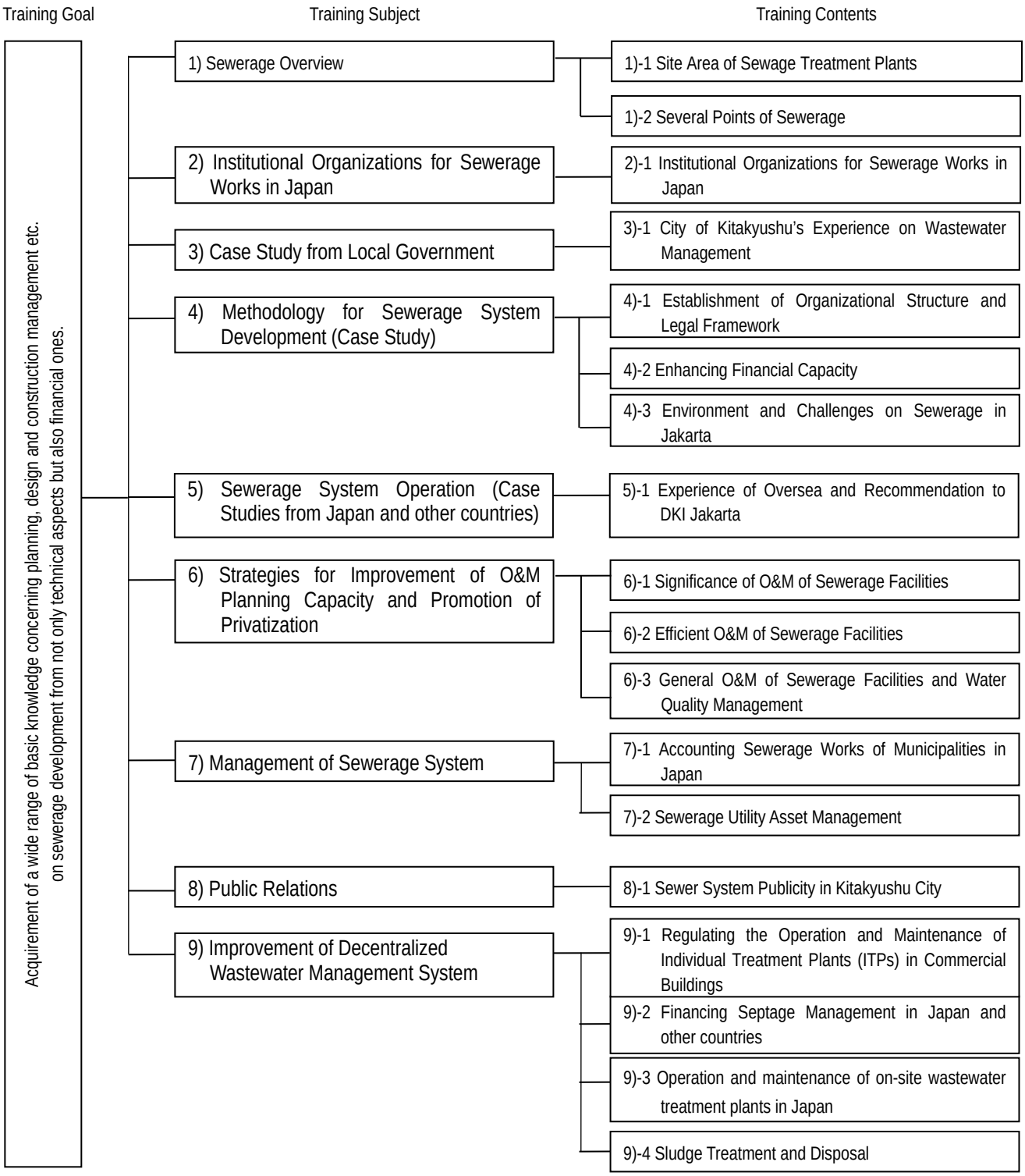


Figure 2-7 Conceptual Diagram of the entire Training

2-3) Achievement Goal for each Lecture

In order to the above-mentioned achievement goal for the entire training plan, an achievement goals for each 8 lectures to be implemented this time, are indicated below:

Table 2-14 Lectures and Achievement Goals

Lecture Title	Achievement Goal
Lecture 1 : Sewerage Overview	Staffs in DKI Jakarta are able to understand the purpose of sewerage, its mechanism, financing, operation and issues which the DKI Jakarta specifically needs to take into account in implementing sewerage works.
Lecture 2 : Institutional Organizations for Sewerage Works in Japan	Staffs in DKI Jakarta are able to establish the institutions for sewerage works implementation in DKI Jakarta, referring to Japanese experiences in sewerage works.
Lecture 3 : Case Study from Local Government	Staffs in DKI Jakarta are able to understand sewerage management by the local government, referring to experiences of Kitakyushu city
Lecture 4 : Methodology for Sewerage System Development(Case Study)	Staffs in DKI Jakarta are able to develop the policy of sewerage system development.
Lecture 5 : Sewerage System Operation (Case Studies from Japan and other countries)	Staffs in DKI Jakarta are able to propose the institutional structure of sewerage system operation.
Lecture 6 : Strategies for Improvement of O&M Planning Capacity and Promotion of Privatization	Staffs in DKI Jakarta are able to understand the significance of O&M aiming: 1) Budgetary Section: To be able to secure necessary and appropriate budget; 2) Design and Construction Section: To be able to manage design and construction considering O&M; and 3) Operation and Maintenance Section: To be able to implement efficient O&M.
Lecture 7 : Management of Sewerage System	Staffs in DKI Jakarta are able to understand the basic principles for the management of sewerage system and reflect these principles in the Municipal By-Law on Sewerage System for which they will prepare.
Lecture 8 : Public Relations	Staffs in DKI Jakarta are able to understand that sharing with the citizens and the government concerning social and economic benefits to the citizens in DKI Jakarta, which are brought by improvement of living conditions caused by sewerage development, make them understand deeply and is able to promote sewerage development effectively.
Lecture 9 : Improvement of Decentralized Wastewater Management System	Staffs in DKI Jakarta are able to establish the institutional framework, including the articles in the Municipal Sewerage Ordinance, for the improvement of the decentralized wastewater management system (DWMS).

2-4) Plan of Lectures (Syllabus)

As for Plan of lectures (Syllabus), refer to “Annex 6 Document for Training Plan in Indonesia.” The training in Indonesia was conducted along this document for training plan in Indonesia. Refer to “2-1-3-2-2-1 Training in Indonesia” according to the activities results.

④ Results (Summary / Details)

⑤ Challenges

⑥ Approaches to deal with

⑦ Lessons

“④ Results (Summary / Details)” to “⑦ Lessons” are explained in “2-1-3-2-2-1 Training in Japan.

2-1-3-2-1-2 Training in Japan

① Background

As is described in "① Background" of "2-1-3-2-1-1 Training in Indonesia", it led to implement trainings to learn broad range of basic knowledge including financial aspects etc. but technical ones of planning, design and construction management and so on concerning sewerage development, for the target of DKI Jakarta and PD PAL Jaya etc. in order to establish implementation structure of sewerage projects. On the other hand, it is expected to learn widely from site visits of the real facilities or local governments' project implementation methods and so on in Japan.

② Study Contents / Results (Current Situations)

Through survey in Indonesia in December, 2015 and work in Japan in January, 2016 as is shown in “② Study Contents / Results (Current Situations) of “2-1-3-2-1-1 Training in Indonesia”, the contents of 1st training in Japan was formulated. And on the basis of the results of that training and after assignments in Indonesia and works in Japan, the contents of 2nd training in Japan was drawn.

③ Policy (Strategy)→Plan

As for training in Japan, 2 times of trainings, that were 1st training (from 14 to 27 February, 2016) and 2nd training (from 21 August to 3 September, 2016) were planned to be implemented. After gathering information in “② Study Contents / Results (Current Situations)” under “① Background,” the contents which were described in “2-1-3-3-3-1 Training in Japan” was planned finally. Regarding the contents planned, refer to “④ Results (Summary / Details).”

④ Results (Summary / Details)
⑤ Challenges
⑥ Approaches to deal with
⑦ Lessons
"④ Results (Summary / Details)" to "⑦ Lessons" are explained in "2-1-3-2-2-2 Training in Japan".

2-1-3-2-2 Activity 2-2 "JICA implements the training programs for sewerage works."

The trainings, seminars and workshops conducted through the Project are shown in the following table. The total number of them is 24 times and their participants are 755 people in total.

Table 2-15 Achievement of Trainings / Seminars / Workshops

No.	Period	Category	Target	No. of Trainees
1	4 April, 2016	Small Seminar	PD PAL Jaya	30
2	5 April, 2016	Small Seminar	DSDA	23
3	6 April, 2016	Small Seminar	BAPPEDA, BPLHD, Biro PKLH, DSDA, PD PAL Jaya	20
4	7 April, 2016	Small Seminar	DGHS	16
5	31 May, 2016	Special Seminar	BAPPEDA, BPLHD, Biro PKLH, DSDA, PD PAL Jaya, PD PAM Jaya, DGHS	67
6	1 June, 2016	JCC	BAPPEDA, BAPPENAS, BPLHD, Biro PKLH, DSDA, PD PAL Jaya, DGHS	39
7	5 August, 2016	Small Seminar	BAPPEDA, BPLHD, Biro PKLH, DSDA, PD PAL Jaya	20
8	5 October, 2016	Small Seminar	BAPPEDA, BPLHD, Biro PKLH, DSDA, PD PAL Jaya, DGHS	32
9	6 October, 2016	Small Seminar	DSDA	18
10	29 October, 2016	Small Seminar	PD PAL Jaya	36
11	1 December, 2016	Special Seminar	BAPPEDA, BPLHD, Biro PKLH, BAPPENAS, DSDA, KPLLH, each Walikota in Jakarta, PD PAL Jaya, PD PAM Jaya, DGHS	85
12	15 December, 2016	High Official Conference	BAPPENAS, KEMENKO, DGHS, BAPPENAS, BAPPEDA, BPKAD, PD PAL Jaya, the other related organizations, JICA	40
13	11 January, 2017	JCC	BAPPEDA, BAPPENAS, BPLHD, Biro PKLH, DSDA, PD PAL Jaya, DGHS, KEMENKO	31
14	26 January, 2017	Small Seminar	PD PAL Jaya	16
15	30 January, 2017	Small Seminar	PD PAL Jaya	27
16	1 February, 2017	Small Seminar	DGHS	19
17	1 February, 2017	Small Seminar	BAPPEDA	21
18	2 February, 2017	Small Seminar	DSDA	15
19	3 February, 2017	Small Seminar	PD PAL Jaya	24
20	6 February, 2017	Small Seminar	BAPPEDA	31
21	23-24 March, 2017	Workshop in Camping	KEMENKO, DGHS, BAPPEDA, BPBUMD[19], DLH, Biro PKLH, BPLHD, DSDA, PD PAL Jaya	36
22	19 May, 2017	Small Seminar	PD PAL Jaya	2
23	23 May, 2017	Special Seminar	BAPPEDA, BPLHD, Biro PKLH, BAPPENAS, KEMENKO, DSDA, KPLLH, PD PAL Jaya, PD PAM Jaya, DGHS	85
24	31 May, 2017	JCC	BAPPEDA, BAPPENAS, BPLHD, Biro PKLH, DSDA, PD PAL Jaya, DGHS, KEMENKO	42
				775

※DSDA : Dinas Sumber Daya Air

Training in Indonesia, training in Japan and Special Seminar are explained below:

[19] Development of Regional-Owned Enterprises Agency (Badan Pembinaan Badan Usaha Milik Daerah) (Hereinafter referred to as “BPMUND”)

2-1-3-2-2-1 Training in Indonesia

2-1-3-2-2-1-1 Small Seminar

① Background
② Study Contents / Results (Current Situations)
③ Policy (Strategy)→Plan
Regarding "① Background" to "③ Policy (Strategy)→Plan, refer to "2-1-3-2 Output 2 "Planning capacity of staffs for sewerage system is enhanced"".

④ Results (Summary / Details)
The achievement of training in Indonesia is as shown in "Table 2-15 Achievement of Trainings / Seminars / Workshops." Here, the details of the achievement of them are described in the next table. In the Project, JICA Expert Team conducted various trainings in charge of each subject throughout the Project period.

Table 2-16 Details of Achievement of Trainings and Seminars

Year			2016									2017					
Month			Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Seminar Category			1st Small Seminar	1st Special Seminar			2nd Small Seminar		3rd Small Seminar	4th Small Seminar	2nd Special Seminar	5th Small Seminar				6th Small Seminar	Sewerage Project Promotion Seminar
Seminar Timing			early Apr	late May			early Aug		early Oct	late Nov	early Dec	late Jan to early Feb				late May	
General Training	①	Seweregе Overview					(1-1) Site Area of Sewage Treatment Plants					(1-2) Several Points of Sewerage					
	②	Institutional Organizations for Sewerage Works in Japan														(2-1) Institutional Organizations for Sewerage Works in Japan	
	③	Case Study from Local Government							(3-1) City of Kitakyushu's Experience on Wastewater Management								
	④	Methodology for Sewerage System Development (Case Study)	(4-1) Establishment of Organizational Structure and Legal Framework						(4-2) Enhancing Financial Capacity			(4-3) Environment and Challenges on Sewerage in Jakarta					
	⑤	Sewerage System Operation (Case Studies from Japan and other countries)								(5-1) Experience of Oversea and Recommendation to DKI Jakarta							
	⑥	Strategies for Improvement of O&M Planning Capacity and Promotion of Privatization	(6-1) Significance of O&M of Sewerage Facilities							(6-2) Efficient O&M of Sewerage Facilities		(6-2) Efficient O&M of Sewerage Facilities					
												(6-3) General O&M of Sewerage Facilities and Water Quality Management					
	⑦	Management of Sewerage System							(7-1) Accounting Sewerage Works of Municipalities in Japan			(7-2) Sewerage Utility Asset Management					
	⑧	Public Relations										(8-1) Sewer System Publicity in Kitakyushu City					
	⑨	Improvement of Decentralized Wastewater Management System							(9-1) Regulating the Operation and Maintenance of Individual Treatment Plants (ITPs) in Commercial Buildings			(9-2) Financing Septage Management in Japan and other countries					
										(9-3) Operation and maintenance of on-site wastewater treatment plants in Japan		(9-3) Operation and maintenance of on-site wastewater treatment plants in Japan					
										(9-4) Sludge Treatment and Disposal		(9-4) Sludge Treatment and Disposal					
Mid-term Sewerage Development Plan			(10-1) Mid-term Sewerage Development Plan									(10-2) 5 Year Programs for Early Stage of Sewerage Construction in Yokohama City					
												(10-3) Advanced Wastewater Treatment and the Cost Function in Japanese Comprehensive Basin-wide Planning of Wastewater System					
Special Seminar				Improvement of Decentralized Wastewater Management in DKI Jakarta							Sewerage Development in Overseas Cities and Recommendations to DKI Jakarta						Sewerage Development in DKI【PD PAL Jaya】
				Key Points of Legal System on Sewerage Management							Sewerage Development Project in Denpasar【PU Bali】						Overseas Sewerage Development Situations【Ho Chi Minh】
				Sewerage System Establishment and Water Quality Control							Domestic Wastewater Management in Bandung【PDAM Bandung】						Overseas Sewerage Development Situations【Bangkok】
				Financial Policy for Sewerage Development in Japan							Onsite Wastewater Management in Surakarta【PDAM Solo】						Overseas Sewerage Development Situations【Kuala Lumpur】
				Governor's Degree No.41/2016【Biro PKLH】							Factors affecting Wastewater Management【Bandung Institute of Technology】						
Assessment			Assessment before Seminars												Assessment after Seminars		

Next, the summary of implementation of each small seminar is shown.

[1st Small Seminar (4, 5, 6 and 7 April, 2016)]

As one of the main activities of the Project, a small seminar, which is part of training in Indonesia, was held at the relevant organizations that are DGHS, BAPPEDA, Dinas Sumber Daya Air and PD PAL Jaya on April 4 to 7 respectively.

Table 2-17 Summary of 1st Small Seminar (PD PAL Jaya)

Date	09:00～12:00, 4 April, 2016, Monday
Place	PD PAL Jaya 2F Meeting Room
Participants	・PD PAL Jaya ・Project Team (Japanese Experts and Local staffs) Total 30 participants
Lecture Contents	・Outline of the Project (Mr. Matsumoto (*Chief Advisor*)) ・Implementation of Capacity Assessment (Mr. Kanai (*Chief Advisor / Sewerage Service Policies and Sewerage Development Plan)*) ・Mid-term Sewerage Development Plan (Mr. Kazuaki SATO (*Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Establishment of Organizational Structure and Legal Framework (Mr. Yakuro INOUE (*Establishment of Organizational Structure and Legal Framework)*) ・Significance of O&M of Sewerage Facilities (Dr. Kim HYEONYEOUL (*Operation and Management of Facilities*))
Key Discussion	・For the success of the sewerage project, it is essential for both hardware aspect such as facility construction and software aspect such as human resource development. ・Human resource development is necessary for not only PD PAL Jaya, but also Dinas Sumbar Daya Air, BPLHD and BAPPEDA etc. ・In the case of Tokyo, as the percentage of sewerage development reached 100% in 1995, the number of staffs related in construction declined between 1995 and 2010. The Great East Japan Earthquake, however, occurred in 2011, and the works expanded in order to conduct the restoration and earthquake resistance of the earthquake-stricken sewage facilities. ・Regarding the water quality of Sumida River and Tamagawa River in Tokyo, the values of BOD[20] and COD[21] are decreasing as the result of the completion of sewerage development. ・I would like you to share data on sewerage management in Tokyo (population, development area, the number of facilities, the number of staffs, O & M cost and sewerage charge revenue) with PD PAL Jaya. ・Works and organizations in big city in Japan are shown as examples in the lectures. It is necessary to adjust them to an organization structure suited to the current situations, in order to apply to DKI Jakarta. ・I would like to know about public relations and residents' education by Japanese local governments.

[20] Biochemical Oxygen Demand

[21] Chemical Oxygen Demand

	・I would like to receive a lecture concerning on-site wastewater treatment.

1st Small Seminar (PD PAL Jaya)
(4 April, 2016)

1st Small Seminar (PD PAL Jaya)
(4 April, 2016)

Table 2-18 Summary of 1st Small Seminar (Dinas Sumber Daya Air)

Date	13:30～17:00, 5 April, 2016, Tuesday
Place	Dinas Sumber Daya Air 7F Meeting Room
Participants	・Dinas Sumber Daya Air, DKI Jakarta ・Project Team (Japanese Experts and Local staffs) Total 23 participants
Lecture Contents	・Outline of the Project (*Mr. Matsumoto (Chief Advisor)*) ・Implementation of Capacity Assessment (*Mr. Kanai (Chief Advisor / Sewerage Service Policies and Sewerage Development Plan)*) ・Mid-term Sewerage Development Plan (*Mr. Kazuaki SATO (Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Establishment of Organizational Structure and Legal Framework (*Mr. Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)*) ・Significance of O&M of Sewerage Facilities (*Dr. Kim HYEONYEOUL (Operation and Management of Facilities)*)
Key Discussion	・Implementation of construction in Zone-1. It is necessary to clarify the roles and responsibilities, and the contents of works among the central government, DKI Jakarta and PD PAL Jaya. ・The sewerage population is the population who receive sewerage services. ・It is necessary to allocate the specified tasks among the organizations related to sewerage project. ・The standards regarding septic tank exists in Japan. What kind of standards should be made in DKI Jakarta? ・I would like to know about cases of sanitation facilities development in Japan before sewerage was developed. ・I would like to compare with organization structure on Sewerage field in Japan and DKI Jakarta.

1st Small Seminar (Dinas Sumber Daya Air)
(5 April, 2016)

1st Small Seminar (Dinas Sumber Daya Air)
(5 April, 2016)

Table 2-19 Summary of 1st Small Seminar (BAPPEDA)

Date	8:30～12:00, 6 April, 2016, Wednesday
Place	BAPPEDA 2F Meeting Room Tempo Doeloe
Participants	・BAPPEDA (City Infrastructure and Environmental Division, Research and Development Division, and Program and Development Funding Division), DKI Jakarta ・BPLHD, DKI Jakarta ・Biro PKLH, DKI Jakarta ・Dinas Sumber Daya Air, DKI Jakarta ・PD PAL Jaya ・Project Team (Japanese Experts and Local staffs) Total 20 participants
Lecture Contents	・Outline of the Project (*Mr. Matsumoto (Chief Advisor)*) ・Implementation of Capacity Assessment (*Mr. Kanai (Chief Advisor / Sewerage Service Policies and Sewerage Development Plan)*) ・Mid-term Sewerage Development Plan (*Mr. Kazuaki SATO (Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Establishment of Organizational Structure and Legal Framework (*Mr. Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)*) ・Outputs of Training in Japan (*Mr. Cipta (Head of Division of City Infrastructure and Environment, BAPPEDA*)
Key Discussion	・It is general in Japan that construction of sewage treatment plant is implemented by the country or the local government, and operation and maintenance is entrusted to the local government or the private sector. ・In the sewerage development promotion plan, 100% of the percentage of sewered population until 2022 was declared, but various funds procurement is necessary to realize it. It should be considered assistance from the Japanese government. ・It is planned to merge PD PAL Jaya and PD PAM Jaya, and revision of water fee and sewerage fee is required.

1st Small Seminar (BAPPEDA)
(6 April, 2016)

1st Small Seminar (BAPPEDA)
(6 April, 2016)

Table 2-20 Summary of 1st Small Seminar (DGHS)

Date	8:30～12:00, 7 April, 2016, Thursday
Place	PU Cipta Karya DGHS 7F Meeting Room
Participants	・Sub-Directorate of Waste Water, Directorate of Environmental Sanitation Development, DGHS ・Project Team (Japanese Experts and Local staffs) Total 16 participants
Lecture Contents	・Sewarage Development in Indonesia (*Mr. Suharsono (Head of Sub-Directorate of Waste Water)*) ・Mid-Term Sewerage Development Plan (*Kazuaki SATO (Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Establishment of Organizational Structure and Legal Framework (*Mr. Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)*) ・Significance of O&M of Sewerage Facilities (*Dr. Kim HYEONYEOUL (Operation and Management of Facilities)*)
Key Discussion	・Blue book, which is the list of loan projects for 5 years in Indonesia, and Green book list of loan projects for each fiscal year, are issued by BAPPENAS, and the priority projects in each field are listed. ・There are two kinds of sewerage fees, which are connection fee and usage fee. ・4,000 staffs in Tokyo Metropolitan Sewerage Bureau is excessive and unrealistic number for DKI Jakarta. I would like to know the necessary number for the current situations of the present DKI Jakarta. ・For example, in Ho Chi Minh City in Vietnam, there are 1,300 staff related to sewerage. ・It is expected this seminar is held continuously in the future and is useful especially for sewerage development in DKI Jakarta, as a place of exchange of information on sewerage related in Indonesia and Japan. ・I would like you to explain sewerage regulations and organizational structures in Japan.

1st Small Seminar (DGHS)
(7 April, 2016)

1st Small Seminar (DGHS)
(7 April, 2016)

[2nd Small Seminar (5 August, 2016)]

Also, a small seminar on the subject of "Site Area of Sewage Treatment Plants" was held on 5 August, 2016. In Jakarta, the site for treating sewage of 1m3/day is as narrow as 0.35m2, but many treatment plants are required the advanced treatment for NCICD plan. It may be possible to accommodate the advanced treatment facilities on a given premises with even the current technology. However, as a result, it is obvious that the cost is raised and difficult temporary constructions such as substitute facilities for quiescent facilities and temporary equipment for construction is required at the time of future renewal. The above-mentioned is explained. It was requested to teach process of public relations on sewerage, sewage treatment laws (especially, for advanced treatment), required land area, and ways to prioritize sewerage development through this small seminars.

Table 2-21 Summary of 2nd Small Seminar (BAPPEDA)

Date	8:30～12:00, 5 April, 2016, Friday
Place	BAPPEDA Meeting Room II
Participants	・BAPPEDA (City Infrastructure and Environmental Division, Research and Development Division, and Program and Development Funding Division), DKI Jakarta ・BPLHD, DKI Jakarta ・Biro PKLH, DKI Jakarta ・Dinas Sumber Daya Air, DKI Jakarta ・PD PAL Jaya ・Project Team (Japanese Experts and Local staffs) Total 20 participants
Lecture Contents	・Site Area of Sewage Treatment Plants (*Mr. Shigeo KANAI (Chief Advisor / Sewerage Service Policies and Sewerage Development Plan)*)
Key Discussion	・There are about 2,200 sewage treatment plants in Japan and their amount of treatment are from 100 to 1,500,000 m 3/day variously. ・Treatment areas are different depending on treatment methods. An average of 0.35 m2/m3/day

	is planned in Jakarta. On the other hand, there are many cases of 0.5 m2/m3/day in large cities of Japan. ・The area is small with a facility where sludge treatment is carried out in other place, and many large cities in Japan have sludge treatment facilities located away from densely populated areas. ・Site area of advanced treatment is small, but the costs increase. In the case that the budget is limited, general treatment facilities must be adopted. ・As an example of activities of public relations in Japan, there are implementation of events on sewerage day every year and invitation to social visit for elementary school students etc. ・I would like you to teach process of public relations on sewerage, sewage treatment laws, required land area, and ways to prioritize sewerage development.

2nd Small Seminar (BAPPEDA)
(5 August, 2016)

[3rd Small Seminar (5 and 6 October, 2016)]

Small Seminars were held at BAPPEDA on 5 October, 2016 and at Dinas Sumber Daya Air on 6 October, 2016 respectively. The subjects of this seminars are “Accounting Sewerage Works of Municipalities in Japan”, “Enhancing Financial Capacity”, “City of Kitakyushu’s Experience on Wastewater Management” and “Regulating the Operation and Maintenance of Individual Treatment Plants (ITPs) in Commercial Buildings”.

Table 2-22 Summary of 3rd Small Seminar (BAPPEDA)

Date	8:30～12:00, 5 October, 2016, Wednesday
Place	BAPPEDA Meeting Room II
Participants	・BAPPEDA (City Infrastructure and Environmental Division, Research and Development Division, and Program and Development Funding Division), DKI Jakarta ・BPLHD, DKI Jakarta ・Biro PKLH, DKI Jakarta ・Dinas Sumber Daya Air, DKI Jakarta ・PD PAL Jaya

	・Sub-Directorate of Waste Water, Directorate of Environmental Sanitation Development, DGHS ・Project Team (Japanese Experts and Local staffs) Total 32 participants
Lecture Contents	・Accounting Sewerage Works of Municipalities in Japan (*Mr. Kazushi HASHIMOTO (Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Enhancing Financial Capacity (*Mr. Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)*) ・City of Kitakyushu's Experience on Wastewater Management (*Mr. Takayuki NAKAMURA (Training Lecturer (Sewerage Systems (Local Agency))*) ・Regulating the Operation and Maintenance of Individual Treatment Plants (ITPs) in Commercial Buildings (*Mr. Kazushi HASHIMOTO (Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*)
Key Discussion	・As for sewerage fee structure in DKI Jakarta, PD PAL Jaya and DKI Jakarta will discuss and develop it, while comparing examples of Japan and other countries. ・JICA Expert Team has been providing useful technical information to formulate sewerage regulations and the Mid-Term Sewerage Development Plan through training in Japan and small seminars. ・In order to gain understanding from residents on payment of sewerage fees in implementing sewerage development and wastewater management in the future, it is necessary to conduct activities of improving awareness on water environment improvement. ・As a specified activity, experiences of sewerage development in Kitakyushu city is very helpful.

3rd Small Seminar (BAPPEDA)
(5 October, 2016)

3rd Small Seminar (BAPPEDA)
(5 October, 2016)

Table 2-23 Summary of 3rd Small Seminar (Dinas Sumber Daya Air)

Date	8:30～12:00, 6 October, 2016, Thursday
Place	Dinas Sumber Daya Air 7F Meeting Room
Participants	・Dinas Tata Air, DKI Jakarta ・Project Team (Japanese Experts and Local staffs) Total 18 participants

Lecture Contents	・Accounting Sewerage Works of Municipalities in Japan (*Mr. Kazushi HASHIMOTO (Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Enhancing Financial Capacity (*Mr. Mr. Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)*) ・City of Kitakyushu's Experience on Wastewater Management (*Mr. Takayuki NAKAMURA (Training Lecturer (Sewerage Systems (Local Agency))*) ・Regulating the Operation and Maintenance of Individual Treatment Plants (ITPs) in Commercial Buildings (*Mr. Kazushi HASHIMOTO (Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*)
Key Discussion	・In Japan, the construction of sewage treatment plants is basically implemented in public works. Meanwhile, operation and maintenance of the treatment plants is conducted by local governments, and there are cases where operation and maintenance is entrusted to the private sector. ・Currently in Jakarta, sewerage/small-scale sewerage system are limited to a part of high-rise buildings, residential areas and industrial complexes. On the other hand, in Japan, sewerage had been developed step by step since 50 years ago, and the system, that collects and treats sewage drainage from the home/commercial building/industrial area through sewerage, was expanded gradually. It is expected that sewerage is expanded step by step in Jakarta as well. ・Regarding sewage treatment technology, examples of regenerating treated water in urban high-rise buildings etc. and using it as recycling water, are adopted not only in Japan but also in Singapore, Malaysia, and others. ・Dinas Sumber Daya Air currently conducts public awareness activities at Malakasari. I would like to refer to experiences of Kitakyushu City. ・As for individual treatment facility in Japan, the certification system is stipulated by the Septic tank law. ・I would like to use Working Group for discussing the contents of sewerage regulations and the Mid-Term Development Plan.

3rd Small Seminar (Dinas Sumber Daya Air)
(6 October, 2016)

3rd Small Seminar (Dinas Sumber Daya Air)
(6 October, 2016)

[4th Small Seminar (29 November, 2016)]

A small seminar was held at PD PAL Jaya on 29 November, 2016 with the total of 36 participants (including JICA Expert Team). The subjects of this seminar are "Stepwise Development of Sewerage Facilities", "Experience of Oversea and Recommendation to DKI Jakarta", "Efficient O&M of Sewerage Facilities", "Operation and maintenance of on-site wastewater treatment plants in Japan" and "Sludge Treatment and Disposal." An active discussion was conducted in question and answer session, and the president of PD PAL Jaya gave an opinion that further support of capacity building is necessary as sewerage facilities are constructed in the future.

Table 2-24 Summary of 4th Small Seminar (PD PAL Jaya)

Date	9:00～14:00, 29 November, 2016, Tuesday
Place	PD PAL Jaya Meeting Room
Participants	・PD PAL Jaya ・Project Team (Japanese Experts and Local staffs) Total 36 participants
Lecture Contents	・Stepwise Development of Sewerage Facilities (*Mr. Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)*) ・Experience of Oversea and Recommendation to DKI Jakarta (*Mr. Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)*) ・Efficient O&M of Sewerage Facilities (*Dr. Kim HYEONYEOUL (Operation and Management of Facilities)*) ・Operation and maintenance of on-site wastewater treatment plants in Japan (*Mr. Akira MORITA (Decentralized Wastewater Management 2)*) ・Sludge Treatment and Disposal (*Mr. Shinhi KUMOKAWA (Decentralized Wastewater Management 3)*)
Key Discussion	・Regarding water quality control of treated water, what is management by turbidity? There is a correlation between BOD and SS[22], and it can be said that the turbidity is low if BOD value decreases by treatment. In Japan, treatment to lower BOD by aerobic decomposition is common, and BOD 20 mg/l or less is standardized. ・Why measure DO[23] for anaerobic filtration tank in septic tank? In the septic tank of nitrogen removal type, in order to maintain nitrogen removal reaction (denitrification reaction) in the anaerobic tank, when DO is more than 0, it is necessary to reduce the inflow from the aerobic tank and suppress DO value. In the septic tank of BOD removal type, DO value is too high means that the amount of inflow from the aerobic tank is too large. And in such case, the carry over of SS occurs and the turbidity of the treated water becomes high. ・As for sewerage fee structure, I would like to decide on the fee structure in Jakarta while referring to examples of other countries.

[22] Suspended Solid

[23] Dissolved Oxygen

4th Small Seminar (PD PAL Jaya)
(29 November, 2016)

4th Small Seminar (PD PAL Jaya)
(29 November, 2016)

[5th Small Seminar (26 and 30 January and 1, 2, 3 and 6 February, 2017)]

Small Seminars were held at PD PAL Jaya on 26 and 30 January, 2017. Many staffs of PD PAL Jaya attended at both seminars, and in question and answer session, active discussion was conducted on technical contents on sewerage finance and operation and maintenance. A summary of the small seminars at PD PAL Jaya is shown below:

Table 2-25 Summary of 5th Small Seminar (PD PAL Jaya)

Date	09:00～12:30, 26 January, 2017, Thursday
Place	PD PAL Jaya 2F Meeting Room
Participants	・PD PAL Jaya ・Project Team (Japanese Experts and Local staffs) Total 16 participants
Lecture Contents	・Several Points of Sewerage (*Mr. Shigeo KANAI (Chief Advisor / Sewerage Service Policies and Sewerage Development Plan)*) ・Financing Septage Management in Japan and other countries (*Mr. Kazushi HASHIMOTO (Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Environment and Challenges on Sewerage in Jakarta (*Mr. Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)*)
Key Discussion	・PD PAL Jaya sets a sludge collection vehicle at the target Kecamatan (ward) in the pilot project, and collect fees too. ・Although sludge is removed basically every 3 years, in fact it is longer than that and the removal of sludge is demanded in about 5 years. ・According to IUWASH survey, only 8% of 8,000 responses demands the removal of sludge. ・The capacity of the present sludge treatment facility is about 300 m^3/day against the planned sludge volume of 900 m^3/day, and 30 sludge collection vehicles are standby. ・Sludge removal fee in Jakarta is collected as the measured rate system, compared with other countries. On the other hand, the fee by PD PAL Jaya is a fixed amount of $ 1.2 / month

	(16,500 IDR / month). ・Regarding sludge treatment, PD PAL Jaya plans to reuse it as fertilizer. It is technically possible, but financially difficult. Under the present circumstances, only drying / dehydration treatment is conducted and special treatment suitable for reuse is not carried out. ・In Japan, dry sludge is reused as cement and brick raw materials and agriculture (soil conditioner) as ash. Revenue does not arise because it is not sold to merchants, but taken over. It is difficult to develop markets and the profit is not much in Japan. ・Concentrated sludge treatment requires transportation cost in addition to treatment.

Table 2-26 Summary of 5th Small Seminar (PD PAL Jaya)

Date	09:00～12:30, 30 January, 2017, Monday
Place	PD PAL Jaya 2F Meeting Room
Participants	・PD PAL Jaya ・Project Team (Japanese Experts and Local staffs) Total 27 participants
Lecture Contents	・Efficient O&M of Sewerage Facilities (*Dr. Kim HYEONYEOUL (Operation and Management of Facilities)*) ・5 Year Programs for Early Stage of Sewerage Construction in Yokohama City (*Mr. Kazuaki SATO (Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Advanced Wastewater Treatment and the Cost Function in Japanese Comprehensive Basin-wide Planning of Wastewater System (*Mr. Kazuaki SATO (Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Sewerage Utility Asset Management (*Mr. Kazushi HASHIMOTO (Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*)
Key Discussion	・At estimating operation and maintenance cost, 20 to 25% of overhead cost is too large. The overhead cost set by PD PAL Jaya is 38 mil IDR. (Response) In this calculation, it is calculated with 30 technicians. ・In sewerage development in Yokohama city, negotiations with seaweed fish farmers and the US Navy were necessary at the time of plant construction. The activated sludge method (AS) was used in the initial treatment plant, but, currently a more compact advanced treatment of removing nitrogen phosphorus is adopted. ・What was important in terms of policy? (Response) In 1970, the Pollution Control Law was enacted. The Japan Sewage Works Association also contributed to pollution prevention measures. ・Treatment plant in Jakarta needs nitrogen phosphorus removal by anaerobic treatment in addition to CAS ・As for pipe construction, jacking method provides shorter construction period than open-cut method. ・PD PAL Jaya has a sewerage ledger. This ledger must be made public. ・Although PD PAL Jaya announces its annual report, it is not detailed but it is updated annually according to the Indonesia Accounting Standards (PSAK).

5th Small Seminar (PD PAL Jaya)
(30 January, 2017)

5th Small Seminar (PD PAL Jaya)
(30 January, 2017)

Small seminars were held in five times in total at DGHS (Cipta Karya), BAPPEDA, Dinas Sumber Daya Air and PD PAL Jaya on 1, 2, 3 and 6 February, 2017. At any seminar many staff from relevant organizations were present. And in question and answer session, active discussions were conducted on technical contents on sewerage finance, operation and maintenance, and public relations activities. A summary of the 5 small seminars is shown below:

Table 2-27 Summary of 5th Small Seminar (DGHS)

Date	09:00～12:30, 1 February, 2017, Wednesday
Place	DGHS 7F Meeting Room
Participants	・Sub-Directorate of Waste Water, Directorate of Environmental Sanitation Development, DGHS ・Project Team (Japanese Experts and Local staffs) Total 19 participants
Lecture Contents	・Efficient O&M of Sewerage Facilities (*Dr. Kim HYEONYEOUL (Operation and Management of Facilities)*) ・5 Year Programs for Early Stage of Sewerage Construction in Yokohama City (*Mr. Kazuaki SATO (Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Sewer System Publicity in Kitakyushu City (*Mr. Takayuki NAKAMURA (Training Lecturer (Sewerage Systems (Local Agency))*)
Key Discussion	・(To staffs of DGHS who misunderstand “Technical Cooperation Project” as “Survey Project”) This technical cooperation project supports capacity development of DKI Jakarta regarding sewerage development and planning skill for 2 years. ・In DGHS, the experts from the Netherlands and South Korea do investigations of the water quality related. ・As for removal of phosphorus, even though NCICD aims to achieve its objectives, the necessary data is lacking. ・Estimated project cost of Revised Master Plan is not based upon the detailed design, and actually earth retaining construction and ground improvement are necessary.

	・Is pipe construction by open-cut method effective in residential area? ・Sewage fee includes 3 types, 1) periodic sludge removal by PD PAL Jaya, 2) sludge removal by community and 3) sludge removal by the Government. ・Regarding water quality conservation, the local government is the executing agency and the Ministry of the Environment is the regulatory body. ・Construction cost of sewerage facility (SANIMAS) is divided into 50% for the country, 45% for the local government and 5% for the user. ・Among the priority zones, zone of which income is likely to be expected are 1, 8, 5, 9 and 2 in descending order. ・KPPIP scheme is used for high-potential zones in PPP, and other zones are implemented by the national budget or loan. ・Zone-9 is not included in the prioritized zones because PPP survey in 2013 targeted Zone-1, targeting the zone with the highest investment effect. ・Public awareness raising activities are important as some of residents always oppose to the projects. It is, however, unclear which organization accounts the budget for the public awareness raising activities.

5th Small Seminar (DGHS)
(1 February, 2017)

5th Small Seminar (DGHS)
(1 February, 2017)

Table 2-28 Summary of 5th Small Seminar (BAPPEDA)

Date	14:00～17:00, 1 February, 2017, Wednesday
Place	BAPPEDA 2F Meeting Room
Participants	・BAPPEDA (City Infrastructure and Environmental Division), DKI Jakarta ・Project Team (Japanese Experts and Local staffs) Total 21 participants
Lecture Contents	・General O&M of Sewerage Facilities and Water Quality Management (*Dr. Kim HYEONYEOUL (Operation and Management of Facilities)*) ・Advanced Wastewater Treatment and the Cost Function in Japanese Comprehensive Basin-wide Planning of Wastewater System (*Mr. Kazuaki SATO (Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Sewer System Publicity in Kitakyushu City (*Mr. Takayuki NAKAMURA (Training Lecturer (Sewerage Systems (Local Agency))*)

Key Discussion	・How is an independent accounting system managed in the local government? (Response) An independent accounting system on sewerage is difficult to be managed only by local government's budget and fee revenue, and the government subsidy is necessary. ・Does slide 8 of sewerage facilities in Japan means emission standards? (Response) That is not emission standards, but a value of achievement goal of environmental standards. ・There are many floods due to heavy rain in the slum area. Is it possible to install an interceptor? (Response) It is possible to use interceptors in the slum area. ・Is it possible to develop fund sources? For example, construction is funded by the central government, and maintenance is borne by the local government. PD PAM Jaya and PD PAL Jaya are integrated. There is also an example of Japanese corporate accounting method. (Response) Special tax system specialized for sewerage development, combination of corporate accounting method and government subsidy etc. are considerable. ・In Kitakyushu city, public relations activities are continued for 50 years until the percentage of sewered population reached 100%. ・How can I get a fee from residents in areas where sewerage is not common? ・In order to reduce unused capacity (Idling rate) in treatment plant and to increase the percentage of sewered population of the plant, it is necessary to lay out the interceptor at first. ・It is necessary to concentrate public relations activities to implement the project and to improve payment motivation.

5th Small Seminar (BAPPEDA)
(1 February, 2017)

5th Small Seminar (BAPPEDA)
(1 February, 2017)

Table 2-29 Summary of 5th Small Seminar (Dinas Sumber Daya Air)

Date	09:00～12:30, 2 February, 2017, Thursday
Place	Dinas Sumber Daya Air 10F Meeting Space
Participants	・Dinas Sumber Daya Air, DKI Jakarta ・Project Team (Japanese Experts and Local staffs) Total 15 participants
Lecture Contents	・General O&M of Sewerage Facilities and Water Quality Management (*Dr. Kim HYEONYEOUL (Operation and Management of Facilities)*) ・Advanced Wastewater Treatment and the Cost Function in Japanese Comprehensive Basin-wide Planning of Wastewater System (*Mr. Kazuaki SATO (Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) /*

	Decentralized Wastewater Management 1)) ・Sewer System Publicity in Kitakyushu City (*Mr. Takayuki NAKAMURA (Training Lecturer (Sewerage Systems (Local Agency))*)
Key Discussion	・In Jakarta, a simple legal system should be established at first ・Advanced treatment is difficult from the viewpoint of ground conditions (land securing of artificial wetlands), cost, and operation and maintenance. ・Combined sewerage system is suitable from a point of view of the amount, and diversion sewerage system is suited from the viewpoint of the quality. It is desirable to develop sewerage with combined system in a step-wised process, and then do it with diversion system. ・Advanced treatment is necessary to achieve goals of water quality in NCICD. ・In Japan, sewerage development was carried out along the comprehensive sewerage development plan by basin.

5th Small Seminar (Dinas Sumber Daya Air)
(2 February, 2017)

5th Small Seminar (Dinas Sumber Daya Air)
(2 February, 2017)

Table 2-30 Summary of 5th Small Seminar (PD PAL Jaya)

Date	09:00～12:30, 3 February, 2017, Friday
Place	PD PAL Jaya 2F Meeting Room
Participants	・PD PAL Jaya ・Project Team (Japanese Experts and Local staffs) Total 24 participants
Lecture Contents	・Efficient O&M of Sewerage Facilities (*Dr. Kim HYEONYEOUL (Operation and Management of Facilities)*) ・Sewer System Publicity in Kitakyushu City (*Mr. Takayuki NAKAMURA (Training Lecturer (Sewerage Systems (Local Agency))*)
Key Discussion	・As for equipment, it is necessary to prepare for an asset management plan (operation plan, maintenance / inspection plan, budget plan). ・PD PAL Jaya should estimate not only the initial cost, but also do costing on the basis of the life cycle cost. ・Energy conservation measures of Zone-1 and 6 also has to be considered. ・The peak of the flow fluctuation in Jakarta is Tuesday in the week and 6 am in the time. In Kitakyushu city, the budget for public relations activities is 0.1 to 0.5% of the total budget.

	・4th - 5th graders in elementary school students are targeted because history classes are in that year. ・Indicators for achieving the goals of public relations activities are investigated by questionnaires at the time of the event. ・There are studies on comparing effect of water quality improvement by septic tank, in which sludge is removed every year, with once every 10 years. When sludge is removed every year, about 75% of BOD is removed. On the other hand, the effect of treatment by septic tank is 0 if sludge removal is not conducted. ・JICA is conducting surveys on periodic sludge removal around the world.

5th Small Seminar (PD PAL Jaya)
(3 February, 2017)

5th Small Seminar (PD PAL Jaya)
(3 February, 2017)

Table 2-31 Summary of 5th Small Seminar (BAPPEDA)

Date	09:00～12:30, 6 February, 2017, Monday
Place	BAPPEDA 2F Meeting Room
Participants	・BAPPEDA (City Infrastructure and Environmental Division), DKI Jakarta ・Project Team (Japanese Experts and Local staffs) Total 31 participants
Lecture Contents	・Operation and maintenance of on-site wastewater treatment plants in Japan (*Mr. Kazushi HASHIMOTO (Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*) ・Sludge Treatment and Disposal (*Mr. Kazushi HASHIMOTO (Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1)*)
Key Discussion	・The Detailed Design of Prioritized 6 Zones is scheduled to be completed soon, but the budgetary provision is undecided. ・Dinas Sumber Daya Air is the executing agency of Jakarta sewerage development, and needs to cooperate with many stakeholders. ・In Manila and Haiphong, interceptors and drainage chambers (connected cell) are developed. They should be developed in Jakarta as well. ・The Governor Degree brought the periodic sludge removal by private sector under the supervision of PD PAL Jaya. ・The unified fee for sludge removal is not decided. In the case of Pulo Gebang and Duri Kosambi,

	it is Rp 2,500 / m^3. ・The state sewerage regulations are under preparation, but there is no national regulation. ・In Manila sewerage fee (environmental fee) was institutionalized at the water supply dissemination rate of 50%. In Hai Phong, sewerage fee will be gradually increased from 10% to 40% of water fee. In China as well, the fee was raised in a way to raise the price gradually from the low sewer charge.

5th Small Seminar (BAPPEDA)
(6 February, 2017)

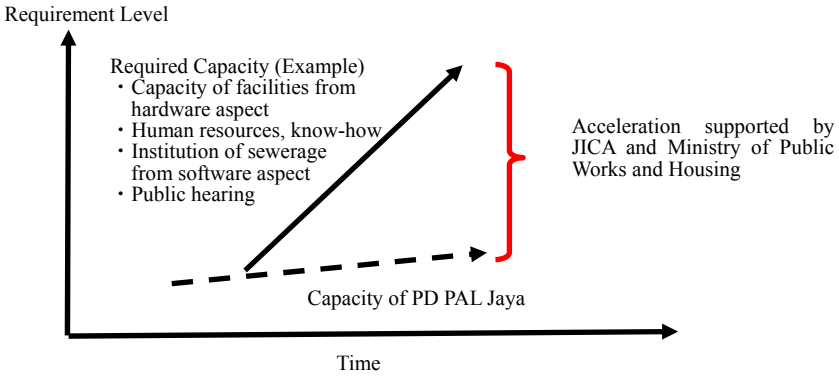
5th Small Seminar (BAPPEDA)
(6 February, 2017)

[6th Small Seminar (18 May, 2017)]

A small seminar was held at PD PAL Jaya on 18 May, 2017. Through this seminar, the sewerage implementation systems between Japan and Indonesia were compared, the goal of the national sewerage policy was set, and the roles and activities of countries which supported the local government (Ministry of Land, Infrastructure, Transport and Tourism, Ministry of Public Management and Ministry of the Environment, etc.) / Public organization / Research Institution were introduced.

Table 2-32 Summary of 6th Small Seminar (PD PAL Jaya)

Date	14:00～16:30, 18 May, 2017, Thursday
Place	PD PAL Jaya 1F Meeting Room
Participants	・PD PAM Jaya (Mr. Subekti (President) and Mr. Erwin (Manager of Technical Division)) ・Project Team (Japanese Experts and Local staffs) Total 2 participants
Lecture Contents	・Institutional Organizations for Sewerage Works in Japan (*Mr. Takehiko KAWAI (Training Lecturer (Operation structure of sewerage systems)*)
Key Discussion	・Background to the advancement of sewerage development in Japan, sewerage implementation structure that supports the local government, such as the national policy / financial support, research study and standardization by the Japan Sewage Works Association, training of the Japan Sewage Works Association, technology development, technical assistance / entrust business etc., contributed.

	・PD PAL Jaya is a company (State-owned Company) and is required to make profits Regarding sludge treatment, the number of customers is about 1% of all households, and there is a lack of public relations / resident understanding, implementation system / treatment facilities and equipment. We must improve through the acceptance of subsidies, development of sewerage, institution of septic tank sludge service, finance, technology, public relations / public hearing. ・PD PAL Jaya's capacity of operation alone can not meet the demand of sewerage in Jakarta. As is shown in the following figure, from the medium- to long-term perspective, we must strengthen with the support of JICA / Ministry of Public Works and Housing. 

6th Small Seminar (PD PAL Jaya)
(18 May, 2017)

6th Small Seminar (PD PAL Jaya)
(18 May, 2017)

2-1-3-2-2-1-2 Special Seminar

As is explained in "(1) Technology Transfer Schedule" of "③ Policy (Strategy)→Plan" in "2-1-3-2-1-1 Training in Indonesia" in "2-1-3-2-1 Activity 2-1 "JICA designs training programs in order to enhance capacity of staffs in charge of sewerage works through scrutinizing practical issues and needs in consultation with DKI,"" in the project, Special Seminar was planned as opportunities for learning more directly and deeply to the contents of the work in the Project, and acquiring knowledge of a little advanced contents or a little progressive knowledge although the contents were indirectly connected.

The Special Seminar is divided into three. The purpose of each seminar was clarified and the seminars were implemented. At the first time, the experiences on the sewerage project in Japan was told. At the second time, information on the situation of the sewerage development situations at other cities in Indonesia was shared. And finally at the third time the sewerage development situations at other cities in Southeast Asia neighboring countries were shared.

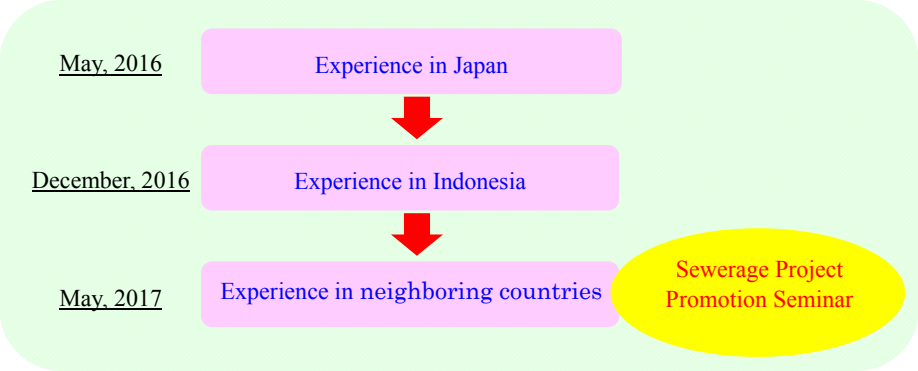


Figure 2-8 Purpose of each Special Seminar

Summary of Special Seminar is shown as below:

[1st Special Seminar]

The following Special Seminar was held at Mercure Hotel in Jakarta city on 31 May, 2016. On the day, about 70 participants from each institution attended, the seminar was able to be finished in success.

Table 2-33 Summary of 1st Special Seminar

Date	8:30～14:00, 31 May, 2016, Tuesday
Place	Mercure Jakarta Sabang Hotel
Participants	・BAPPEDA (City Infrastructure and Environmental Division, Research and Development Division, and Program and Development Funding Division), DKI Jakarta ・BPLHD, DKI Jakarta ・Biro PKLH, DKI Jakarta ・Dinas Sumber Daya Air, DKI Jakarta ・PD PAL Jaya ・PD PAM Jaya ・Sub-Directorate of Waste Water, Directorate of Environmental Sanitation Development, DGHS ・Project Team (Japanese Experts and Local staffs) Total 67 participants
Seminar Contents	
9:00-9:05	Opening Remarks (Mr. Shigeo KANAI (*Chief Advisor / Sewerage Service Policies and Sewerage*

	Development Plan))
9:05-9:10	Outline of the Project (Mr. Matsumoto (*Chief Advisor*))
9:10-10:40	・Improvement of Decentralized Wastewater Management in DKI Jakarta Mr. Kazushi HASHIMOTO (*Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1*) ・Key Points of Legal System on Sewerage Management Mr. Yakuro INOUE (*Establishment of Organizational Structure and Legal Framework*) ・Governor's Degree No.41/2016 Mr. Mahmuri (*Head of Division of City Spatial Pattern Control, Biro PKLH*)
10:40-11:00	Break
11:00-12:30	・Sewerage System Establishment and Water Quality Control Mr. Kazuaki SATO (*Finance of Sewerage Systems 1 (Administrative Structure) / Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1*) ・Financial Policy for Sewerage Development in Japan Kazushi HASHIMOTO (*Finance of Sewerage Systems 2 (Business Operation Planning) / Decentralized Wastewater Management 1*)
12:30-12:45	Questions and Answers
12:45-12:50	Closing Remarks (Mr. Kanai)
12:50-14:00	Lunch
Questions and Answers Session	Q1 : Regarding combined sewer system, the confluent system, does the quality of discharged water from sedimentation pond meet the standards first? A1 ： Sewage is diluted by mixing with rainwater, and the sewage is treated in sedimentation pond. A part of the wastewater that has been precipitated is sent to a tank for secondary treatment, and precipitated water (its BOD is low) which exceeds the secondary treatment capacity is discharged outside the plant. However, if rainfall is more than 5 times the amount of wastewater (3 times the maximum amount of wastewater), the treatment capacity will be exceeded and the quality of treated water will exceed the standard. Q2 : How much does the cost of interceptor type treatment plant increase? A2 : Even when using the interceptor type, the cost of the treatment plant does not change. Q3 : In Jakarta, there is a rule that mixing wastewater and sewage should not be mixed. I would like to hear your opinion on this. A3 : I do not know whether I understand the intent of the question, but I think that it might be better to arrange a combined sewerage system if necessary. It takes long time to develop separated sewer system. In order to promote sewerage development it is necessary to take steps that sewerage is developed tentatively as interceptor type and combined sewerage is developed in the future. Q4 : In Japan, how is the standard of BOD and COD to be considered in designing? A4 : In Japan, the BOD of treated water is 15 mg/l.

1st Special Seminar
(31 May, 2016)

1st Special Seminar
(31 May, 2016)

1st Special Seminar
(31 May, 2016)

1st Special Seminar
(31 May, 2016)

1st Special Seminar
(31 May, 2016)

1st Special Seminar
(31 May, 2016)

[2nd Special Seminar]

On 1 December, 2016, Special Seminar for staffs of DKI Jakarta at Mandarin Oriental Hotel. In this seminar, the main theme is set as sharing achievements and experiences of sewerage development and sewage management in other cities, and the seminar was implemented,

inviting people related to sewerage projects / sewage management as lecturers from each city, Denpasar, Bandung and Surakarta, which have achievements in Indonesia. Regardless of the busy period at the end of the fiscal year, total 85 participants (including JICA Expert Team) attended, and did active discussion. In the questionnaire collected after the seminar, there were many requests for holding similar seminars in the future, and many opinions were desired that wish for further discussion time.

Table 2-34 Summary of 2nd Special Seminar

Date	9:00～16:00, 1 December, 2016, Thursday
Place	Mandarin Oriental Hotel
Participants	・BAPPEDA (City Infrastructure and Environmental Division, Research and Development Division, and Program and Development Funding Division), DKI Jakarta ・BPLHD, DKI Jakarta ・Biro PKLH, DKI Jakarta ・Dinas Sumber Daya Air, DKI Jakarta ・KPLH24, DKI Jakarta ・Each City in Jakarta (Walikota) ・PD PAL Jaya ・PD PAM Jaya ・Sub-Directorate of Waste Water, Directorate of Environmental Sanitation Development, DGHS ・BAPPENAS ・JICA Indonesia Office ・Project Team (Japanese Experts and Local staffs) Total 85 participants
Lecture Contents	・Keynote speech 1 (Mr. Teguh Hendarwan, Director, *Dinas Sumber Daya Air*) ・Keynote speech 2 (Mr. Harada, Deputy Representative, *JICA Indonesia office*) ・Sewerage Development Project in Denpasar (Mr. Wayan Budiarsa, *Director of Environment, PU Bali* and Mr. Subrata, *DSDP*) ・Domestic Wastewater Management in Bandung (Mr. Boy Tagajagawani, *former Sewer Department Manger, PDAM Bandung*) ・On-site Wastewater Management in Surakarta (Mr. Nanang Primono, *Sewer Department Manager, PDAM Solo*) ・Sewerage Development in Overseas Cities and Recommendations to DKI Jakarta (Mr. Yakuro INOUE (*Establishment of Organizational Structure and Legal Framework*)) ・Factors affecting Wastewater Management (Prof. Dr. Ing. Ir.Prayatni Soewondo, *Bandung Institute of Technology*)
Main Questions and Answers	Question : Mr. Hendry (PD PAL Jaya) (Question to Mr. Boy) 1. Is desludging vehicle required in Jakarta? 2. What is the issue regarding desludging vehicle? Answer : Mr. Boy 1. In Bandung, the existing 60% is messy and the position of the septic tank is located in various places in the house, so a desludging vehicle is needed. It is assumed to be the same

[24] Kantor Pengelola Lingkungan Hidup (hereinafter referred to as “KPLH”)

	in Jakarta. Also, I think that setting manhole for each house connection will be experienced in Jakarta the same as Bandung. In Bandung, construction of treatment plant is completed in 2016, SOP (Standard Operation Procedure) will be created so far. 2. Sludge collection by the private sector was not done before, but the state of the vehicle was regularly checked and now the private sector also began periodic collecting sludge Question : Ms. Yoshi (BPLHD) 1. In Bandung, it is said that the private sector is conducting regular sludge collection, but is there a procedure for registering a trader? (Question to Mr. Boy) 2. Who managed the pipe construction in Bali? (Question to Mr. Subrata and Mr. Wayan) Answer : Mr. Boy 1. First of all, we conduct adequate public awareness raising activities for customers. In addition, private companies without stickers are invited to register by PDAM. Answer : Mr. Wayan 1. In the project of Bali, the quality of pipes and construction was stipulated in bidding documents, and construction management was carried out according to that documents. Bidding documents (specifications and drawings) were prepared by consultant, and management was handled by the construction department of PU. Question : Ms. Anny (BAPPEDA) (Question to Mr. Boy) 1. Is periodic sludge collection regulated by the mayor or PDAM Tirtawening Kota Bandung? 2. Is 43% of the percentage of sewered populations estimated from the start of operating plant? What is the funds source? Answer : Mr. Boy 1. The regulations is Mayor Degree (PERDA) No. 270/2013 on water supply and sewerage service, which includes fees. There is provision of PDAM 2. Bandung Urban Development Project (BUDP) targerts areas where sewage treatment is particularly required, and treatment plant in Bojongsoang has been in operation since 1992. The source of funds is ADB loan, and the water project is total IDR 34 billion. For that reason, although the fee is raised every two years, management has become difficult in the last five years, and we are looking for a solution. Question : Mr. Eko (Dinas Sumber Daya Air) (Question to Mr. Wayan) 1. I would like you to explain the process of DED and AMDAL. How long did you continue public awareness raising activities? What is the budget from? Which department was the responsible organization? 2. Regarding operation and maintenance, what should we do to ensure that the facility constructed 15 years ago is continuously operated in Malakasari? Answer : Mr. Wayan 1. The process of FS, DED and AMDAL takes time. Public awareness raising activities were carried out in stages, for example, in the area (RW), neighborhood association (RT), and households, and took six months in Bali. The Bali state government was in charge of the agreement, and the local administration was in charge of the activities. Resident activities and O & M by the administration were included in RPJMD, and the budget was secured. 2. For Malakasari, it is necessary to establish regulations and fee structure according to the ordinance. Moreover, in Denpasar house connection of 90% in the prioritized area already

	has been achieved. Question : Mr. Pak Endin (Kanpekko Jakarta Barat) (Question to Mr. Nanang) 1. Surakarta and Jakarta are quite different. For example, the population of the daytime will be 9.7 million people, the nighttime will be 12.7 million people. PD PAL Jaya's sewage management should also be taken care of. Are there any proposals for secure land and human resources for sewage management? 2. Regarding broad-area sewerage and wastewater treatment facilities at factory, there are offices in Jalan Sudirman etc. How do you manage the treatment plants for each district? Answer : Mr. Nanang (Solo) 1. As for treatment plant, it is better to set facility and volume according to population i each district or treatment area. 2. Jakarta has more population, so sewerage is more suitable than individual treatment. i) Buildings that do not have individual treatment and sewage treatment facilities are not permitted for office buildings. In Surakarta, sludge is reused as fertilizer. It is also possible in Jakarta. ii) Local governments regulate sewerage facilities. iii) Wastewater at factory (individual treatment facility in the office building) is managed by the Environmental Management Bureau. Offices in Jalan Sudirman etc. are in charge of managing the individual processing facilities of the building. Answer : Mr. Wauan (Bali) 1. In high building, the cost of connecting to a sewer is cheaper than individual treatment. 2. Management is done by Bali State (Sat. Pol. PP Propinsi Bali) manages treatment plant. Question : Ms. Nadia (PD. PAL JAYA) (Question to Ms. Prayatni) Sewage management in Jakarta is prioritized low, and is not taken care of. Are there any solutions and advice? Answer : Ms. Prof. Dr. Ir. Prayatni Soewondo (ITB-Bandung) To promote understanding of Jakarta citizens, it is necessary to provide education and scientific knowledge. For that purpose too, it is necessary for the administration to formulate regulations for sewage management promptly. Proposals to DKI Jakarta (Mr. Inoue) 1. Examples of overseas and Japan are offered from JICA Expert Team to DKI Jakarta for reference, but we would like you to study the domestic case (Denpasar, Solo and Bandung) and fee structure by DKI Jakarta itself. 2. 1. DKI Jakarta needs to establish a call center and an office as a customer contact point. 3. It is desirable to revise the construction permission (IMB) to connect to sewerage facilities. 4. It is better to simplify the fee structure / fee collection as much as possible without setting it complicatedly (To make it possible to pay online or in a regional office, etc.). 5. DKI Jakarta needs to develop and enforce the regulations and the fee structure as soon as possible in order to operate and maintain treatment plants properly. Public awareness raising activities are important for enabling fee collection.

2nd Special Seminar
(1 December, 2016)

2nd Special Seminar
(1 December, 2016)

2nd Special Seminar
(1 December, 2016)

2nd Special Seminar
(1 December, 2016)

[3rd Special Seminar (Sewerage Project Promotion Seminar)]

Sewerage Project Promotion Seminar was implemented on 23 May, 2017, Tuesday as the last event by JICA Expert Team. The purpose of this seminar was to share the achievements or issues related to operation and maintenance on sewerage development in each cities of overseas (Vietnam, Thailand and Malaysia), and to promote sewerage development in Jakarta with reference to those experiences and lessons learned. The seminar consisted of 2 parts. In the first part activities and outputs by JICA Expert Team was presented, and in the second part the sewerage officials, who were invited from Jakarta, Ho Chi Minh, Bangkok and Kuala Lumpur, provided lectures on experiences and lessons learned on sewerage dissemination and improvement of water environment in each city. After the lecture, a panel discussion was taken place, and active discussions were made, including the current situations, issues of each city and recommendations for promoting sewerage development in Jakarta etc. Summary of seminar is described below:

Table 2-35 Summary of 3rd Special Seminar (Sewerage Project Promotion Seminar)

Date	9:00～17:00, 23 May, 2017, Tuesday
Place	Akmani Hotel
Participants	・BAPPEDA (City Infrastructure and Environmental Division, Research and Development Division, and Program and Development Funding Division), DKI Jakarta ・BPLHD, DKI Jakarta ・Biro PKLH, DKI Jakarta ・Dinas Sumber Daya Air, DKI Jakarta ・KPLH, DKI Jakarta ・PD PAM Jaya ・Sub-Directorate of Waste Water, Directorate of Environmental Sanitation Development, DGHS ・BAPPENAS ・JICA Indonesia Office ・Project Team (Japanese Experts and Local staffs) Total 50 participants
Seminar Contents	
10:00-10:10	Opening Remarks (Mr. Matsumoto (*Chief Consultant*))
	<Part 1 : Report on the Activities of the Project>
10:10-10:30	Summary of the Project (Mr. Matsumoto (*Chief Consultant*))
10:30-11:00	Break
11:00-12:30	・Results of the activities by JICA Expert Team Mr. Shigeo KANAI (*Chief Advisor / Sewerage Service Policies and Sewerage Development Plan*)) ・Support for formulation of Mid-Term Sewerage Development Plan Ms. Kiyoko TAKAMIZAWA (*Vice Chief Advisor / Sewerage Service Policies and Sewerage Development Plan*) ・Support for formulation of Regional Regulation or Compulsory Rules related to Sewerage Mr. Yakuro INOUE (*Establishment of Organizational Structure and Legal Framework*)
12:30-13:00	Questions and Answers
13:30-14:00	Lunch
	<Part 2 : Promotion of Sewerage Development in Jakarta>
14:00-16:00	・Sewerage Development in DKI (Mr. Subekti, *Jakarta*) ・Overseas Sewerage Development Situations in Ho Chi Minh (Mr. Phi Anh, *Ho Chi Minh*) ・Overseas Sewerage Development Situations in Bangkok (Dr. Pathan, *Bangkok*) ・Overseas Sewerage Development Situations in Kuala Lumpur (Mr.Hussain, *Kuala Lumpur*)
16:00-16:50	Panel Discussion (Chairman : Dr. Herto, *Bandung Institute of Technology*)
16:50-17:00	Closing Remarks (Mr. Kanai (*Chief Advisor*))
Questions and Answers / Comments	[Mr. Ozwar, *Deputy Governor of Spatial Planning and Environment Planning, DKI Jakarta*] In the presentation of JICA Expert Team, explanation about the priority of sewerage Zones was given, but in Jakarta there are still 700,000 population who do open defecation.

	Especially the development of urban sanitation in the river has high priority. Therefore, it is necessary to advance the project preferentially in those areas independently of 15 Zones and the areas should be included in the Mid-Term Development Plan as well. [Dr. Herto, Chairman] We would like to discuss the following three points in today's discussion. 1) Is sewerage development really need in Jakarta? 2) If sewerage development is necessary, what kind of arrangements are required? 3) What are advices from other cities to Jakarta? [Dr. Pathan, Bankok] I also want to pay attention to the relationship between annual rainfall and dilution. In Bangkok, there is an experience that cholera has become popular in the dry season, and it can be said that the wastewater remained in the city without being diluted. [Mr. Hussain, Kuala Lumpur] Strong restrictions by laws and regulations are indispensable for promotion of sewerage improvement. The idea of collecting contribution fees for environmental improvement is also necessary. Treatment plant and sewage pipes are major development facilities. Also, in Malaysia, sewerage is disseminated, and the era, that septic tanks are removed, comes. [Mr. Erwin, PD PAL Jaya] How long will it take to build sewerage all over the country? In Jakarta, improved septic tank is still needed. There are also analysis results that rivers contain E. coli of 3 million MPN. [Dr. Pathan] In Bangkok, the flowing water from septic tank flows into sewerage, and the design specifications are different from the ones in Kuala Lumpur. [Mr. Hussain] It is the stage that septic tank is removed and it is connected to sewerage in Kuala Lumpur. Standard design and regulation by laws are driving the implementation. [Ms. Olsa, Ministry of Public Works and Housing, Cipta Karya] Indonesia is decentralized. There is practically no law because the Sanitation Law has not been issued. Rate structures of the existing domestic sewerage facilities are different from each. Also, I would like to know the situation of PPP in other countries. Not all Jakarta sewerage projects are carried out with the national budget. [Mr. Hussain] In Malaysia the government is setting the price. There was a review every 3 years since 1994, but the price has not been raised. The government is a responsible institution for sewerage project. Although PPP is not common, It is possible to reduce the construction cost by allowing private urban developers to build sewerage facilities and the government taking over the completed facilities.

	[Dr. Pathan] In Bangkok, some households refuse to pay sewerage fees in areas where there are drains in the neighborhood and sewage is directly discharged. PPP will be decided upon deliberation by the National Assembly. [Mr. Phi Anh, Ho Chi Minh] Sewerage fee is collected under the provision of the central government in the name of environmental protection tax. As for the calculation, the fee is determined by regarding 10% of water supply fee as sewerage fee (or environmental protection tax) and multiplied the fee by the government-decided coefficient. PPP has no practical examples and the possibility of PPP is currently investigated. [Mr. Subekti, PD PAL Jaya] In the case of water supply facility, fee collection is obtained depending on the usage fee and profits are generated. However, according to sewerage facility, its profits cannot be expected. Other fund sources have to found. Private companies are contractors and not investors. In Jakarta, sewerage fees are currently set as occupied area, but in the future it is necessary to calculate sewerage fees by volume. [Ms. Yoshi, Bureau of City Planning and Environment (BPKLH)] Jakarta is different from other cities. State governments cannot set sewage fees. [Mr. Hussain] Is it legal for PD PAL Jaya to conduct sewerage development? [Mr. Subekti] PD PAL Jaya is the responsible institution for Zone-1. Its commission is good. Because Jakarta sewerage is not an attractive project for politicians, regulation by law is important. [Mr. Hussain] In the training in Japan, I saw a sludge treatment device that generates gas from sludge. I think that training regarding such advanced technology is required. In the previous presentation, the average construction cost of the treatment plant was 8.8 Juta/m^3, but that construction cost in Malaysia is 8-13 Juta/m^3, which is a good figure without much difference. [Mr. Inoue] Residents deposit sewage savings, and the administration subsidizes interest. Understanding of sewer deepens. It is a mechanism used for construction of sewerage connection when the project start. As for PPP, it is called PSP (Private Sector Participation), and operation and maintenance is carried out on a contract basis by the private sector. Similar to Malaysia, sewerage facilities constructed in urban development projects have been transferred to the government.

The speakers from each city are shown in the table below:

Table 2-36 Speakers of 3rd Special Seminar (Sewerage Project Promotion Seminar)

City	Name	Organization / Postion
Jakarta	Mr. Subekti	President Director、PD PAL JAYA
Bangkok	Dr. Pathan Banjongproo	Chief of Operation 3 Sub-Office、Department of Drainage and Sewerage、Bangkok Metropolitan Administration
Ho Chi Minh	Mr. Hong Nguyen Phi Anh	Director of Water Environmental Improvement project I (WEIP1)、UCCI
Kuala Lumpur	Mr. Hussain Omar	Assistant General Manager、Indah Water Konsortium (IWK) Sdn Bhd Regional Office (NORTH)
Bandung	Dr. Herto Dwi Ariesyady	Associate Professor、Faculty of Civil and Environmental Engineering、Institut Teknologi Bandung

3rd Special Seminar
(23 May, 2017)

3rd Special Seminar
(23 May, 2017)

3rd Special Seminar
(23 May, 2017)

3rd Special Seminar
(23 May, 2017)

3rd Special Seminar
(23 May, 2017)

3rd Special Seminar
(23 May, 2017)

2-1-3-2-2-2 Training in Japan

① Background
② Study Contents / Results (Current Situations)
③ Policy (Strategy)→Plan

Regarding "① Background" to "③ Policy (Strategy)→Plan, refer to "2-1-3-2-1 Activity 2-1 "JICA designs training programs in order to enhance capacity of staffs in charge of sewerage works through scrutinizing practical issues and needs in consultation with DKI"".

④ Results (Summary / Details)

The results of 1st training (14 to 27 February, 2016) and 2nd training in Japan (21 August to 3 September, 2016) are described below:

(1) 1st Training in Japan

The summary of the 1st training in Japan is shown below:

1) Summary of the course

(a) Name of the course

Sewerage Administration for Indonesia

(b) Period of the training

14 to 27 February, 2016 (14 to 20 February, 2016 for 2 trainees)

(c) Number of the trainees

8 trainees (including 3 semi high-level staffs)

2) Contents of the training

As the contents of the training, (a) Outline of the entire training, (b) Schedule and (c) Training Curriculum are indicated.

(a) Outline of the entire training

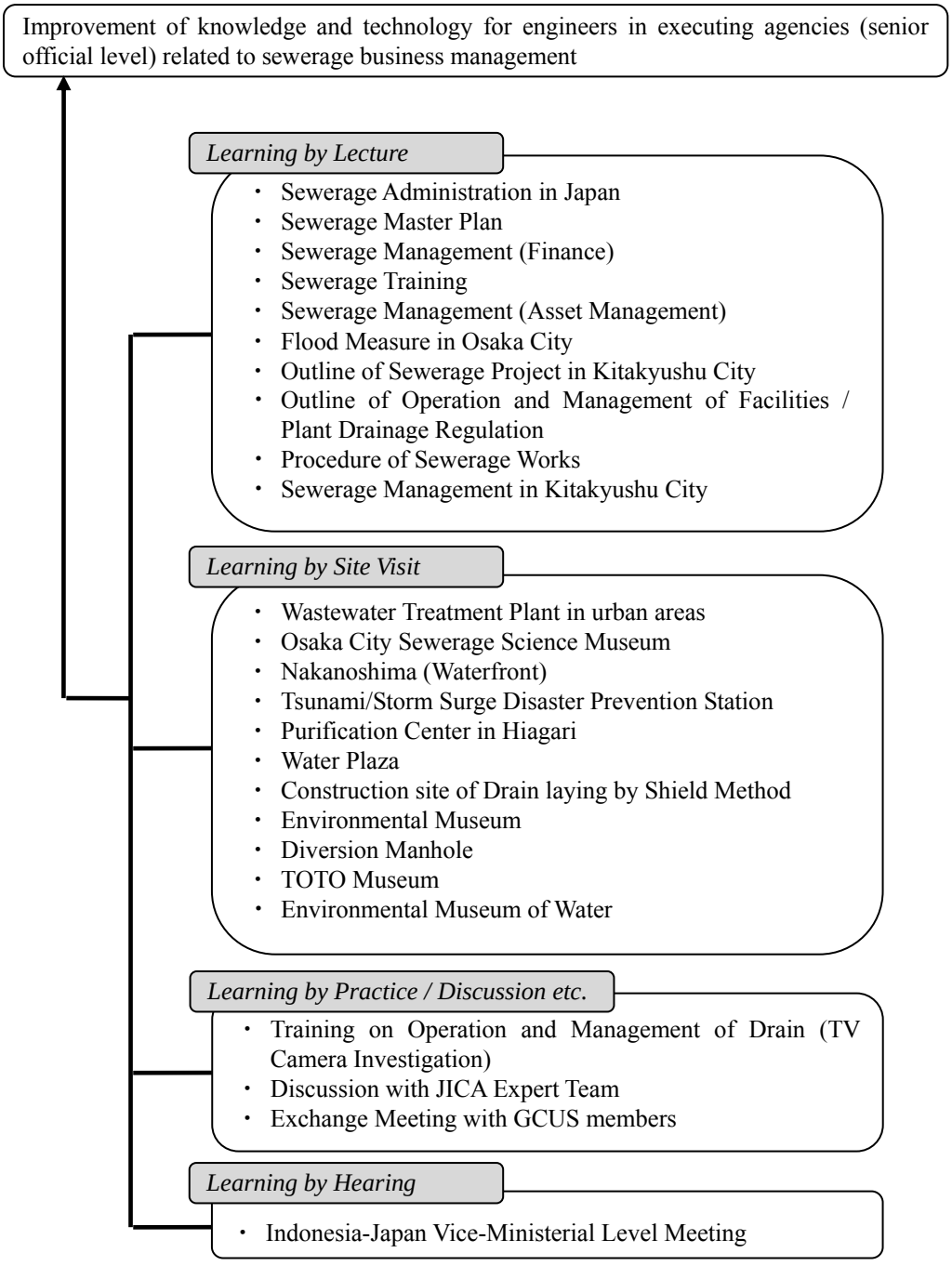


Figure 2-9 Outline of the entire training in 1st Training in Japan

(b) Schedule

Table 2-37 Schedule of 1st Training in Japan

Date	Time		Activity	Contents of Training	Organization	Training Place
14 Feb (Sat)				Move from Jakarta to Haneda	TIC	TIC
15 Feb (Sun)	09:30	10:30		Briefing at JICA	TIC	TIC
	11:30	12:00		Courtesy Call to MLIT	MLIT	MLIT
	14:00	15:00		Courtesy Call to JICA	JICA	JICA
	15:30	17:30		Program Orientation	Japan Techno Co., Ltd.	TIC
16 Feb (Tue)	09:30	10:30	Lecture	Sewerage Administration in Japan	MLIT	TIC
	13:30	16:00	Lecture	Sewerage Master Plan	Sewerage Business Management Center	TIC
17 Feb (Wed)	09:30	11:00	Lecture	Sewerage Management (Finance)	Japan Sewage Works Agency	TIC
	14:00	17:00	Special Lecture	Indonesia-Japan Construction Vice-Ministerial Level Meeting	MLIT	Shinagawa Prince Hotel
	18:00	20:00		Reception	MLIT	Shinagawa Prince Hotel
18 Feb (Thur)	09:30	11:30	Site Visit	Wastewater Treatment Plant in urban areas	Bureau of Sewerage in Tokyo	Ochiai Water Reclamation Center
	13:30	15:30	Lecture	Sewerage Training	Japan Sewage Works Agency	TIC
	15:30	17:00	Lecture	Sewerage Management (Asset Management)	Japan Sewage Works Agency	TIC
19 Feb (Fri)	10:00	12:00	Practice	Training on Operation and Management of Drain (TV Camera Investigation)	Sewage Pipe Research Center	JASCOMA
	13:30	15:30	Lecture	Discussion with JICA Expert Team	JICA Expert Team	TIC
	15:30	17:00	Lecture	Exchange Meeting with GCUS members	GCUS	TIC
20 Feb (Sat)	08:50	12:00	Move	Tokyo → Kyoto		
	13:30	15:30		Sightseeing at Kyoto (Bus tour)		
	15:30	17:00	Move	Kyoto → Osaka		
21 Feb (Sun)	10:00	10:30	Site Visit	Osaka City Sewerage Science Museum		
	11:00	12:00	Site Visit	Nakanoshima (Waterfront)		
	12:30	15:30		Dotonbori River (including Lunch)		
	16:00	18:00		Review of Training Contents		
22 Feb (Mon)	09:30	11:00	Lecture	Flood Measure in Osaka City	Public Works Bureau in Osaka City	Urban Technology Center
	14:00	15:30	Site Visit	Tsunami/Storm Surge Disaster Prevention Station		
23 Feb (Tue)	09:00	13:00	Move	Osaka → Kitakyushu		
	14:00	15:30	Lecture	Outline of Sewerage Project in Kitakyushu City	Kitakyushu City Water and Sewer Bureau	KIC
	16:30	16:50		Courtesy Call to Mayor of Kitakyushu City	Kitakyushu City Water and Sewer Bureau	Kitakyushu City Government
	17:30	18:30		Review of Training		
24 Feb (Wed)	09:30	12:00	Lecture	Outline of Operation and Management of Facilities / Plant Drainage Regulation	Kitakyushu City Water and Sewer Bureau	Purification Center in Hiagari
	13:00	15:00	Site Visit	Purification Center in Hiagari	Kitakyushu City Water and Sewer Bureau	Purification Center in Hiagari
	15:00	17:00	Site Visit	Water Plaza	GWSTA	Purification Center in Hiagari
25 Feb (Thur)	09:00	10:30	Lecture	Procedure of Sewerage Works	Kitakyushu City Water and Sewer Bureau	KIC
	10:30	12:30	Lecture	Sewerage Management in Kitakyushu City	Kitakyushu City Water and Sewer Bureau	KIC
	14:00	15:30	Site Visit	Construction site of Drain laying by Shield Method	Kitakyushu City Water and Sewer Bureau	Yahata
	16:00	17:00	Site Visit	Environmental Museum	Kitakyushu City Water and Sewer Bureau	Environmental Museum
26 Feb (Fri)	09:30	10:20	Site Visit	Diversion Manhole	Kitakyushu City Water and Sewer Bureau	Kokura
	10:30	11:30	Site Visit	TOTO Museum	Kitakyushu City Water and Sewer Bureau	TOTO Museum
	11:40	12:00	Site Visit	Environmental Museum of Water	Kitakyushu City Water and Sewer Bureau	Kokura
	13:30	14:00		Preparation for Evaluation Meeting / Review		KIC

	14:00	15:00		Evaluation Meeting	KIC	KIC
	15:00	1600		Closing Ceremony / Farewell Party	KIC	KIC
27 Feb (Sat)				Move from Fukuoka to Jakarta		

TIC : JICA Tokyo International Center KIC : JICA Kyushu International Center
MLIT : Ministry of Land, Infrastructure, Transport and Tourism
GWSTA : Global Water Recycling and Reuse Solution Technology Research Association
JASCOMA : Japan Sewer Collection System Maintenance Association

(c) Training Curriculum

Table 2-38 Training Curriculum of 1st Training in Japan

Major Training Subjects	Training Method	Training Contents	Time	Trainer Organization
Sewerage Administration in Japan	Lecture	To explain its history and outline, the current issues and policies and its international cooperation about the sewerage administration in Japan.	2.0	Sewerage Planning Division, Sewerage and Wastewater Management Department, MLIT
Sewerage Master Plan	Lecture	To explain the mechanism of making master plan, while showing the procedure of implementation of sewerage projects (in order of preparation for basic plan, decision of urban plan, approval of commercialization plan on sewerage laws and approval of business license of urban planning laws).	2.5	Sewerage Business Management Center
Sewerage Management (Finance)	Lecture	To explain sewerage management through sewerage laws, sewerage finance and management of sewerage projects using PDCA in Japan.	2.0	Japan Sewage Works Agency
Indonesia-Japan Construction Vice-Ministerial Level Meeting	Hearing	High level officials from both Japan and Indonesia (Vice Minister level) present their sewerage projects respectively and exchange information.	3.0	Sewerage Planning Division, Sewerage and Wastewater Management Department, MLIT
Wastewater Treatment Plant in urban areas	Site Visit	To explain its technology and history about each facility equipment in Ochiai Water Reclamation Center and visit inside of the center.	2.0	Bureau of Sewerage in Tokyo
Sewerage Training	Lecture	To introduce Japan Sewage Works Agency and its training center, and explain the roles of the agency and training center.	2.0	Japan Sewage Works Agency
Sewerage Management (Asset Management)		To introduce the present status and problems of sewerage project in Japan, and the activities of Asset Management by Japan Sewage Works Agency.	1.5	Japan Sewage Works Agency
Training on Operation and Management of Drain (TV Camera Investigation)	Practice	To conduct Operation and Maintenance practice in demonstration drain, introduction of TV camera for Operation and Maintenance and operation practice of them.	2.0	Global Water Recycling and Reuse Solution Technology Research Association
Discussion with JICA Expert Team	Discussion	To explain the outline of the Project and capacity assessment, and exchange opinions each other.	3.0	JICA Expert Team

Major Training Subjects	Training Method	Training Contents	Time	Trainer Organization
Exchange Meeting with GCUS members	Discussion	To introduce trainees and members of GCUS and conduct meeting for exchanging opinions.	2.0	GCUS[25] members
Osaka City Sewerage Science Museum	Site Visit	To explain the mechanism and functions of sewerage, and the characteristics of sewerage in Osaka city while showing the exhibits in order to understand the roles of sewerage.	0.5	Osaka City Sewerage Science Museum
Nakanoshima (Waterfront)	Site Visit	To show waterfront and explain its history and characteristics.	1.0	JICA Expert Team
Flood Measure in Osaka City	Lecture	To explain flood measure in Osaka city through the topographical features and history, flood prevention by embankment (measures against storm surges: measures against external water), inundation prevention to secure the city from rain water (measures against inundations: measures against internal water), and the summary of management of rain water.	1.5	Water Environmental Division, Water, Sewage River Department, Public Works Bureau in Osaka City
Tsunami/Storm Surge Disaster Prevention Station	Site Visit	To introduce the situations in West-Osaka area where tsunami / storm surge occurred before, and the current disaster prevention measures, through videos and exhibitions.	1.5	Tsunami/Storm Surge Disaster Prevention Station
Outline of Sewerage Project in Kitakyushu City	Lecture	To introduce the outline of Kitakyushu City, its actions / the future development in the city, as the outline of sewerage project in Kitakyushu City.	1.5	Kitakyushu City Water and Sewer Bureau
Outline of Operation and Management of Facilities / Plant Drainage Regulation	Lecture	To explain operation and maintenance of treatment plants / pump stations, regulation of factory / plant drainage in Kitakyushu City, and laws and regulations against industrial wastewater.	2.5	Kitakyushu City Water and Sewer Bureau
Purification Center in Hiagari	Site Visit	To introduce Purification Center in Hiagari, which treats wastewater by an activated sludge process and discharges its treated water to the entrance of Dokai-Bay. It was constructed in April, 1970 and its operation was started. And it has been operated even now.	2.0	Kitakyushu City Water and Sewer Bureau
Water Plaza	Site Visit	To explain newest technologies in Water Plaza, which is adjacent to Purification Center in Hiagari, and was established to with the aim of promoting technology dissemination by developing the advanced water circulation systems, accumulating know-how of management and operation, and further, transmitting information to domestic and overseas.	2.0	Global Water Recycling and Reuse Solution Technology Research Association
Procedure of Sewerage Works	Lecture	To explain case examples of sewerage project management from 3 perspectives of organization,	1.5	Kitakyushu City Water and Sewer Bureau

[25] Japan Global Center for Urban Sanitation

Major Training Subjects	Training Method	Training Contents	Time	Trainer Organization
		operation and management, as a sample of Kitakyushu City.		
Sewerage Management in Kitakyushu City	Lecture	To explain management of sewerage projects in Kitakyushu City from 3 points of the principle of sewerage management, Kitakyushu City's development conditions and financial administration of sewerage development, and the current situations and issues in the city.	2.0	Kitakyushu City Water and Sewer Bureau
Construction site of Drain laying by Shield Method	Site Visit	To visit the current constructing site of drain laying and observe an administration building and the inside of drain (up to the leading edge of drilling by shield method).	1.5	Kitakyushu City Water and Sewer Bureau
Environmental Museum	Site Visit	To visit Environmental Museum, "Comprehensive base facilities of the environmental learning and exchange for citizens", which is organized by Kitakyushu-City which aims to be the world's environmental capital, and introduce the activities implemented to realize environmentally-friendly and sustainable society in Kitakyushu City.	1.0	Environmental Museum
Diversion Manhole	Site Visit	To enter inside diversion manhole of sewerage in practice and observe the site, and explain the roles of diversion manhole.	0.8	Kitakyushu City Water and Sewer Bureau
TOTO Museum	Site Visit	To explain history of TOTO established in 1917, and toilet (history and the latest model) and public health.	1.0	TOTO Museum
Environmental Museum of Water	Site Visit	To learn the importance of water through history of Mirasaki River which suffered huge environment damage and has recovered now.	1.0	Kitakyushu City Water and Sewer Bureau

Sewerage Working Group in Indonesia-Japan Construction Vice-Ministerial Level Meeting sponsored by MLIT

(17 February, 2016)

Site Visit at Ochiai Water Reclamation Center

(18 February, 2016)

Award of Certificate
(19 February, 2016)

Award of Certificate
(19 February, 2016)

Site Visit at Purification Center in Hiagari
(24 February, 2016)

Site Visit at Construction site of Drain laying by Shield Method
(25 February, 2016)

Site Visit at Diversion Manhole
(26 February, 2016)

Evaluation Meeting
(26 February, 2016)

(2) 2nd Training in Japan

The summary of the 2nd training in Japan is shown below:

1) Summary of the course

(a) Name of the course

Sewerage Administration for Indonesia

(b) Period of the training

21 August to 3 September, 2016

(c) Number of the trainees

9 trainees

2) Contents of the training

As the contents of the training, (a) Outline of the entire training, (b) Schedule and (c) Training Curriculum are indicated.

(a) Outline of the entire training

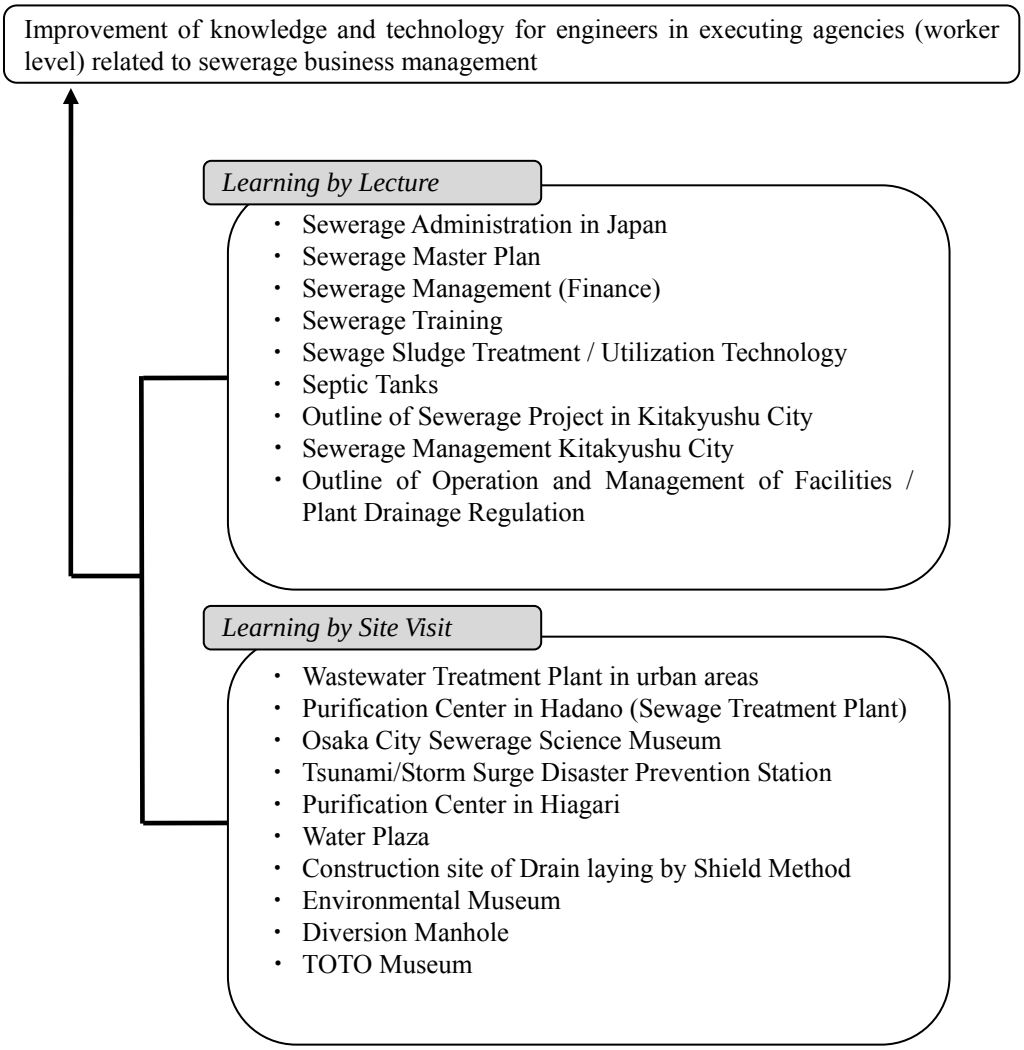


Figure 2-10 Outline of the entire training in 2nd Training in Japan

(b) Schedule

Table 2-39 Schedule of 2nd Training in Japan

Date	Time		Activity	Contents of Training	Organization	Training Place
21 Aug (Sun)				Move from Jakarta to Haneda	TIC	TIC
22 Aug (Mon)	10:00	12:30		Briefing at JICA	TIC	TIC
	14:00	14:30		Courtesy Call to MLIT	MLIT	MLIT
	16:00	17:00		Courtesy Call to JICA	JICA	JICA
	17:30	18:00		Program Orientation	Japan Techno Co., Ltd.	TIC
23 Aug (Tue)	10:00	12:00	Lecture	Sewerage Administration in Japan	MLIT	TIC
	13:30	16:00	Lecture	Sewerage Master Plan	Sewerage Business Management Center	TIC
24 Aug (Wed)	09:30	11:30	Lecture	Sewerage Management (Finance)	Japan Sewage Works Agency	TIC
	14:00	17:00	Site Visit	Wastewater Treatment Plant in urban areas	Bureau of Sewerage in Tokyo	Shibaura Water Reclamation Center
25 Aut (Thur)	09:30	12:00	Lecture	Sewerage Training	Japan Sewage Works Agency	TIC
	13:30	15:30	Lecture	Sewage Sludge Treatment / Utilization Technology	Japan Sewage Works Agency	TIC
26 Aug (Fri)	09:30	11:30	Lecture	Septic Tanks	Japan Education Center of Environmental Sanitation	same as left
	15:30	17:00	Lecture	Purification Center in Hadano (Sewage Treatment Plant)	Purification Center in Hadano	same as left
27 Aug (Sat)				Review of Training Contents		
28 Aug (Sun)	08:50	12:00	Move	Tokyo → Kyoto		
	13:30	17:30		Sightseeing at Kyoto (Bus tour)		
	18:30	19:40	Move	Kyoto → Osaka		
29 Aug (Mon)	10:00	11:30	Site Visit	Osaka City Sewerage Science Museum		
	14:00	15:30	Site Visit	Tsunami/Storm Surge Disaster Prevention Station		
30 Aug (Tue)	09:00	13:00	Move	Osaka → Kitakyushu		
	14:00	15:30	Lecture	Outline of Sewerage Project in Kitakyushu City	Kitakyushu City Water and Sewer Bureau	KIC
	15:30	17:30	Lecture	Sewerage Management in Kitakyushu City	Kitakyushu City Water and Sewer Bureau	KIC
31 Aug (Wed)	09:30	12:00	Lecture	Outline of Operation and Management of Facilities / Plant Drainage Regulation	Kitakyushu City Water and Sewer Bureau	Purification Center in Hiagari
	13:00	15:00	Site Visit	Purification Center in Hiagari	Kitakyushu City Water and Sewer Bureau	Purification Center in Hiagari
	15:00	17:00	Site Visit	Water Plaza	GWSTA	Purification Center in Hiagari
1 Sep (Thur)	09:30	10:00	Site Visit	Diversion Manhole	Kitakyushu City Water and Sewer Bureau	KIC
	10:00	11:30	Site Visit	TOTO Museum	Kitakyushu City Water and Sewer Bureau	KIC
	14:00	15:30	Site Visit	Construction site of Drain laying by Shield Method	Kitakyushu City Water and Sewer Bureau	Yahata
	16:00	17:00	Site Visit	Environmental Museum	Kitakyushu City Water and Sewer Bureau	Environmental Museum
2 Sep (Fri)	09:30	10:00		Move from Kitakyushu to Tokyo		
	13:30	14:00		Preparation for Evaluation Meeting / Review		KIC
	14:00	15:00		Evaluation Meeting	KIC	KIC
3 Sep (Sat)				Move from Fukuoka to Jakarta		

TIC : JICA Tokyo International Center KIC : JICA Kyushu International Center
MLIT : Ministry of Land, Infrastructure, Transport and Tourism
GWSTA : Global Water Recycling and Reuse Solution Technology Research Association
JASCOMA : Japan Sewer Collection System Maintenance Association

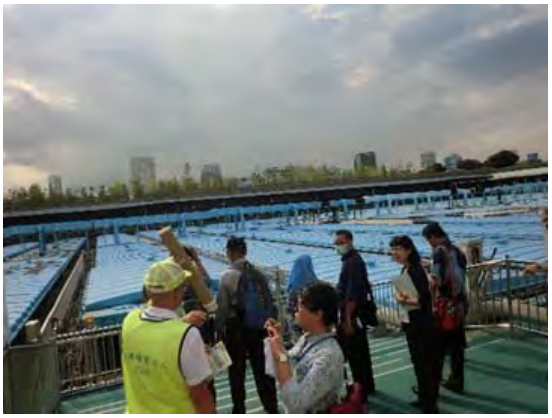
(c) Training Curriculum

Table 2-40 Training Curriculum of 2nd Training in Japan

Major Training Subjects	Training Method	Training Contents	Time	Trainer Organization
Sewerage Administration in Japan	Lecture	To explain its history and outline, the current issues and policies and its international cooperation about the sewerage administration in Japan.	2.0	Sewerage Planning Division, Sewerage and Wastewater Management Department, MLIT
Sewerage Master Plan	Lecture	To explain the mechanism of making master plan, while showing the procedure of implementation of sewerage projects (in order of preparation for basic plan, decision of urban plan, approval of commercialization plan on sewerage laws and approval of business license of urban planning laws).	2.5	Sewerage Business Management Center
Sewerage Management (Finance)	Lecture	To explain sewerage management through sewerage laws, sewerage finance and management of sewerage projects using PDCA in Japan.	2.0	Japan Sewage Works Agency
Wastewater Treatment Plant in urban areas	Site Visit	To explain its technology and history about each facility equipment in Shibaura Water Reclamation Center and visit inside of the center.	3.0	Bureau of Sewerage in Tokyo
Sewerage Training	Lecture	To introduce Japan Sewage Works Agency and its training center, and explain the roles of the agency and training center.	2.5	Japan Sewage Works Agency
Sewage Sludge Treatment / Utilization Technology	Lecture	To explain the current status of sewage sludge treatment technology in Japan and energy utilization technology of sludge (biomass, conversion to solid fuel, energy recovery by anaerobic digestion, etc.)	2.0	Japan Sewage Works Agency
Septic Tanks	Lecture	To introduce the current status of Septic Tanks in Japan and the latest septic tank facilities.	2.0	Japan Education Center of Environmental Sanitation
Purification Center in Hadano (Sewage Treatment Plant)	Site Visit	To explain its technology and history about each facility equipment in Purification Center in Hadano (Sewage Treatment Plant) and visit inside of the center.	2.0	Purification Center in Hadano
Osaka City Sewerage Science Museum	Site Visit	To explain the mechanism and functions of sewerage, and the characteristics of sewerage in Osaka city while showing the exhibits in order to understand the roles of sewerage.	1.5	Osaka City Sewerage Science Museum
Tsunami/Storm Surge Disaster Prevention Station	Site Visit	To introduce the situations in West-Osaka area where tsunami / storm surge occurred before, and the current disaster prevention measures, through videos and exhibitions.	1.5	Tsunami/Storm Surge Disaster Prevention Station
Outline of Sewerage Project in Kitakyushu City	Lecture	To introduce the outline of Kitakyushu City, its actions / the future development in the city, as the outline of sewerage project in Kitakyushu City.	1.5	Kitakyushu City Water and Sewer Bureau

Major Training Subjects	Training Method	Training Contents	Time	Trainer Organization
Sewerage Management in Kitakyushu City	Lecture	To explain management of sewerage projects in Kitakyushu City from 3 points of the principle of sewerage management, Kitakyushu City's development conditions and financial administration of sewerage development, and the current situations and issues in the city.	2.0	Kitakyushu City Water and Sewer Bureau
Outline of Operation and Management of Facilities / Plant Drainage Regulation	Lecture	To explain operation and maintenance of treatment plants / pump stations, regulation of factory / plant drainage in Kitakyushu City, and laws and regulations against industrial wastewater.	2.5	Kitakyushu City Water and Sewer Bureau
Purification Center in Hiagari	Site Visit	To introduce Purification Center in Hiagari, which treats wastewater by an activated sludge process and discharges its treated water to the entrance of Dokai-Bay. It was constructed in April, 1970 and its operation was started. And it has been operated even now.	2.0	Kitakyushu City Water and Sewer Bureau
Water Plaza	Site Visit	To explain newest technologies in Water Plaza, which is adjacent to Purification Center in Hiagari, and was established to with the aim of promoting technology dissemination by developing the advanced water circulation systems, accumulating know-how of management and operation, and further, transmitting information to domestic and overseas.	2.0	Global Water Recycling and Reuse Solution Technology Research Association
Diversion Manhole	Site Visit	To enter inside diversion manhole of sewerage in practice and observe the site, and explain the roles of diversion manhole.	0.5	Kitakyushu City Water and Sewer Bureau
TOTO Museum	Site Visit	To explain history of TOTO established in 1917, and toilet (history and the latest model) and public health.	1.5	TOTO Museum
Construction site of Drain laying by Shield Method	Site Visit	To visit the current constructing site of drain laying and observe an administration building and the inside of drain (up to the leading edge of drilling by shield method).	1.5	Kitakyushu City Water and Sewer Bureau
Environmental Museum	Site Visit	To visit Environmental Museum, "Comprehensive base facilities of the environmental learning and exchange for citizens", which is organized by Kitakyushu-City which aims to be the world's environmental capital, and introduce the activities implemented to realize environmentally-friendly and sustainable society in Kitakyushu City.	1.0	Environmental Museum

Lecture (“Sewerage Administration in Japan” MLIT)
(23 August, 2016)



Site Visit at Shibaura Water Reclamation Center
(24 August, 2016)

Lecture (“Septic Tanks” Japan Education Center of Environmental Sanitation)
(26 August, 2016)

Site Visit at Diversion Manhole
(1 September, 2016)

Site Visit at TOTO Museum
(1 September, 2016)

Site Visit at Construction site of Drain laying by Shield Method
(1 September, 2016)

Site Visit at Construction site of Drain laying by Shield Method

(1 September, 2016)

Site Visit at Construction site of Drain laying by Shield Method

(1 September, 2016)

Evaluation Meeting

(2 September, 2016)

Evaluation Meeting

(2 September, 2016)

2-1-3-2-3 Activity 2-3 “DKI drafts Mid-Term Sewerage Development Plan in DKI Jakarta in consultation with JCIA experts.”

① Background

The DKI Jakarta formulates a Medium-Term Development Plan (Rencana Pembangunan Jangka Menengah Daerah) (hereinafter referred to as “RPJMD”) every five years in each sector and implements the programmes and projects with the allocation of human and financial resources. RPJMD covers 14 sectors of education, health, public infrastructure, housing, spatial plan, transportation, environment, welfare, labor, support for SME, investment, administration, communication information, and trade. Sewerage development and wastewater management are one section of public infrastructure sector. Public infrastructure includes roads, bridges, airports, ports, special economic zones, flood control and drainage, drinking water and water resource, wastewater management, groundwater development, settlements and energy.

The sewerage and wastewater management plan in the current RPJMD (2013-2017) has been formulated in line with Revised Master Plan in 2012 supported by JICA. Major projects in RPJMD (2013-2017) were limited to the implementation of sewerage systems of Zone-1 and 6, implementation of ITPs at commercial and public facilities, construction of community wastewater system or SANIMAS, and septic sludge removal and sludge treatment.

Meanwhile, NCICD for improvement of water environment in Jakarta was formulated in 2014 and approved by the related ministries and agencies. NCICD plans to close the Jakarta Bay with Giant Wall to prevent ground subsidence and flooding, construct a rainwater adjustment reservoir, and improve transportation network, urban area, and water resources development. Under NCICD, the accelerated sewerage development and appropriate wastewater management is indicated one of most important issues.

DKI Jakarta integrated the updated JICA Master Plan (2012) and the National Capital Integrated Coastal Development (NCICD) and formulated the Acceleration Plan (2014) with PD PAL Jaya. The Acceleration Plan targets the coverage of wastewater treatment at 75% by 2022 the year of closure of the western Jakarta Bay. The wastewater treatment includes the centralized sewerage system, communal system and onsite sanitation. Reflecting the Acceleration Plan, the Governor Regulation No. 42/2016 were enforced in 2016, which targets the coverage of “off-site” (centralized sewerage and communal system) at 65% and that of “on-site” sanitation at 35%.

Based on such a change in the national and regional plan, the mid-term sewerage development plan for the next five years (2018-2022) is under formulation by mainly the Urban Infrastructure Facilities and Environment Division, Regional Development Agency (BAPPEDA) and the Raw

Water and Wastewater Division, Water Resource Office (Dinas Sumber Daya Air, former Dinas Tata Air) in DKI Jakarta.

② Study Subjects and Results (Current Situation)

The current PRJMD (2013-2017) and the related master plans (JICA Revised Master Plan 2012, NCICD, Acceleration Plan) have been reviewed by BAPPEDA in order to analyze the sector development strategy and priority, current situations and issues related wastewater management, and planning requirements for the next five years. The results of study are summarized below.

(1) Current RPJMD (2013-2017)

The sewerage development and wastewater management plan in the current RPJMD (2013-2017) was formulated in accordance with Revised M/P in 2012. Major projects in the RPJMD (2013-2017) were the implementation of sewerage systems of Zone-1 and 6, implementation of ITPs at commercial and public facilities, construction of community wastewater system or SANIMAS, and septic sludge removal and sludge treatment.

The NCICD was not formulated yet at the time of planning of RPJMD (2013-2017). It was a realizable implementation plan of sewerage development and wastewater management activities and the annual budgets were arrangement accordingly.

Table 2-41 Implementation Plan of Sewerage Sector in Current RPJMD (2013-2017)

Program	Program Pi (outcome)	Initial condition 2012	Performance target program					Performance conditions end of year 2017
			2013	2014	2015	2016	2017	
			Target	Target	Target	Target	Target	
Performance Improvement Program Wastewater Management	Percentage of centralized wastewater systems	Only Zone 0 (4% of DKI)	Preparation of ground breaking Zone1 and the land acquisition WWTP Zone1	Land acquisition WWTP operations continued Zone1 and Zone1 EIA preparation	Land acquisition WWTP continued Zone1 and EIA preparation Zone6	Commence-ment of construction of piping Zone1	Construction Zone1 advanced piping and piping construction commence-ment Zone6	Facilities of centralized wastewater systems by 8% of the DKI (Zone 0, Zone1 and Zone6)
	Percentage of local systems with ITP	0	1	71	21	3,5	3,5	100 %
	Number of WWTP for communal system	2	0	3	3	2	1	11
	Volume of desludging and sludge treatment	400 m^3/d	500 m^3/d	700 m^3/d	900 m^3/d	1,200 m^3/d	1,500 m^3/d	1,500 m^3/d

Source : RPJMD (2013-2017) BAPPEDA, Jakarta DKI
WWTP : Wastewater Treatment Plant

(2) JICA Revised Master Plan (M/P) 2012

The basis of the sewerage development of DKI Jakarta is the New Master Plan for Wastewater Management in DKI Jakarta (March 2012) formulated with the support from JICA. The target year of Revised Master Plan was 2012-2050. Revised Master Plan proposed the development plans for improvement of wastewater management in DKI dividing 15 sewerage zones (including Zone-0) and 3 development terms.

In the master plan, after evaluation of sewerage zones based on the proposed criteria, Zone-1 and 6 were selected as the first priority zones. The development terms were divided that short-term of 2012-2020, mid-term of 2021-2030, and long-term of 2030-2050.

Table 2-42 Development Master Plan and Sewerage Zones for Each Target Development Year

Term	Development year	Zone No.	Remarks
Short-term	2012-2020	1, 6	Priority projects. Facility coverage 20%
Mid-term	2021-2030	4, 5, 8, 10	Facility coverage 40%
Long-term	2031-2050	2, 3, 7, 9, 11, 12, 13, 14	Facility coverage 80%

Source : Project for Capacity Development of Wastewater Sector through Reviewing the Wastewater Management Master Plan in DKI Jakarta, 2012 JICA

Based on the selection criteria as listed below, Zone-4, 5, 8 and 10 were categorized as the mid-term targets.

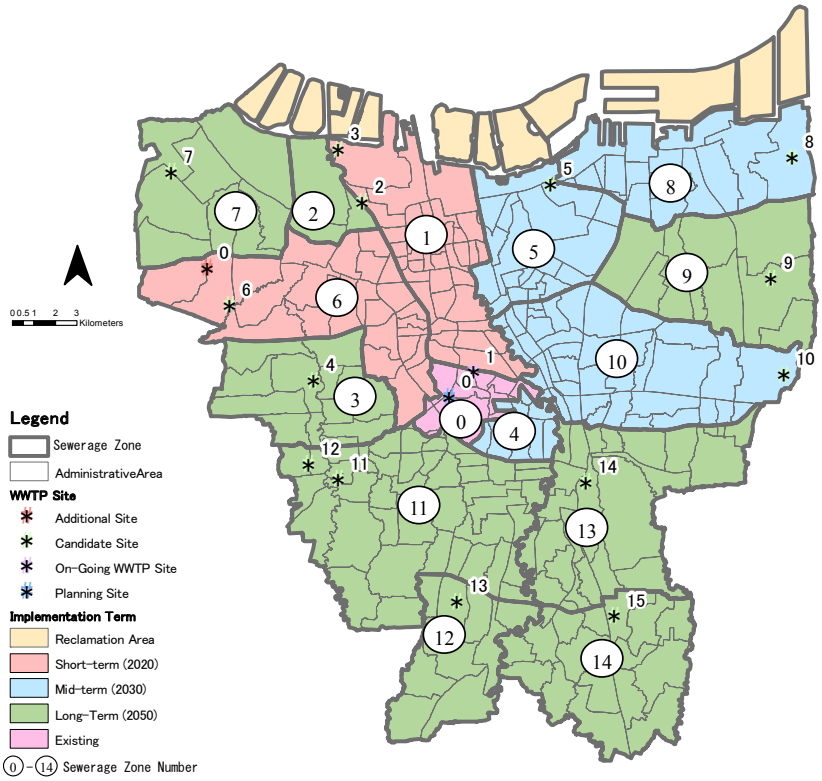
Table 2-43 Criteria for Selection of Priority Zone in JICA Revised Master Plan 2012

	Factor	Remark
1	Population density is high.	Pollutant load is high.
2	WWTP site shall be secured inside the sewerage zone.	Construction and O&M cost are low.
3	Sewer trunk lines are shorter and river crossings should be avoided as much as possible.	Construction and O&M cost are low.
4	There are many commercial establishments who can afford to pay wastewater charge after the proposed project is implemented.	Easier to collect wastewater charge in the future.
5	There are the existing sewerage systems.	Easier to collect wastewater charge in the future.
6	Socio-economic conditions are not good.	Water borne disease ratio and pollutant load are high
7	River water quality is not good (BOD is high).	Pollutant load is high.
8	Groundwater quality is not good (E-coli is high).	Possibility of contamination by domestic wastewater is high.

Source: Project for Capacity Development of Wastewater Sector through Reviewing the Wastewater Management Master Plan in DKI Jakarta, 2012 JICA

Sewerage zones of each target year are shown in the map below.

Target Year	Zone
Off-site	
Short-term 2012-2020	1, 6 (20%)
Mid-term 2021-2030	4, 5, 8, 10 (40%)
Long-term 2030-2050	2, 3, 7, 9, 11, 12, 13, 14 (80%)



Source : Project for Capacity Development of Wastewater Sector through Reviewing the Wastewater Management Master Plan in DKI Jakarta, 2012 JICA

Figure 2-11 Implementation Plan for Sewerage Zones (Revised Master Plan 2012)

(3) National Capital Integrated Coastal Development (NCICD)

In the NCICD in 2014, as a countermeasure against inundation flooding in Jakarta city, the Government of Indonesia set the goal of developing highly reliable flood control facility by constructing a large embankments (Giant Sea Wall) in the offshore of Jakarta Bay and a water retention pond inside the wall, instead of the treatment of symptoms such as discharging inundation water by drainage pumps.

The projects proposed by NCICD are the construction of the large embankments, urban development on the embankment, infrastructure improvement such as road, railroad and so on. Regarding drainage, it is emphasized that the construction and renovation of drainage pumping stations, and urgent development of sewerage systems which reduce water pollution load of the water retention pond and secure stable water resources in the city.

In Phase A of the NCICD project, the administration will promote urgent and high-priority embankment construction, socio-economic related projects, water supply and sewerage development. The second and third phase (Phase-B, C) are planned to promote harbors, landfills,

roads, railways and urban development through investment by private sector. Sewerage development is positioned as an urgent and short-term, high-priority project in which the administration proactively promotes water quality conservation.

Three phases of NCICD project

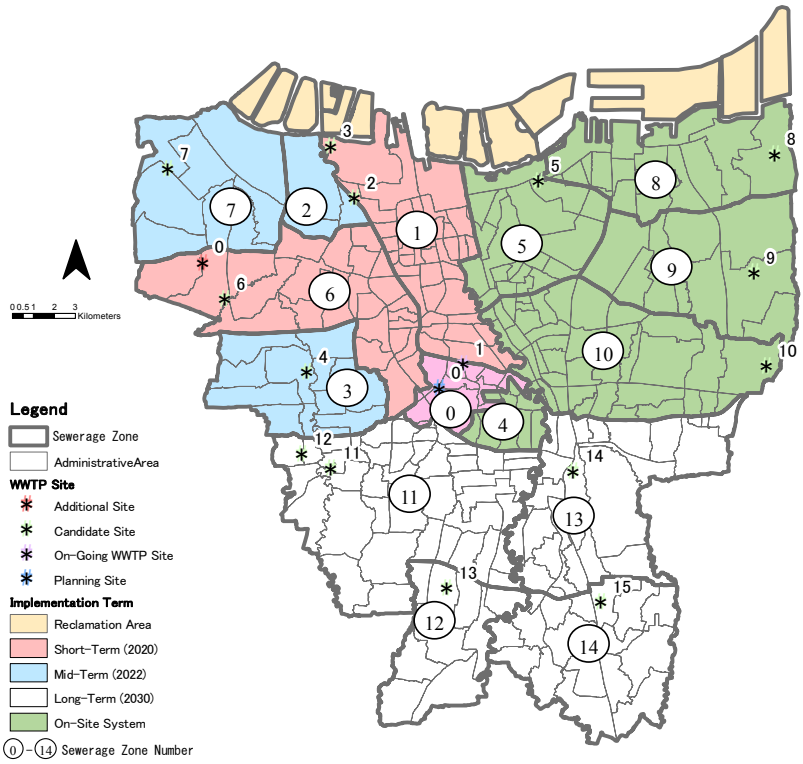
- Phase A: onshore sea dykes construction (2014-2022);
- Phase B: construction of the outer seawall in the western part of Jakarta Bay (2018-2025);
- Phase C: constructing the outer seawall in the eastern part of Jakarta Bay (after 2025).

Source : NCICD: From Master planning to Implementation,2014, Coordinating Ministry for Economic Affairs, Republi Indonesia

Figure 2-12 Closure Plan of Jakarta Bay in the NCICD

Since the closure of western part of Jakarta Bay was initially planned by 2022, the western sewerage zones of coastal area became higher priority compared to the other zones. At the same time, the improvement of On-site system such as regular desludging and change of conventional septic tanks (CST) to modified septic tanks (MST) in the eastern coastal areas is planned as mid-term intervention to reach the target of 70% facility coverage rate.

Target Year	Zone
Off-site	
Short-term 2014-2020	0, 1, 6 (23%)
Mid-term 2018-2022	2, 3, 7 (12%)
On-site	
Mid-term 2014-2030	4, 5, 8, 9, 10 + (35%)



Source: PD PAL Acceleration Plan

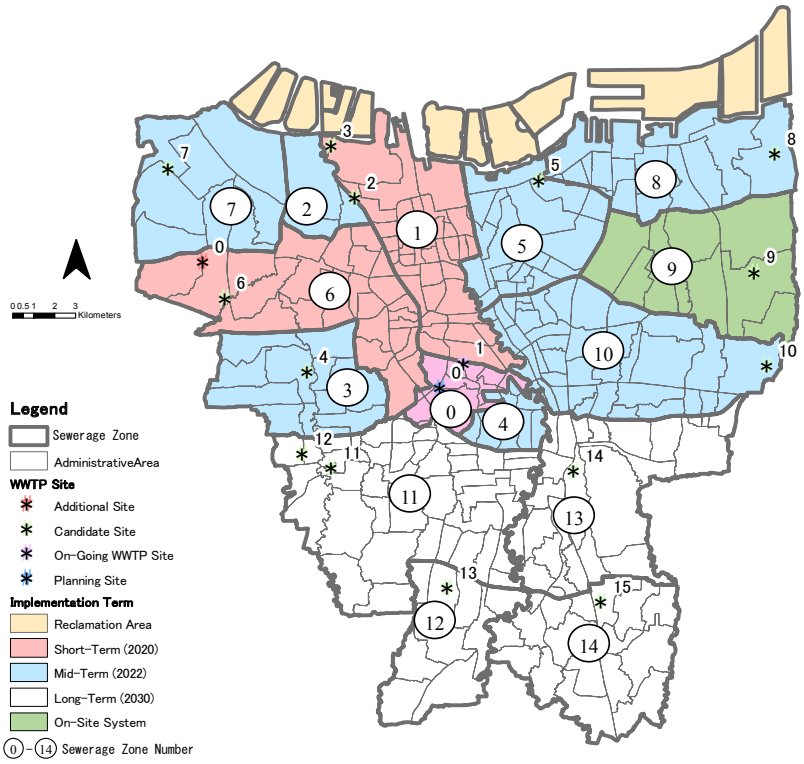
Figure 2-13 Implementation Plan for Sewerage Zones (NCICD)

(4) Acceleration Plan and Governor Regulation (No.41/ 2016)

The latest sewerage development plan so called “Acceleration Plan” was formulated by PD PAL Jaya combined of the updated JICA Revised Master Plan and the NCICD.

The first priority of sewerage development is Zone-1 and 6 in which the service coverage of wastewater service in DKI Jakarta is 23%. And the second priority Zones 2, 3, 4, 5, 7, 8 and 10 will increase the service coverage by 42%. In total, the target ratio of wastewater management services through the off-site centralized system is 65% by 2022. Also the target ratio of wastewater management services through the on-site system is 35% in 2022.

Target Year	Zone
Off-site	
Short-term 2014-2020	0, 1, 6 (23%)
Mid-term 2018-2022	2, 3, 7, 4, 5, 8, 10 (42%)
On-site	
Mid-term 2014-2022	All zones (35%)



Source: PD PAL Acceleration Plan

Figure 2-14 Implementation Plan for Sewerage Zones (Acceleration Plan)

Based on this Acceleration Plan, the Governor of DKI Jakarta has published a regulation (No.41/ 2016) regarding the development of infrastructure and facilities of domestic wastewater management.

(5) Work Situation of Other Related Organizations in the Planning Process

The mid-term sewerage development plan will be formulated reflecting the data of the strategic program (5-year Strategic Program) created by Dinas Sumber Daya Air (Dinas Sumber Daya Air, former Dinas Tata Air). The strategic program is prepared by a local consultant employed by Dinas Sumber Daya Air and includes a breakdown of specific project costs.

On the other hand, PD PAL Jaya has also formulated its own long-term five-year plan. This content will be reflected in the Strategic Program of Dinas Sumber Daya Air and the Mid-Term Sewerage Development Plan of BAPPEDA. In addition, PD PAL Jaya is carrying out the detailed engineering design (DED) of Phase-1 sewerage zones (Zone-2, 3, 4, 5, 7, 8, 10) except Zone-1 and 6. PD PAL Jaya is urging to secure the financial resource including private investment. The DED is designed by different local consultants employed by PD PAL Jaya and evaluated by the in-house consultant in aspect of technical feasibility.
As a result, a substantial review of the sewer pipe construction was required. The revision was carried out in 2016, and in January 2017 the provisional project cost of each sewerage zone was estimated.

In addition, the project cost estimation is expected to reflect the concept of the Standard Cost Estimation of Sewer Installation with Micro-Tunneling Method which is currently drafted by JICA Expert Team working in the Ministry of Public Works and Housing, further revision is expected. Also, as the DED was implemented without F/S beforehand, the F/S will be carried out under the support of INDII in some sewerage zones.

③ Policy (Strategy) → Plan
Based on the above situation, the following support policies and specific activities were planned at the beginning of this project.

(1) Output
"DKI Mid-Term Development Plan RPJMD (2018-2022): Sewerage edition"
Draft of Mid-Term Sewerage Development Plan which constitutes part of the next DKI Mid-Term Development Plan RPJMD (2018-2022)

(2) Specific support policy
The main countermeasure policy taken to complete "DKI Midterm Development Plan RPJMD (2018-2022) sewerage edition" is described below. The contents will be explained in the later part of "④Result (summary and details)".

2-1) Course of action to Governor Regulation (No.41 / 2016)
Regarding the Governor Regulation (No.41/2016) enforced in 2016, the following issues were considered as future tasks concerning the formulation of the Mid-Term Sewerage Development Plan (2018-2022).

- It is extremely difficult to achieve the targets of the coverage of “off-site” (centralized sewerage and communal system) at 65% and that of “on-site” sanitation at 35% by 2022

mentioned in the Governor Regulation. Therefore it is necessary to list up the requisites, such as budget, construction organization, construction technique, and land acquisition, for achieving the target and formulate the mid-term plan under the premise that those conditions are satisfied.

- Regarding the targets of sewerage system and onsite sanitation coverage, 65% and 35% respectively, it is necessary to consult with the DKI side on how to definitely consider this evaluation index to form a common understanding.
- In the mid-term plan, the results of DED of PD PAL Jaya shall be reflected to the implementation plans in each sewerage zone. However, the review of DED was still ongoing in early 2016 and it seemed to take time to modify the DED, the reflection of the DED in the mid-term plan will be made to the extent possible.
- Though the locations for the wastewater treatment plants are specified by the above Governor Regulation, the land acquisition procedures are different as it is uncertain the availability of the proposed lands for wastewater treatment plants. In order to attain the targets until 2022, securing land is an urgent task and coordination with Biro PKLH is necessary.

Based on the above, the direction of the next mid-term sewerage development project was determined.

2-2) Direction of the Next Mid-term Sewerage Development Plan

To clarify the contents of the draft mid-term sewerage development plan formulated in this project and to share common recognition among the stakeholders, in consultation with the composed Task Force comprised of BAPPEDA sewerage section and Dinas Sumber Daya Air planning section, the following directions were confirmed.

- The meaning of the rate of 65% is interpreted as starting implementation for the priority 9 sewerage zones which covers 65% the population of whole DKI Jakarta. In this case implementation shall include FS and Pre-FS. In other words, the rate of sewered population of 65% by 2022 is that implementation has begun, but not completed.
- The priority for the next midterm is set as 6 sewerage zones of Zone-2, 3, 4+10, 5, 7, 8, but the way of prioritization will be examined in the Task Force.
- NCICD will be included in the mid-term plan.
- Private investment is also taken account for financial arrangement.
- Incorporating the NCICD plan into the mid-term plan means introducing advanced treatment process to many wastewater treatment plants, and it is under discussion whether or not facility plan of wastewater treatment plants is possible in the currently proposed lands. The JICA expert team will introduce the area and arrangement of wastewater treatment

plant in major cities in Japan and present the relationship between advanced treatment process and required area in coming months.

- The JICA expert team will provide information on public relations activities to encourage people to understand the necessity of sewerage system.
- As the mid-term sewerage development plan is planned to formulate as sewerage section of DKI Jakarta Mid-Term Development Plan RPJMD, contents and chapters shall conform to the RPJMD.

2-3) Collaboration with other related organizations in the planning process

After the evaluation of DED for the Phase-1 sewerage zones (Zone-2, 3, 4, 5, 7, 8, 10) by the in-house consultants of PD PAL Jaya, the substantial review was needed. Therefore the collaboration with PD PAL Jaya exchanging the updated information is required.

Regarding the plan for sewer installation and wastewater treatment plants, the collaboration with the Biro PKLH is necessary to ensure the consistency with Detailed Spatial Plan (RDTR).

2-4) Support method on the Mid-term sewage development plan formulation

For the Task Force consisting of BAPPEDA sewerage section and Dinas Sumber Daya Air planning section, the JICA expert team will show the direction to achieve milestone of each work.

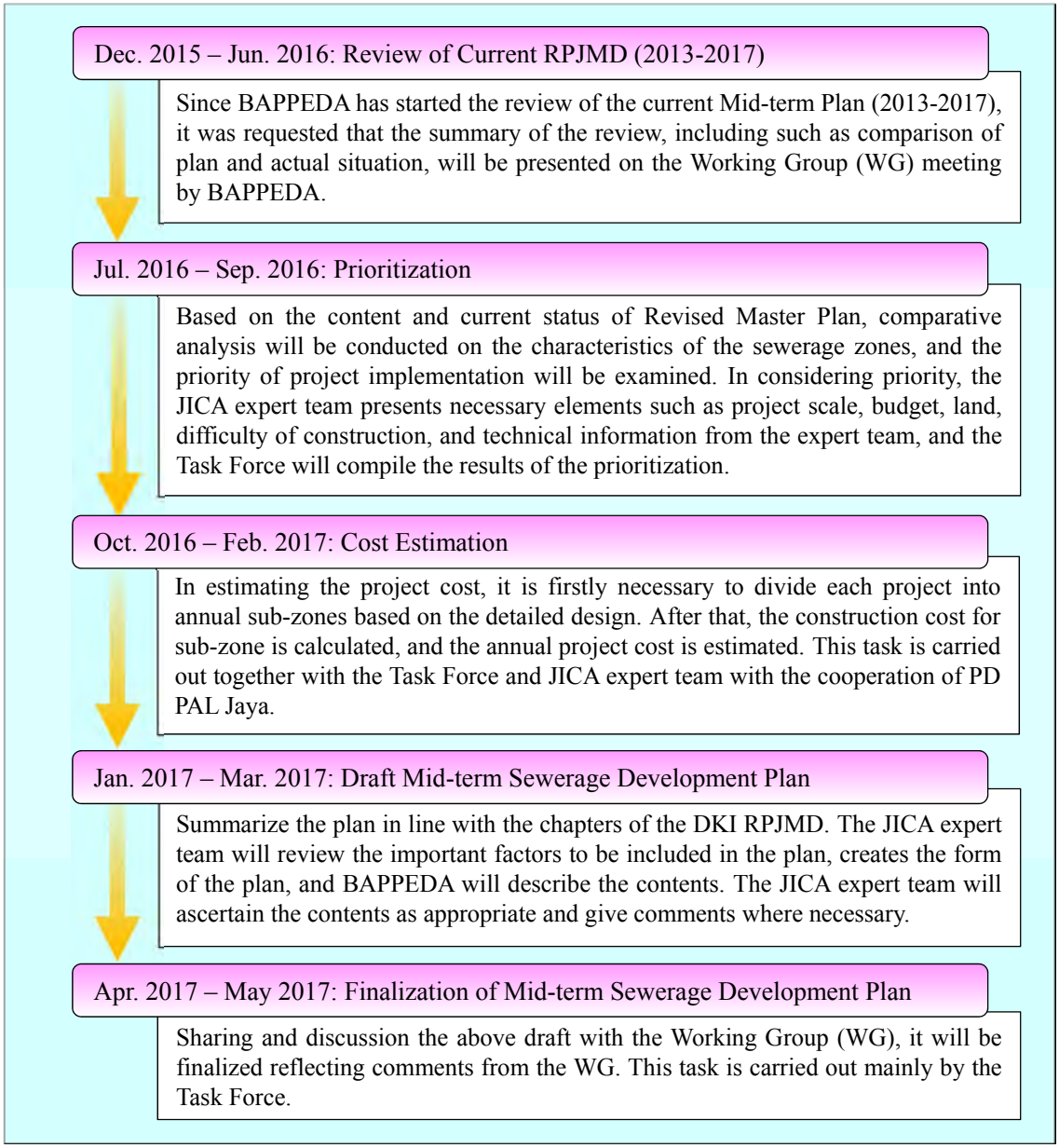


Figure 2-15 Flow of Support on Mid-term Sewerage Development Planning

Specifically, consultation and discussion will be carried out with the Task Force after small seminars utilizing the assignment periods of the JICA expert team. Also, as an efficient structure of operation during the absence periods of JICA experts, the JICA expert team will give a framework to compile consideration items and issues, and the Task Force will fill the necessary information to formulated the mid-term plan. To manage the progress of this task, the local consultant will visit members of the Task Force twice a month to check the situation and report it to the JICA expert team.

(3) Milestones

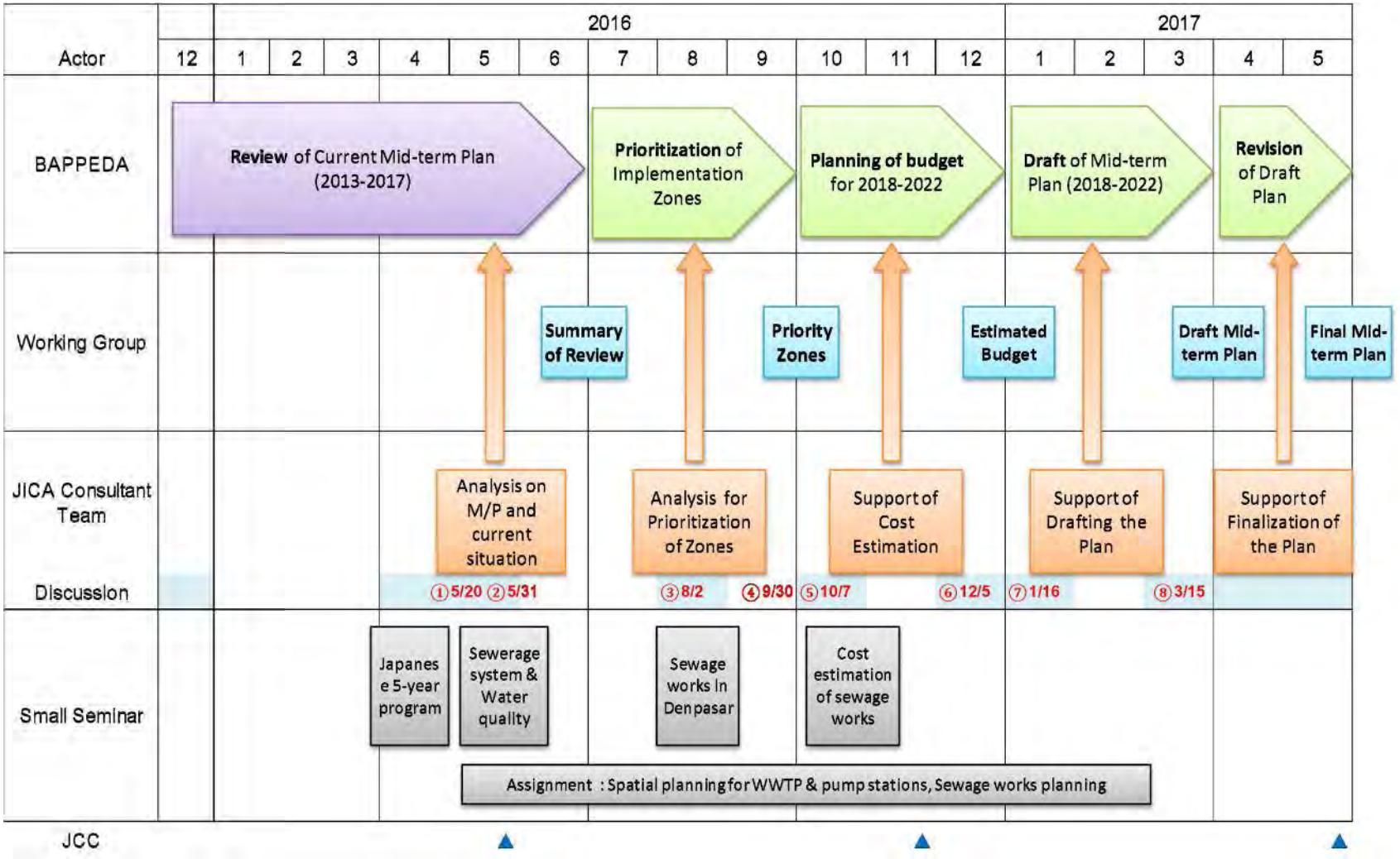
Milestones of the support on formulating the Mid-term Sewerage Development Plan are as follows.

Summary of review:	Jul. 2016
Prioritization of zones:	Sep. 2016
Estimated annual budget:	Dec. 2016
Draft mid-term plan:	Mar. 2017
Final draft mid-term plan:	May 2017

(4) Work Schedule

See next page.

Table 2-44 Schedule of support for formulating med-term sewerage development plan



④ Result (Summary and Details)

The JICA expert team mainly supported the Task Force consisting of the BAPPEDA sewerage section and Dinas Sumber Daya Air, planning section responsible for formulating the mid-term sewerage development plan, and strengthened technical knowledge at small seminars as well as continual consultation and discussion on actual planning as OJT. The summaries of discussion during consultation are shown below. For the consultation schedule, refer to “Table 2-44 Schedule of support for formulating med-term sewage development plan" on the previous page.

Table 2-45 Minutes of 1st Meeting on Draft Mid-term Sewerage Development Plan

Date	20 May 2016, Friday (14:00 - 15:45)
Venue	BAPPEDA Meeting Room
Attendants	(BAPPEDA) Mr. Cipta, Mr. Haley; (JICA Expert Team) Takamizawa, Ohashi, Gandhy
Discussion	(1) Output of Project ▪ BAPPEDA expects a document summarized the next five year (2018-2022) mid-term plan as the output of project activity 2-3 “DKI drafts mid-term sewerage development plan in DKI Jakarta in consultation with JCIA experts”. ▪ Contents and structure of the mid-term sewerage development plan will follow that of DKI RPJMD. ▪ BAPPEDA will analyze the realizability of the target of Governor Regulation and set the priority of sewerage zones. (2) Method of Training and Technical Support ▪ As support on the formulation of mid-term plan, the JICA expert team will provide some assignments to BAPPEDA to be handled during the absence of JICA experts with contacts via email. (3) Collaboration with Other Institutes ▪ Mid-term plan will be formulated based on the 5-year Strategic Program prepared by the Dinas Sumber Daya Air. Dinas Sumber Daya Air employs local consultant for preparing the 5-year Strategic Program. ▪ Layout plan of sewer pipes and WWTPs needs to be consistent with the Detailed Spatial Plan (RDTR) of Biro PSKLH. (4) Work Schedule ▪ In order to finalize the mid-term plan before the next fiscal year, a clear work schedule must be planned. To formulate the first draft within December 2016, some milestones are set on the appropriate timing. ▪ Next meeting with BAPPEDA and JICA Expert Team will be on Monday 30 May. The JICA consultant will prepare the proposed work schedule for discussion.

Table 2-46 Minutes of 2nd Meeting on Draft Mid-term Sewerage Development Plan

Date	31 May 2016, Tuesday (13:00 - 14:00)
Venue	Mercure Jakarta Sabang Hotel (after 1st Special Seminar)
Attendants	(BAPPEDA) Mr. Cipta, Mr.Haley; (Dinas Sumber Daya Air) Ms. Sarah; (JICA Expert Team) Sato, Takamizawa
Discussion	(1) Mid-term Sewerage Development Plan ▪ In accordance with the next mid-term development plan RPJMD (2018-2022) of DKI Jakarta, Task Force from BAPPEDA and Dinas Sumber Daya Air will prepare the draft Mid-term Sewerage Development Plan before the end of May 2017. ▪ The JICA experts will support the DKI staff/Task Force by providing related information and consultation concerning the important issues on the sewerage development. (2) Work Schedule ▪ The tentative work schedule was proposed by the JICA experts. It was proposed that the achievement of the task will be shared with the Working Group members after the timing of milestones. Generally agreed by Task Force, the milestones of the "Summary of review" and "Estimated budget" need to be adjusted to the real situations. ▪ Regarding the Small Seminars, the syllabus of lectures on the mid-term sewerage development plan was explained by the JICA experts and confirmed by the Task Force. (3) Review of Current Revised Master Plan and Mid-term Development Plan RPJMD ▪ Since BAPPEDA has started the revision of the current Mid-term Plan (2013-2017), it was requested that the summary of the review will be presented on the Working Group meeting by BAPPEDA. It was suggested the presentation to be after the Ramadan period which will be in late July. (4) Land acquisition and Spatial Plan of WWTPs ▪ Although the locations of the WWTP for all sewerage management zones are indicated by the Governor Regulation 41/2016, different arrangement of the site acquisition for each zone is required. The plan of the site acquisition is summarized in the "Detailed Spatial Plan (RDTR)" of the City Planning Bureau (PSKLH). The copy of RDTR was shared by BAPPEDA to the JICA Expert Team. (5) Sewer Pipeline ▪ The types of sewage collection system (separated, combined and interceptor sewerage system) were explained by Mr. Sato during the "1st Seminar on Sewerage Project in DKI Jakarta" on the day of 31 May 2016. For additional information on this topic, any questions or clarifications are welcome to ask Mr. Sato via e-mail. (6) Detailed Engineering Design (DED) and Cost Estimation ▪ Currently the PD PAL Jaya is carrying out the DED for the 6 zones for phase-1. The JICA experts had already requested to the Director of PD PAL to share the result of the DED. The cost estimation of the mid-term plan depends on the result of DED. Normally the figure of the DED will be total cost of the implementation and the DKI will make breakdown of stages for each fiscal year. The cost will be estimated by the stages and prioritized based on the "5year

	Strategic Programme" prepared by the Dinas Tata Air. (7) Priority of Next 5 years ▪ Implementation of priority zones after Zone-1 and 6 will depend on the availability of financial resources but the DKI needs to prepare the internal priority of the implementation. (8) On-site Treatment ▪ It was confirmed that the 6 Zones for phase-2 (Zone-9, 11a, 11b, 12, 13 and 14) will be served temporarily by the on-site treatment until the completion of phase-2 implementation. ▪ The DKI plans to continue to use the conventional septic tanks, however, the conventional septic tanks need to desludge for the recovery of the proper function of treatment. The intervention of DKI is that the private septic tanks will be desludged with the minimum tariff of PD PAL Jaya paid by the owners, while the septic tanks of government buildings will be covered by DKI budget. (9) Financial Resources ▪ Financial resource will be the central government, international donors and PPP. In the Mid-term plan, DKI will put the local budget which will covered by the regional government of DKI

Table 2-47 Minutes of 3rd Meeting on Draft Mid-term Sewerage Development Plan

Date	02 August 2016, Friday (13:30 - 15:30)
Venue	BAPPEDA Meeting Room
Attendants	(BAPPEDA) Mr.Tri, Mr.Haley; (JICA Expert Team) Kanai, Inoue, Gandhy, Imam
Discussion	(1) Review of Current Revised Master Plan, NCICD and Acceleration Plan ▪ BAPPEDA is carrying out the review of current Revised Master Plan, Acceleration Plan and RPJMD. It will be shared to WG after summarizing the results of review. (2) Detailed Engineering Design (DED) ▪ The DED of PD PAL Jaya is missing the financial analysis as it was urgently started without F/S or Pre F/S for early realization of the projects. Supplementary study is required for each project. (3) Financial Resources ▪ BAPPEDA provided information on the regional budget of DKI (APBD) with an average of 64 T IDR/year. The total project cost of Zone-1and, 6 is about 15 T IDR. ▪ DKI consults with DGHS to ask Zone 2 and 4 + 10 to be covered by the national budget. (4) Works to be done ▪ In prioritization, BAPPEDA is considering the consistency with NCICD, the beneficiary population, environment, and so on. ▪ A small seminar is planned on the next Monday 5 August, providing a lecture on sewage treatment technology and required land area.

Table 2-48 Minutes of 4th Meeting on Draft Mid-term Sewerage Development Plan

Date	30 September 2016, Friday (8:30 - 10:00)
Venue	BAPPEDA Meeting Room
Attendants	(BAPPEDA) Ms. Anny, Mr.Haley; (JICA Expert Team) Inoue, Takamizawa, Gandhy, Imam
Discussion	(1) Outcome of the Project ▪ Consensus has been made between BAPPEDA and JICA expert team that the outcomes of this project "Formulation of the Mid-Term Sewerage Development Plan" are supposed to be a document of sewerage edition of RPJMD (2018-2022). ▪ Contents and chapters of the document will be in accordance with the structure of the DKI medium-term development plan RPJMD, but if there is any content that the JICA Expert Team and BAPPEDA deems necessary, it will be added as appropriate. ▪ In this project, supporting staging/project-programing (annual plan) and budget allocation will be focused on, which is particularly necessary to support in formulating the mid-term sewerage development plan. ▪ A request for sharing an example of mid-term sewerage plan in Japan such as that of old era when Tokyo had not developed its sewerage system for reference. (→ JICA expert team answered the lecture would be carried out during next mission). (2) Review of Revised Master Plan, NCICD, Acceleration Plan ▪ BAPPEDA reviewed Revised Master Plan, NCICD and Acceleration Plan, but the results have not been summarized yet for sharing with the WG. Whether the results shall be included in RPJMD will be examined later on. (3) Prioritization of sewerage zones ▪ Proposed criteria for prioritization and result of evaluation were shared by the JICA expert. The criteria and evaluation will be checked by BAPPEDA and any comments/feedback will be provided in the next meeting. ▪ Since the evaluation proposed by JICA expert was based on the value of Revised Master Plan 2012, it is necessary to update some values in accordance with the latest circumstances. In particular, the length of sewer pipes and project costs, availability of land for WWTP shall be updated in accordance with the results of DED conducted by PD PAL Jaya. (→ PD PAL Jaya was requested to participate in the next meeting) ▪ It is necessary to have common understandings among stakeholders concerning the target of sewerage coverage of 65% of the Governor Regulation No.41/2016. The JICA expert team proposed the idea that Gray and Black water will be managed by installation of trunk sewers and wastewater treatment plants in the target sewerage zones (excluding individual connection) and establishment of regular septage system from existing septic tanks. (4) Works to be done ▪ To confirm the progress status of the DED and the project cost of each sewerage zone, participation from PD PAL Jaya for the next meeting was requested by BAPPEDA. ▪ The next meeting will be provisionally set to 8:30 on Friday, 7 October. The JICA expert team will prepare necessary materials until then.

Table 2-49 Minutes of 5th Meeting on Draft Mid-term Sewerage Development Plan

Date	07 October 2016, Friday (8:30 - 10:30)
Venue	BAPPEDA Meeting Room
Attendants	(BAPPEDA) Mr.Tri, Ms.Anny, Mr. Haley; (JICA Expert Team) Kanai, Inoue, Hashimoto, Nakamura, Takamizawa, Gandhy, Imam
Discussion	(1) Detailed Engineering Design (DED) for 6 Zones ▪ The representative from PD PAL Jaya who had supposed to present the result of DED was absent due to being busy. ▪ According to the information from PD PAL Jaya, DED of 6 sewerage zones has finished, but reviews by in-house consultants are being conducted. In the review, it was reported that modification of DED is required in each sewerage zone. ▪ In cooperation with PU Cipta Karya, Cost Estimation Standards of sewer pipe installation is currently formulated in PD PAL Jaya. The cost estimation of DED will also follow the standards, and therefore the project costs and implementation schedule will be revised. ▪ According to the PU Cipta Karya, INDII (Indonesian Infrastructure Initiative) is currently reviewing the DED under support of DFAT/AusAIDA. This is not a F/S but a survey that identifies the work necessary to accelerate the implementation and the survey is carried out for a period of 3 months (until the end of December 2017). (2) Prioritization of Sewerage Zones ▪ (Though the criteria for prioritization were proposed by JICA Expert Team for consideration among BAPPEDA, it seemed no discussion had been done since last meeting.) It was agreed that BAPPEDA will review the proposed criteria and evaluation and revise or modify as necessary before the next meeting. ▪ Another suggestion was made by the Chief Advisor of the project that the same criteria as Revised Master Plan 2012 to be used for the mid-term plan. However, BAPPEDA commented Revised Master Plan was formulated before NCICD thus the information needs to be updated. BAPPEDA promised to consider the appropriate criteria for the next mid-term plan. ▪ Because NCICD is currently under implementation of Phase-B and its result may affect the priority of coastal areas, BAPPEDA will consult with NCICD officials and experts and obtain necessary information. (3) Project Cost and Financial allocation ▪ In sewerage zones other than Zones -1 and 6, the financial measure is still uncertain. ▪ JICA expert team was asked to propose the financial arrangement for the 6 zones, but to avoid political intervention, JICA Expert Team excused not to discuss this issue. ▪ The budgets for DED and F/S are set in the local budget (APBD). (4) Land Acquisition and EIA ▪ Although the land of the 6 WWTPs are secured, detailed survey by Dinas Sumber Daya Air has not been implemented yet. ▪ Responsible organization of land acquisition and EIA is Dinas Sumber Daya Air of DKI Jakarta. EIA is implemented by Dinas Sumber Daya Air and submitted to BPLHD for approval. The budget is also covered by DKI.

	(5) Works to be done ▪ In order to achieve the Governor Regulation target "65% sewerage coverage rate in 2022", it is necessary to commence the project implementation in 6 priority zones in addition to Zone-1 and 6. The JICA expert team explained the idea of step-wised development and will propose a realistic plan implemented in step-wised approach in the next meeting. ▪ The remaining work is the preparation of implementation schedule of each sewerage zone as well as calculation of annual project cost in the format of RPJMD. ▪ During the next mission (end October), discussion with PD PAL Jaya, preparation of JCC meeting, criteria for prioritization, stepwised implementation planning will be carried out.

Table 2-50 Minutes of 6th Meeting on Draft Mid-term Sewerage Development Plan

Date	05 December 2016, Monday (8:30 - 10:30)
Venue	BAPPEDA Meeting Room
Attendants	(BAPPEDA) Mr. Tri, Ms. Anny, Mr. Haley; (JICA Expert Team) Kanai, Inoue, Takamizawa, Gandhy, Imam
Discussion	(1) Criteria for Priority Sewerage Zones ▪ As a comment from BAPPEDA on criteria for prioritization proposed by JICA Expert Team, two criteria, investment efficiency and difficulty of groundwater penetration, were suggested and agreed to add to the criteria. (2) Implementation Schedule and Project Cost ▪ Three alternative plans of implementation schedule and annual project costs were proposed by JICA expert team for Zone-1 and 6 and 6 priority zones of mid-term plan. ▪ In Plan A, the implementation of Zone-1, 6 and Priority 6 zones is commenced from 2018 to achieve the Governor Regulation target of 65% in 2022. In this plan, trunk sewers and WWTPs will be constructed by 2022, and the secondary & tertiary sewers and house connection will be carried out after 2023. ▪ In Plan B, the target year will be 2030 when the closure of Jakarta Bay by the Giant Wall will be completed under the NCICD project. The construction of trunk sewers and WWTPs in Zone-1, 6 and Priority 6 zones will be carried out during 2018 to 2030. The secondary & tertiary sewers and house connection will be carried out after 2031. ▪ In Plan C, offering a realistic plan, the implementation of Zone-1, 6 and Priority 6 zones will be gradually carried out. Each zone will be divided into sub-zones and trunk sewers will be installed not fully but partially. WWTPs are planned to construct firstly with the cost of 70% the total construction cost and it will be expanded after 5 years operation. ▪ Since BAPPEADA expressed that two plans of Plan A and C are good enough rather than having three plans. Only two plans will be considered later on. ▪ Estimated project costs are based on Revised Master Plan. After the completion of review of DED in PD PAL Jaya, the figures will be compared between Revised Master Plan and DED and decided which value to be used in the mid-term plan. ▪ BPPEDA, Dinas Sumber Daya Air, PD PAL Jaya will have a meeting on DED next week (9 December), so BAPPEDA will confirm the progress and direction at that time. ▪ JICA undertakes projects in Zone-1 and 6, but they are separate projects and thus JICA expert team has difficulty to access the latest information especially on the budget. BAPPEDA was requested to contact to JICA Indonesia office for asking information.

Table 2-51 Minutes of 7th Meeting on Draft Mid-term Sewerage Development Plan

Date	16 January 2017, Monday (9:00 - 11:00)
Venue	BAPPEDA Meeting Room
Attendants	(BAPPEDA) Mr.Tri, Ms.Anny, Ms.Tezza, Mr. Haley; (JICA Expert Team) Kanai, Inoue, Takamizawa, Gandhy, Jana
Discussion	(1) Difference between DED and Revised Master Plan ▪ Based on the contents of DED shared by PD PAL Jaya as of January 2017, a comparison of the project costs of the DED and Revised Master Plan was explained to BAPPEDA. ▪ Firstly, the construction cost per unit swear discharge volume (m^3) of the WWTP of Revised Master Plan is about twice as high as that of DED, while the construction cost per unit extension of sewer pipeline (m) of DED is higher than the value of Revised Master Plan. ▪ Wastewater generation volumes as design criteria are 200 lpcd for Revised Master Plan and 120 lpcd for DED. As a result, the DED has a smaller diameter of sewer pipes. However, with regard to the installation of sewer pipes, the construction cost of DED became higher than Revised Master Plan as a result of a substantial review of the construction cost of the micro-tunneling method, including such as soil improvement on the soft ground and the construction of the shafts. ▪ Revised Master Plan includes indirect cost and contingency while DED does not include those costs. ▪ BAPPEDA raised the question which figures to be used for the mid-term plan. Since only Revised Master Plan has been authorized at the present, using the value of Revised Master Plan was agreed after discussion. (2) Criteria for Prioritization ▪ The JICA expert team reported the result of evaluation using the new criteria of investment efficiency and difficulty of underground penetration suggested by BAPPEDA. ▪ BAPPEDA requested to use the latest water quality data on the report “Study Roadmap Acceleration Water Quality Improvement Jakarta EKN 2016 (BAPPENAS)”. The copy of the report was requested to BAPPEDA. (3) Implementation Schedule and Project Cost ▪ It was discussed that the project preparation such as land acquisition, EIA, sensitization will start in all 6 priority zones during the next 5 years. Also the engineering services (E/S) including the design and tender process for 3 zones are planned to start. ▪ In view of BAPPEDA, Only 1 or 2 zones may start implementation after Zone-1 and 6. (4) Performance Indicator Matrix ▪ The performance indicators for the next five years were proposed by the JICA expert team. BAPPEDA was asked to review them and give the feedback/comments to the JICA Expert Team where necessary in the next meeting.

Table 2-52 Minutes of 8th Meeting on Draft Mid-term Sewerage Development Plan

Date	15 March 2017, Wednesday (8:00 - 11:00)
Venue	BAPPEDA Meeting Room
Attendants	(BAPPEDA) Ms.Tezza, Mr. Haley; (JICA Expert Team) Takamizawa, Gandhy, Jana
Discussion	(1) Difference between DED and Revised Master Plan ▪ Regarding the comparison of the construction cost per unit wastewater flow (m3) and per unit sewer length (m), it will be explained to the related persons and organizations for further understanding. ▪ The Difference of design criteria of sewer generation (Revised Master Plan: 200lpcd, DED: 120lpcd) will be also explained to the relevant persons. (2) Criteria for Prioritization ▪ Support data for evaluation on the new criteria suggested by BAPPEDA were shared by the JICA expert team. ▪ Water quality of each sewerage zone were not discussed in the recent study report, "Study Roadmap Acceleration Water Quality Improvement Jakarta EKN 2016 (BAPPENAS)", thus the water quality data were referred to the JICA Revised Master Plan 2012. (3) Communal System ▪ The importance of implementation of the communal system was emphasized by the Head of BAPPEDA, Ms. Tuty. The implementation schedule and budget for the communal system will be included in the Mid-term sewerage development plan. ▪ Some of projects has been implemented or under the detailed design stage with the finance of IDB, SAIIG (Australian aid), ADB, World Bank and so on. In addition, the project of 1,000 communal systems has been implemented with the DKI budget. Also 44 sites of IDB project and 2 sites of SAIIG loan project are under implementation. (4) Performance Indicator Matrix ▪ The performance indicators proposed by the JICA expert team were generally agreed with the BAPPEDA without any objection.

Upon completion of the support task to the task force consisting of the BAPPEDA sewerage section and the Dinas Sumber Daya Air planning section, the final "Mid-Term Development Plan RPJMD (2018-2022) Sewerage Edition" was formulated as a Draft Mid-Term Sewerage Development Plan which constitutes a part of the next DKI mid-term development plan RPJMD (2018-2022). The followings are the main considerations.

(1) Priority of Project Implementation

Comparative analysis on the characteristics of the sewerage zones based on the priority of the project implementation, the contents of Revised Master Plan and the current situation for the six priority zones was carried out. As a criteria for priority assignment, JICA expert team presented factors and technical information such as consistency with the DKI's urban development plan

based on NCICD, scale of project, budget, land availability for WWTP, difficulty of construction etc., and the Task Force considered the criteria to be used for the evaluation.
Referring the criteria of Revised Master Plan 2012 and considering the latest situations in DKI Jakarta, the following criteria have been suggested by the JICA consultant team and the Task Force:

A. Criteria (Suggested by JICA Expert Team and Task Force)

1. Consistency with NCICD (location of zone)
2. Capital and operational costs (pipe &WWTP)
3. Service revenue (ratio of Revenue-Gross Floor Area)
4. Investment efficiency (sewer construction cost per wastewater volume)
5. Land availability
6. Environmental impacts (water quality)
7. Difficulty of underground penetration (land subsidence & groundwater level)

B. Evaluation and Weighting

In order to prioritize the 6 sewerage zones (Zone-2, 3, 4+10, 5, 7, 8) which indicated in the Governor Regulation No.41/2016, the evaluation is conducted using the criteria in the following way:

(a) Quantitative or qualitative evaluation is conducted in 6 sewerage zones for each criterion.
(b) For each criterion, the priority rank is given.
(c) For the rank of each zone, score is put according to the rank and the weight as follows:

- Basic score
  1st Rank: 10 points
  2nd Rank: 8 points
  3rd Rank: 6 points
  4th Rank: 4 points
  5th Rank: 2 points
  6th Rank: 0 points.
- Weight
  W=1: weight is 1, i.e. the score is basic score multiplied by 1.
  W=2: weight is 2, i.e. the score is basic score multiplied by 2.

Among the criteria consistency with NCICD and service revenue (financial efficiency) were judged to be more important, so that the priority was increased by the above weighting. For

example of the criterion No.1 consistency with NCICD, zones in north-west of Jakarta is highest priority so ranked as 1, basic score is 10. The total score is multiplied by the weight 2, therefore the zones in north-west is scored 20 points.

C. Evaluation Result and Priority

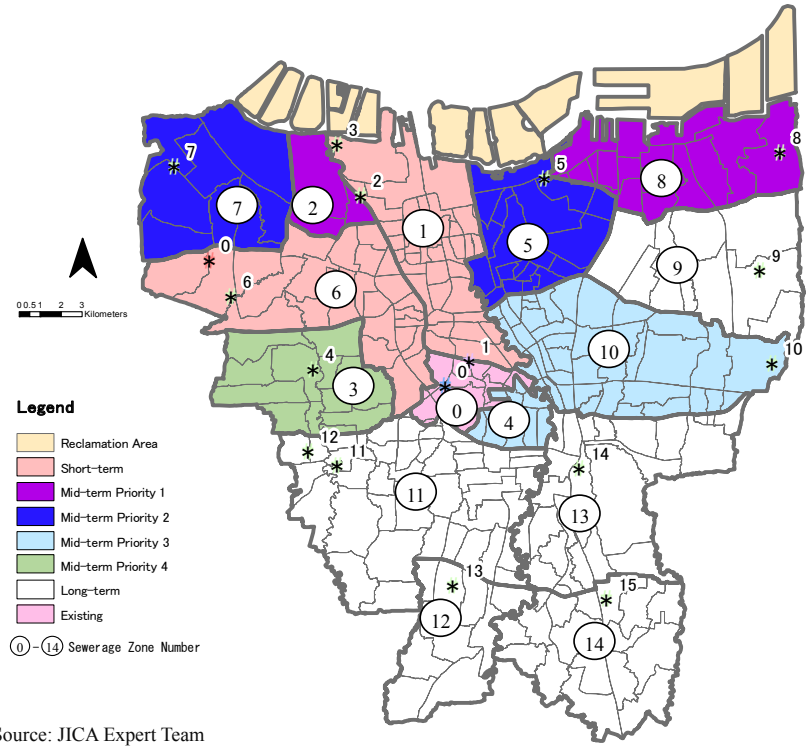
The summary of each score for the criteria is shown in table below. Zones with the higher total score are considered as higher priority. As a result, Zone-2 and 8 are the highest priority, Zone-7 and 5 the second, Zone-4 + 10 the third, and Zone-3 the last.

Table2-53 Summary of Evaluation for Priority Zones

Zone No.	S-1	S-2	S-3	S-4	S-5	S-6	S-7	Total	Priority
2	20	10	12	0	5	12	18	77	1
3	12	8	0	4	5	8	0	37	6
4+10	0	0	8	8	10	12	6	42	5
5	8	4	16	6	10	14	6	66	4
7	20	6	4	2	10	10	16	68	3
8	8	2	20	10	10	12	14	76	2

Source: JICA Expert Team

Priority	Zone
Short-term	0, 1, 6
Mid-term Priority 1	2, 8
Mid-term Priority 2	7, 5
Mid-term Priority 3	4+10
Mid-term Priority 4	3
Long-term	9, 11, 12, 13, 14



Source: JICA Expert Team

Figure 2-16 Priorities for Mid-term Sewerage Development Plan

This evaluation and priority are based on the consultation between the JICA expert team and the Task Force. The final priority described in the Mid-Term Sewage Development Plan will be

decided through the consultation with other DKI organizations and other relevant sewage officials.

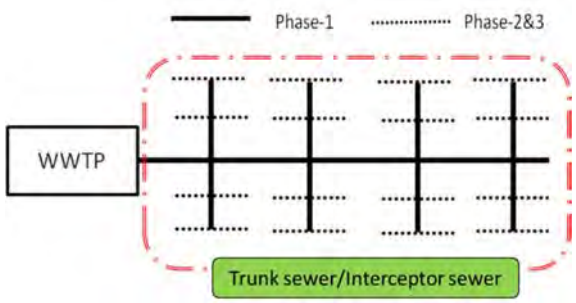
(2) Consideration of Step-Wised Implementation Plan

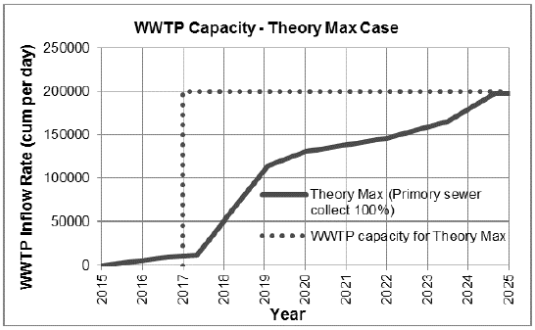
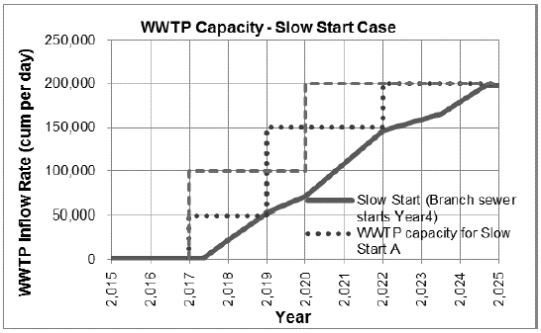
In order to implement the sewerage projects within a limited budget, it is more practical to reduce the financial demand, by constructing the trunk sewer and WWTP in priority, and then in subsequent years constructing the secondary/tertiary sewers and house connections which are financed by the local government and payment of the beneficiaries.

In addition, the project is not targeting the entire sewerage zone, but started the implementation of trunk sewer from high priority areas. The capacity of WWTP also responds to the increase in the volume of wastewater collection due to the installation of the sewer pipelines. A strategic facility design and implementation plan that increases the capacity in stages is essential.

In the step-wised plan, for example, the construction of trunk sewer in the business area and WWTP is scheduled in Phase 1, and the construction of the sub-trunk and trunk sewer in the adjacent areas is planned in Phase-2. And then the secondary/tertiary sewer and house connection is planned to be constructed in the following phases or future projects.

Regarding the WWTP, considering the gradual increase in collected wastewater volume due to the installation of sewer pipes, the planned water volume and water quality shall be set so that the facility at the initial stage of construction will not be excessive capacity. The sewerage facilities shall be gradually extended corresponding to updating and improving the operation method.

Construction Phases	
Step-wised development of interceptor sewer Collected wastewater: Gray water Phase-1: Trunk sewer in the business center & STP Phase-2: Sub trunk sewer & trunk sewer in the adjacent areas 2nd & 3rd sewer and house connection will be implemented in future projects	

Case1: Whole trunk sewer & sub-trunk sewer (secondary & tertiary sewer) are constructed	Case 2: Sub-trunk sewer follows the trunk sewer construction with 4-year delay
	

Source: JICA Preparatory Survey on Central Sewerage Treatment System in Jakarta

Figure 2-17 Concept of Step-wised Sewerage Development

The following figure and table show an example of step-wised implementation plan of Zone-6, which were developed under the F/S in 2013 when the NCICD and Governor Regulation 41/2016 had not been formulated. The sewerage zone was divided into four sub-zones, and planned to implement in four phases in totally about 30 years.

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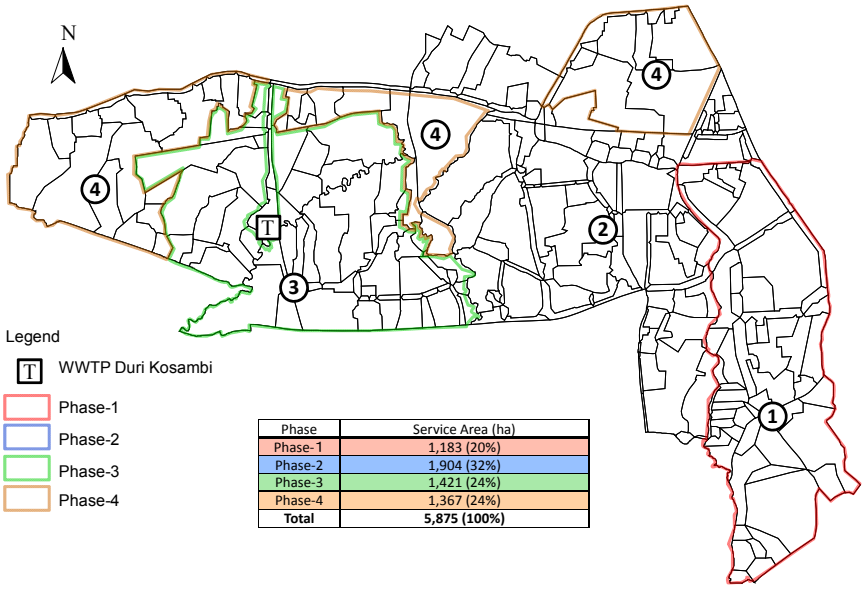


Phase	Service Area (ha)
Phase-1	1,183 (20%)
Phase-2	1,904 (32%)
Phase-3	1,421 (24%)
Phase-4	1,367 (24%)
Total	**5,875 (100%)**

Source: JICA F/S Team

Figure 2-18 Sub-zones and Phasing of Zone-6 Sewerage Development

Table 2-54 Step-wised Implementation Schedule of Zone-6 in F/S (2013)

Items	year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
0. PROJECT PREPARATION		★																													
Ⅰ. WWTP																															
Phase 1	4																														
Phase 2	3																														
Phase 3	3																														
Phase 4 (Ultimate phase)	3																														
Ⅱ. Sewer																															
(1) Trunk sewer																															
Phase 1	4																														
(2) Main, Secondary and Tertiary sewer																															
Phase 1	7																														
Phase 2	7																														
Phase 3	7																														
Phase 4 (Ultimate phase)	7																														
Ⅲ. House connection																															
(1) Connection pipe for household																															
Phase 1	8																														
Phase 2	8																														
Phase 3	8																														
Phase 4 (Ultimate phase)	8																														
(2) Connection pipe for non-household																															
Phase 1	5																														
Phase 2	5																														
Phase 3	5																														
Phase 4 (Ultimate phase)	5																														
[Service coverage ratio]		0%	0%	0%	0%	0%	0%	0%	14%	22%	30%	38%	43%	50%	58%	66%	69%	75%	82%	88%	91%	94%	97%	100%	100%	100%	100%	100%	100%	100%	100%
[Wastewater flow rate]		0%	0%	0%	0%	0%	0%	0%	3%	6%	8%	10%	19%	26%	32%	38%	48%	54%	61%	67%	76%	81%	86%	92%	95%	97%	98%	100%	100%	100%	100%

Source: JICA F/S Team

(3) Calculation of Estimated Project Cost

In order to develop the implementation schedule and to estimate the annual budget for the sewerage development projects, two alternative scenarios are proposed by the JICA consultant team for the next Mid-Term Sewerage Development Plan.

Two alternative scenarios in developing the implementation schedule and estimating the engineering services (E/S) and construction costs that account for a large proportion of the project budget.

One scenario (Plan-A) plans to achieve the target of 65% served with sewerage systems by 2022, in accordance with the Governor Regulation No. 41/2016; while the other scenario (Plan-B), based on the concept of the step-wised development plan, illustrates the gradual implementation of sewerage systems rather than constructing 100% of facilities at once.

The draft construction schedule and annual estimated cost of Plan-A and Plan-B are shown in the following figures.

PLAN-A (Acceleration): In line with the Acceleration Plan and the Governor Regulation 41/2016, completion of the construction of WWTP, main sewer (interceptor) and pumping stations of Zone-1 & 6 and the sewerage zones of phase-1(Zone-2, 3, 5, 7, 8, 4+10) shall be before 2022. It is expected the WWTP in all the zones will start operation before 2022. Secondary and tertiary sewers and house connections are all installed in the next 5 years.

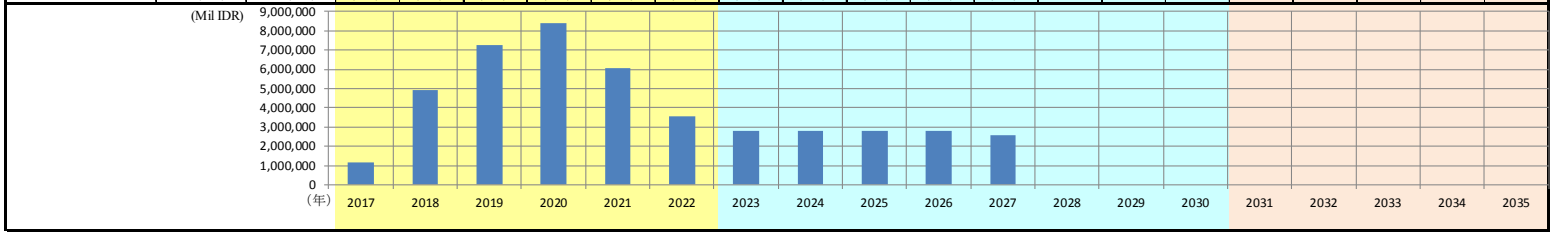
PLAN-B (Step-wised): Target year of the completion and commencement of service of phase-1 sewerage zones is 2030 when the outer seawall of NCICD will close the Jakarta Bay. Also the step-wised development is applied for the implementation of the sewer and WWTP. An assumption has been made for rough estimation of annual cost that the Main sewer is constructed in 5 to 6 years or more starting from priority sub-zones, the secondary and tertiary sewer will be implemented after the main sewer in 10 years. The construction of WWTP is also step-wised, the first phase construction will require 70% of total construction cost and after 5 years from completion the second phase will start to increase the capacity of WWTP.

Table 2-55 Construction Schedule and Estimated Project Cost_Plan-A

Draft Overall Construction Schedule for Sewerage Development Projects and Annual Estimated Project Cost (PLAN-A | Acceleration)

Sewerage Zone	E/S (Mil IDR)	Construction (Mil IDR)	【PH-1 of Mid-Term Plan】 2017	2018	2019	2020	2021	2022	【PH-2 of Mid-Term Plan】 2023	2024	2025	2026	2027	2028	2029	2030	【Long Term Plan】 2031	2032	2033	2034	2035
WWTP																					
1	106,000	1,698,000	106,000	679,000	679,000	340,000															
6	125,000	2,015,000	125,000	672,000	672,000	672,000															
2	17,000	271,000	11,000	73,000	136,000	68,000															
3	80,000	1,289,000			53,000	285,000	516,000	516,000													
7	77,000	1,243,000		51,000	275,000	497,000	497,000														
10 (including 4)	205,000	3,301,000		68,000	137,000	1,100,000	1,100,000	1,101,000													
5	100,000	1,421,000	33,000	67,000	474,000	474,000	474,000														
8	138,000	1,971,000	92,000	834,000	788,000	395,000															
WWTP Sub-total	848,000	13,209,000	242,000	1,610,000	3,214,000	3,831,000	2,587,000	1,617,000													
Sewerage Zone			2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Sewer & PS																					
1	133,000	2,652,000	133,000	884,000	884,000	884,000			364,000	364,000	364,000	364,000	364,000								
6	203,000	4,059,000	203,000	1,015,000	1,015,000	1,015,000	1,015,000		462,000	462,000	462,000	462,000	462,000								
2	54,000	1,080,000	36,000	127,000	218,000	218,000			134,000	134,000	133,500	133,500									
3	149,000	2,970,000	50,000	99,000	347,000	347,000	347,000	347,000	316,000	316,000	316,000	316,000	316,000								
7	167,000	3,335,000	56,000	111,000	441,000	441,000	441,000	441,000	314,000	314,000	314,000	314,000	314,000								
4	38,000	758,000		25,000	74,000	122,000	122,000	61,000	98,000	98,000	98,000	98,000									
10	271,000	5,409,000	90,000	181,000	710,000	710,000	710,000	710,000	514,000	514,000	514,000	514,000	514,000								
5	135,000	2,683,000	217,000	380,000	344,000	344,000	344,000	172,000	261,000	261,000	261,000	261,000	261,000								
8	180,000	3,583,000	120,000	508,000	465,000	465,000	465,000	233,000	345,000	345,000	345,000	345,000	345,000								
Sewer & PS Sub-total	1,330,000	26,529,000	905,000	3,330,000	4,033,000	4,546,000	3,444,000	1,964,000	2,808,000	2,808,000	2,807,500	2,807,500	2,576,000								
			31,323,000						13,807,000												
Annual Total	2,178,000	39,738,000	1,147,000	4,940,000	7,247,000	8,377,000	6,031,000	3,581,000	2,808,000	2,808,000	2,807,500	2,807,500	2,576,000								

Refer the project cost of 2012 MP, and not consider deflator as well as price escalation



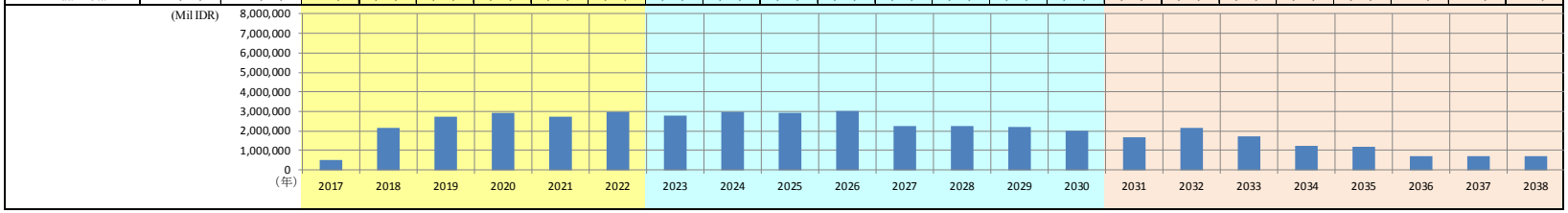
Legend:
: Detailed Design of WWTP
: Construction of WWTP
: Detailed Design of Sewer and Pumping Stations
: Construction of Sewer (First Step: Interceptor Pipe)
: Construction of Sewer (Second Step: Secondary & Tertiary pipe and house connection)

Source : JICA Consultant Team based on the MLIT report

Table 2-56 Construction Schedule and Estimated

Draft Overall Construction Schedule for Sewerage Development Projects and Annual Estimated Project Cost (PLAN-B | Step-Wised Plan)

Sewerage Zone	E/S (Mil IDR)	Construction (Mil IDR)	【PH-1 of Mid-Term Plan】						【PH-2 of Mid-Term Plan】								【Long Term Plan】							
			2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
WWTP																								
1																								
	106,000	1,698,000	106,000	354,000	566,000	566,000	283,000																	
6																								
	125,000	2,015,000	125,000	672,000	672,000	672,000																		
2																								
	17,000	271,000			11,000	53,000	95,000	47,000					41,000	41,000										
3																								
	80,000	1,289,000								27,000	53,000	301,000	301,000	301,000						193,000	193,000			
7																								
	77,000	1,243,000						26,000	51,000	290,000	290,000	290,000						186,000	186,000					
10 (including 4)																								
	205,000	3,301,000					68,000	137,000	578,000	578,000	578,000	578,000						495,000	495,000					
5																								
	100,000	1,421,000				67,000	33,000	332,000	332,000	332,000						213,000	213,000							
8																								
	138,000	1,971,000			92,000	46,000	460,000	460,000	460,000						296,000	296,000								
WWTP Sub-total	848,000	13,209,000	231,000	1,026,000	1,249,000	1,404,000	939,000	1,002,000	1,421,000	1,227,000	921,000	1,169,000	342,000	342,000	296,000	509,000	213,000	681,000	681,000	193,000	193,000			
Sewerage Zone			2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Sewer & PS																								
1																								
	133,000	2,652,000	89,000	339,000	589,000	589,000	589,000	589,000	182,200	182,200	182,200	182,200	182,200	182,200	182,200	182,200	182,200	182,200						
6																								
	203,000	4,059,000	203,000	812,000	812,000	812,000	812,000	812,000	231,000	231,000	231,000	231,000	231,000	231,000	231,000	231,000	231,000	231,000						
2																								
	54,000	1,080,000			36,000	79,000	121,000	121,000	121,000	121,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000	53,000				
3																								
	149,000	2,970,000									75,000	75,000	256,000	256,000	256,000	256,000	198,000	198,000	198,000	198,000	198,000	198,000	198,000	198,000
7																								
	167,000	3,335,000							84,000	84,000	353,000	353,000	353,000	353,000	353,000	175,000	175,000	175,000	175,000	175,000	175,000	175,000	175,000	175,000
4																								
	38,000	758,000						19,000	19,000	73,000	73,000	73,000	73,000	73,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000
10																								
	271,000	5,409,000						136,000	136,000	473,000	473,000	473,000	473,000	473,000	473,000	286,000	286,000	286,000	286,000	286,000	286,000	286,000	286,000	286,000
5																								
	135,000	2,683,000			68,000	68,000	275,000	275,000	275,000	275,000	275,000	131,000	131,000	131,000	131,000	131,000	131,000	131,000	131,000	131,000	131,000			
8																								
	180,000	3,583,000			90,000	90,000	310,000	310,000	310,000	310,000	310,000	310,000	172,000	172,000	172,000	172,000	172,000	172,000	172,000	172,000	172,000	172,000		
Sewer & PS Sub-total	1,330,000	26,529,000	292,000	1,151,000	1,505,000	1,548,000	1,797,000	1,952,000	1,358,200	1,749,200	2,025,200	1,881,200	1,924,200	1,924,200	1,890,200	1,525,200	1,467,200	1,467,200	1,054,000	1,054,000	1,001,000	698,000	698,000	698,000
			14,096,000						20,504,600								8,137,400							
Annual Total	2,178,000	39,738,000	523,000	2,177,000	2,754,000	2,952,000	2,736,000	2,954,000	2,779,200	2,976,200	2,946,200	3,050,200	2,266,200	2,266,200	2,186,200	2,034,200	1,680,200	2,148,200	1,735,000	1,247,000	1,194,000	698,000	698,000	698,000



Refer the project cost of 2012 MP, and not consider deflator as well as price escalation

Legend:
- : Detailed Design of WWTP
- : Construction of WWTP
- : Detailed Design of Sewer and Pumping Stations
- : Construction of Sewer (First Step: Interceptor Pipe)
- : Construction of Sewer (Second Step: Secondary & Tertiary pipe and house connection)

Source : JICA Consultant Team based on the MLIT report

(4) Formulation and Finalization of Draft Mid-term Sewerage Development Plan

Draft Mid-Term Sewerage Development Plan was formulated and finalized in line with the chapter of the DKI Mid-Term Development Plan RPJMD. The JICA expert team reviewed the important issues to be included in the plan and prepared the format of the plan, while BAPPEDA described the contents. The JICA expert team touched-up the contents as appropriate as a draft. The table of contents is shown below.

Table 2-57 Contents of Mid-term Sewerage Development Plan

Table of Contents
Preface
Chapter I Introduction
Chapter II General Description of Current Condition
Chapter III Financial and Funding Frameworks
Chapter IV Analysis of Strategic Issues
Chapter V Vision, Mission and Objectives
Chapter VI Strategy and Policy Direction
Chapter VII Priority Development Programme
Chapter VIII Indication of Implementation Plan
Chapter IX Performance Indicators
Chapter X Transition Guidelines and Implementation RULES
Appendix-1 Matrix of Implementation

Source: JICA Expert Team

After discussing the above draft with the Task Force, it was finalized as "DKI Midterm Development Plan RPJMD (2018-2022) Sewerage Edition" reflecting comments and modifications raised by the Task Force. Also, from the assistant of the governor at the final seminar held just before the end of the project, the mid-term plan dealt with the sewage treatment preferential treatment area, but improvement of urban hygiene for residents who still do not have access to sanitation facilities has priority We advised that it was better to indicate the target area separately from the priority treatment area and

Reflecting the advice provided by the Deputy Governor in the Final Seminar that the improvement of urban sanitation is more urgent and important issue than sewerage development and therefore it is better to indicate separately the priority target areas of urban sanitation from priority sewerage zones, a description on the link between the urban sanitation improvement and future sewerage development was added. With reference to the contents of this sewerage edition, the sewerage section of the next 5-year mid-term development plan of DKI Jakarta RPJMD (2018-2022) will be formulated.

In addition, the DKI Jakarta’s Mid-Term Development Plan RPJMD (2018-2022) will be

approved through the following procedures in near future.

May 2017	Finalization of sewerage section and compilation of RPJMD (2018-2022)
October 2017	Inauguration of new Governor
April 2018	Finalization and submission to Regional Assembly (DPRD)
June 2018	Approval from Regional Assembly (DPRD)
August 2018	Publishing of RPJMD (2018-2022)

(5) Lecture on Mid-term Sewerage Development Plan at Seminar/Workshop

Related to the previous subsection 2-1-3-2-1 "Activity 2-1", various seminars and workshop were conducted in order to deepen the understanding of counterpart staffs that play a leading role in the sewerage development as a part of training under this project.

The trainings, seminars and workshop delivered the necessary knowledge on sewerage development and management for the practitioners involved in sewerage planning, business management, maintenance plan, securing financial resources for construction and operation, publicity and public hearing. Among those training program, the topics related to the mid-term sewerage development plan are shown in the table below.

In the two-day workshop which was held to clarify the tasks related to sewerage development and the direction of sewerage development and management, active participation and discussion were carried out with participation of BAPPENAS, KEMENKOs, BPBUMD, and Working Group members (BAPPEDA, Dinas Sumber Daya Air, BPKLH, PD PAL Jaya, DGHS). In the workshop, to ensure the implementation of sewerage projects and financial system, it was shared that priority project selection, step-wised sewerage development method, sewerage tariff setting, and connection obligation to sewerage, etc.

Table 2-58 Summary of Technology Transfer on the Mid-term Sewerage Development Planning

No.	Main theme of Lecture/Discussion	Date	Method	Target
1	Mid-term Sewerage Development Planning	04 April 2016	Small Seminar	PD PAL Jaya
		05 April 2016		Dinas Sumber Daya Air
		06 April 2016		BAPPEDA
		07 April 2016		DGHS
2	Sewerage Development and Water Quality Control	31 May 2016	Special Seminar	BAPPEDA 、 BPLHD 、 BiroPSKLH 、 Dinas Sumber Daya Air、PD PAL Jaya、PD PAM Jaya、DGHS
3	Mid-term Development Plan	03 August 2016	Discussion	PD PAL Jaya
4	Land Area for WWTP	05 August 2016	Small Seminar	BAPPEDA
5	Mid-term Development Plan (Prioritization/Financial Resources)	03 October 2016	Discussion	DGHS
		04 October 2016	Discussion	PD PAL Jaya
6	Step-wised Sewerage Development	21 November 2016	Discussion	PD PAL Jaya
7	Early 5-year Sewerage Development Plan in Yokohama City	31 January 2017	Small Seminar	PD PAL Jaya
		01 February 2017		DGHS
	Advanced Wastewater Treatment Technology and Cost	01 February 2017		BAPPEDA
		02 February 2017		Dinas Sumber Daya Air
8	Sewerage Development Plan and Decentralized Wastewater Treatment	23-24 March 2017	Workshop	BPBUMD, PD PAL Jaya, DGHS, KEMENKO (NCICD), BAPPENAS, BPKLH, DLH, BAPPEDA, Dinas Sumber Daya Air
9	(Main Theme) Progress and Results of the Project and Study of Experiences of other Countries (Session-1) Mid-term Sewerage Development Plan	23 May 2017	Special Seminar	DGHS, KEMENKO, BPBUMD, PD PAL Jaya, PD PAM Jaya, BPKLH, DLH, BAPPEDA, Dinas Sumber Daya Air, KEMENKO (NCICD), BAPPENAS

Source : JICA Expert Team

2-1-3-2-4 Activity 2-4 “DKI drafts Regional Regulation or compulsory rules to manage and operate the entire development of centralized waste water system in consultation with JICA experts.”

① Background

Sewerage Law as well as Law on Sanitation Management are not promulgated in Indonesia. Draft Law on Sanitation Management is now on the way to enactment. This draft Law focuses on sanitation improvement but is far different from sewerage laws which are common in EU and USA as well as Japan.

Enacting Sewerage Law is prioritized subject due to enhance sewerage management sustainably, then this Project provides necessary advice in order that DKI drafts regulations and compulsory rules (Regional Regulation) on obligation to connect sewerage system and on sewerage tariff system in consultation with JICA Expert Team. Accordingly this Project provides supports on DKI Jakarta for enacting Regional Regulation which is appropriated to local condition in future through not copy Japanese regulations but to scrutinize existing regulation as well as condition of sewerage works in DKI Jakarta.

Sewerage Ordinance (Regional Regulation of Sewerage) is the legal background of individual service of sewerage as well as institutional system.

Providing legal framework of standard sewerage service and management applied in developed cities requires a huge amount of efforts and institution on the city who just implements large scale of sewerage system. Individual sewerage service, for example, is important responsibility such as obligation of sewerage connection, properly discharging wastewater to sewerage system, quality management of house connection, tariff levy, and collaboration of public and private as well as quality management of on-site treatment system and on-site sludge management. Implementing these services require a huge amount of resources and a refined know-how as well as a large scale of institution. DKI Jakarta, who is newly implementing sewerage system, is practical to allocate the restricted resources of human and finance into prioritized sewerage services.

JICA Expert Team introduces standard sewerage service and management provided by developed cities as well as institutional and financial system as their legal background. Then, step-wised development of regulatory and institutional system is proposed. Once DKI Jakarta determines type of sewerage service, task force and institution which will be practicable, modified regulatory system (Regional Regulation) can be appropriate to DKI Jakarta through selecting appropriate articles accordant with sewerage operation procedure. Standard sewerage service and management in developed cities will contribute to step-wised development of institution and to

up-grade of sewerage service in DKI Jakarta.

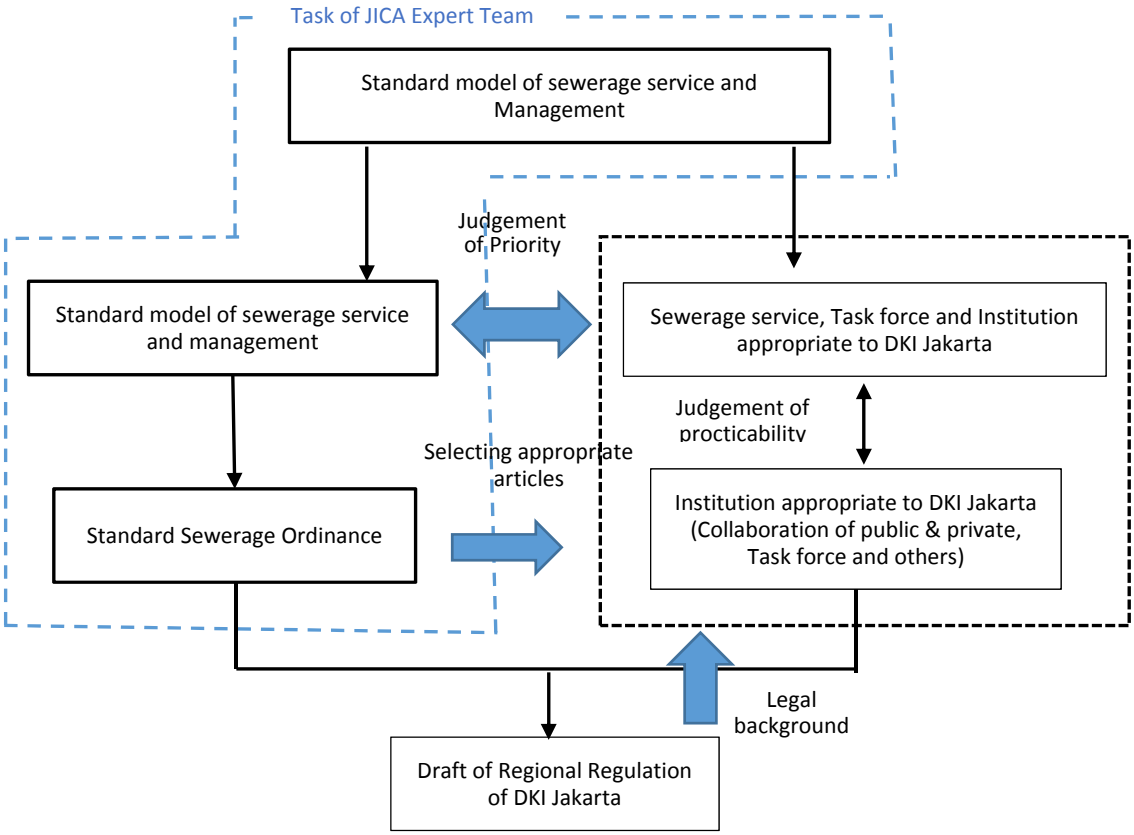


Figure 2-19 Establishing Methodology of Regulatory Framework

Two ways of supporting approach are provided for drafting Regional Regulation.

First way of supporting approach is to obtain fundamental knowledge on sewerage works described in "2-1 JICA designs training programs in order to enhance capacity of staffs in charge of sewerage works through scrutinizing practical issues and needs in consultation with DKI" and "2-2 JICA implements the training programs for sewerage works".

Second way of supporting approach is to provide textbook which compiles institutional system as legal background as well as sewerage development methodology and sewerage works management applicable to DKI Jakarta. This textbook is used as discussion tools at seminar and workshop in order to help understanding sewerage management systematically. This textbook works for DKI Jakarta who drafts Regional Regulation. Section of"③ Policy (Strategy) → Plan" in this report describes these ways of supporting approaches in detail.

In order to improve sewerage planning capacity as well as to develop regulatory system, issues and measure are analyzed in three category followings and then they shall be solved

comprehensively.

(1) View points on substance of wastewater and wastewater management which the Project targets,
(2) Direction of sewerage development and wastewater management, and
(3) Human resources in sewerage sector.

(1) View point on substance of wastewater and wastewater management which the Project targets

Law on Sanitation Management (Draft) of Indonesia defines “Domestic waste water is waste water from household activities (bathing, washing, toilet) derived from various sources”. The draft Law does not define municipal wastewater which is discharged by municipal activities. Developed cities in oversea manage wastewater from household and business activities as well as storm water.

This means Government of Indonesia focuses wastewater management on sanitation such as wastewater discharged from household activities as well as inundation mitigation by storm water.

Table 2-59 Draft Law on Sanitation Management, Republic of Indonesia

DRAFT LAW OF THE REPUBLIC OF INDONESIA (Draft) NOMOR…..... YEAR…..... ON SANITATION MANAGEMENT Domestic waste water is waste water from household activities (bathing, washing, toilet) derived from various sources. CHAPTER II: PRINCIPLES, OBJECTIVES & SCOPE Part Two: Objectives Article 3 Sanitation Management was held in order to: a. controlling the quality of domestic wastewater discharged into the environment; b. controlling and / or drain excess surface water from rain water in urban areas; c. protect and conserve water resources; d. controlling the quality of the environment; e. improving public health, and f. making domestic wastewater and rainwater as a resource. CHAPTER III: GUIDANCE AND SUPERVISION Article 5 (1) Guidance and supervision of local government policy in the management of domestic waste water and urban drainage systems conducted by the Government

Source: Ministry of Public Work and Housing

DKI Jakarta, however, defines sewerage system (centralized wastewater management system) which collects and treats gray water and black water of commercial, office and industries as well as household activities.
Governor Decree No. 1040 of 1997 specifies wastewater into two sources of “I. Domestic Wastewater” and “II. Non-Domestic Wastewater”, and this is same principles as developed cities in oversea.

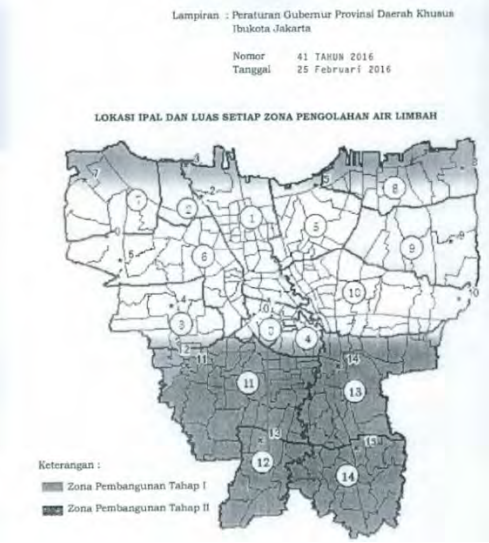
Governor Decree No 41/2016 on Master Plan for the Development of Infrastructure and Means of Domestic Wastewater Management

Article 1 General Requirement 10 Domestic waste water is wastewater generated from domestic activities, houses, flats, apartments, offices, hospitals, mall, markets, supermarkets, hotels, industries, schools either gray water or black water toilet waste water. 16 Centralized System is a waste water management system where waste water from any source connected through a network of collection pipes, which is then piped to the treatment plant carrier joint / centralized.

Source : Governor Decree No.41 of 2016 on Master Plan for the Development of Infrastructure and Means of Domestic Wastewater Management, and Edited by JICA Expert Team

(2) Direction of sewerage development and wastewater management
Sewerage works in Jakarta inaugurated sewerage service of Zone-0 (Setia Budi WWTP) in 1991, and PD PAL (Perusahan Daerah Pengelolaan Air Limbah) which is State-owned Wastewater Enterprise Company was established. However, sewerage system has not expanded to out-side of Zone-0.

NCICD was authorized in Master Plan in order to solve serious issues on urbanization such as land subsidy, inundation, congested transportation, land acquisition for urban development and water resource. Conservation of storm water reservoir, which will be constructed by NCICD, requires sewerage system. Sewerage development with sewerage served area of 65% in 2022 is stipulated by “Governor Decree No 41/2016 on Master Plan for the Development of Infrastructure and Means of Domestic Wastewater Management”.



NCICD (National Capital Integrated Coastal Development)

Governor Decree No 41/2016 on Master Plan for the Development of Infrastructure and Means of Domestic Wastewater Management

Considering:

b. that the Master Plan for Water Management of Domestic Waste in the Special Province of Jakarta have been prepared in 2012 and in order to support Program National Capital Integrated Coastal Development (NCICD) as well as the improvement of services of domestic wastewater in the Special Province of Jakarta required acceleration of domestic waste water management.

Source : Governor Decree No 41/2016, and JICA Expert Team Edited

Figure 2-20 Sewerage Master Plan (Wastewater Management) of DKI Jakarta

DKI Jakarta has been persistent on the separate sewerage system (SSS). However, service sewer pipe and house connection are the obstacles on wastewater management service rate of 65% in 2022, which is the most prioritized target of sewerage development and NCICD stipulated by Governor Decree No. 41/2016.

A most practicable sewerage development may be combination of SSS and interceptor sewer system. This interceptor sewer system, which is applied in Kaohsiung (Taiwan), Bangkok, almost all cities in Vietnam, Manila and others, utilizes existing drainage and septic tank as intermittent system upward to SSS.

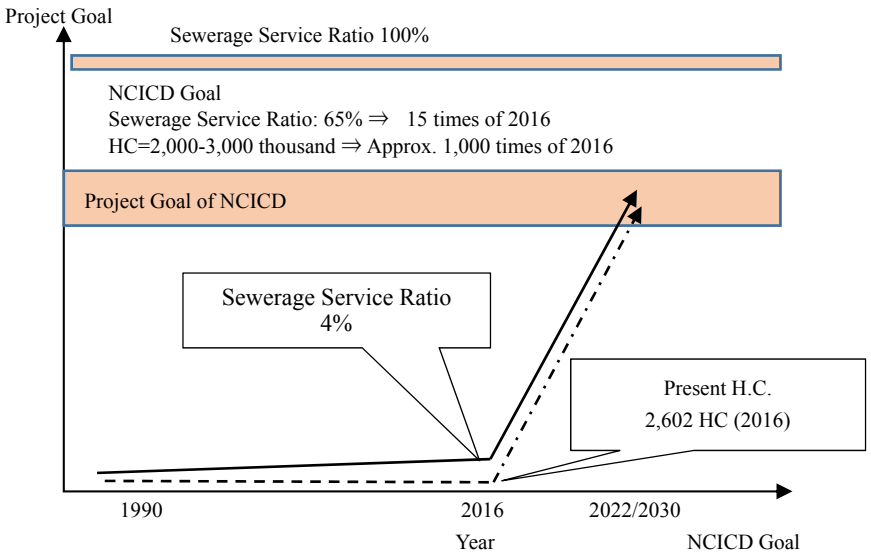
Tariff system was not discussed how to design coping with the sewerage service level with / without house connection. Present sewerage development strategy has deadlocked on the gap among sewerage development policy and applicable technology as well as regulatory system.

(3) Human resources in sewerage sector

DKI Jakarta has provided sewerage service to 2,602 house connection by now as shown in Figure 2-21. Project goal of NCICD within 5 years is to provide service on approximately 1,000 times of the past 25 years.

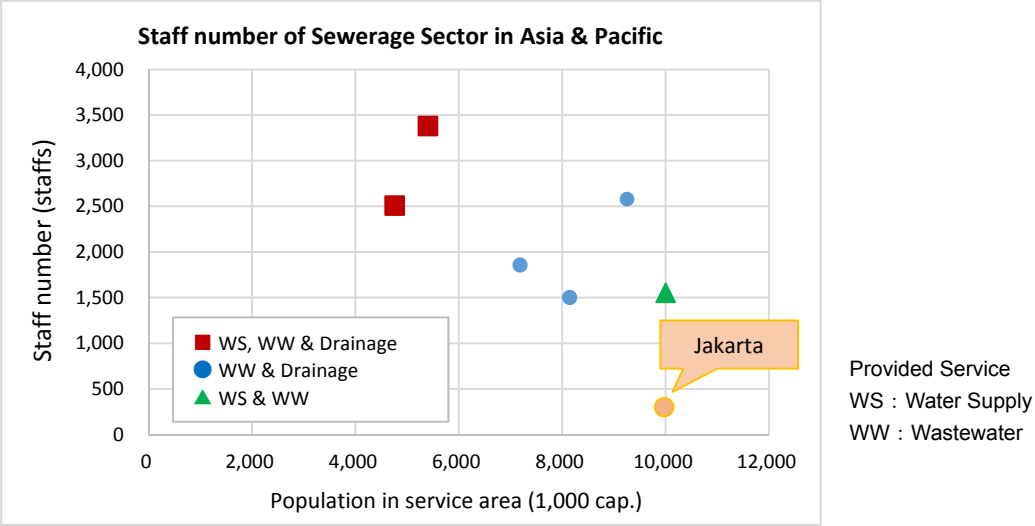
PD PAL Jaya employs approximately 110 staffs. Sewerage sector in Asian and Australian cities employ approximately 1,500 through 3,400 staffs although their services vary from water supply, wastewater management, septage management and/or storm water drainage (Figure 2-22 and Table 2-60). Sewerage Bureau of Tokyo employed approximately 5,000 staffs at maximum for sewerage development in 23 wards area. Present organization of DKI Jakarta is too small comparing with Asian large cities.

Furthermore, expertized staffs on large scale sewerage development as well as operation are scarce. Dinas Sumber Daya Air, which is a counterpart organization, is newly assigned to sewerage project implementation but employs no expertized staff in sewerage sector.



Source: JICA Expert Team

Figure 2-21 Sewerage Development Target of DKI Jakarta



Source: JICA Expert Team

Figure 2-22 Staff Number of in Asian & Australian Cities vs. Jakarta

Table 2-60 Staffing and Service of Sewerage Sector in Asian & Australian Cities

City	Service Type	Population in Service Area (1,000 Cap.)	House Connection (1,000 HC)	Staff Number (Staffs)	Staff / 1,000 HC
Manila Water	WS & WW	10,000	1,092	1,555	1.4
Singapore PUB	WS, WW, Drainage & WWR	5,399	1,424	3,382	2.4
Malaysia IWK	WW	21,000*1	n.d.	3,236	n.d.
Ho Chi Minh UDC	WW & Drainage	8,146	n.d.	1,500	n.d.
Hong Kong DSD	WW & Drainage	7,188	2,468	1,856	0.8
Sydney Water	WS, WW, Drainage & WWR	4,755	1,848	2,509	1.4
Tokyo Sewerage Bureau	WW, Drainage & WWR	9,257	5,384	2,579	0.5

*1: Population Equivalent (Malaysia IWK)

WS: Water supply, WW: Wastewater, WWR: Wastewater Reuse

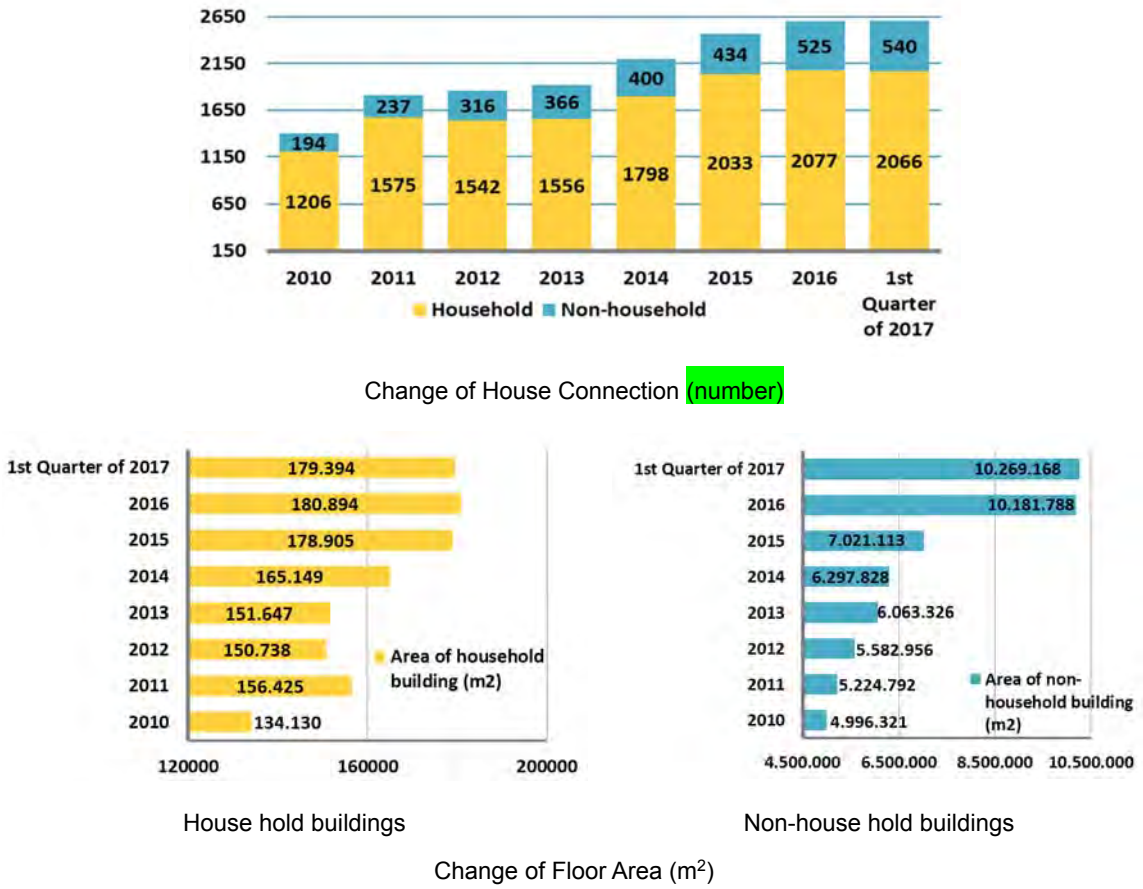
Source: JICA Expert Team

② Surveyed Subjects and Results at Present

(1) Present Situation of Sewerage in DKI Jakarta

Literature survey (through PD PAL Jaya Annual Report) and site visit survey scrutinize the present sewerage service situation in Zone-0 area (Figure 2-23 and 2-24). Number of house connection (HC) at present is approximately 2,602 and increased rate in a year is 200 HC. Sewerage tariff is levied based on floor area. Non-household building (Commercial and office building) occupies 10 million m^2 which is equivalent to approximately 60 times of household

(180 thousand m^2), and then is most preferable customer.



Source : PD PAL Jaya

Figure 2-23 House Connection in Zone-0 in Jakarta Sewerage

Existing drainage flows wastewater without treatment (Figure 2-25). Map of sewerage served area shows the delayed sewerage service since buildings connected to sewer (colored excluding blue color) are scattered, and furthermore blue colored buildings (plan to connect sewer) are still limited (Table 2-61 and Figure 2-25). Hearing survey detected that residents raise complains on sewerage tariff and then they refuse to connect to sewer. The Greater Jakarta Governor Decree "No. 1040 of 1997 regarding Standard of Wastewater Quality to Sewerage in the Greater Jakarta" stipulates house connection on building owner, however this Decree has not worked well far from legal system of developed cities in Japan, Singapore, Australia, Taiwan and others.

Green-belt-covered drainage in business Center

Drainage under green-belt

Drainage in residential area

Sewer in residential area

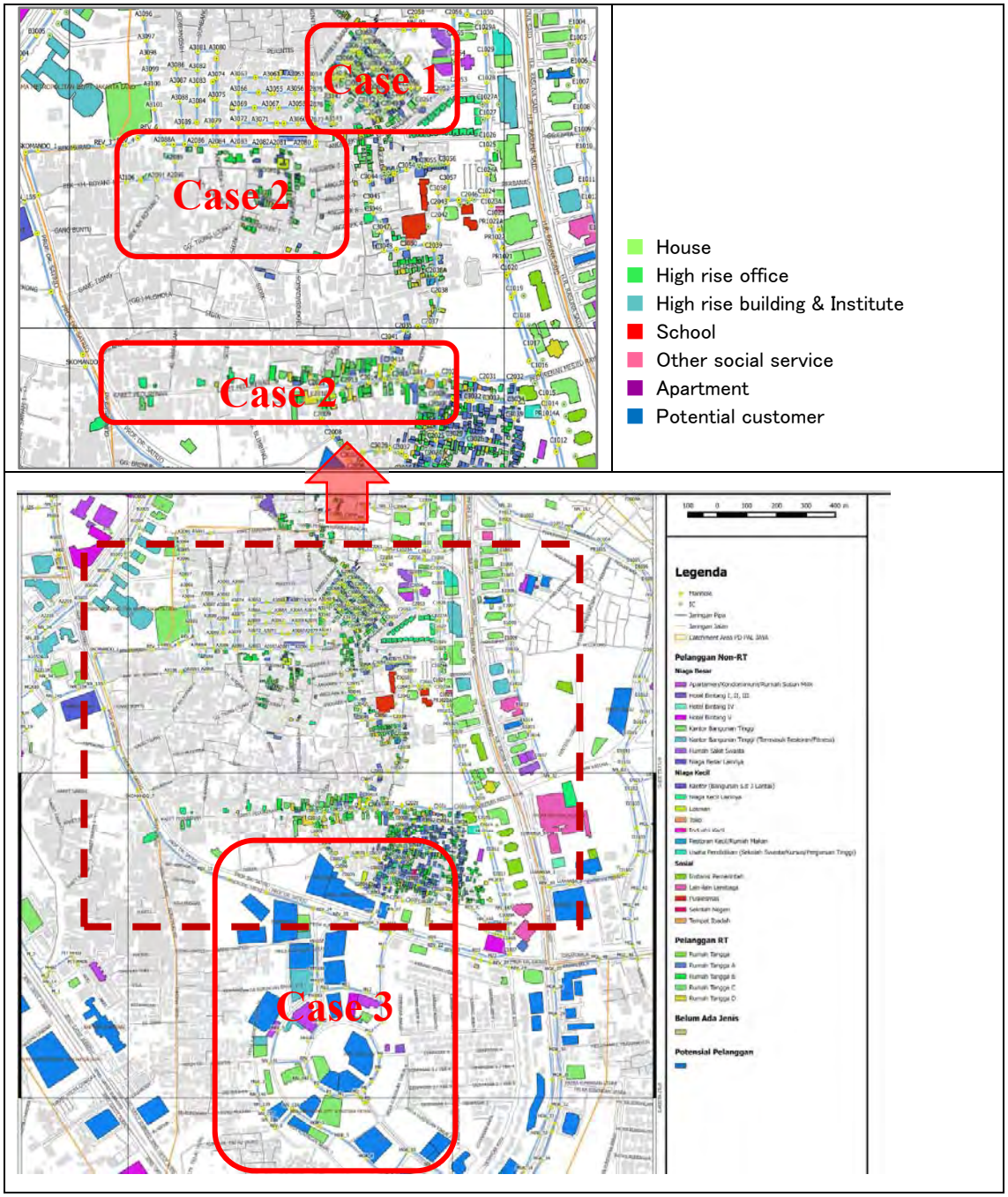
Source: JICA Expert Team

Figure 2-24 Wastewater Drainage in Zone-0 Sewerage Service Area

Table 2-61 Types of House Connection into Public Sewer

Case 1: Individual house with discharging to sewerage system Artificially developed residential complex with high-income as well as with awareness to environment sanitation. **Case 2: Individual house with almost discharging to existing channels** Naturally developed residences and various value on sewerage role. A few residents appreciate sewerage role, however many owners of elegant premises are reluctant to connect sewerage due to sewerage charge. **Case 3: Artificially developed business district with individual treatment plant, and will connect to public sewer** Artificially developed business center, however lack of coordination on sewerage development. Individual Treatment Plant wastes money.
Direction of solution (1) How to collect gray water which is major pollution source? (2) How to speed up house connection? (3) How to levy the wastewater discharger?

Source: JICA Expert Team



Source: PD PAL Jaya

Figure 2-25 Wastewater Discharge to Sewerage System in Kuningan, Setia Budi

Table 2-62 Stipulation on Discharge to Public Sewer by Decree

The Greater Jakarta Governor Decree
No. 1040 of 1997
Regarding
Standard of Wastewater Quality to Sewerage in the Greater Jakarta

The Greater Jakarta Governor

"Article 5" does not work well. Solution is practical institutional design.

CHAPTER III CONTROL

Article 5

Each owners/inhabitants/responsibility bearers of the buildings as located within the service area of installed public wastewater pipeline canals shall dispose their wastewater into such public wastewater pipeline canals.

Article 6

Each owners/inhabitants/responsibility bearers of the buildings as stipulated under Article 5 above shall construct parcel wastewater channeling structure and connect properly to the public wastewater pipeline canals under supervision of PD PAL Jaya and related Government Services.

Article 7

Each owners/inhabitants/responsibility bearers of the buildings as stipulated under Articles 5 and 6 above and have been using the public wastewater pipeline canals shall observe the disposed wastewater quality to comply with the pipeline system wastewater quality standard in order to prevent from disturbances to the wastewater canals and other structures.

Practical institutional design is carefully developed.

CHAPTER IV SUPERVISION AND MONITORING

Article 8

(1) Supervision and Monitoring against the Quality Standard of the Public Pipeline System Wastewater shall be executed by PD PAL Jaya.

(2) In execution of the supervision as stipulated under point (1) above of this Article, PD PAL Jaya shall coordinate with the related government services and report its supervision results to the Greater Jakarta Governor.

(3) The supervision task as stipulated under point (1) above of this Article include inter alia:
   a. monitoring and evaluation of quality standard of wastewater that enter into the pipeline system,
   b. collection and evaluation of data that relate to activities as stipulated under point a. above shall be executed by PD PAL Jaya.

(4) The supervision shall be conducted periodically and any time as required.

(5) If the results of the supervision and monitoring indicate quality standard deviation, the Government service in charge of guidance provision shall, on behalf of the Greater Jakarta Governor, request the owners/inhabitants/responsibility bearers of the buildings concerned to take needed measures and, if required, enforce penalties based on the pertaining provisions.

(6) Provisions on implementation procedure of the supervision and monitoring shall be established separately that include its implementation guidance and technical guidance

Table 2-63 Stipulation on Discharge to Public Sewer in Oversea

Japan Sewerage Law

Article 9
Public Notice of Commencement of Sewerage Service
Municipal sewerage operator has to issue a public notice on the dates of commencement of new sewerage service, drainage/treatment area, and the others stipulated in the ordinance of sewerage while ensuring public access to the plans & sections in the offices of municipal governments.

Article 10
Mandatory Connection
10.1 Once sewerage service becomes available, land owners, tenants, or occupants **shall install house or lateral sewers** without delay by the following classification.
10.1.1 Where a land has a building, the building owner has the duty.
10.1.2 Where a land does not have a building, the land owner has the duty.
10.1.3 Where a land is public roads or used by other public authorities, the concerned authorities have the duty.
10.2 The repair & rehabilitation of house or lateral sewers shall be made by those who shall install them. The cleaning and other maintenance work shall be conducted by the occupants of the land.
10.3 The installation work & structure of house or lateral sewers shall comply with Building Law & the Order of Sewerage Law.

Singapore: SEWERAGE AND DRAINAGE ACT (CHAPTER 294)

(Original Enactment: Act 10 of 1999) REVISED EDITION 2001
Premises not provided with adequate sewerage system
6. (1) **If it appears to the Board that any premises are not provided with an adequate sewerage system, the Board may, by notice in writing, require the owner or occupier of the premises to construct such sewerage system,** or to make such alteration to the existing sewerage system as he considers necessary.
(2) The Board may, at any time by notice in writing, require the owner or occupier of any premises served by any sewerage system to make a sufficient drain-line emptying into any public sewer and to disconnect and demolish at his own expense any sewerage system rendered useless or unnecessary thereby.
(3) **The Board may, by notice in writing, require the owner or occupier of any premises to cause all sewage from that premises to be discharged into such sewerage system as it may direct.**

Malaysia: LAWS OF MALAYSIA Act 508

SEWERAGE SERVICES ACT 1993 *Incorporating all amendments up to 1 January 2006*
Requirement that proper drainage for sewage be made
17. (1) If any building is at any time not drained for sewage in accordance with this Act or any regulation made under this Act or otherwise to the satisfaction of the Director General by a sufficient private connection pipe communicating with a public sewer or public sewerage system, **the Director General may give notice in writing requiring the owner**, or if the owner cannot with reasonable diligence be traced the occupier, thereof to construct or lay from such building a pipe of such materials or size at such level and with such fall as the Director General thinks necessary for the draining of sewage from the building.
(2) If the owner or occupier fails to comply with a notice given under subsection (1) the Director General may apply to a Magistrate's Court for a mandatory order requiring the owner or occupier to construct or lay the pipe specified in the notice.

Queensland Sewerage and Water Supply Act 1949
STANDARD SEWERAGE LAW
15 Premises to connect to sewerage system
The owner of premises in a local government's sewered area must make sure that—

(a) the soil or waste pipes from all fixtures on the premises, including water closet pans, urinals, sinks, baths, clothes washers and dishwashers, discharge into sanitary drainage; and
(b) all sanitary drainage on the premises discharges to the local government's sewerage system for the sewered area.
16 Notice to connect to sewerage system or install on-site sewerage facility
(1) A local government may, by written notice given to the owner of premises, require the owner—
(a) to connect the premises to a sewerage system or common effluent drainage; or
(b) to install an on-site sewerage facility on the premises.

Taiwan: Sewerage Law 2007-01-03

Chapter III. Use and Management
Article 19
The Sewer institution shall publicly announce the drainage area, the date to start use, the connecting procedure and the sewerage management rule before the start use of the Sewers.
Except otherwise permitted by the local competent authority, the Sewage within the drainage area shall be drained off in the Sewer subject to the public announcement.
Article 20
The User shall be responsible for the management and maintenance of its own Drainage Facility.

(2) Scrutinizing Sewerage System in DKI Jakarta

Scrutinizing is indispensable in order to analyze technical and institutional issues as well as to propose measure of solution on regulatory system such as background law, finance and institution, sewerage development plan, organization, technical standards and others. This Project comprehensively surveyed the current situation of sewerage works through providing the list of law and decree (Table 2-64). This Project also surveyed by site survey of expert team the current situation of sewerage system and management of Denpasar City and Bandung City which are developing sewerage system.

Table 2-64 Request List on Law/Decree on Wastewater Management in DKI Jakarta and Relevant

Category	Title / Name
Gov. Law	
	Draft Law on Sanitation Management, Government of Indonesia
DKI Jakarta	
Wastewater Management	Wastewater Management Decree
Wastewater Management & Project Development	No. 41/2016 Master Plan for the Development of Infrastructure and Means of Domestic Waste Water Management
Water Quality Standards and Design Guidelines	No. 582, 1995 Determination of the Quality Standard and Designation of River Water/Water Body, and on Quality Standard of Liquid Waste in the Area of DKI Jakarta
	No. 122/2005 Domestic Wastewater Management in DKI Jakarta (Planning and Design Criteria, and Standard drawings)
	No.69/2013 Regulation of the governor about Standard Quality of Waste Water for Activity and/or Business
	Regulation of Monitoring Commercial/Business WW Treatment
	SOP and Periodical Reports of Monitoring Business Wastewater Discharge
Tariff	Sewerage Tariff in 2012-Oct (Specific fee and Connection fee) (per m2 and month) (The Greater Jakarta Governor Decree)
Organization & Institution	No.1564 2013/10/8 Governor's Decree on the establishment of assistant's team for Central Sewerage System
	No. 133, 2010 Establishment of Organization and Administration of Septic Tank Waste Treatment Unit
PD PAL Jaya	
Establishment	No. 12 of 2009 PD PAL Jaya Managing Director Decree
	No. 944/2014 Determination of The President Director of PD Director Jaya PAL as Project Implementation Units Executing Development of Centralized Wastewater Management System in The DKI Jakarta
Wastewater Quality Discharge Standard	Decree on Wastewater Quality Standard to Public Sewerage
	No. 1040, 1997 Standard Quality of Sewerage System
House Connection	Regulation on House Connection Application Standard House Connection Contract
Sewage Sludge Management Strategy	Strategical Plan of Sewage Sludge Disposal and 3R (reduce, reuse and recycle)
Human Resource Training and R&D of Sewerage Sector	Research and Technical Development Activities Human Resource Development Plan and Result of Trainees participated to Home/International Training Course
Operation report	Five Year Development 2013-2017
	PD PAL Jaya Acceleration Plan
	PD PAL Jaya Annual Report 2013
	Responsibility of Sludge Management of Setia Budi WWTP between PD PAL Jaya and Dinas Tata Air (Flood Control Sector)
Decentralized Wastewater Management	Regulation on the residents' obligation to install decentralized wastewater treatment facility
	Regulation on the manufacturing of decentralized wastewater treatment facility
	Regulation on the installation work of decentralized wastewater treatment facility
	Structural standard of decentralized wastewater treatment facility for household

	Structural standard of decentralized wastewater treatment facility for commercial buildings
	Regulation on the maintenance of decentralized wastewater treatment facility for household
	Regulation on the maintenance of decentralized wastewater treatment facility for commercial building
	Regulation on the introduction of regular desludging system
	Regulation on the qualification of maintenance workers of decentralized wastewater treatment facility
	Regulation on the qualification of desludging vendors of decentralized wastewater facilities
	Activity of On-site Septic Tank Cleansing Service after transferred from Dinas Kebersihan (such as Kinds of Service and Task-forces, SOP (Standard Operation Procedure) of Customer-call to Septic Tank Cleansing, Fleets of Tank Truck and Sludge Treatment Plant, Trips of Tank Trucks in a day/month, Office Distribution for Customer Service)
	Laporan Input Data Hasil Sensus Sarana Sanitasi Setempat 2016 (On-site sanitation report)
Bali Gov.	
Wastewater management	Decree on Wastewater Management
	No. 8/2007 Environmental Quality Standards and Criteria for Raw Environmental Damage
	Tariff
	Decree on Wastewater Quality Standard to Public Sewerage
Bandung	
Wastewater management	Decree on Wastewater Management
	Decree on Tariff
	Decree on Wastewater Quality Standard to Public Sewerage

Source: JICA Expert Team

(3) Scrutinizing Relevant Information for Solving Issues on DKI Jakarta Sewerage

Through literature survey on Manila, Singapore, Malaysia (IWK: Indah Water Konsortium), Kaohsiung (Taiwan), Hong Kong, Shanghai, Ho Chi Minh and Haiphong (Vietnam), and Sydney, the best management practice on sewerage works (wastewater management and septage management) are analyzed such as situation and history of sewerage development, sewerage regulation, sewerage tariff, organization and others.

Special Seminar invited experts as seminar lecturers from Bandung City, Bali Province (Denpasar Municipality, Badung Regency, Gianyar Regency and Tabanan Regency） and Surakarta City in order to scrutinize the situation of present sewerage development in Indonesia. JICA Expert Team also surveyed Bali Province and Bandung City, and then specified the situation of sewerage development.

(4) SWOT Analysis on Sewerage Works in DKI Jakarta

SWOT analysis on sewerage works in DKI Jakarta is shown in Table 2-65.

Weakness is such as insufficient sewerage development strategy, limited time for achieving

political target, huge cost of project investment and O&M, which cause serious burden on budget of DKI Jakarta Government, and small task force with limited experience on sewerage development as well as operation of large scale WWTP. Threat may be the policy change of sewerage development and the deficit of finance especially for O&M expense.

Strong is world class Mega-city which attracts human resources from whole Indonesia, stable growth and strong economic, and experience of PD PAL Jaya. Opportunity is NCICD as a driving force, international event & tourist destination and the merging with wastewater sector and water supply sector (PDAM: Perusahaan Daerah Air Minum).

Table 2-65 SWOT Analysis on Sewerage of DKI Jakarta

Strong	**Weakness**
➢ World class Mega-city attracting human resources from whole Indonesia ➢ Stable growth and strong economic ➢ Experience of PD PAL Jaya	1. Insufficient sewerage development strategy 2. Limited time 3. Huge cost of project investment and O&M 4. Small task force of wastewater management 5. Limited experience on sewerage development as well as operation of large scale WWTP
Opportunity	**Threat**
➢ NCICD as driving force ➢ International event & tourist destination ➢ Merging with Wastewater sector and Water supply sector	1. Policy change of sewerage development 2. Deficit of finance especially for O&M expense

Source : JICA Expert Team

(5) Direction of Solving Issues on Sewerage Works in DKI Jakarta

Financial and institutional system as legal background for sewerage development strategy is required in order to solve the complicated issues in DKI Jakarta. Sewerage works in DKI Jakarta requires a huge amount of task force (organization) and finance, accordingly the step-wised solution is proposed (Table 2-66).

At first step, this Project exploits the best practice in oversea and then proposes the institutional system such as the obligation on sewerage connection and the notification of sewerage service area in order to specify the beneficiary as well as the tariff system in accordance with service level.

At second step, legal system is drafted through the institutional system which is elaborated by first step.

For example shown in Table 2-67, following (i) through (iii) are practicable for overcoming the weakness.

(i) To focus on prioritized role of sewerage, and then to provide the step-wised sewerage development plan which applies the interceptor sewer as intermittent sewer system to

separate sewer system.

(ii) To subject the affordability on tariff system and to combine the financial system consisted of public finance and beneficiary charge.

(iii) To provide the resource of personnel and finance through allying water supply sector and sewerage sector.

Experience of oversea brings more applicable measures to DKI Jakarta. Furthermore, systematic legal background is very important in order to eliminate the causes by policy change on sewerage development and management.

Table 2-66 Step-wised Institutional Design on Sewerage Issues in DKI Jakarta

Solution: Synchronizing with well-designed development strategy and legal background.
First step: Apply BMP learned from oversea on Sewerage development strategy
➢ Obligation on Wastewater discharge to public sewer
➢ Notification of Sewerage service inauguration
➢ Tariff in accordance with Sewerage service type
Second step: Draft institutional design, as a result, legal framework to be established

Source : JICA Expert Team

Table 2-67 Issues and Concept of Solution for Sewerage in DKI Jakarta

Issues	Concept of solution
Weakness 1. Insufficient sewerage development strategy 2. Limited time 3. Huge cost of project investment and O&M 4. Small task force of wastewater management 5. Limited experience on sewerage development as well as operation of large scale WWTP	1. Mid-term sewerage development plan 2. Focus on prioritized project based on step-wised development 3. Various financial source especially for investment and O&M expense 4. Well-trained staff and motivation as result of merging water supply sector 5. Learned from oversea (BMP: best management practice)
Threat 1. Policy change of sewerage development Deficit of finance especially for O&M expense	1. Robust legal background especially for investment and O&M expenses 2. Careful design considering such affordability and balance of fairness “PPP: Pollutant-Pay-Principle”

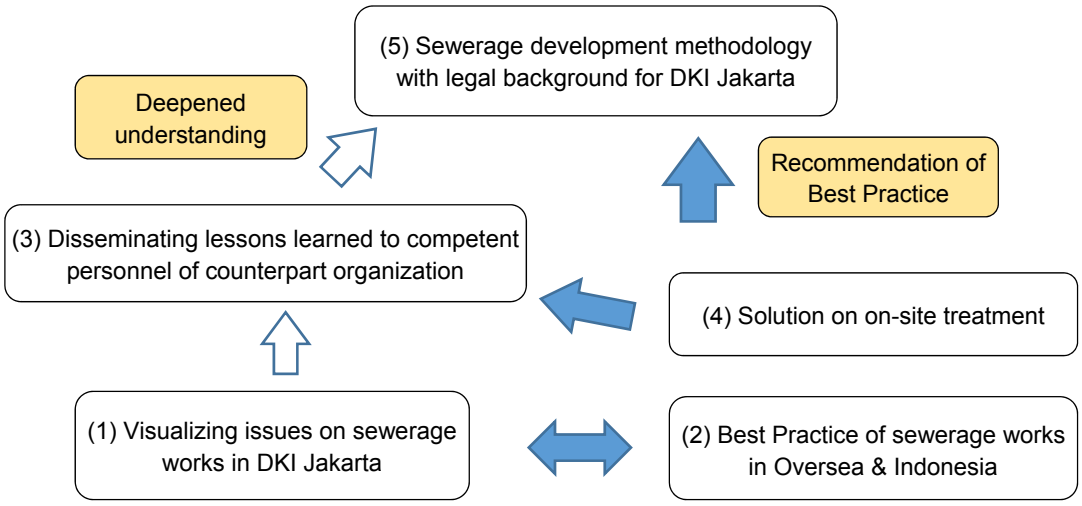
Source : JICA Expert Team

③ Policy (Strategy) → Plan

DKI Jakarta shall provide the sewerage service on larger juridical area and population than Tokyo Sewerage Bureau which provides the public sewerage service on 23 wards area. Present weak organization and institution of DKI Jakarta cannot be achieved in short term up to same scale of metropolitan cities in EU, USA and Japan. Accordingly, this Project applies the flow in order to enhance the management capacity as following;

(i) To visualize the complicated issues and their solution
(ii) To exploit the best management practice in oversea and Indonesia
(iii) To select the counterpart resource
(iv) To propose the solution on on-site wastewater management (septic tank sludge management and sanitation)
(v) To propose the sewerage development methodology and the legal background appropriate to DKI Jakarta

This Project transfers the relationship between sewerage development methodology and legal background which are applicable to DKI Jakarta through introducing the best management practice into competent counterpart repeatedly.



Source : JICA Expert Team

Figure 2-26 Capacity Enhancement Flow on Sewerage Development Plan

(1) Visualization of Complicated Issues and Their Solution

Wastewater is scarcely discharged into public sewerage system in Zone-0 in spite of the sewerage system developed.

Sewerage works hold complicated issues such as a huge amount of time and budget required as

well as the obligation on sewerage tariff and house connection charge on residents. Sewerage works require an awareness of public and financial department as well as a strong leadership on aesthetic urban development. Only proposed legal system cannot work well. A Comprehensive awareness on sewerage works is indispensable for such as how to develop sewerage system, how to obey on residents and why sewerage law / regional regulation is required.

Source : JICA Expert Team

Figure 2-27 Issues on Sewerage in DKI Jakarta

Issues and solution were visualized through introducing the best management on sewerage development as well as relationship of sewerage management and financial / institutional system. For understanding, seminar / workshop and working group meeting were held repeatedly.

Source: JICA Expert Team

Photo 2- Various Activities on Understanding and Consensus Building

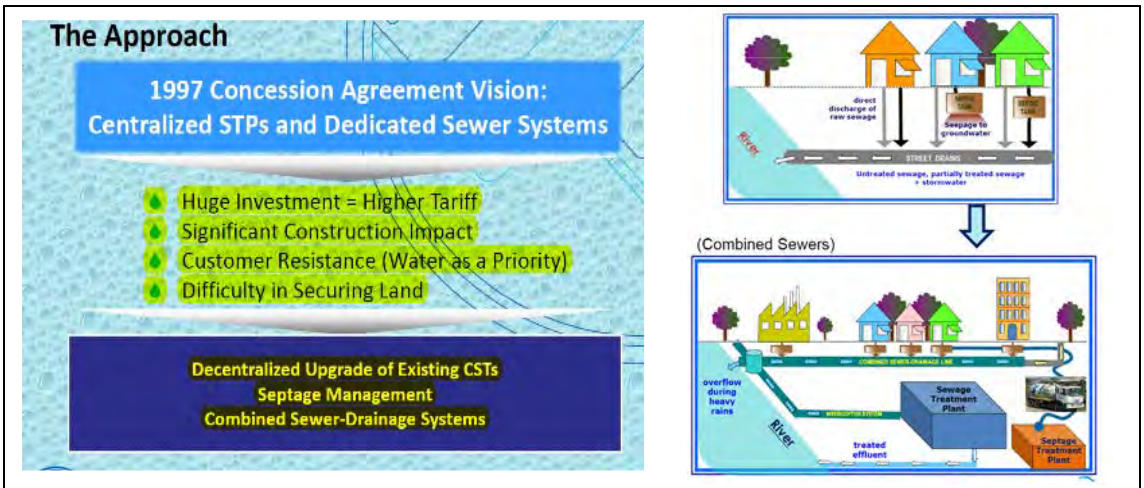
(2) Exploitation of Best Management Practice in Oversea and Indonesia

Financial and institutional system of Japanese sewerage sector is difficult to be transferred due to far difference among Jakarta and Japanese large cities on history, human resource, economy as well as public needs on sewerage and water environment. Accordingly, the best practices are scrutinized in Asian large cities which are developing sewerage system along with an economic growth. And then, the prioritized issues and sewerage development methodology as well as

management are introduced.

Furthermore, sewerage developed cities have accumulated a know-how on sewerage development and management such as Bandung, Denpasar (Bali Province), Yogyakarta, Surakarta, Cirebon and others. This Project surveys ones through site survey in Bandung and Bali. Special seminar invites the presenters from these two city /region and Surakarta City, and know-how of three cities / region are shared on sewerage development and management (Table 2-68). Bali, which is an international tourist destination, continues public campaign "Keep Bali Clean: Jaga Bali Bersih" on beach cleansing and sanitation improvement together with cleansing department. Bandung City provides sewerage development plan targeting 100 % service ratio by 2032 and is implementing sewerage project. Sewerage development plan consists of 59 % of sewerage system and remaining 41 % of on-site system utilizing existing drainage and WWTP.

These best management practices provide a solution to DKI Jakarta.



Source : Domestic Wastewater Management in Mega Manila, Metropolitan Waterworks Sewerage System Philippines 2012

Figure 2-28 BMP in Oversea & Indonesia: Policy Change of Development in Manila

Data collection of Reguratory, Bandung
(27 May 2016)

Data collection of Reguratory, Bandung
(27 May 2016)

Data collection of Reguratory, Bali
(27 May 2016)

WWTP Construction Project
(28 May 2016)

Source : JICA Expert Team

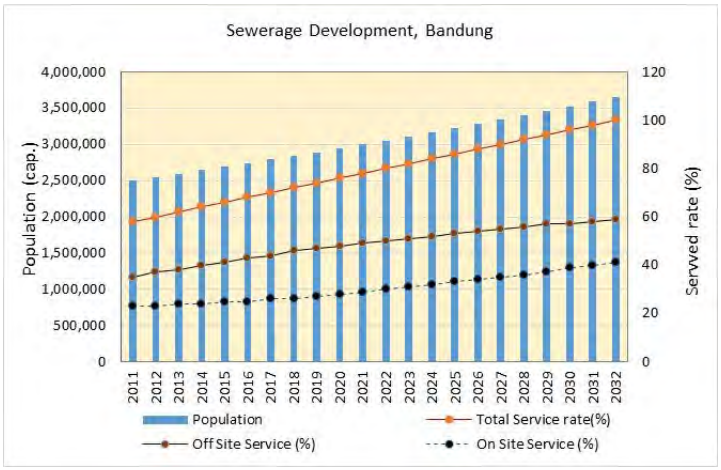
Figure 2-29 Best Practice Survey in Indonesia (Bandung City and Bali Province)

Table 2-68 Best Practice in Indonesia (Bandung City and Bali Province)

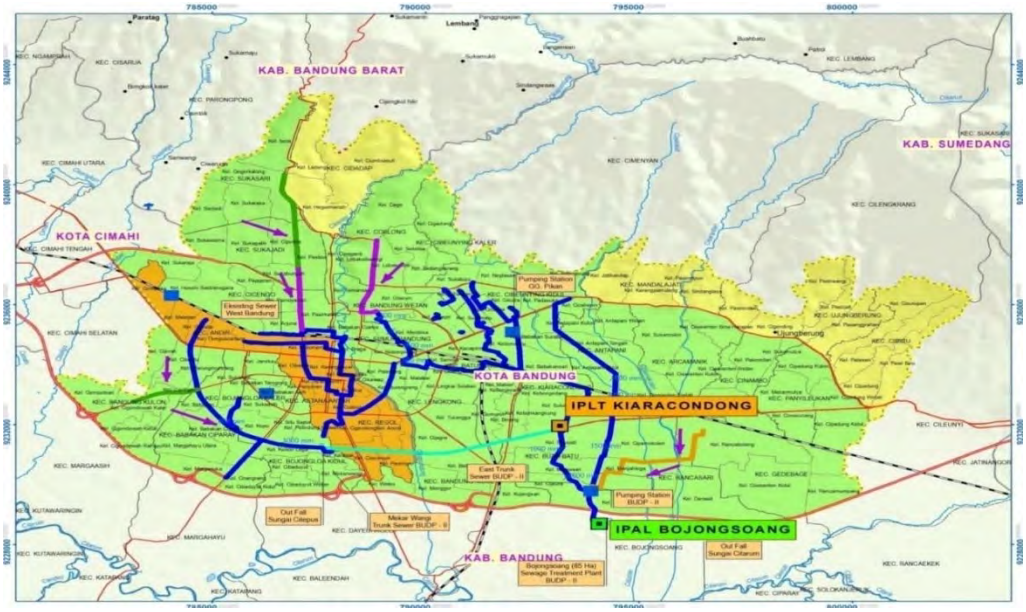
Subjects	Bali Province	Bandung City
Project implementation organization	・ Badan Layanan Umum Pengelola Air Limbah (BLUPAL) is established as regional sewerage system operators which provides sewerage service to Denpasar City and Kabupaten Badung (Sanur and Kuta).	・ PDAM Tirtawening Bandung provides water supply and sewerage service. ・ Mission of operator is to secure independent on financial management and upgrading treatment quality of water supply and wastewater.
Local regulation	・ National Law on Wastewater Management has not been stipulated. Accordingly Bali Provincial Government enacted Decrees on PIU (Project Implementation Unit), Sewerage tariff and Environmental discharge standard, and they implement and operate sewerage works.	・ Regional regulation (PERDA) stipulates job, project implementation unit and tariff system of water supply and sewerage.
Finance for construction	・ Expense of house connection is provided by local fund of Province, Kota and Kabupaten. This allocation of finance mitigates burden of residents, and then house connection proceeds. Commercial and hotel pay for their construction cost of house connection.	・ Wastewater revenue contribute almost 30 % of whole revenue of PDAM, local budget is used for sewer development followed BUDP I and II. ・ PDAM provides various type of service together with charge such as wastewater effluent reuse.
Sewerage tariff	・ Sewerage tariff is separate bill. Tariff rate	・ Tariff applies combined bill of water supply

	is decided accordant with number of guest room for hotel, chair for restaurant and road width for house. Tariff group and rate apply cross subsidy from commercial to low income residents.	and sewerage. Sewerage tariff is 30 % of water supply on commercial and industry. Septage is charged and treated by WWTP.
Sewerage development program / technology	・ Open trench and trenchless construction method are applied to sewer main as well as house connection accordant with land use and traffic condition. “Clean construction” is a keyword for socio / economic condition in Bali.	・ Sewerage development plan is provided. Sewerage area is divided to separate sewer area, interceptor sewer area using existing drainage and on-site treatment area. ・ Scheduled septage service is provided.
Public relation	・ Socialization of sewerage works is important for public awareness and then every community holds meetings repeatedly.	・ Water supply and sewerage work together for public relation as well as external exchange. ・ Department of Wastewater Public Service works for public relation.

Source : JICA Expert Team

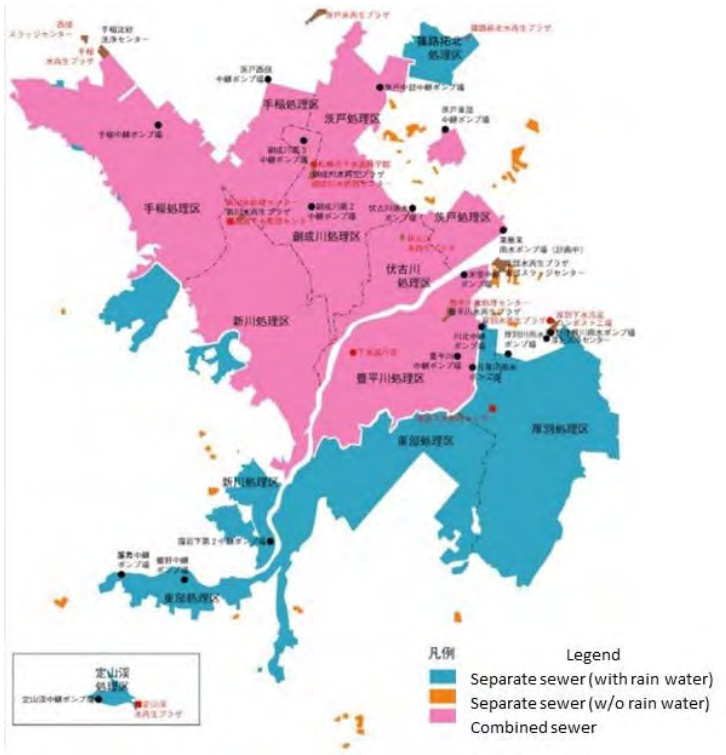


System Map of Domestic Waste Water Management



Source : Domestic Wastewater Management Kota Bandung, PDAM Tirta Wening, Bandung

Figure 2-30 BMP in Oversea & Indonesia: Sewerage Development in Bandung



Source: Sewerage and River Bureau, Sapporo City, Japan

Figure 2-31 BMP in Oversea & Indonesia: Notification of SSS and CSS Service Area

(3) Selection of Counterpart Resource

Chief of Planning and Development Division, Dinas Sumber Daya Air, is nominated to a counterpart on sewerage regional regulation, and he/she is busy and lack in experience of sewerage works. Accordingly, improving capacity is not by practice but by only literature.

Capacity on regional regulation requires an improvement through organization, and this Project provides information actively to BAPPEDA and PD PAL Jaya in addition to Dinas Sumber Daya Air as well as to CIPTA KARYA as National Government in order to enhance an awareness on management and regulation of sewerage works.

(4) Effects on Water Environment Improvement by Sewerage System and On-site Wastewater Management

4-1) Effects on Water Environment Improvement by Sewerage System

Water courses in DKI Jakarta receive wastewater without treatment in a whole year, accordingly their color are blackish and they produce an offensive odor. Small channel flows only wastewater in dry weather due to a water resource of gray water and septic tank supernatant.

Grabity discharge (in dry weather)

Pumped discharge (in dry weather))

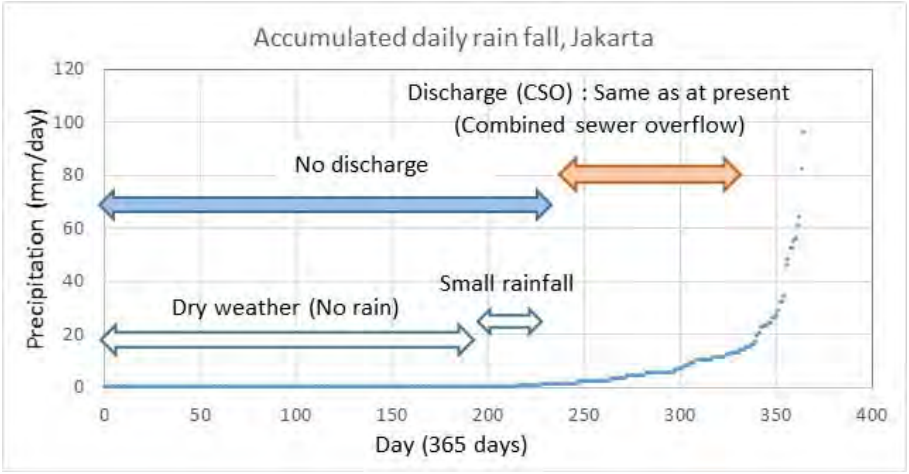
Source : JICA Expert Team

Figure 2-32 Water Courses in DKI Jakarta

Precipitation in Jakarta is 1,200 through 2,000 mm in a year (Average 1,700 mm/year, reported by World Meteorological Organization), and rainy days are 100 through 150 days. There is a long rainfall in rainy season, however short and strong rains are dominant in a year. Since sewerage system is developed, wastewater in dry weather as well as small rain events are collected and treated by sewerage system. Wastewater, where house connection is not developed, is discharged from existing drainage in medium and heavy rain events. This overflow is same situation as present. Rain events in a year and accumulated curve of daily rainfall are shown in Figure 2-33. Sewerage system contributes remarkably to reduce overflow events in year.

Combined sewer overflow (CSO) continues in interceptor sewer area, however house connection does not intentionally connect to existing drainage (house connection is connected only to interceptor sewer) and such CSO is same as present. Natural event continues. Overflow rate gradually declined accordant with the separate sewer developed in Mid. - and Long-term.

Rain events in a Year



Accumulated curve of Daily Rainfall in a year

Source : Weather History - Soekarno Hatta and JICA Expert Team Edition

Figure 2-33 Characteristics of Rain Fall in DKI Jakarta

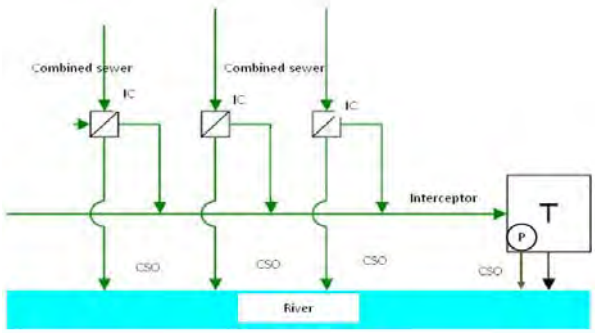
Table 2-69 Effects of Sewerage System on Wastewater Discharge

Weather		Present	With sewerage system	
			SSS area	CSS area
Dry weather		Discharged	**Collected & treated**	**Collected & treated**
Rain events	Small rain	Discharged	**Collected & treated**	**Collected & treated**
	Heavy rain	Discharged	**Collected & treated**	CSO (reduced accordant with SSS)

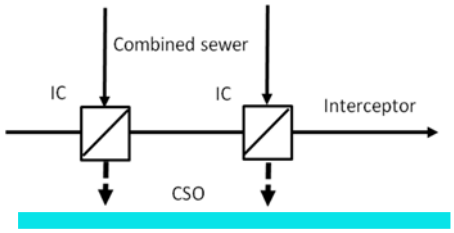
CSO: Combined Sewer Overflow CSS: Combined Sewer System SSS: Separated Sewer System
Source: JICA Expert Team

Collection system of wastewater is shown in Figure 2-34. Wastewater is collected and transported to WWTP by main sewer (interceptor sewer) which is constructed in deep elevation due not to cross existing drainage, river or underground facility. Wastewater including human waste discharged from separate sewer area combines with wastewater discharged from interceptor sewer

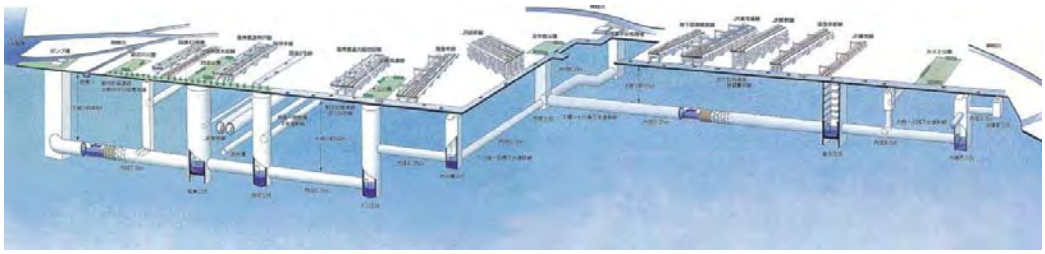
area, and then is transported to WWTP. Whole collected wastewater is treated, disinfected and discharged to river or sea. This means interceptor sewer can remarkably reduce pollution load as well as pathogenic microorganism.



Good example (Jakarta)



Bad Example

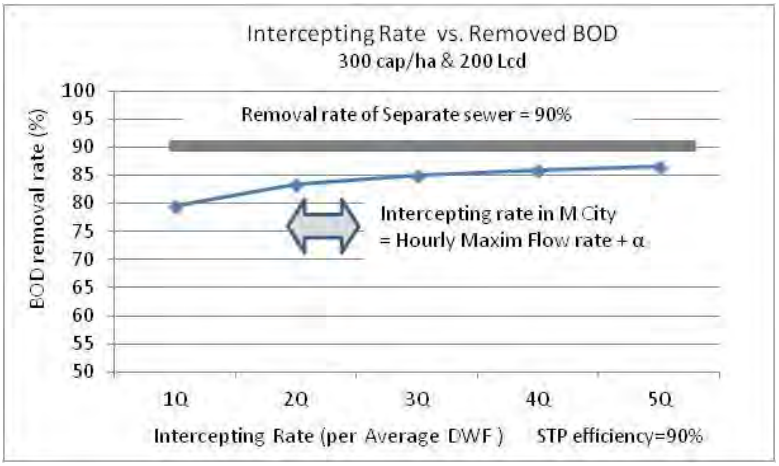


Conceptual layout plan of main sewer (Interceptor sewer)

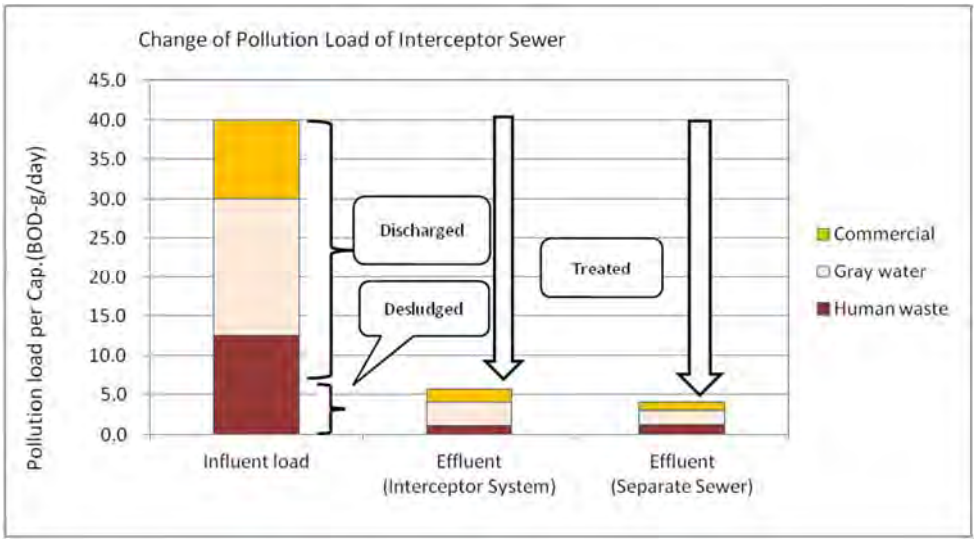
Source: JICA Expert Team

Figure 2-34 Wastewater Collection

CSO mitigation technology in Japan estimates 80 % through 86 % of BOD removal efficiency which is simulated by interception rate of 1Q through 5Q (1Q = one time of daily average wastewater flow). Sewer capacity in Jakarta is designed to hourly wastewater flow rate plus some allowance, accordingly sewer collects 2 through 2.5 times of daily average wastewater flow. Annual BOD removal efficiency is estimated to 83 %. This removal rate remarkably contributes to pollution control of whole wastewater discharged at present (Figure 2-35).



BOD removal efficiency in a year (estimated as 2 times interception rate of Daily Average Flow)



Source: JICA Expert Team

Interceptor sewers can collect approx. 80 to 86% of annual pollution.
Pollution load reduction（BOD removal efficiency）of separate sewerage depends on treatment efficiency (approx. 90%). Interceptor sewerage is almost the same level in cities like Jakarta where improvement of water environment is the high priority of wastewater management.

Category	Removal rate	Pollution load per capita			
		Domestic		Commercial (1/3 of Domestic)	Total
		Human waste	Gray water		
	%	g/cap	g/cap	g/cap	g/cap
Influent load	—	12.5	17.5	10.0	40.0
Estimated Effluent load					
Interceptor System	83%	1.1	3.0	1.7	5.8
Separate Sewer	90%	1.3	1.8	1.0	4.1

Source : Sewerage Planning and Design Manual, Japan Sewage Works Association

Figure 2-35 Pollution Load Removal Efficiency of Interceptor Sewer System

4-2) Proposed Solution on On-site Wastewater Management and Sanitation

Securing development strategy and institutional system on on-site wastewater management are important for improving sanitation in DKI Jakarta.

Management of on-site treatment facility is defined to responsibility of building owner. Proper treatment and desludging including sludge treatment are important for improving on-site treatment efficiency. PD PAL Jaya provides septic tank cleansing service since affiliation with Septage Management Division, Department of Cleansing (Dinas Kebershihan) in 2016. PD PAL Jaya is improving on-site wastewater management such as providing scheduled desludging service with monthly installment payment (16,500 IDR/month), which mitigates burden of residents.

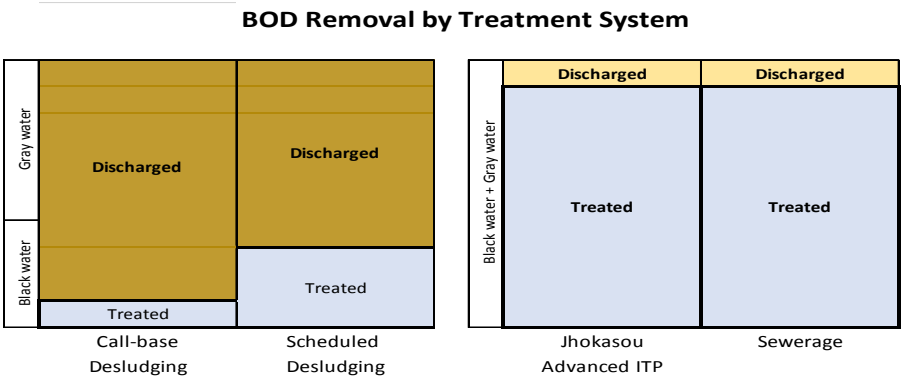
Source : PD PAL Jaya

Figure 2-36 Scheduled Desludging Service by PD PAL Jaya

Septic tank does not treat gray water but only human waste. Gray water shares 60 % of pollution load which exceeds human waste, for example on BOD load.

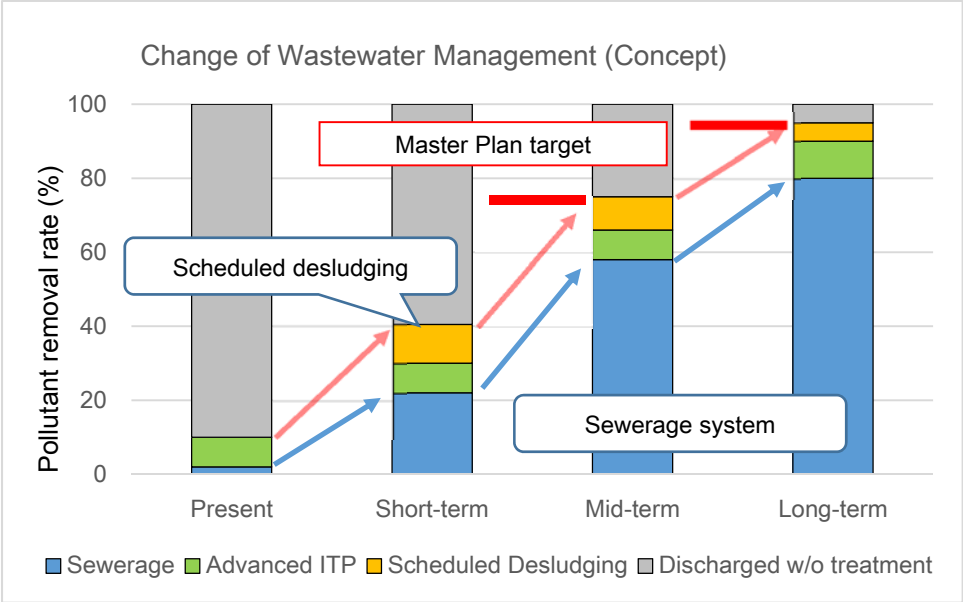
Effects of septage treatment on pollution load control is limited as shown in Figure 2-37, however, has advantages such as sanitation improvement and dissemination with high speed on whole DKI Jakarta. Furthermore, sewerage system in DKI Jakarta applies more interceptor sewer area than house connection area. This means septic tank remains for long time and septage treatment is a public service also for long term. Gap between Master Plan and project implementation capacity is very large, accordingly septage management can be positioned to step-wised up-grading of service quality as well as legal basis for tariff levy. Scheduled desludging is practicable for sewerage development plan.

This Project proposes on-site wastewater management such as investment and management of septage treatment facility, regulating private operator, training and certificates on business entity / technical staff, service provided by PD PAL Jaya and investment of public resource based on institutional system stipulated by Japanese Jokasou Law. This Project supports DKI Jakarta in order to decide by itself through providing necessary information since on-site wastewater management requires political judgement.



Source : JICA Expert Team

Septic Tank: Only treats human waste (black water) and discharges gray water without treatment. Scheduled desludging enhances BOD removal efficiency due to preventing sludge spill out.
Jhokasou and advanced ITP treat black water as well as gray water, and are almost same level of treatment efficiency as sewerage with 90 % removal rate.



Source: JICA Expert Team

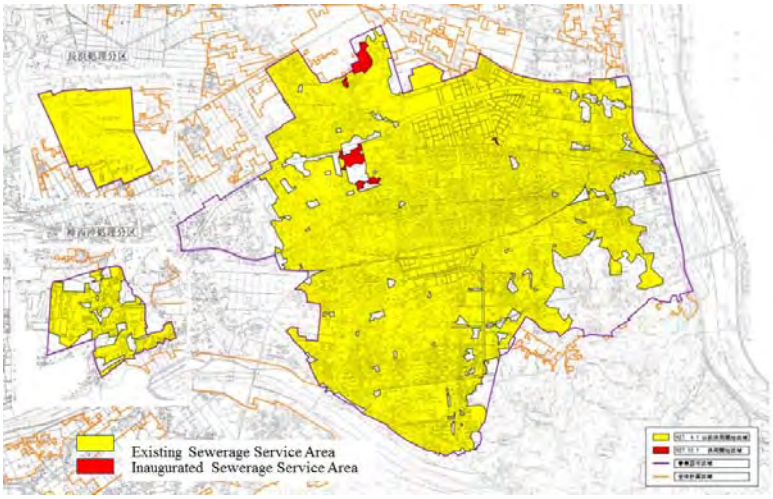
Figure 2-37 Comprehensive Development Plan of Scheduled Desludging & Sewerage

(5) Proposed Sewerage Development Methodology and Legal Background

Wastewater management law, which is a basic law on sewerage and wastewater management, has not enacted in spite of effort of National Government. This Project proposes following institutional system through exploiting the best management practice in Asian cities as well as referring Regulatory System in Japan.

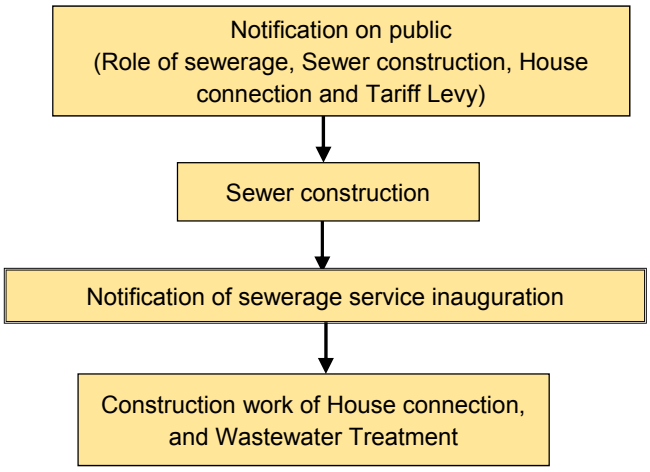
5-1) Promoting House Connection through Stipulating Obligation

The notification of sewerage service area and the obligation on house connection shall be stipulated in order to promote the sewerage development in accordance with Sewerage Master Plan. This stipulation defines sewerage service area and solicits residents to connect sewer, accordingly it contributes to water environment improvement which is the most prioritized role of sewerage.



Source : Izumo City, Japan

Flow of Notification of Sewerage Project



Source: JICA Expert Team

Figure 2-38 Flow of Sewerage Service Inauguration

5-2) Tariff System Applicable to Interceptor Sewer

Notification of sewerage service area defines the types of sewerage service of separate sewer system (with house connection) and interceptor sewer (without house connection), respectively.

Manila Water Co. Inc. and Maynilad Water Service Inc. provide the combined services of water supply and wastewater management as a requirement of the concession contract. Tariff system has the characteristics following:

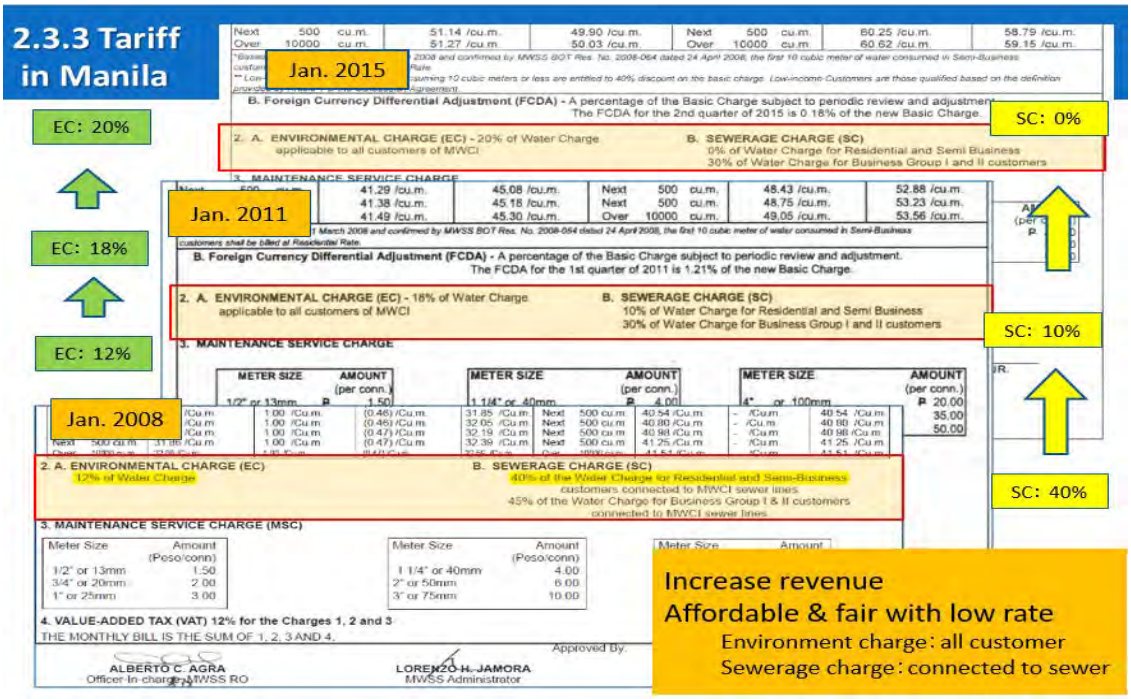
- Combined tariff of water supply and sewerage
- Four charges of water consumption, environmental charge and sewerage charge based on water consumption rate, and maintenance service charge
- Four groups of residential, semi business, and business I and II. Progressive tariff based on water consumption rate as well as cross subsidy from business with higher rate to residential with lower rate.
- Foreign currency differential adjustment
- Tariff is adjusted in every year for adjusting investment, consumer price index and foreign currency differential.

Environmental charge as for wastewater management is levied for whole water supply users in accordance with PPP (Polluters Pay Principle). Sewerage charge is levied to sewerage user. At present, sewerage charge for residential and semi-business are abolished and combined to environmental charge since sewerage development policy changed to interceptor sewer from separate sewer. Hence, environmental charge is periodically raised in order to secure the revenue (Table 2-70 and Figure 2-39).

Table 2-70 Change of Tariff System of Manila (Rate of Wastewater Charge per Water Supply Charge)

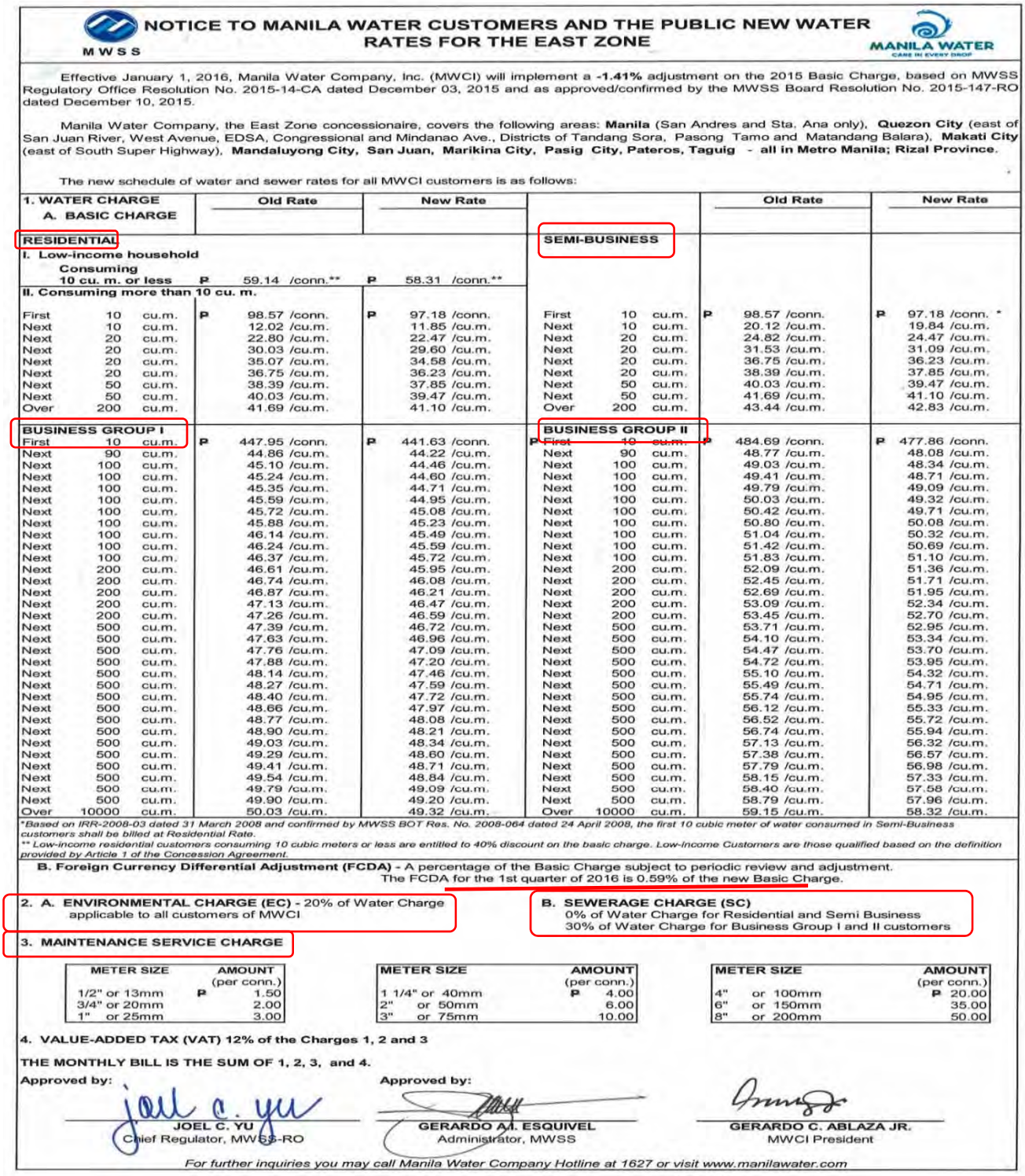
Group & Tariff Rate \ Year		2008	2011	2015
Residential & Semi Business	Environmental Charge	12 %	18 %	20%
	Sewerage Charge	40 %	10 %	0%
Business Group I & II	Environmental Charge	12 %	18 %	20%
	Sewerage Charge	45 %	30 %	30 %

Remarks：Environmental Charge = 12 - 20 % × Water Charge
Sewerage Charge = 0 - 45 % × Water Charge
Source : Manila Water Co. Inc., and JICA Expert Team Edition



Source : Manila Water Co. Inc., and JICA Expert Team Edition

Figure 2-39 Change of Charges of Environment and Sewerage of Manila Water



NOTICE TO MANILA WATER CUSTOMERS AND THE PUBLIC NEW WATER RATES FOR THE EAST ZONE

MWSS — MANILA WATER

Effective January 1, 2016, Manila Water Company, Inc. (MWCI) will implement a **-1.41%** adjustment on the 2015 Basic Charge, based on MWSS Regulatory Office Resolution No. 2015-14-CA dated December 03, 2015 and as approved/confirmed by the MWSS Board Resolution No. 2015-147-RO dated December 10, 2015.

Manila Water Company, the East Zone concessionaire, covers the following areas: **Manila** (San Andres and Sta. Ana only), **Quezon City** (east of San Juan River, West Avenue, EDSA, Congressional and Mindanao Ave., Districts of Tandang Sora, Pasong Tamo and Matandang Balara), **Makati City** (east of South Super Highway), **Mandaluyong City, San Juan, Marikina City, Pasig City, Pateros, Taguig - all in Metro Manila; Rizal Province.**

The new schedule of water and sewer rates for all MWCI customers is as follows:

1. WATER CHARGE A. BASIC CHARGE	Old Rate	New Rate
RESIDENTIAL		
I. Low-income household Consuming 10 cu. m. or less	₱ 59.14 /conn.**	₱ 58.31 /conn.**
II. Consuming more than 10 cu. m.		
First 10 cu.m.	₱ 98.57 /conn.	₱ 97.18 /conn.
Next 10 cu.m.	12.02 /cu.m.	11.85 /cu.m.
Next 20 cu.m.	22.80 /cu.m.	22.47 /cu.m.
Next 20 cu.m.	30.03 /cu.m.	29.60 /cu.m.
Next 20 cu.m.	35.07 /cu.m.	34.58 /cu.m.
Next 20 cu.m.	36.75 /cu.m.	36.23 /cu.m.
Next 50 cu.m.	38.39 /cu.m.	37.85 /cu.m.
Next 50 cu.m.	40.03 /cu.m.	39.47 /cu.m.
Over 200 cu.m.	41.69 /cu.m.	41.10 /cu.m.
BUSINESS GROUP I		
First 10 cu.m.	₱ 447.95 /conn.	₱ 441.63 /conn.
Next 90 cu.m.	44.86 /cu.m.	44.22 /cu.m.
Next 100 cu.m.	45.10 /cu.m.	44.46 /cu.m.
Next 100 cu.m.	45.24 /cu.m.	44.60 /cu.m.
Next 100 cu.m.	45.35 /cu.m.	44.71 /cu.m.
Next 100 cu.m.	45.59 /cu.m.	44.95 /cu.m.
Next 100 cu.m.	45.72 /cu.m.	45.08 /cu.m.
Next 100 cu.m.	45.88 /cu.m.	45.23 /cu.m.
Next 100 cu.m.	46.14 /cu.m.	45.49 /cu.m.
Next 100 cu.m.	46.24 /cu.m.	45.59 /cu.m.
Next 100 cu.m.	46.37 /cu.m.	45.72 /cu.m.
Next 200 cu.m.	46.61 /cu.m.	45.95 /cu.m.
Next 200 cu.m.	46.74 /cu.m.	46.08 /cu.m.
Next 200 cu.m.	46.87 /cu.m.	46.21 /cu.m.
Next 200 cu.m.	47.13 /cu.m.	46.47 /cu.m.
Next 200 cu.m.	47.26 /cu.m.	46.59 /cu.m.
Next 500 cu.m.	47.39 /cu.m.	46.72 /cu.m.
Next 500 cu.m.	47.63 /cu.m.	46.96 /cu.m.
Next 500 cu.m.	47.76 /cu.m.	47.09 /cu.m.
Next 500 cu.m.	47.88 /cu.m.	47.20 /cu.m.
Next 500 cu.m.	48.14 /cu.m.	47.46 /cu.m.
Next 500 cu.m.	48.27 /cu.m.	47.59 /cu.m.
Next 500 cu.m.	48.40 /cu.m.	47.72 /cu.m.
Next 500 cu.m.	48.66 /cu.m.	47.97 /cu.m.
Next 500 cu.m.	48.77 /cu.m.	48.08 /cu.m.
Next 500 cu.m.	48.90 /cu.m.	48.21 /cu.m.
Next 500 cu.m.	49.03 /cu.m.	48.34 /cu.m.
Next 500 cu.m.	49.29 /cu.m.	48.60 /cu.m.
Next 500 cu.m.	49.41 /cu.m.	48.71 /cu.m.
Next 500 cu.m.	49.54 /cu.m.	48.84 /cu.m.
Next 500 cu.m.	49.79 /cu.m.	49.09 /cu.m.
Next 500 cu.m.	49.90 /cu.m.	49.20 /cu.m.
Over 10000 cu.m.	50.03 /cu.m.	49.32 /cu.m.

	Old Rate	New Rate
SEMI-BUSINESS		
First 10 cu.m.	₱ 98.57 /conn.	₱ 97.18 /conn. *
Next 10 cu.m.	20.12 /cu.m.	19.84 /cu.m.
Next 20 cu.m.	24.82 /cu.m.	24.47 /cu.m.
Next 20 cu.m.	31.53 /cu.m.	31.09 /cu.m.
Next 20 cu.m.	36.75 /cu.m.	36.23 /cu.m.
Next 20 cu.m.	38.39 /cu.m.	37.85 /cu.m.
Next 50 cu.m.	40.03 /cu.m.	39.47 /cu.m.
Next 50 cu.m.	41.69 /cu.m.	41.10 /cu.m.
Over 200 cu.m.	43.44 /cu.m.	42.83 /cu.m.
BUSINESS GROUP II		
First 10 cu.m.	₱ 484.69 /conn.	₱ 477.86 /conn.
Next 90 cu.m.	48.77 /cu.m.	48.08 /cu.m.
Next 100 cu.m.	49.03 /cu.m.	48.34 /cu.m.
Next 100 cu.m.	49.41 /cu.m.	48.71 /cu.m.
Next 100 cu.m.	49.79 /cu.m.	49.09 /cu.m.
Next 100 cu.m.	50.03 /cu.m.	49.32 /cu.m.
Next 100 cu.m.	50.42 /cu.m.	49.71 /cu.m.
Next 100 cu.m.	50.80 /cu.m.	50.08 /cu.m.
Next 100 cu.m.	51.04 /cu.m.	50.32 /cu.m.
Next 100 cu.m.	51.42 /cu.m.	50.69 /cu.m.
Next 100 cu.m.	51.83 /cu.m.	51.10 /cu.m.
Next 200 cu.m.	52.09 /cu.m.	51.36 /cu.m.
Next 200 cu.m.	52.45 /cu.m.	51.71 /cu.m.
Next 200 cu.m.	52.69 /cu.m.	51.95 /cu.m.
Next 200 cu.m.	53.09 /cu.m.	52.34 /cu.m.
Next 200 cu.m.	53.45 /cu.m.	52.70 /cu.m.
Next 500 cu.m.	53.71 /cu.m.	52.95 /cu.m.
Next 500 cu.m.	54.10 /cu.m.	53.34 /cu.m.
Next 500 cu.m.	54.47 /cu.m.	53.70 /cu.m.
Next 500 cu.m.	54.72 /cu.m.	53.95 /cu.m.
Next 500 cu.m.	55.10 /cu.m.	54.32 /cu.m.
Next 500 cu.m.	55.49 /cu.m.	54.71 /cu.m.
Next 500 cu.m.	55.74 /cu.m.	54.95 /cu.m.
Next 500 cu.m.	56.12 /cu.m.	55.33 /cu.m.
Next 500 cu.m.	56.52 /cu.m.	55.72 /cu.m.
Next 500 cu.m.	56.74 /cu.m.	55.94 /cu.m.
Next 500 cu.m.	57.13 /cu.m.	56.32 /cu.m.
Next 500 cu.m.	57.38 /cu.m.	56.57 /cu.m.
Next 500 cu.m.	57.79 /cu.m.	56.98 /cu.m.
Next 500 cu.m.	58.15 /cu.m.	57.33 /cu.m.
Next 500 cu.m.	58.40 /cu.m.	57.58 /cu.m.
Next 500 cu.m.	58.79 /cu.m.	57.96 /cu.m.
Over 10000 cu.m.	59.15 /cu.m.	58.32 /cu.m.

*Based on IRR-2008-03 dated 31 March 2008 and confirmed by MWSS BOT Res. No. 2008-064 dated 24 April 2008, the first 10 cubic meter of water consumed in Semi-Business customers shall be billed at Residential Rate.

** Low-income residential customers consuming 10 cubic meters or less are entitled to 40% discount on the basic charge. Low-income Customers are those qualified based on the definition provided by Article 1 of the Concession Agreement.

B. Foreign Currency Differential Adjustment (FCDA) - A percentage of the Basic Charge subject to periodic review and adjustment.
The FCDA for the 1st quarter of 2016 is 0.59% of the new Basic Charge.

2. A. ENVIRONMENTAL CHARGE (EC) - 20% of Water Charge applicable to all customers of MWCI

B. SEWERAGE CHARGE (SC)
0% of Water Charge for Residential and Semi Business
30% of Water Charge for Business Group I and II customers

3. MAINTENANCE SERVICE CHARGE

METER SIZE	AMOUNT (per conn.)
1/2" or 13mm	₱ 1.50
3/4" or 20mm	2.00
1" or 25mm	3.00
1 1/4" or 40mm	₱ 4.00
2" or 50mm	6.00
3" or 75mm	10.00
4" or 100mm	₱ 20.00
6" or 150mm	35.00
8" or 200mm	50.00

4. VALUE-ADDED TAX (VAT) 12% of the Charges 1, 2 and 3

THE MONTHLY BILL IS THE SUM OF 1, 2, 3, and 4.

Approved by:

JOEL C. YU
Chief Regulator, MWSS-RO

Approved by:

GERARDO M. ESQUIVEL
Administrator, MWSS

GERARDO C. ABLAZA JR.
MWCI President

For further inquiries you may call Manila Water Company Hotline at 1627 or visit www.manilawater.com

Table 2-71 Tariff of Water Supply and Sewerage, Manila

Source : Manila Water Co. Inc.

Japanese cities such as Osaka City had levied both charges of gray water discharge and flush toilet user (Table 2-72).Wastewater treatment charge (sewerage charge), and environmental tax (or charge) or drainage charge are levied in Singapore (refer Table 2-74).

Tariff rate (tariff level) shall be decided in accordance with the quality of sewerage service and wastewater treatment cost.

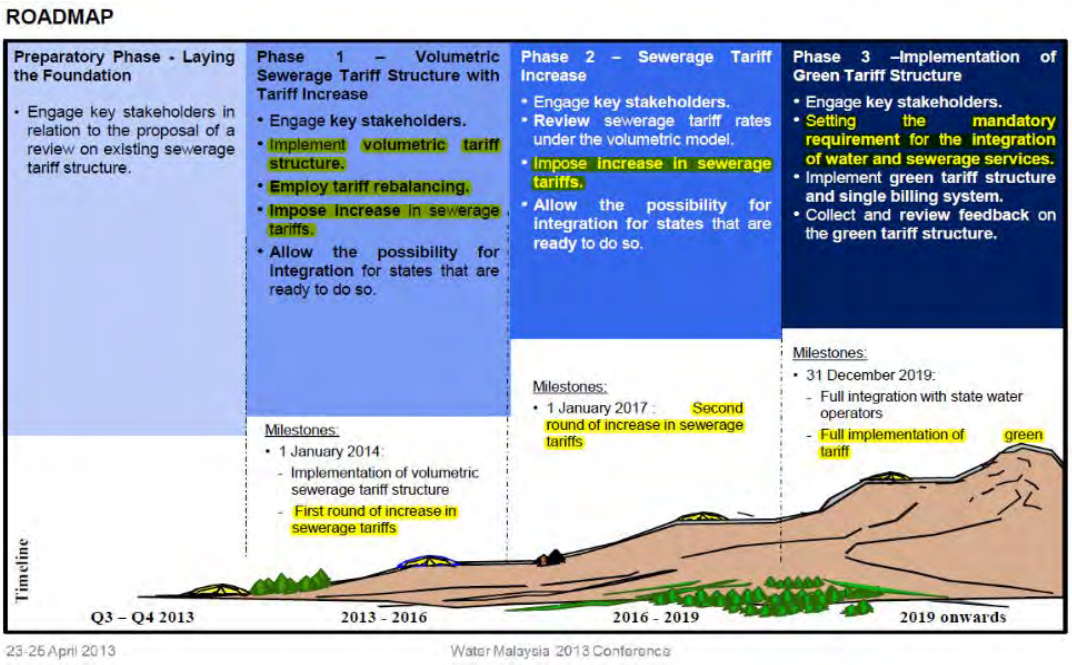
Table 2-72 Tariff of Wastewater Treatment and Drainage in Japan (Example)

Tariff Structure of Osaka City, Japan in 1972 1 JPY = 0.004 USD (1972)						
Category			Consumption (m^3 per month)	Old Tariff (JPY/m^3)	New Tariff (JPY/m^3)	
General User (Gray water discharge)	Basic Charge	Individual house	8 m^3 or less	50	50	
		Public bath	10 m^3 or less	70	70	
		Communal use	8 m^3 or less	24	24	
	Consuming charge	Individual house	Per 1 m^3	10	m^3/month 11-20 21-30 31-50 51-100 101-	 10 15 16 17 18
		Public bath	Per 1 m^3	4.5	4.5	
		Communal use	Per 1 m^3	3.9	3.9	
Flush Toilet User	House hold	Closet bowl	Per unit	20	To be abolished	
		Urinal lavatory	Per unit	10		
	Commercial	Closet bowl	Per unit	40		
		Urinal lavatory	Per unit	20		

Source: Construction Bureau, Osaka City

Tariff system in Malaysia (IWK and F.T. Labuan) applies fixed tariff accordant with the income level for domestic customers (residents), tariff based on number of employee for industry customer and tariff based on annual revenue for commercial premises, respectively. Users receiving septic tank service is levied at lower rate than users who connect to sewerage system (Table 2-73).

Tariff system is under discussion for amendment because the tariff rate has not been raised since 1997 and the revenue is only 60 % of O&M expense (Figure 2-40). Recommended tariff system tries to apply a volumetric tariff accordant with water consumption, step-wised tariff increase, fairness and affordability as well as setting mandatory requirement for integration of water supply and sewerage services in future.



Source : Charge for Sewerage Service, Water Malaysia 2013 Conference, IWK Malaysia

Figure 2-40 Road Map Reviewing Tariff System, Malaysia

Table 2-73 Wastewater Tariff System of Malaysia

Sewerage Charges (Peninsular Malaysia and F.T. Labuan) 1 RM = 0.232USD

Domestic Customers (Including Government Quarters)

Category	Connected Charge Per Month
Domestic Customers (Including Government Quarters) Low cost houses, houses with Annual Value of less than RM600 and government quarters in categories F, G, H and I (receiving either Individual Septic Tank or Connected Sewerage Services)	RM 2.00
Premises and Government quarters with individual septic tanks	RM 6.00
Houses in Kampung, New Villages and Estates (receiving either Individual Septic Tank or Connected Sewerage Services)	RM 3.00
Premises and government quarters in categories A, B, C, D, and E receiving Connected Sewerage Services	RM 8.00

Industrial Customers

Category	Rate Based on Number of Employees
Premises receiving Individual Septic Tanks Service	RM 2.00 per head per month
Premises with Connected Sewerage Services	RM 2.50 per head per month

Government Premises (Excluding Government Quarters)

Category	Connected Charge Per Month
Government Premises Rate on excess volume of water usage per month	RM 40.00 • Water usage up to 100m³ – No Charge • Water usage more than 100m³ – RM 0.45 per m³ • Water usage more than 200m³ – RM 0.98 per m³

Commercial Premises / 商業施設

Band	Annual Value (RM)	Connected Charge Per Month (RM)
1	0 – 2000	8
2	2,001 – 5,000	14
3	5,001 – 10,000	20
4	10,001 – 20,000	26
5	20,001 – 30,000	29
6	30,001 – 40,000	32
7	40,001 – 50,000	35
8	50,001 – 60,000	38
9	60,001 – 70,000	41
10	70,001 – 80,000	44
11	80,001 – 90,000	47
12	90,001 – 100,000	50
13	100,001 – 200,000	180
14	200,001 – 400,000	495
15	400,001 – 600,000	522
16	600,001 – 800,000	1,980.00
17	800,001 – 1,000,000	2,160.00
18	1,000,001 – 3,000,000	4,320.00
19	3,000,001 – 5,000,000	8,800.00
20	5,000,001 – 7,000,000	9,200.00
21	More than 7,000,001	9,600.00
Rate on excess volume of water usage per month	• Water usage up to 100m³ – No Charge • Water usage more than 100m³ but less than 200m³ – RM 0.30 per m³ • Water usage more than 200m³ – RM 0.45 per m³	

Source : Malaysia Water Industry Guide 2016

Singapore applies separate sewer system with house connection. Water supply and sewerage tariff has been levied on four charges of water tariff, water conservation tax, water bone fee and sanitary appliance fee.

Tariff structure and tariff rate are amended in 2017 and 2018. Increased tariff rate is 14% in 2017 and 30 % in 2018 in accordance with increased investment and O&M cost. Water conservation tax is a message of "Water is precious.", and increased to 35% (50% for consumed rate more than 40m^3/month) and 50% (65% for consumed rate more than 40m^3/month) of water price from 30% (45% for consumed rate more than 40m^3/month) at present.

Last sewerage tariff was flat at 0.28 SGD/m^3 , and is amended to progressive tariff of 0.78-1.02 SGD/m^3, in 2017 and 0.92/1.18 SGD/m^3 in 2018, respectively (1 SGD = 0.6 USD). Sanitary appliance fee is abolished and combined to sewerage charge (water bone fee).

Table 2-74 Tariff System of Water Supply and Wastewater, Singapore

		Current		From 1 July 2017		From 1 July 2018	
		Water Price ($/m^3)		Water Price ($/m^3)		Water Price ($/m^3)	
		0 - 40m^3	> 40m^3	0 - 40m^3	> 40m^3	0 - 40m^3	> 40m^3
Potable Water	Tariff	$1.17	$1.40	$1.19	$1.46	$1.21	$1.52
	Water Conservation Tax (% of water tariff)	$0.35 (30% of $1.17)	$0.63 (45% of $1.40)	$0.42 (35% of $1.19)	$0.73 (50% of $1.46)	$0.61 (50% of $1.21)	$0.99 (65% of $1.52)
Used Water	Waterborne Fee	$0.28	$0.28	$0.78	$1.02	$0.92	$1.18
	Sanitary Appliance Fee	$2.80 per fitting*		Combined into Waterborne Fee		Combined into Waterborne Fee	
Total Price		$2.10	$2.61	$2.39	$3.21	$2.74	$3.69

Note: Water is charged per cubic metre (m^3), which is equivalent to 1000 litres. All figures are before GST.
**For the calculation of total price, the Sanitary Appliance Fee is converted to its volumetric equivalent.*

GST: Goods and Services Tax

Source : PUB, Singapore

3) Wastewater Management Tariff Recommended to DKI Jakarta

Practicable tariff system to DKI Jakarta shall be accordant with the different level of sewerage service of with and/or without of house connection. Separate sewer area applies house connection, while interceptor sewer area does not apply house connection.

Tariff for interceptor sewer area is recommended to two types of "with / without septic tank cleansing service" optionally. Water supply service is still 60 % of whole Jakarta, and also water supply companies provide bulk water service. DKI Jakarta levies ground water exploitation tax on the user of deep well. Served population rate of water supply will increase in Mid- and Long-term like Manila. Accordingly, volumetric tariff accordant with water consumption is practicable

as same as oversea.

As for septage management, DKI Jakarta shall select the jobs for which Government has the responsibility on tariff levy and payment for operation cost since private operator provides desludging service at present.

Tariff for separate sewer area can follow the present tariff system based on floor area in order to eliminate the confusion which will be raised due to change of tariff calculation formula. Contract of sewer use can be agreed at sewer connection approval.

Tariff rate shall consider the O&M cost since present tariff rate in Zone-0 is lower than estimated O&M cost.

Table 2-75 Recommended Options of Wastewater Management Tariff to DKI Jakarta

Option-1 "Without" septic tank cleansing service

Service type		Separate sewer	Interceptor sewer (Combined)
House connection	Gray water	Yes	Yes
	Black water	Yes	No (Septic tank)
Tariff	Gray water	Yes	Yes
	Black water	Yes	No

Oprion-2 "With" septic tank cleansing service

Service type		Separate sewer	Interceptor sewer (Combined)
House connection	Gray water	Yes	Yes
	Black water	Yes	No (Septic tank)
Tariff	Gray water	Yes	Yes
	Black water	Yes	Yes

Source: JICA Expert Team

Furthermore, scheduled desludging service in case operated by government shall be provided in both interceptor sewer area and on-site wastewater management area. Different tariffs of interceptor sewerage area with septic tank and on-site wastewater management area may be difficult to explain since there is no difference of beneficiary which residents feel. Practicable tariff system is recommended such as environmental charge or wastewater charge which Manila and Hai Phong apply to both sewerage service area and on-site wastewater management area. This tariff system could provide the finance for O&M cost of interceptor sewer with septage collection and treatment. In Manila and Hai Phong, the environmental charge or the wastewater management charge is obeyed to whole water supply user including commercial users. This tariff

system is advantageous in relatively low rate with stable financial source.

4) Combined Treatment of Septage and Sewage Sludge

Substance of setage is technically similar with sewage sludge. In almost all large cities in Japan, sewerage system receive septage and human waste. WWTP in Japan originated to night soil treatment plant. Sewerage development plan require s human waste management plan since exploited night soil and Jokasou sludge decreases in accordance with sewerage service development.

In case of effluent discharged to river, septage treatment requires advanced wastewater treatment process of BOD removal and nitrification – denitrification process. This is a technical reason for combined treatment in order to apply simple treatment process such as removing screenings and grids.

Combined treatment of septage and sewage sludge is prevalent in Bandung and Yogyakarta, Indonesia, and Manila and others in oversea. ADB also recommends combined treatment of septage and sewage sludge in Vietnam.

WWTP (Over view of lagoon)

Septage treatment facility

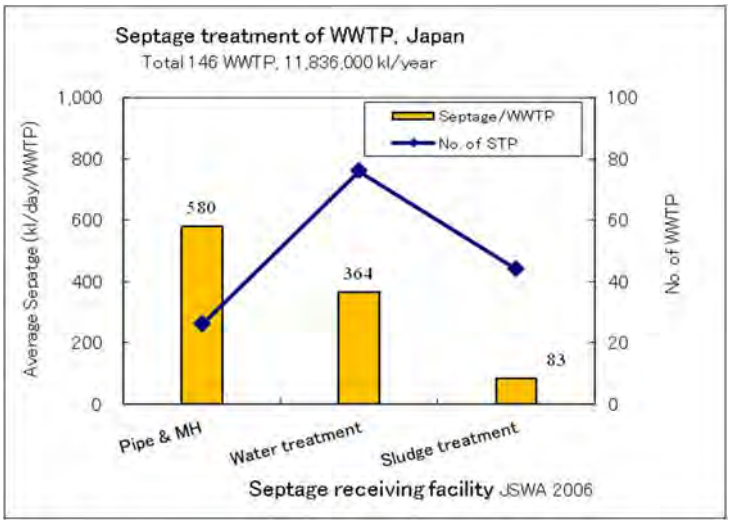
Screen & dewatering

Source: JICA Expert Team

Figure 2-41 Septage Treatment Facility (Dadat Dagatan WWTP, Manila)

Combined treatment of septage and sewage sludge can save duplicate costs of investment as well as O&M. Cost of WWTP is economy of scale, accordingly administrative cost on wastewater management is also advantageous. Sludge tanker can shorten the trip of transportation and then improve the workability through installing septage receiving facility adjacent to WWTP and/or sewer main. Septage management charge is transferred to the sewerage works account, which will be enhanced.

Water treatment facility and sludge treatment facility are popular in number of WWTP, however sewer pipe receives more night soil in volume per facility shown in Figure 2-42. Pretreatment facility is required. Screening and dewatering are for removing debris (vinyl strings, metal, sand, others), and equalization tank is for high concentrated pollutants (BOD, SS and N).



Source : Sewerage Statistics, Japan Sewage Works Association and Edited by JICA Expert Team

Figure 2-42 Septage Treatment of Sewerage System in Japan

Transportation route and waste business operator shall be monitored in order to eliminate illegal dumping of industrial waste. Pretreatment facility installs truck scale, inspection of manifesto document, receiving tank, screening and flow equalization tank shown in Figure 2-43. Debris is screened, dewatered, and incinerated or landfilled. High concentrated sludge is diluted and equalized before discharged to sewer.

Truck scale & Manifest inspection

Pretreatment (Screening, washing, dewatering)

Sludge retention tank (Equalization tank)

Source: Fukui City

Figure 2-43 Pretreatment Facility of Septage Discharged to Sewerage System

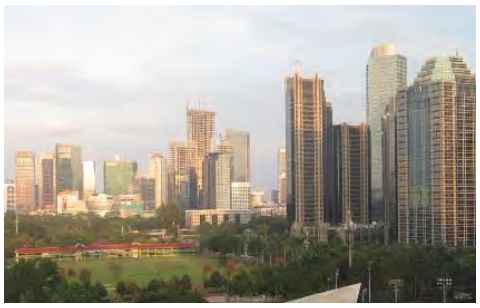
5-5) Collaboration with Private Development Project and High-income Residents

Urban development projects with high-rise buildings are remarkably implemented everywhere adjacent to MRT station, rail way station and highway. Collaboration with private development project as well as high-income resident are important for sewerage development and management. Metropolitan region in Japan obligates the sewerage development or the sewer connection on urban development project financed by private through combining “Notification of sewerage service inauguration” and “Obligation of Sewer Connection of Sewerage Law (Article 9 and 10)”,

"Urban Development Approval of Urban Planning Law (Article 29)" and "Construction Approval of Building Standards Law". This institutional system provides "Win-Win-Solution" on private and public. Private project benefits from the accelerated wastewater treatment with low cost. Public sector also benefits saving the sewer development cost owing to private finance.
DKI Jakarta also obligates the environmental management system as well as the building construction approval on urban development project as following;

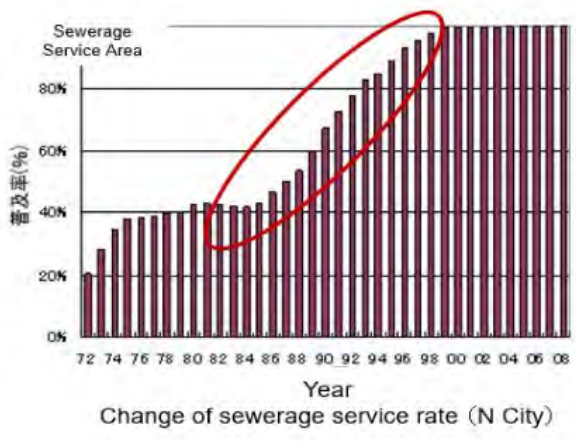
- Environmental Impact Assessment (AMDAL)
- Request and Approval of Environmental Management Plan (UKL)
- Request and obtain building construction permit (IMB)

Residents, who reside or work in urban development project site, are rich in general, and they have affordability for sewerage cost. This mechanism provides the separate sewer development and the cross subsidy of O&M cost for low-income residents, and then contributes to saving Government budget as well as to increase revenue of sewerage tariff. This mechanism shall be implemented to sewerage works.



High-raised building, Business Center, Jakarta

Urban Development District (Setia Budi &Kuningan)



Sewerage development with urban development project (Nishinomiya City)

Figure 2-44 Collaboration on Sewerage Development and Urban Development

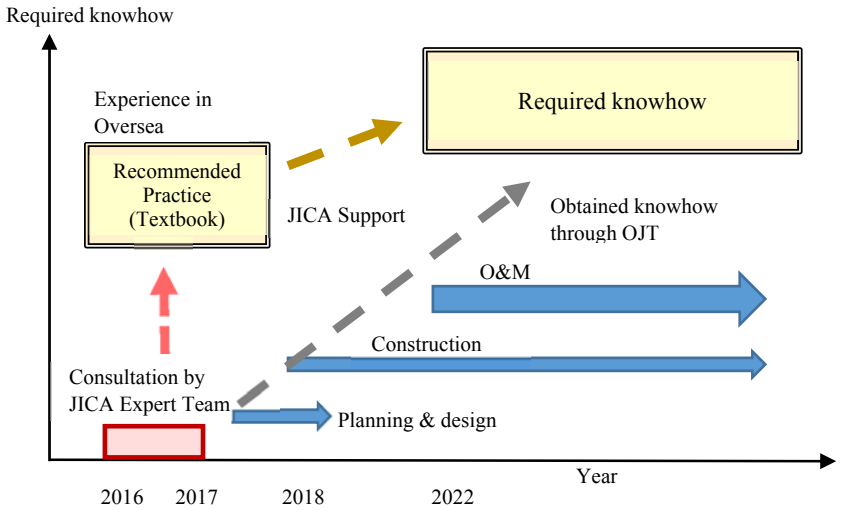
④ Result (Summary and Detail)

(1) Conceptual Plan for Improving Planning Capacity

This Project is implemented in advance to DD through construction and ES of Zone-1 sewerage development project. Institutional design is practicable as OJT basis in accordance to solve the issues raised during project implementation. Dinas Sumber Daya Air, however, had to study in advance to implement sewerage construction project. Accordingly, this Project scrutinized experience in oversea and exploited know-how which are applicable to sewerage development and management of Jakarta Sewerage Works. This Project, then, proposed the institution to DKI Jakarta.

Experiences in EU and Japan cannot be copied to DKI Jakarta since their experiences do not always work well in Jakarta. Scrutinizing the lessons learnt in developed cities is more practicable to DKI Jakarta since Jakarta has not experienced in construction and management of large scale sewerage system. Proposed institutional design for Jakarta (refer Textbook) is provided through screening know-how in Asian Cities who have overcome water pollution through sewerage system development.

DKI Jakarta can integrate the institutional system in oversea and draft individual article and stipulation of Regional Regulation (basic model) through elaborating SOP (Standard Operation Procedure) through project implementation phases. Textbook compiles the regulatory system and the sewerage tariff system as well as the stipulation of Law and Decree in Japan and oversea.



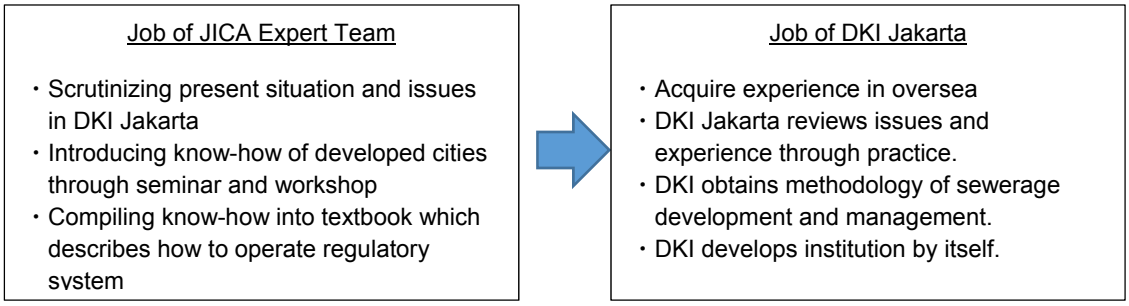
Source: JICA Expert Team

Figure 2-45 Mile Stone for Designing Institution of Sewerage Works

DKI Jakarta does not have experience in developing and managing modern large scale sewerage system. Individual organizations relevant to sewerage works shall have the mutual consensus on

sewerage development and management methodology. They, for example, lack in how to develop and manage the sewerage system, even though they have only raised their own issues and then reached no solution such as sewerage development methodology (demarcation of on-site system and off-site system, and conventional separate sewer system versus interceptor sewer system), effects on water environment improvement versus impact of combined sewer overflow (view on EIA), and legal basis of sewerage tariff levy.

This Project visualized present situation and issues in DKI Jakarta as well as the best management practice in developed cities shown in Figure 2-46. And then, these knowhow on sewerage development and management are introduced at seminar and workshop in order to decide the institutional system by themselves. Text book commentates easily how to operate the legal system in order to obtain experience and knowhow in oversea as well as to develop the institution appropriate to DKI Jakarta.



Source: JICA Expert Team

Figure 2-46 Job Demarcation of Technology Transfer of the Project

Building regulatory system follows the procedure described in Figure 2-47:

- Compiling the information of present situation of sewerage works in DKI Jakarta,
- Scrutinizing issues and SOP,
- Consensus building through Seminar and Workshop, and
- Authorizing and Assigning Taskforce (Refer Table 2-70 through 2-72).

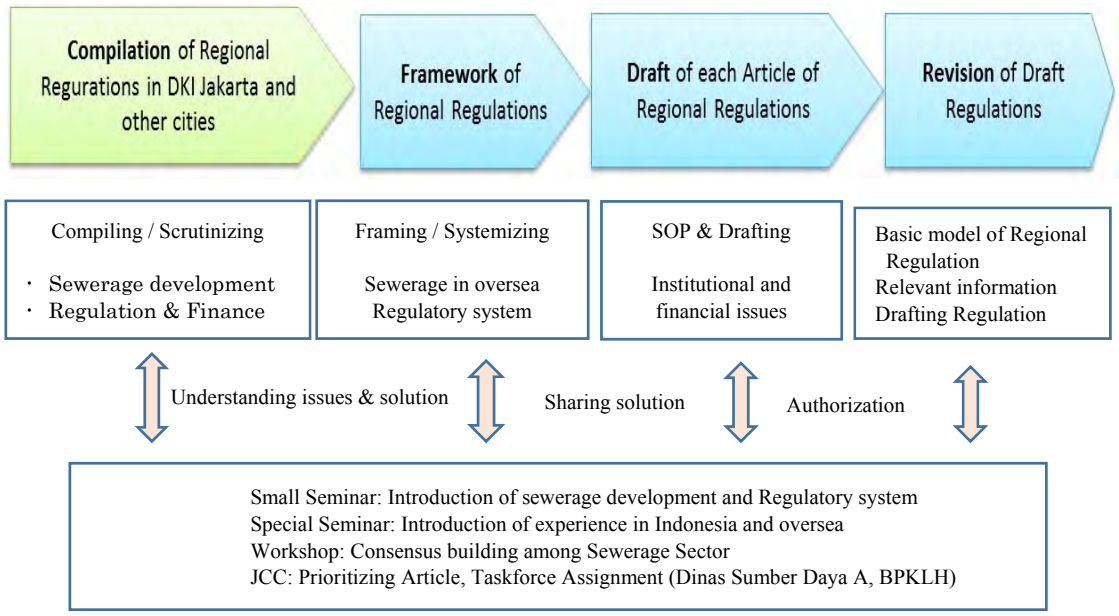


Figure 2-47 Flow of Regulatory System Building

(2) Providing Textbook

Content of Textbook for Working Group "Establishment of Legal Framework for the Sewerage System" is shown in Table 2-76.

Institutional design of sewerage works requires to understand the issues raised during On-the-Job and then examines the case studies for solution.

This Project is implemented in advance to DD through construction and ES of Zone-1 sewerage development project. And then, counterpart does not have the experience of issues on sewerage development and management raised by on-the-job.

Accordingly, the textbook aims to provide hints for solution of issues, which are raised during practical jobs, through obtaining the experience of developed cities as well as to commentate sewerage development and management.

Textbook describes (1) Aim of Textbook and (2) Content of Textbook, and supports understanding (3) Jobs versus Stipulation of Articles. DKI Jakarta, then, drafts (4) Regional Sewerage Regulation with own intention.

Textbook also proposes the basic model of Regional Regulation based on Sewerage Ordinance and Sewerage Law as well as Jokasou Law in Japan as reference for easy understanding.

Table 2-76 Content of Textbook

Content of Textbook
1. Aim of Textbook (1) Understanding sewerage development methodology and sewerage works management is essential in order to establish sewerage regulatory system. (2) Textbook tries to commentate briefly the relationship between legal background and sewerage development methodology as well as institutional design. (3) Institutional design appropriate to DKI Jakarta is elaborated through scrutinizing experiences of sewerage development methodology and sewerage works management. Best management practices in oversea and Indonesia are introduced for regional sewerage regulation which is appropriate to DKI Jakarta. (4) Institutional design is deemed in order to establish sewerage development methodology and sewerage works management appropriate to DKI Jakarta. (5) Individual Article as well as description in oversea are introduced. (6) Individual Article and description are difficult to be understood, accordingly References-1 through Reference-8 are provided as concept of operation procedure. **2. Content of Textbook** Part-1: Issue and Circumstances of Sewerage in DKI Jakarta Part-2: Experience of Oversea Part-3: Outline of Legal System / Sewerage Law in Japan Part-4: Basic Model of Sewerage Ordinance / Local Government Law (Recommendation to Regional Sewerage Regulation of DKI Jakarta) Part-5: Appendixes **3. Jobs versus Stipulation of Articles** (1) Jobs of sewerage works are defined. (2) Institutional system is designed as legal background for executing individual job of sewerage works. (3) Reference-1 through Reference-8 help understanding individual institutional system. **4. Procedure of Drafting Regional Sewerage Regulation of DKI Jakarta** (1) Jobs of sewerage works necessary to DKI Jakarta are carefully reviewed along with Basic Model of Regional Regulation. (2) Institutional system is designed as legal background for individual job. (3) Individual Article is selected for realizing individual institutional system. (4) Key words of individual Article is deemed for realizing individual institutional system as Legal Background. (5) Stipulation and/or description of individual Article are refined through referring relevant Articles of Appendixes of Textbook in order to realize individual institutional system as legal background.
5. Appendixes Appendix-1 Standard Sewerage Ordinance of Municipality Government in Japan Appendix-2 Sewerage Law in Japan (Draft) Appendix-3 Structure of Sewerage Related Law in Oversea in 10 Countries and Regions Appendix-4 PI (Performance Indicator) Appendix-5 Governor Decree No. 41 of 2016 Master Plan Appendix-6 Governor Regulation on PIU Number 1658 Year 2016 Appendix-7 Wastewater Discharge Standard--No.68/2016 Appendix-8 The Greater Jakarta Governor Decree No. 1040 OF 1997 Appendix-9 Tariff of PD PAL Jaya 2016 Appendix-10 Local Regulation of Sewerage Works, Denpasar

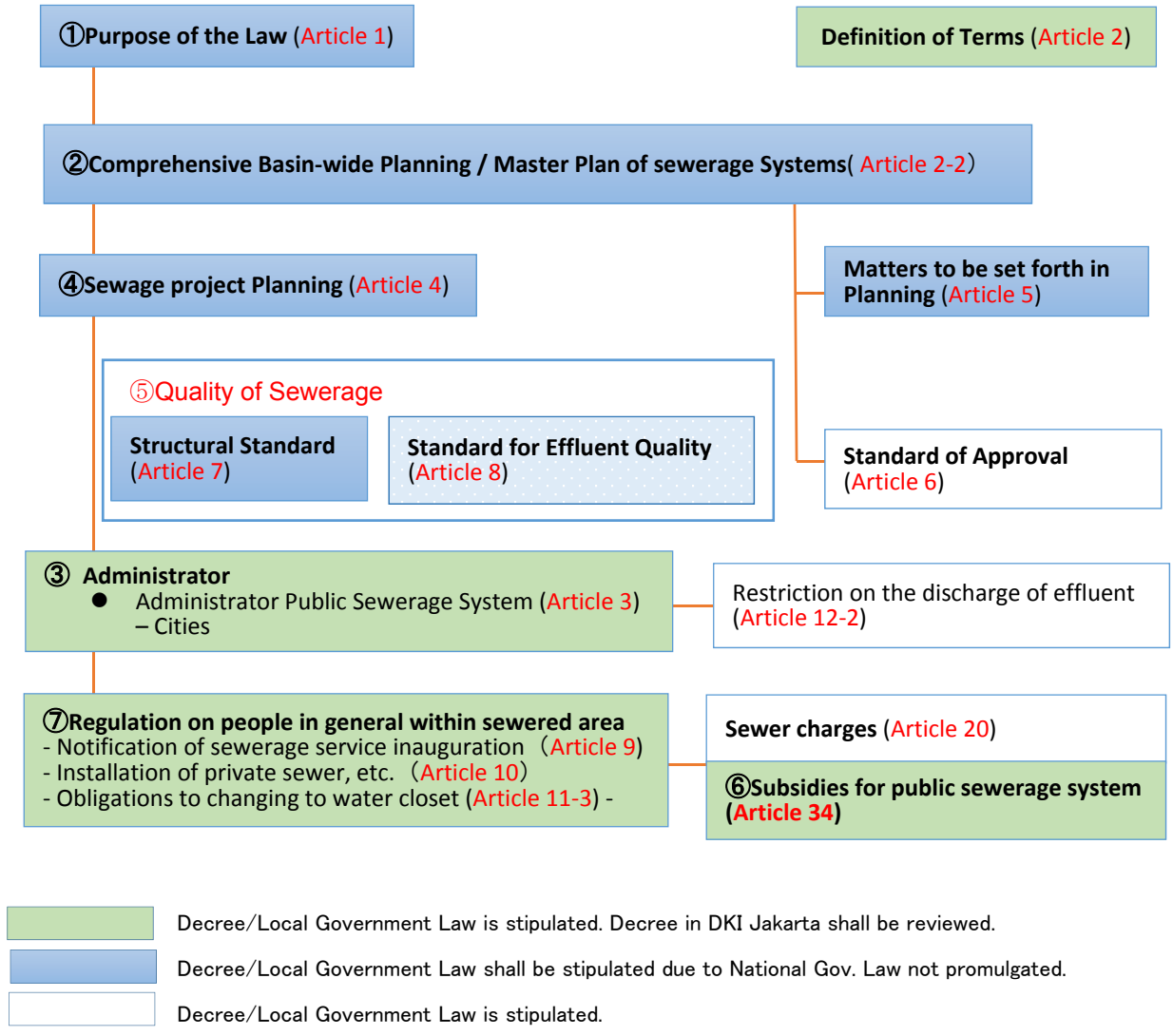
Source: JICA Expert Team

(3) Proposed Regional Regulation to DKI Jakarta

"Outline of Regulatory System" and "Proposed Regional Sewerage (Wastewater Management) Regulation to DKI Jakarta" are described followings.

3-1) Outline of Regulatory System

The textbook proposes outline of the legal system and the requirement for DKI Jakarta (Figure 2-48 and Table 2-77).



Source : Seminar on Japan Sewerage Act- Experience in formation and implementation, MLIT, and JICA Expert Team Edition

Figure 2-48 Legal System of Japan (Sewerage Law) and Jakarta (Governor Decree)

Table 2-77 Present Situation and Requirement of Regional Sewerage Regulation for DKI Jakarta

Stage of stipulation	Description
Overall	・ Systematic / comprehensive legal frame such as law is not provided (Governor Decree is individually promulgated)
Already stipulated, however points to be reviewed	・ Weak administrative power / responsibility of Municipality Government for sewerage development as well as providing sewerage service ・ Obligation and administrative procedure on residents in sewerage service area ・ Financial subsidy of Government for sewerage development
Not stipulated, and clear stipulation to be required	**Off-site wastewater management (Sewerage)** ・ Roles of Sewerage of sanitation improvement and inundation mitigation as well as water pollution control in public water **(Storm water drainage is out-of-scope as well as focusing on domestic wastewater in wastewater management in Indonesia)** ・ Principle of Master Plan for complying with Environmental Quality Standards in view point of watershed management (Master Plan is already promulgated by Governor Decree) ・ Technical standard / requirements in order to achieve roles of sewerage. **On-site wastewater management** ・ Obligation of building owner ・ Responsibility on wastewater management of Municipal Government ・ Technical requirement of operator and engineer ・ Responsibility of On-site sludge treatment
Already stipulated, however careful institutional design (enhancing Article) to be required	・ Application of sewer connection ・ Wastewater discharge standard to public sewer ・ Sewer charge, however lacks in PPP (polluter pay principle)

Source : JICA Expert Team

3-2) Proposed Regional Sewerage (Wastewater Management) Regulation to DKI Jakarta

JICA Expert Team proposes a basic model of regional regulation which integrates (i) Standard Sewerage Ordinance of Municipality Government in Japan, (ii) related Articles of Sewerage Law in Japan on responsibility of operator of municipal sewerage as well as stipulation on quality management and provision of sewerage information database, and (iii) related Articles of Jokasou Law in Japan on quality management of on-site treatment plant and responsibility of Municipality Government on septage management. Reference-1 through Reference-8 describe the concept and practice of individual Article which shall specify how to regulate.

Regional Regulation shall be enacted by DKI Jakarta Government since National Law on Wastewater Management as basic law has not been enacted. Regional Sewerage Regulation will be enacted through discussion at Council and stake-holders including Indonesian expert (academic paper), public notice and Council's judgment due to levy on residents.

Bali Provincial Government provides sewerage service based on three Decrees of (i) PIU function and operation are endorsed, (ii) Sewerage Tariff Regulation and (iii) Environmental Standard and Effluent Quality Standard since National Wastewater Management Law was not enacted as basic

law.

Regional Regulation of DKI Jakarta is practicable to follow the regulatory system of Bali, which is based on Indonesian rule, along with the regulatory system of large cities in Asia and Japan as well as water environmental regulations in EU and USA.

Table 2-78 Proposed Regional Sewerage (Wastewater Management) Regulation to DKI Jakarta

Article	Right / Obligation	Content / Keyword
Article-1 Purpose of Ordinance	Administrative power **【Reference-1】**	Purpose of Ordinance, Role of Sewerage, Ownership/administration of sewerage works
Article 2 Definition of Terms	Defining terms	
Stipulation on Planning	Responsibility of Planning of Domestic (Municipal) Wastewater Management	Content and feature of Domestic (Municipal) Wastewater Management Plan Municipal sewerage operator shall make an implementation program when they start a sewerage project. Implementation program shall decide following items. - Lay-out, structure and capacity of sewerage facilities, and planned sewerage area - Location, structures, & capacities of WWTP - Dates of commencement &completion of construction works Requirements of implementation program - Location & capacity of sewerage shall be decided by considering precipitation, population, and others that affect quality and quantity of sewage, geography, land use, and conditions of receiving waters. - The structure of municipal sewerage shall conform to the technical requirements stipulated in the order of the sewerage law in order to keep sanitation and to secure pollution control.
Stipulation on Construction (if necessary)	Responsibility of PIU establishment	Municipal government shall design, build, operate, and maintain municipal sewerage.
Stipulation on Finance (if necessary)	Responsibility of Financing	National Government can subsidy a part of costs to local governments that install and/or refurbish sewerage within budgetary allowance. Detailed provisions are stipulated by Government Decree. National Government shall provide loan resource necessary for local governments that install and/or refurbish sewerage.
Article 3 – 5 Installation of house connection and private (building) sewer	Obligation of public sewer connection (discharge to public sewer) **【Reference-2】**	Public sewer connection within a definite period of time, Design criteria of house connection and requirement of sewer material, Application procedure

Article	Right / Obligation	Content / Keyword
Article 6 Registration and order on plumber	Plumber registration, Qualification / certification of professional engineer **【Reference-3】**	Registration, renewal and revoke of plumber, requirement of installation work
Article 7 Inspection of private sewer installation	Inspection of installation work **【Reference-4】**	Inspection of installation work, issue of certification on house connection and private sewer
Article 8 - 12 Pretreatment of wastewater from business and industry	Installation of pretreatment facility, Restriction on wastewater discharge of specified factory, Assignment of water quality management professional, Notification of installation, suspension or removal of pretreatment facility **Reference-2】& 【Reference-5】**	Installation of pretreatment facility, Restriction on wastewater discharge of specified factory, Discharge standard to public sewer, Assignment of water quality management professional, Notification of installation, suspension or removal of pretreatment facility
Article 13 Suspension or restriction of wastewater discharge	Right on suspension or restriction of wastewater discharge	Wastewater discharge to damage sewerage facility, Wastewater discharge to affect treatment function, Any other case necessary for sewerage management
Article 14 Notification of public sewer use	Application / notification of public sewer use, suspension, resume or abandonment	Application / notification of public sewer use, suspension, resume or abandonment
Article 15 – 17 Sewerage tariff	Right of tariff levy and collection, request on data submission **【Reference-2】& 【Reference-6】**	Tariff levy, tariff collection procedure, Tariff structure, Tariff calculation method
Sewerage Law Article 23 Sewerage Information Database	To create sewerage (asset) information data base To open data base if requested **【Reference-7】**	Proper management of sewerage system (data base on topographic, structural, operation and management)
Article 18 Order for improvement of pretreatment facility	Right / Order on facility improvement and operation practice of pretreatment facility	Improvement of structure of pretreatment facility, Improvement of operating practice
Article 19 - 26 Approval of activity and sewer occupation	Right on sewer facility occupation and user charge **【Reference-8】**	Application and approval of sewer use, Requirement of sewer use, Revoke of sewer use, Fee of application and user charge
Article 28 Responsibility of households and building owners who are not connected to separate sewer system	Responsibility for proper installation of on-site facilities, and proper operation and maintenance of them	[Key words] Responsibility of households and building owners, Technical standards for installation of on-site wastewater treatment facilities, Technical standards for operation and maintenance of on-site wastewater treatment facilities **[Note-1 (Example of writing)]**
Article 29 Responsibility for regular desludging of household septic tanks	Who is responsible for regular desludging of household septic tanks? (residents?, PD PAL JAYA?, both of them?)	[Key words] Responsibility for regular desludging of household septic tanks, **[Note-2 (Examples of writing)]**
Article 30 Qualification and training of desludging operators	Who will approve them? What are the conditions for approval? Who will train them?	[Key words] Qualification of desludging operators, Training of desludging technicians **[Note-3 (Example of writing)]**

Article	Right / Obligation	Content / Keyword
Article 31 Operation and Maintenance of Individual Treatment Plant (ITP) of commercial buildings and office buildings	Obligation of building owners to appoint ITP Technical Supervisor or ITP Operator	[Key words] Operation and Maintenance of Individual Treatment Plant (ITP) of commercial buildings and office buildings, Building owner's obligation to employ or to contract with the qualified ITP Operator or the original supplier for the operation and maintenance of ITP. Building owner's obligation to appoint an ITP Technical Supervisor for ITP for 501 PE or more. **[Note-4 (Example of writing)]**
Article 32 Qualification and training of ITP Technical Supervisors and ITP Operators	Who will qualify the ITP Technical Supervisor or ITP operator? Who will train and examine the capacity of the Technical Supervisor or ITP operator?	[Key words] Qualification of ITP Technical Supervisor and ITP Operator Training of ITP Operator **[Note-5(Example of writing)]**
Article 33 Inspection of ITP performance	BPLHD designate the inspection job to the designated inspection agency	[Key words] Inspection of the effluent water quality of ITP The designated inspection agency **[Note-6 (Example of writing)]**
Article 34 On-site Sludge treatment	Who is responsible for providing sludge treatment capacity? Who will pay the sludge treatment cost?	[Key words] Responsibility for providing sludge treatment capacity **[Note-7 (Example of writing)]**
Article 27 Penalty	Omitted	Omitted

White cell — Standard Sewerage Ordinance of Municipality Government in Japan

Sewerage Law in Japan (National)

Jhokasou Law in Japan

[Note-1]

An example of writing of Article 28 'Responsibility of households and building owners who are not connected to the separate sewer system'

'Owners of houses or buildings not connected to the separate sewer system are responsible for proper installation of on-site wastewater treatment facilities and proper operation and maintenance of such facilities, in accordance with the technical standards to be established by the relevant department of DKI Government.'

[Note-2]

Examples of writing of Article 29 'Responsibility for regular desludging of household septic tanks'

[Option 1]

'Owners of houses or buildings shall have the sludge accumulated in their on-site wastewater treatment facilities be emptied at the regular intervals to be established by the relevant department of DKI Government, which may vary depending on the size and the type of the facilities. Owners of houses or buildings shall pay the cost for the emptying and transporting services of the sludge to the operators who provide such services. Non-compliance to this article is subject to fines, the amount of which is to be determined by the relevant department of DKI Government.'

[Option 2]

Article	Right / Obligation	Content / Keyword

'PD PAL JAYA is responsible for providing the sludge emptying and transporting services to all the houses and buildings which are not connected to the separate sewer system. PD PAL JAYA"s cost for such services shall be compensated by the DKI Government.'

[Note-3]
Examples of writing of Article 30 'Qualification and training of desludging operators'

[Option 1]
'The company or person who wants to conduct the emptying and transporting services of the sludge from the on-site wastewater treatment facilities (herein after referred to 'Desludging Operator') in DKI Jakarta area shall obtain the permission of DKI Governor. Such permission shall be given to the operator who meets all the technical standards set forth by the relevant department of DKI Government, one of such standards shall be the employment of the desludging technicians who possess the completion certificate of the training course for Desludging Operators administered by PD PAL JAYA. The permission shall be renewed every five (5) years. Once the Desludging Operator is proved not to meet such technical standards, or is engaged in unlawful activities, the permission shall be revoked by the DKI Governor. Non-compliance to this article is subject to fines, the amount of which is to be determined by the relevant department of DKI Government.'

[Option 2]
'Only PD PAL JAYA, or the company or person who is subcontracted by PD PAL JAYA, has the right to conduct the emptying and transporting services of the sludge from the on-site wastewater treatment facilities in DKI Jakarta area. Non-compliance to this article is subject to fines, the amount of which is to be determined by the relevant department of DKI Government.'

[Note-4]
An example of writing of Article 31 Operation and Maintenance of Individual Treatment Plant (ITP) of commercial buildings and office buildings

'For the Individual Treatment Plant (ITP) of the building not connected to the separate sewer system, the owner of the building shall employ or contract with the qualified ITP Operator or the original supplier of the ITP for the operation and maintenance of the ITP. For the ITP which treats the wastewater generated by more than 501 persons equivalent calculated based on the method prescribed in 'Population equivalent (PE) scale for ITP designation based on building usage type' in Governor Regulation No.122/2005, the owner of the building shall appoint an ITP Technical Supervisor who has the qualification of the ITP Operator with experience of operating the ITP of similar size for more than two (2) years. The ITP Technical Supervisor can outsource the operation and maintenance work and the desludging work of the ITP to the qualified ITP Operator or the original supplier of the ITP and to the qualified Desludging Operator. Non-compliance to this article is subject to fines, the amount of which is to be determined by the relevant department of DKI Government'

[Note-5]
An example of writing of Article 32 'Qualification and training of ITP Technical Supervisors and ITP Operators'

'The company or person who wants to conduct the operation and maintenance service of the ITP (hereinafter referred to 'ITP Operator') in DKI Jakarta area shall register to the DKI Governor. The ITP Operator shall assign at least a person who has obtained the completion certificate of the training course for ITP Operator administered by [name of the institution designated as the training institution (to be decided. It can be a public institution or a private institution such as a group of the suppliers of ITPs which have the operation and maintenance section in Indonesia.)] to each operation and maintenance work of ITP.'

[Note-6]
An example of writing of Article 33 'Inspection of ITP performance'

Article	Right / Obligation	Content / Keyword
'The owner of the building not connected to the sewer system in DKI Jakarta area shall make the effluent water quality of the ITP be inspected by BPLHD or other institutions designated by BPLHD twice a year. If the effluent water quality of the ITP does not meet the effluent water quality standard, the DKI Governor can order the owner of the building, the ITP Supervisor, the ITP Operator or the original supplier of the ITP to improve the operation and maintenance of the ITP so that it may meet the effluent water quality of the ITP. Non-compliance to this article is subject to fines, the amount of which is to be determined by the relevant department of DKI Government.'		

[Note-7]
An example of writing of Article 34 'On-site Sludge Treatment'

'PD PAL JAYA shall develop the sludge treatment capacity for all the on-site wastewater treatment facilities in the DKI Jakarta area. PD PAL JAYA can charge the sludge treatment cost to the DKI Government.'

Source: JICA Expert Team

References-1 through Reference-8

Reference-1 through Reference-8 bellow provides the concept and practice of proposed regional regulation for DKI Jakarta in order to understand easier.
Individual reference describes the aim of sewerage law, responsibility and right of sewerage administrator, obligation of resident on sewer connection and wastewater discharge, sewerage tariff and sewerage facility management.

Table 2-79 Contents of Reference-1 through Reference-8

Reference	Contents
1	Aim of sewerage law, responsibility of sewerage administrator on sewerage development and management
2	Right of sewerage administrator, obligation of sewer connection, application and approval of sewer connection
3	Qualification and registration of plumber and professional engineer
4	Installation and water quality management of pretreatment, order on improvement and suspension of discharge
5	Wastewater discharge standard to sewerage
6	Tariff system, levy, collection and mitigation
7	Sewerage information database and notification
8	Occupation of sewerage facility

Source: JICA Expert Team

【Reference-1】

Article-1" Administration and management of sewerage works are stipulated by the Sewerage Ordinance **as well as Sewerage Law in Japan** and relevant regulations of National Government."

Article-1：Objectives of Sewerage Law in Japan
In this article, three different levels of objectives are described.

- The direct objective is stipulation of master planning and standards for design, build & operation of sewerage system.
- This enables the expansion of sewerage system, which is refereed as the medium objective.
- It leads to the highest level of objective or supreme goal of the law, which includes sustainable urban development, sanitation, and water pollution control.

Article 3: Operator of Municipal Sewerage
3.1 Municipal government shall design, build, operate, and maintain municipal sewerage.

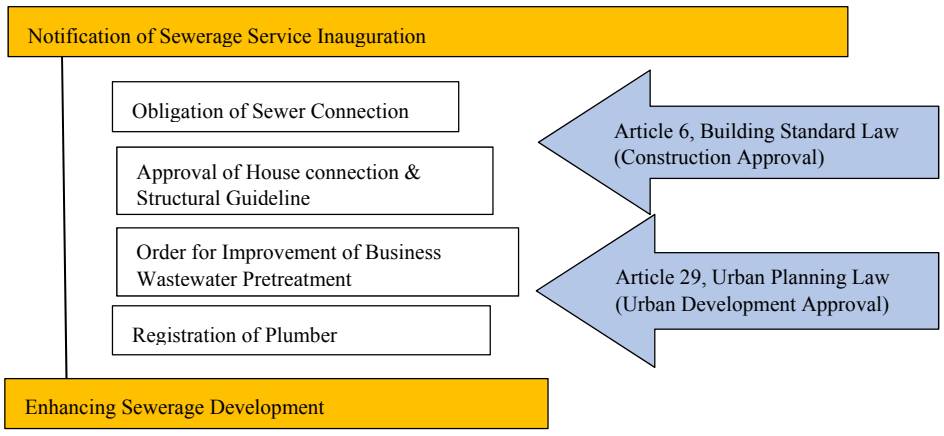
【Reference-2】

Sewerage service area is notified to public, and then public sewer connection is stipulated to residents. Operator is imposed responsibility to provide sewerage service.

(1) Power and right

Article 3
Person, who shall install house connection and private sewer at inauguration date of sewerage service, shall connect to public sewer within ** days.

Power for sewerage development through collaboration among Municipal Government



(2) Inauguration of Sewerage Service Area

Sewerage service area is notified for inauguration in order to regulate sewerage user.

Notification of Sewerage Service Area (1/2)

Inauguration of Sewerage Service Area

Sewerage service area is notified for inauguration in order to regulate sewerage user.

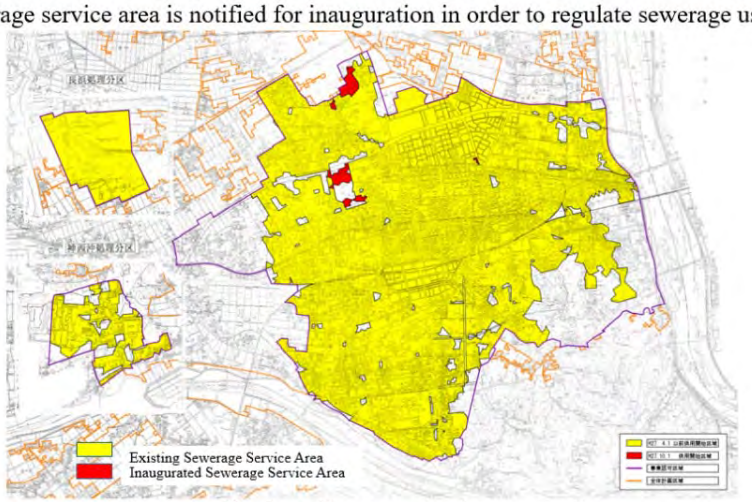


Figure- Notification of Sewerage Service Inauguration

Notification of Sewerage Service Area (2/2)

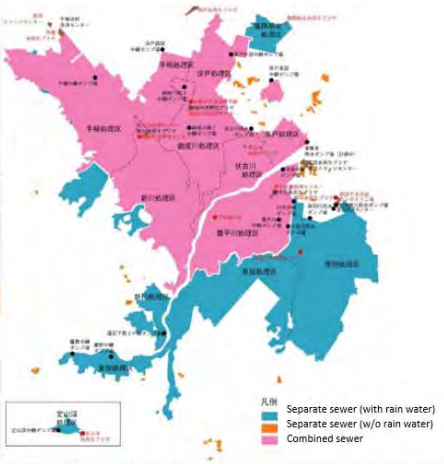
Recommendation to JKT
- Notify service type
- Tariff accordant with service type

Without septic tank cleansing service (Option-1)

Service type		Separate sewer	Interceptor sewer (Combined)
House connection	Gray water	Yes	Yes
	Black water	Yes	No (Septic tank)
Tariff	Gray water	Yes	Yes
	Black water	Yes	No

With septic tank cleansing service (Option-2)

Service type		Separate sewer	Interceptor sewer (Combined)
House connection	Gray water	Yes	Yes
	Black water	Yes	No (Septic tank)
Tariff	Gray water	Yes	Yes
	Black water	Yes	Yes



What type of tariff to be applied?
- Refer the experiences of Osaka, Singapore and Manila

Notification of Sewerage Service Inauguration with service type

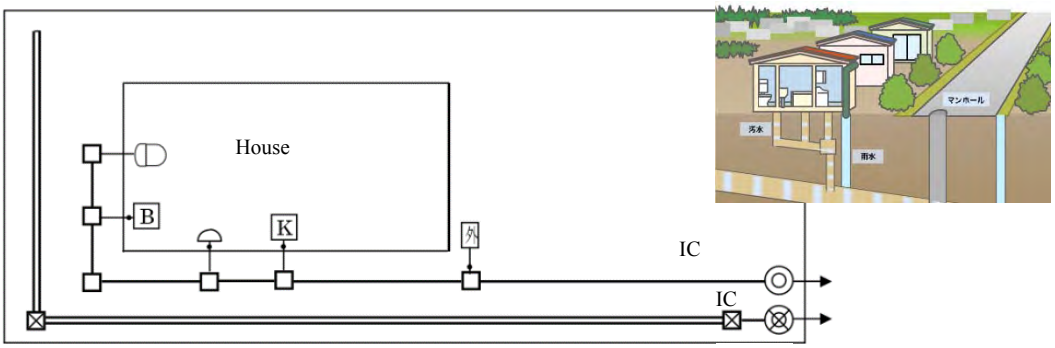
Recommendation to DKI Jakarta

Recommendation to DKI Jakarta based on the difference of service level or with/without house connection:

- Sewerage service area, which is divided to house connection area and interceptor sewer area, is notified to public.
- Separated sewer area applies house connection, accordingly obeys sewerage charge
- Combined sewer area applies interceptor sewer of existing drainage and septic tank remains, accordingly obeys environmental protection charge.

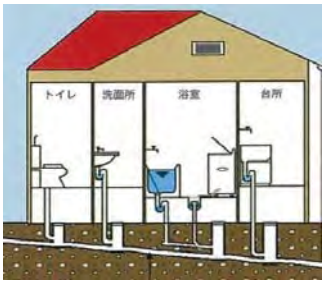
(3) Application/Approval of House Connection

(i) Technical Requirement

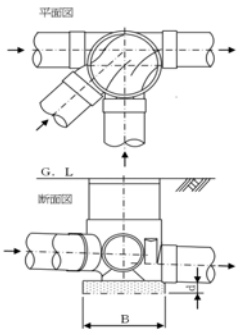


Inspection job: Based of desgin guideline and operation manual of house connection such as
- Approval of house connection and accumulation of costumer information
- Materials and structure of pipe, chamber, fittings, etc.
- Location of inspection chamber
- Sewer separation/Cross connection of sanitary sewer and storm water sewer
- Traps of oil/fat, odor, etc.
- In case of pretreatment plant of business/industrial wastewater discharge, facility and equipments, operation performance, recording, assigmnent of professional engineer, etc.

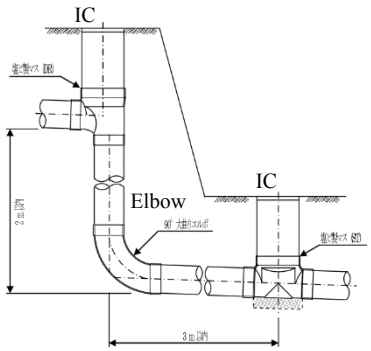
Approval of Building Sewer Connection and Wastewater Discharge to Public Sewer



Traps and chamber



Fitting



Drop-connection

Standard of Plumbing and House connection

Detailed Regulations for Enforcement

(1) Notification of Inauguration of Sewerage Service
- Area, Date, WWTP
- Type of sewerage service (with/without house connection, or with/without septic tank
- Media of notification
- Obligation of wastewater discharge and dead-line of house connection work, etc.

(2) Application / Approval of House Connection

- Application Form of wastewater discharge including name of owner, address and telephone number of applicant, bank account number and remittance, etc.
- Technical requirement of building sewer such as drawing, flow rate, pipe diameter, gradient, pipe material, calculation documents, etc.

【Reference-3】

Plumber registration, Qualification / Certification of professional engineer

Objectives:

- Rule for private business "Creditable quality with affordable cost"
- Task force for enhancing house connection
- Outsourcing of claim resolution on sewer maintenance (inspection, cleansing and fixing)

Article 6 Registration of plumber Article 6-2 Application of registration Article 6-3 Requirement of registration Article 6-4 Professional engineer of plumbing Article 6-5 Registration of professional engineer Article 6-6 Application of professional engineer registration Article 6-7 Requirement on professional engineer registration Article 6-8 Professional engineer examination Article 6-9 Certificate of professional engineer Article 6-10 Certificate of plumber registration Article 6-11 Responsibility and norm Article 6-12 Notification of change Article 6-13 Revocation and suspension of registration	Sewer connection application - Cost estimation - Construction contract - Commissioning - Sewer use    

Detailed Regulations for Enforcement

(1) Registration
- Requirement of plumber
- Registration fee
- Application Form of applicant including name of owner, address and telephone number
- Number of employee, certification of professional engineer, work force, etc.

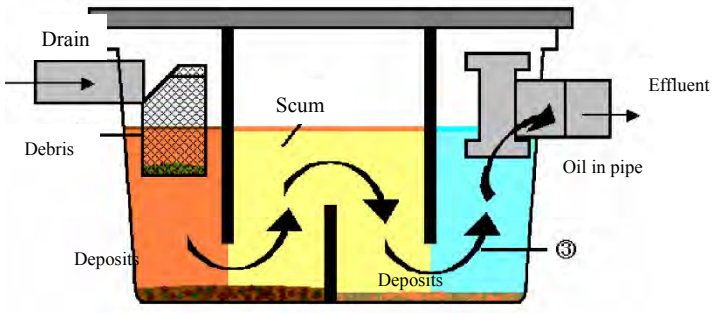
(2) Responsibility and norm
- Certification, examination and training
- Penalty, fine, etc.

【Reference-4】

Inspection of private sewer installation secures to use public sewer properly. Sewerage is usually affected by innocent or illicit users such as wastewater spill out due to clogging and storm water infiltration, degradation by harmful waste and others.

Pipe, inspection chamber and pretreatment facility, if necessary, are inspected whether they comply with guideline.

1. Person, who installed private sewer, shall notify the completion of construction work to Mayor of City within ** days, and accept the inspection of city officer in accordance with the regulation on private sewer installation and structure.
2. City office issues the certificate of inspection to owner of private sewer since the installed private sewer complies with the regulation on private sewer installation and structure.



Source: Ohmihachiman City

Figure: Oil trap

Detailed Regulations for Enforcement

(1) Application / Approval of Pretreatment Facility
- Application Form of wastewater discharge including name of owner, address and telephone number of applicant, bank account number and remittance, etc.
- Business type, flow rate and quality of wastewater
- Technical requirement of pretreatment facility such as treatment process, drawing, flow rate, pipe diameter, gradient, pipe material, calculation documents, etc.
- Name of professional engineer with certification, etc.

(2) Operation and Reporting
- Reporting Form of treatment condition such flow rate, test result of wastewater quality, etc.

【Reference-5】

Discharge Standards to Sewerage System

Table below is Example of Standards for Wastewater Characteristics for Discharge to Sewerage System.

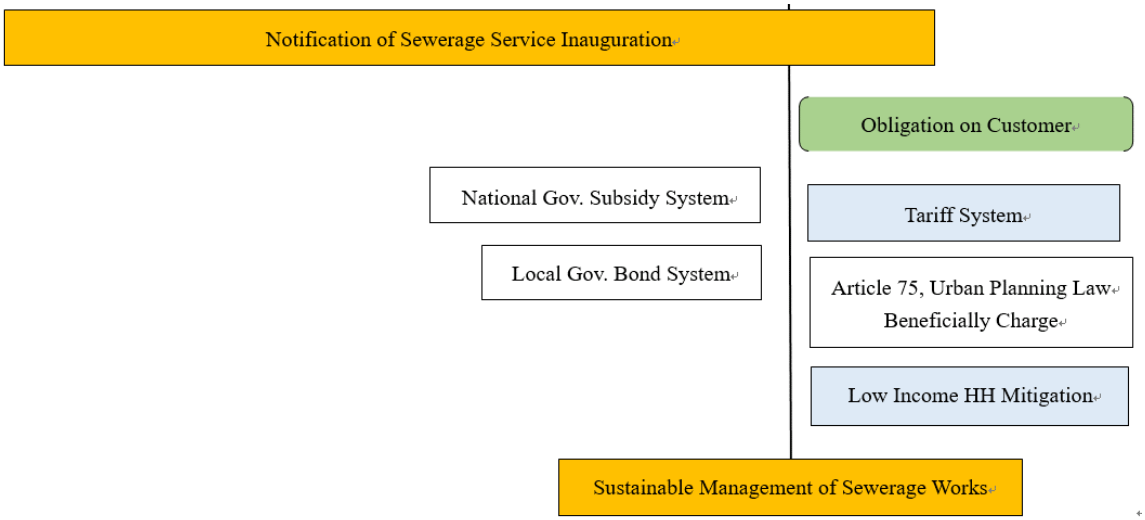
Material or Item				Discharge more than 50 m^3/d	Discharges less than 50 m^3/d
Hazardous Substances	Cadmium			Less than 0.1mg/l	Less than 0.1mg/l
	Cyan			Less than 1mg/l	Less than 1mg/l
	Organic Phosphorus			Less than 1mg/l	Less than 1mg/l
	Lead			Less than 0.1mg/l	Less than 0.1mg/l
	Six Equivalent Chromium			Less than 0.5mg/l	Less than 0.5mg/l
	Arsenic			Less than 0.1mg/l	Less than 0.1mg/l
	Total Mercury			Less than 0.005mg/l	Less than 0.005mg/l
	Alkyl mercury			Not detected	Not detected
	Polychlorobiphenyl			Less than 0.003mg/l	Less than 0.003mg/l
	Trichloroethylene			Less than 0.3mg/l	Less than 0.3mg/l
	Tetrachloroethylene			Less than 0.1mg/l	Less than 0.1mg/l
	Dichloromethane			Less than 0.2mg/l	Less than 0.2mg/l
	Carbon tetrachloride			Less than 0.02mg/l	Less than 0.02mg/l
	1,2-Dichloroethane			Less than 0.04mg/l	Less than 0.04mg/l
	1,1-Dichloroethylene			Less than 0.2mg/l	Less than 0.2mg/l
	cis-1,2-Dichloroethylene			Less than 0.4mg/l	Less than 0.4mg/l
	1,1,1-Tricholoroethane			Less than 3mg/l	Less than 3mg/l
	1,1,2-Trichloroethane			Less than 0.06mg/l	Less than 0.06mg/l
	1,3-Dichlotobenzene			Less than 0.02mg/l	Less than 0.02mg/l
	Thiuram			Less than 0.06mg/l	Less than 0.06mg/l
	Simazine			Less than 0.03mg/l	Less than 0.03mg/l
	Tiobencarb			Less than 0.2mg/l	Less than 0.2mg/l
	Benzene			Less than 0.1mg/l	Less than 0.1mg/l
	Selenium			Less than 0.1mg/l	Less than 0.1mg/l
	Boron and its compounds		to river	Less than 10mg/l	Less than 10mg/l
			to sea	Less than 230mg/l	Less than 230mg/l
	Fluoride and its compounds		to river	Less than 8mg/l	Less than 8mg/l
			to sea	Less than 15mg/l	Less than 15mg/l
Environmental and Other Parameters	Total chromium			Less than 2mg/l	Less than 2mg/l
	Copper			3less than mg/l	Less than 3mg/l
	Zinc			Less than 2mg/l	Less than 2mg/l
	Phenolic compounds			5mg/l	-
	Iron (soluble)			Less than 10mg/l	-
	Manganese (soluble)			Less than 10mg/l	-
	BOD	General		Les than600mg/l	-
		Manufacture, gas		Less than 300mg/l	
	SS	General		Less than 600mg/l	-
		Manufacture, gas		Less than 300mg/l	
	Normal Hexane Extract	Mineral oil		Less than 5mg/l	-
		Animal and vegetable oil		Less than 30mg/l	-
	Nitrogen			Less than 120mg/l	-
	Phosphorus			Less than 16mg/l	-
	pH	general		5 to 9	5 to 9
		Manufacture, gas		5.7 to 8.7	5.7 to 8.7
	Temperature	general		Less than 45℃	Less than 45℃
		Manufacture, gas		Less than 40℃	Less than 40℃
	Iodine consumption			Less than 220mg/l	Less than 220mg/l

Source: Example of ordinary city of Japan

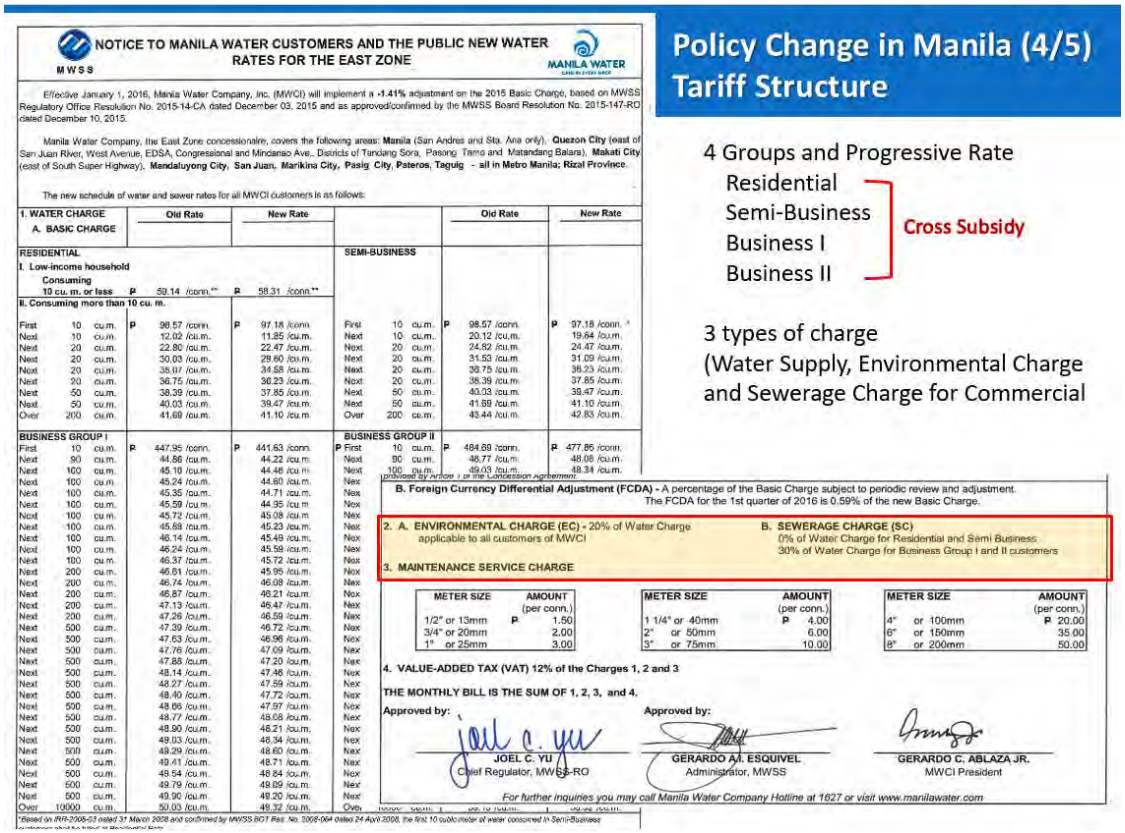
【Reference-6】

Tariff collection, Tariff calculation and Request of data submission

Tariff is designed to enhance financial sustainability as well as the affordability of user. Tariff structure is appropriate inaccordantwith locality of municiplity. Cross subsidy works well to secure financial resource as well as affordability of low income.



(i) Tariff of Manila Water



NOTICE TO MANILA WATER CUSTOMERS AND THE PUBLIC NEW WATER RATES FOR THE EAST ZONE

MWSS — MANILA WATER

Effective January 1, 2016, Manila Water Company, Inc. (MWCI) will implement a **-1.41%** adjustment on the 2015 Basic Charge, based on MWSS Regulatory Office Resolution No. 2015-14-CA dated December 03, 2015 and as approved/confirmed by the MWSS Board Resolution No. 2015-147-RO dated December 10, 2015.

Manila Water Company, the East Zone concessionaire, covers the following areas: **Manila** (San Andres and Sta. Ana only), **Quezon City** (east of San Juan River, West Avenue, EDSA, Congressional and Mindanao Ave., Districts of Tandang Sora, Pasong Tamo and Matandang Balara), **Makati City** (east of South Super Highway), **Mandaluyong City, San Juan, Marikina City, Pasig City, Pateros, Taguig - all in Metro Manila; Rizal Province.**

The new schedule of water and sewer rates for all MWCI customers is as follows:

1. WATER CHARGE A. BASIC CHARGE	Old Rate	New Rate
RESIDENTIAL		
I. Low-income household Consuming 10 cu. m. or less	₱ 59.14 /conn.**	₱ 58.31 /conn.**
II. Consuming more than 10 cu. m.		
First 10 cu.m.	₱ 98.57 /conn.	₱ 97.18 /conn.
Next 10 cu.m.	12.02 /cu.m.	11.85 /cu.m.
Next 20 cu.m.	22.80 /cu.m.	22.47 /cu.m.
Next 20 cu.m.	30.03 /cu.m.	29.60 /cu.m.
Next 20 cu.m.	35.97 /cu.m.	34.58 /cu.m.
Next 20 cu.m.	36.75 /cu.m.	36.23 /cu.m.
Next 50 cu.m.	38.39 /cu.m.	37.85 /cu.m.
Next 50 cu.m.	40.03 /cu.m.	39.47 /cu.m.
Over 200 cu.m.	41.69 /cu.m.	41.10 /cu.m.
BUSINESS GROUP I		
First 10 cu.m.	₱ 447.95 /conn.	₱ 441.63 /conn.
Next 90 cu.m.	44.86 /cu.m.	44.22 /cu.m.
Next 100 cu.m.	45.10 /cu.m.	44.46 /cu.m.
Next 100 cu.m.	45.24 /cu.m.	44.60 /cu.m.
Next 100 cu.m.	45.35 /cu.m.	44.71 /cu.m.
Next 100 cu.m.	45.59 /cu.m.	44.95 /cu.m.
Next 100 cu.m.	45.72 /cu.m.	45.08 /cu.m.
Next 100 cu.m.	45.88 /cu.m.	45.23 /cu.m.
Next 100 cu.m.	46.14 /cu.m.	45.49 /cu.m.
Next 100 cu.m.	46.24 /cu.m.	45.59 /cu.m.
Next 100 cu.m.	46.37 /cu.m.	45.72 /cu.m.
Next 200 cu.m.	46.61 /cu.m.	45.95 /cu.m.
Next 200 cu.m.	46.74 /cu.m.	46.08 /cu.m.
Next 200 cu.m.	46.87 /cu.m.	46.21 /cu.m.
Next 200 cu.m.	47.13 /cu.m.	46.47 /cu.m.
Next 200 cu.m.	47.26 /cu.m.	46.59 /cu.m.
Next 500 cu.m.	47.39 /cu.m.	46.72 /cu.m.
Next 500 cu.m.	47.63 /cu.m.	46.96 /cu.m.
Next 500 cu.m.	47.76 /cu.m.	47.09 /cu.m.
Next 500 cu.m.	47.88 /cu.m.	47.20 /cu.m.
Next 500 cu.m.	48.14 /cu.m.	47.46 /cu.m.
Next 500 cu.m.	48.27 /cu.m.	47.59 /cu.m.
Next 500 cu.m.	48.40 /cu.m.	47.72 /cu.m.
Next 500 cu.m.	48.66 /cu.m.	47.97 /cu.m.
Next 500 cu.m.	48.77 /cu.m.	48.08 /cu.m.
Next 500 cu.m.	48.90 /cu.m.	48.21 /cu.m.
Next 500 cu.m.	49.03 /cu.m.	48.34 /cu.m.
Next 500 cu.m.	49.29 /cu.m.	48.60 /cu.m.
Next 500 cu.m.	49.41 /cu.m.	48.71 /cu.m.
Next 500 cu.m.	49.54 /cu.m.	48.84 /cu.m.
Next 500 cu.m.	49.79 /cu.m.	49.09 /cu.m.
Next 500 cu.m.	49.90 /cu.m.	49.20 /cu.m.
Over 10000 cu.m.	50.03 /cu.m.	49.32 /cu.m.

	Old Rate	New Rate
SEMI-BUSINESS		
First 10 cu.m.	₱ 98.57 /conn.	₱ 97.18 /conn.
Next 10 cu.m.	20.12 /cu.m.	19.84 /cu.m.
Next 20 cu.m.	24.82 /cu.m.	24.47 /cu.m.
Next 20 cu.m.	31.53 /cu.m.	31.09 /cu.m.
Next 20 cu.m.	38.75 /cu.m.	38.23 /cu.m.
Next 20 cu.m.	38.39 /cu.m.	37.85 /cu.m.
Next 50 cu.m.	40.03 /cu.m.	39.47 /cu.m.
Next 50 cu.m.	41.69 /cu.m.	41.10 /cu.m.
Over 200 cu.m.	43.44 /cu.m.	42.83 /cu.m.
BUSINESS GROUP II		
First 10 cu.m.	₱ 484.89 /conn.	₱ 477.86 /conn.
Next 90 cu.m.	46.77 /cu.m.	46.08 /cu.m.
Next 100 cu.m.	49.03 /cu.m.	48.34 /cu.m.

(provided by Article 7 of the Concession Agreement)

B. Foreign Currency Differential Adjustment (FCDA) - A percentage of the Basic Charge subject to periodic review and adjustment. The FCDA for the 1st quarter of 2016 is 0.59% of the new Basic Charge.

2. A. ENVIRONMENTAL CHARGE (EC) - 20% of Water Charge applicable to all customers of MWCI

B. SEWERAGE CHARGE (SC) 0% of Water Charge for Residential and Semi Business; 30% of Water Charge for Business Group I and II customers

3. MAINTENANCE SERVICE CHARGE

METER SIZE	AMOUNT (per conn.)
1/2" or 13mm	₱ 1.50
3/4" or 20mm	2.00
1" or 25mm	3.00

METER SIZE	AMOUNT (per conn.)
1 1/4" or 40mm	₱ 4.00
2" or 50mm	6.00
3" or 75mm	10.00

METER SIZE	AMOUNT (per conn.)
4" or 100mm	₱ 20.00
6" or 150mm	35.00
8" or 200mm	50.00

4. VALUE-ADDED TAX (VAT) 12% of the Charges 1, 2 and 3

THE MONTHLY BILL IS THE SUM OF 1, 2, 3, and 4.

Approved by:

JOEL C. YU
Chief Regulator, MWSS-RO

Approved by:

GERARDO A.J. ESQUIVEL
Administrator, MWSS

GERARDO C. ABLAZA JR.
MWCI President

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*Based on IRR-2006-03 dated 31 March 2006 and confirmed by MWSS BOT Res. No. 2006-064 dated 24 April 2006, the first 10 cubic meter of water consumed in Semi-Business

Policy Change in Manila (4/5)
Tariff Structure

4 Groups and Progressive Rate
- Residential
- Semi-Business
- Business I
- Business II

Cross Subsidy

3 types of charge
(Water Supply, Environmental Charge and Sewerage Charge for Commercial

Tariff Structure

4 Groups of Cross Subsidy and Progressive Rate

Residential, Semi-Business, Business I and Business II

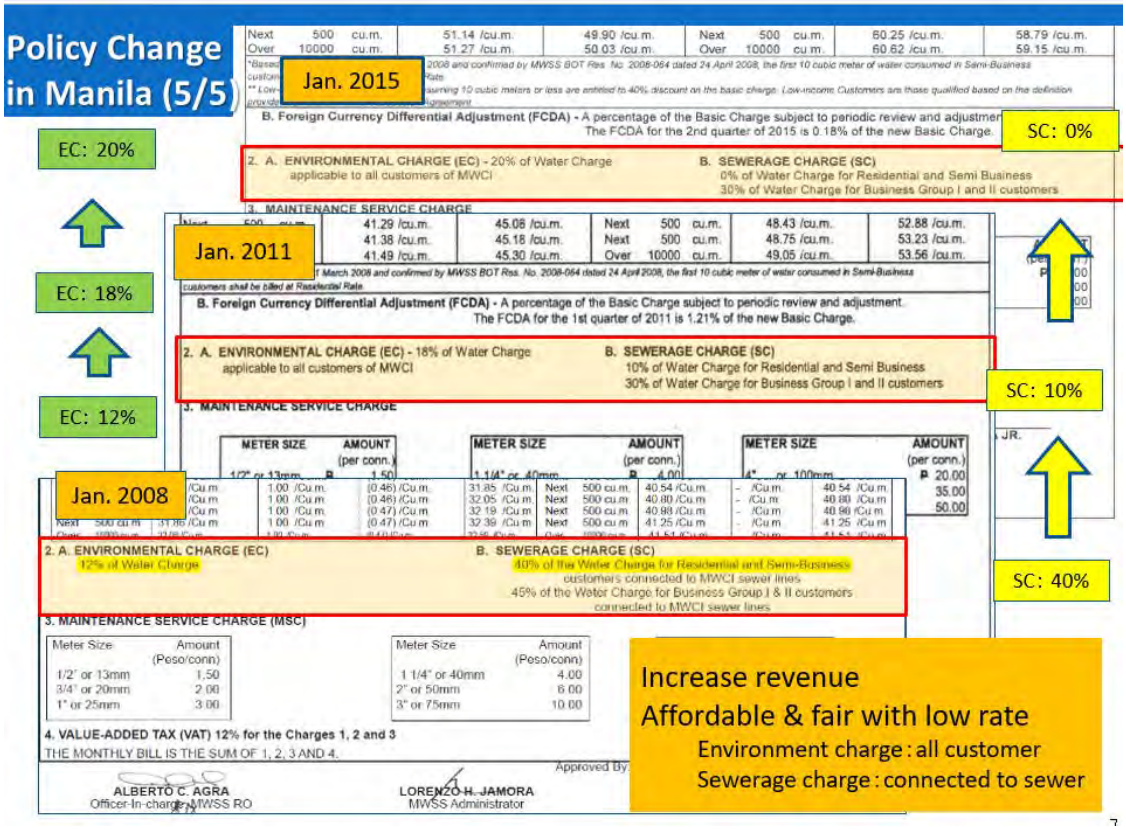
3 types of charge

(Water Supply, Environmental Charge and Sewerage Charge for Commercial)

Tariff Change in accordance with Sewerage Development Policy

Tariff of Residents: EC (Environmental Charge), which is levied to whole water consumer, increased to 18% in 2011, 20% of water supply charge in 2015 from 12 % in 2008.

SC (Sewerage charge), which levied to house connection service, decreased to 0% from 40% in 2008.



NOTICE TO MANILA WATER CUSTOMERS AND THE PUBLIC NEW WATER RATES FOR THE EAST ZONE

MWSS

MANILA WATER
CARE IN EVERY DROP

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Next 100 cu.m.	45.10 /cu.m.	44.46 /cu.m.
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	Old Rate	New Rate
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Next 100 cu.m.	50.42 /cu.m.	49.71 /cu.m.
Next 100 cu.m.	50.80 /cu.m.	50.08 /cu.m.
Next 100 cu.m.	51.04 /cu.m.	50.32 /cu.m.
Next 100 cu.m.	51.42 /cu.m.	50.69 /cu.m.
Next 100 cu.m.	51.83 /cu.m.	51.10 /cu.m.
Next 200 cu.m.	52.09 /cu.m.	51.36 /cu.m.
Next 200 cu.m.	52.45 /cu.m.	51.71 /cu.m.
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Next 500 cu.m.	58.15 /cu.m.	57.33 /cu.m.
Next 500 cu.m.	58.40 /cu.m.	57.58 /cu.m.
Next 500 cu.m.	58.79 /cu.m.	57.96 /cu.m.
Over 10000 cu.m.	59.15 /cu.m.	58.32 /cu.m.

*Based on IRR-2008-03 dated 31 March 2008 and confirmed by MWSS BOT Res. No. 2008-064 dated 24 April 2008, the first 10 cubic meter of water consumed in Semi-Business customers shall be billed at Residential Rate.

** Low-income residential customers consuming 10 cubic meters or less are entitled to 40% discount on the basic charge. Low-income Customers are those qualified based on the definition provided by Article 1 of the Concession Agreement.

B. Foreign Currency Differential Adjustment (FCDA) - A percentage of the Basic Charge subject to periodic review and adjustment.
The FCDA for the 1st quarter of 2016 is 0.59% of the new Basic Charge.

2. A. ENVIRONMENTAL CHARGE (EC) - 20% of Water Charge applicable to all customers of MWCI

B. SEWERAGE CHARGE (SC)
0% of Water Charge for Residential and Semi Business
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METER SIZE	AMOUNT (per conn.)
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Approved by:

JOEL C. YU
Chief Regulator, MWSS-RO

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GERARDO A. ESQUIVEL
Administrator, MWSS

GERARDO C. ABLAZA JR.
MWCI President

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(ii) Tariff of Tokyo, Japan

2 Groups of General Wastewater and Public-bath Wastewater

Progressive rate

Tariff for Pollution load which is obeyed to excessive concentration of BOD & SS on industrial wastewater discharger.

Conventional Sewerage Tariff in Japan

● Sewerage Service Charges (1 month): Right Table
※ The sewerage service charge is calculated by multiplying the figures in the above table by 1.08 (current consumption tax rate).
※ When not only tap water, but also well water is included in wastewater, the total figures in the above table are used to calculate the charge.

[Measuring wastewater discharge]
● Tap water
Wastewater is assumed to equal the amount of tap water used.
● Water other than tap water (i.e. well water)
A timer is placed on a water pump to record pumping time and calculate the amount of wastewater discharge.
※ Businesses whose wastewater amounts vary drastically from water use amounts (such as ice manufacturers) should consult with the Customers Service and Management Division of the Bureau of Sewerage at 03 (5320) 6573, or sewerage offices.

[Sewerage service charge exemptions]
Sewerage service charges are reduced in the following situations.
・Households living on public assistance.
・For public interest projects or in other special circumstances.

[Temporary Use]
When using the sewer system temporarily while performing construction, etc. the user must submit a notice for temporary usage. Please note that sewerage service charges will be applied for this usage.

Wastewater type	Volume (m^3)	Rate (Yen)
General wastewater	0~8m^3	560
	9~20m^3	110/m^3
	21~30m^3	140/m^3
	31~50m^3	170/m^3
	51~100m^3	200/m^3
	101~200m^3	230/m^3
	201~500m^3	270/m^3
	501~1,000m^3	310/m^3
	1,001m^3 and more	345/m^3
Public Bath wastewater	0~8m^3	280
	9m^3 and more	35/m^3

BOD & SS Tariff
Industrial wastewater discharger is obeyed to concentration of BOD & SS

(iii) Sewerage Finance Principle

- Role and effects of Sewerage Works prevail on private and community as well as region.
- Responsibility is allocated between beneficiaries between private and public.
- Beneficiary charge (Tax) is obeyed in accordance with benefits of sewerage works.
- Historically, Municipality Government shall provide own budget before requesting subsidies of National Government.
- Present financial system is financed through the allocation among private, municipal government and National Government.

Detailed Regulations for Enforcement
(1) Sewerage Charge Payment
- Forms of sewerage charge payment such as payment notice, application and approval of exemption & reduction, etc. including name of owner, address and telephone number of applicant, bank count number and remittance, etc.

(2) Tariff Calculation of Unmetered Water and Ground water use
- Formula of charged discharge wastewater

(3) Exemption and Reduction of Tariff Levy
- Requirement of exemption
- Requirement and rate of alleviation

【Reference-7】

Sewerage information database on topographic, structural, operation and maintenance.

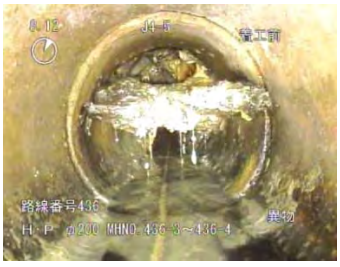
Contents of sewerage information database

- Sewerage service area such as location and town name, served population, etc.
- Inauguration date of sewerage service
- Location of WWTP, pumping station and outlet
- Sewer information such as pipe length, location of man-hole, elevation, gradient, material
- Location, area, structure and capacity of wastewater treatment plant
- Location, area, structure and capacity of Pumping station

Role of sewer management

(1) Planning & Construction stage: Land occupation, Lay-out, Structural requirement

(2) O&M stage: HC approval, inspection & maintenance, Construction arrangement with adjacent building & utilities

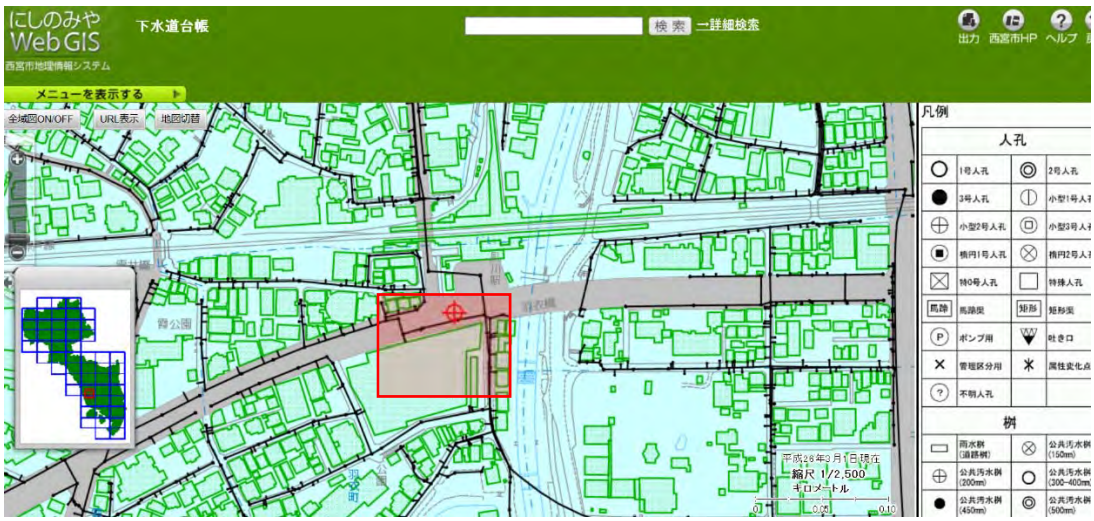


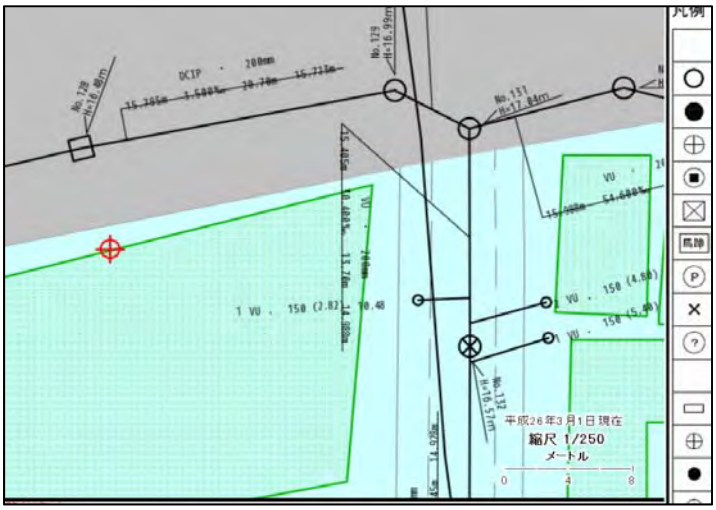
Pipe clogging

Pipe cleansing

	
Pipe crack	Pipe crack
	
Subsidy	Traffic accident

Sewer Information Database





Data of mapping system

- Location of sewer, MH, IC
- Length & Gradient of sewer
- Elevation & Type of MH
- Material & ID of sewer
- Material & ID of HC
- Date of inauguration
- CCTV photo, O&M record

Detailed Regulations for Enforcement

(1) Principle
- To notify the sewerage facilities which shall be managed by sewerage operator
- To notify the sewerage service area
- To specify the location of wastewater discharge

(2) Document
- Sewerage service area, sewer length, pumping station, WWTP, etc.

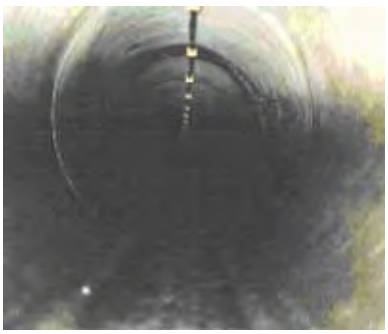
(3) Drawing
- Location of sewer, man-hole, inception chamber
- Length & Gradient of sewer
- Elevation & Type of MH
- Material & ID of sewer
- Material & ID of HC
- Date of inauguration

(4) O&M record
- O&M record on inspection, repairs, rehabilitation work
- CCTV photo

【Reference-8】

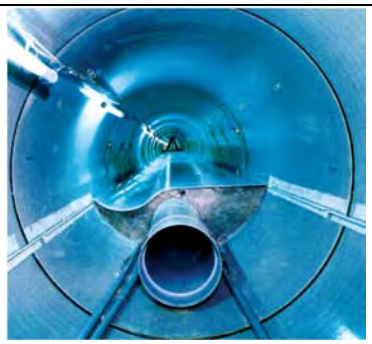
Occupation approval of sewerage facility, which sustains urban activities.

- Telecommunication using optical fiber for urban utilities as well as sewerage system operation.
- Multi-purpose use such as water supply, utility conduit, etc. Occupation charge is important revenue.
- Regulated use such as flood mitigation and traffic control of open channel, which sewerage sector owns.



Optical fiber in sewer

Optical fiber installation

 Occupation in large diameter pipe (multi-purpose use)	 Open channel occupation (flood control)

Detailed Regulations for Enforcement

(1) Application / Approval of Occupation

- Application Form of sewer occupation including name of owner, address and telephone number of applicant, bank account number and remittance, etc.
- Business type
- Duration of occupation and condition on termination, etc.
- Fee of occupation,
- Prohibition and penalty

(2) Document and drawing

- Drawing of location, structure, material, calculation documents, etc.

(3) Reporting

- Operation record, inspection, maintenance, etc.

(3) Standard Model of Sewerage Ordinance

Standard Model of Sewerage Ordinance, which can be applied to DKI Jakarta as well as the other municipalities in Indonesia, is shown in Table 2-80. This Standard Model can be refer to the Sewerage Ordinance and/or Regional Regulation of wastewater management proposed to DKI Jakarta.

Type of sewerage service and management, which DKI Jakarta designs, has a close relation with institutions required for sewerage system. Individual sewerage service, for example, is important responsibility such as obligation of sewerage connection, quality management of house connection, certification of professional engineer and plumber, responsibility and quality management of on-site treatment system as well as responsibility of on-site sludge management. Institutions required for DKI Jakarta shall be decided through scrutinizing their practicability and priority. Individual article and description, which European countries and Japan have applied, are selected. Then, individual institution will be practicable in DKI Jakarta as BMP (best management practice).

Table2-80 Proposed Sewerage Ordinance to Indonesia (Standard Model)

	Chapter 1 **General Provisions**
Article 1	**Purpose of Ordinance** Administration and management of sewerage works are stipulated by the Sewerage Ordinance as well as Sewerage Law and relevant regulations of National Government.
Article 2	**Definition of Terms** Terms following items mean: a. Sewage (wastewater and storm water) and wastewater are defined in Item 1, Article 2 of Sewerage Law in Japan. b. Public sewerage system is defined in Item 3, Article 2 of Sewerage Law in Japan. c. Regional sewerage system is defined in Item 4, Article 2 of Sewerage Law in Japan. d. Wastewater treatment plant is defined in Item 6, Article 2 of Sewerage Law in Japan. e. House connection and Private sewer are defined in Item 1, Article 10 of Sewerage Law in Japan. f. Specified facility of industrial wastewater treatment is defined in Item 2, Article 2-2 of Sewerage Law in Japan. g. Industrial pretreatment facility is defined in Item 1, Article 12 of Sewerage Law in Japan. h. Specified factory is defined in Item 1, Article 12-2 of Sewerage Law in Japan. i. Sewerage user is defined to person who discharges sewage (wastewater and storm water) into public sewerage system. j. Water supply and plumbing are defined in Item 1 and Item 9, Article 3 of Water Supply Act respectively in Japan. k. Sewerage service month means almost one month for sewerage tariff levy, and inauguration and termination of sewerage service are defined by Order.
	Chapter 2 **Master Plan (Comprehensive Basin-wide Sewerage Plan)**
Article 3	**Master Plan** 1 Provincial Gov. shall provide a sewerage master plan for a public water body where environmental quality standards are set by Environmental Law in Japan. The master plan shall include sewerage systems to achieve EQSs (Environmental Quality Standards). 2 Master Plan shall decide following items i. Principle of sewerage development ii. Sewerage areas of wastewater discharge and treatment iii. Lay-out, structure and capacity of principal sewerage facilities iv. Priority of project implementation of individual sewerage area in “ii” in this Item. v. Target value and treatment process of nitrogen and phosphorus removal of individual waste water treatment which is decided to sustain the water quality in public water body stipulated in Item 1. 3 Master plan shall be provided in accordance with following items. i. Topography, precipitation, river flow and other natural condition in planning area ii. Perspective land use in planning area iii. Perspective water use of public water body in planning area iv. Perspectives of produced flow-rate and quality of wastewater in planning area v. Condition of wastewater effluent discharge point vi. Cost benefit analyses on sewerage development
	Chapter 3 **Public Sewerage System**
Article 4	**Operator of Municipal Sewerage** 1 Municipal government shall design, build, operate, and maintain municipal sewerage.

Article 5	**Implementation program** 1. Municipal sewerage operator shall provide an implementation program when they start a sewerage project. 2. Municipal sewerage operator shall consult with provincial government upon providing the implementation program.
Article 6	**Contents of implementation program** Implementation program of Article 4 shall decide following items. 1.1 Lay-out, structure and capacity of sewerage facilities, and planned sewerage area 12 Location, structures, & capacities of WWTPs or connection spot to prefecture sewerage 1.3 Lay-out, structure and capacity of supplemental treatment facility if necessary 1.4 Dates of commencement &completion of construction works 2. Requirements for form of project implementation program stipulated in Article 5 shall be prescribed in Circular.
Article 7	**Requirements of implementation program** 1 Location & capacity of sewerage shall be decided by considering precipitation, population, and others that affect quality and quantity of sewage, geography, land use, and conditions of receiving waters. 2 Structure of sewerage shall conform to the Article 8. 3 Treatment area shall harmonize with the location & capacity of collection system & WWTP. 4 The implementation program of municipal sewerage connecting to prefecture sewerage shall harmonize with the implementation program of prefecture sewerage. 5 The implementation program shall harmonize with the master plan if any. 6 Facility layout plan and duration of project implementation of the implementation program shall coincide with urban planning and/or urban project implementation program.
Article 8	**Structural Requirement** 1 The structure of municipal sewerage shall conform to the technical requirements stipulated in the order of the sewerage law in order to keep sanitation and to secure pollution control. 2 The structure of municipal sewerage shall conform to the technical requirements stipulated in the municipal law based on the order.
Article 9	**Effluent Quality Standard** The effluent quality standard of municipal sewerage shall satisfy the requirements made by the order of sewerage law.
Article 10	**Sewerage Information Database** 1 Municipal sewerage operator shall create asset information database. 2 The contents of database shall be decided by the ordinance. 3 Municipal sewerage operator shall show the database to persons if requested.
	Chapter 4 **Installation of House Connection and Private Sewer**
Article 11	**Installation of House connection and private sewer** Person, who shall install house connection and private sewer at inauguration date of sewerage service, shall connect to public sewer within ** days.
Article 12	**Installation of house connection, pipe diameter of private sewer and others** Installation, expansion and/or rehabilitation (herein after "installation work") of house connection and private sewer are stipulated in Items followings: a. Private sewer, which discharges wastewater into separate public sewer, shall fix with public inlet of sanitary sewer. Private sewer, which discharges storm water into separate public sewer, shall fix with public inlet of storm sewer.

b. Private sewer, which discharges sewage into combined public sewer, shall fix with public inlet of combined sewer.
c. Private sewer shall be fixed with public sewer where function and facility of public sewer are not affected. Fixing shall follow standard operating procedure.
d. Diameter and gradient of sanitary private sewer shall be designed in principle on the basis of following Table. Flow capacity and diameter of private sewer shall comply respective design dimension. In case less than three meter length of private sewer of one building, 75 mm of diameter pipe can be applied.

Service population (person)	Pipe diameter (mm)	Gradient
Less than 150	100 and more	2/100 and more
150 and more, less than 300	125 and more	1.7/100 and more
300 and more, less than 500	150 and more	1.5/100 and more
500 and more	200 and more	1.2/100 and more

e. Diameter and gradient of storm and combined private sewer shall be designed in principle on the basis of following Table. Flow capacity and diameter of private sewer shall comply with respective design dimension. In case less than three meter length of private sewer of one property, 75 mm of diameter pipe can be applied.

Drainage area (m^2)	Pipe diameter (mm)	Gradient
Less than 200	100 and more	2/100 and more
200 and more, less than 400	125 and more	1.7/100 and more
400 and more, less than 600	150 and more	1.5/100 and more
600 and more, less than 1500	200 and more	1.2/100 and more
1500 and more	250 and more	1/100 and more

Article 13

Approval of private sewer construction plan

1. Person, who installs private sewer, shall apply necessary documents of construction plan and be approved in advance by Mayor of City accordant with the stipulation of house connection and private sewer installation.
2. Person, who alters private sewer construction plan, shall apply necessary documents of alteration plan and be approved in advance by Mayor of City. In case of no structural alteration of private sewer, person can cope with reporting to Mayor of City.

Chapter 5
Order on Construction Works of House Connection and Private Sewer

Article 14

Registration of plumber

1. Any construction work related to the house connection and private sewer installation shall not be done by anyone else except the licensed plumber.
2. Terms of validity of plumber license is ** years from the date of registration.
3. Registration shall be renewed in case to continue the licensed plumber due to license expiration.

Article 15

Application of registration

1. Registration prescribed in Item 1, Article 16 shall be done by the application of person who works for private sewer construction.
2. Person, who applies registration, shall submit the following documents to Mayor of City.
a. Name and/or trade name, and address. Authorized representative in case of corporation.
b. Name and address of business office as well as name of professional engineer who belongs

	exclusively to the office. 3. Application for Item 2, this Article submits documents followings; a. Written oath not applicable to Item 4, Article 16. b. Certified copyofarticles of corporation orendowment and the register, a copy of certificate of residence and/or alien registration in case of individual. c. Layout plan, photo and sketch of business office d. A copy of certificate prescribed in Article 22 of professional engineer who belongs exclusively to the office e. Equipment and machinery list stipulated in b. Item 1, Article 16.
Article 16	**Requirement of registration** 1. Mayor of City approves the plumber registration in accordance with requirements followings: a. One and more professional engineers exclusively belong to the respective business office stipulated in Article 17. b. Business office who provides equipment and machinery stipulated by the regulation. c. Business office located in respective prefecture/province. d. Not applicable to followings; - An adult ward or a person under curatorship, or a bankrupt who has not obtained a restoration of rights. - Less than two years since license is revoked by Item 1, Article 26. - Person with a considerable reason that he/she is likely to engage in illegal or dishonest work. - Corporation who employs not applicable person prescribed above. 2. Administrator punctually notifies the plumber registration to public when the plumber application is approved.
Article 17	**Professional engineer of plumbing** 1. Registered plumber office shall exclusively employ a professional engineer registered in Article 18 to the respective business office in order to assign jobs following. 2. Professional engineer shall perform following duties faithfully; a. Technical management on private sewer construction. b. Technical supervision on workers engaged to private sewer construction. c. Certification of private sewer in accordance with the stipulation on installation and structure. d. Attendance on private sewer installation stipulated Article 27. 3. Workers engaged to private sewer construction shall obey the direction of professional engineer.
Article 18	**Registration of professional engineer** 1. Mayor of City registers professional engineer in accordance with Item 1, Article 17. 2. Duration of validity of Item 1, this Article is ** years. 3. Registration shall be renewed in case to continue the licensed plumber due to license expiration.
Article 19	**Application of professional engineer registration** Person, who applies for the registration stipulated in Item 1, Article 17, shall submit the following documents to Mayor of City. a. A copy of certificate of residence and/or alien registration. b. Certification of professional engineer examination stipulated in Item 1, Article 20. c. Written oath not applicable to Item 2, Article 6-7.
Article 20	**Requirement on professional engineer registration** 1. Person, who passed the professional engineer examination, acquires the certification of professional engineer registration. 2. Mayor of City has the right to reject the application of professional engineer in accordance with followings: a. An adult ward or a person under curatorship, or a bankrupt who has not obtained a

	restoration of rights b. Less than two years since license is revoked by Item 3 in this Article. 3. Mayor of City can revoke the registration or suspend the validity of the registration of professional engineer in case that the registered professional engineer violates the Sewerage Ordinance.
Article 21	**Professional engineer examination** 1. ****** executes the professional examination in accordance with knowledge and technique required for professional engineer. 2. Regulation prescribes the eligibility requirements for examination, the subject of test, the examination procedure and the other details for the implementation of professional engineer examination.
Article 22	**Certificate of professional engineer** 1. Mayor of City registers to the professional engineer and issues the certificate in accordance that a person eligible to Item 1, Article 20 applies the professional engineer registration stipulated in Article 6-6. 2. Professional engineer shall carry the certificate and show ones whenever municipal officer requests during engaging in private sewer construction work. 3. Professional engineer shall return the certificate which is revoked due to stipulation on Item 3, Article 27 as well as the validity suspended. 4. Regulation prescribes the necessary procedure for 1-3 Items, this Article as well as the renewal and the reissuance.
Article 23	**Certificate of plumber registration** 1. Mayor of City issues certificate of plumber to registered corporation. 2. Plumber shall display certificate on clearly visible location in business office. 3. Registered plumber shall punctually return certificate to Mayor of City when the registration is revoked as well as suspended validity. 4. Regulation prescribes necessary procedure for 1-3 Items, this Article as well as renewal and reissuance.
Article 24	**Responsibility and norm** Registered plumber shall execute private sewer construction work properly in accordance with Law, Ordinance and regulations of sewerage.
Article 25	**Notification of change** Registered plumber shall notify the changes to Mayor of City such as name of business office, address and others stipulated by regulation as well as closure, suspension or resumption of business.
Article 26	**Revocation and suspension of registration** 1. Mayor of City can revoke the registration or suspend the business for less than ** months in case applicable to following: a. Not applicable to Item 1, Article 16. b. Violating Item 1, Article 17. c. There is considerable reason that plumber cannot execute the private sewer construction work properly in accordance with the responsibility or norm stipulated in Article 24. d. There is no notification stipulated in Article 25 or false statement. e. Executed private sewer construction affects a damage as well as a considerable reason on malfunction to public sewerage. f. Registration of Item 1, Article 14 through false procedure. 2. Stipulation of Item 2, Article 16 is applied to Item 1, this Article.
Article 27	**Inspection of private sewer installation** 1. Person, who installed private sewer, shall notify the completion of construction work to Mayor of City within ** days, and accept the inspection of city officer in accordance with the regulation on private sewer installation and structure. 2. City office issues the certificate of inspection to owner of private sewer since the installed private sewer complies with the regulation on private sewer installation and structure.
	Chapter 6

	Drainage to Public Sewer
Article 28	**Installation of pretreatment facility** 1. Person, who discharges wastewater not complying with the stipulation of Item 1, Article 12 of Sewerage Law in Japan, shall install the pretreatment facility or carry out the appropriate measure. *(Table is omitted due to confuse understanding. Accordingly, Table is replaced to wastewater discharge requirement of large city.)* 2. Item 1, this Article exempts person who discharges daily average flow less than ** m^3.
Article 29	**Restriction on wastewater discharge of specified factory** Person, who discharges wastewater not complying with the stipulation of Item 3 and 5, Article 12-2 of Sewerage Law in Japan, shall not discharge wastewater followings; *(Table is omitted due to difficult to understand. Accordingly, Table is replaced to wastewater discharge requirement of large city.)*
Article 30	**Installation of pretreatment facility** Omitted due to prescription on public sewerage connected to Regional sewerage system This Article is omitted due to confuse understanding. Accordingly, Table is replaced to wastewater discharge requirement of large city.
Article 31	**Water quality management professional** Person, who installed pretreatment facility or specified facility, shall assign the water quality management professional and punctually notify to Mayor of City in accordance with stipulated regulation. Water quality management professional works for operation and maintenance of pretreatment facility or specified facility.
Article 32	**Notification of pretreatment facility installation** Person, who installs, suspends or removes pretreatment facility, shall notify to Mayor of City in accordance with the stipulated regulation. Dischargers, who changes notified matters, shall notify amended plan.
Article 33	**Suspension or restriction of wastewater discharge** Mayor of City can suspend and/or restrict drainage to public sewer in case applicable to following: a. Discharger may be liable to damage sewerage facility. b. Discharger may be liable to affect treatment function. c. In any other case where it is found necessary for sewerage management.
Article 34	**Notification of public sewer use** 1. Person, who starts, suspends or resumes discharge, or abandons the private sewer, shall notify the effect to Mayor of City in advance accordant with the regulation. In case of only storm water discharge, notification of discharge is not required. 2. Person, who applied to Articles of 11-2, 12-3, 12-4 or 12-7 of Sewerage Law in Japan, is deemed to one who notified in accordance with Item 1, this Article.
	Chapter 7 **Private Wastewater Treatment**
Article 35	**Responsibility of households and building owners who are not connected to separate sewer system** An example of writing of Article 35 'Responsibility of households and building owners who are not connected to the separate sewer system' 'Owners of houses or buildings not connected to the separate sewer system are responsible for proper installation of on-site wastewater treatment facilities and proper operation and maintenance of such facilities, in accordance with the technical standards to be established by the relevant department of DKI Government.'
Article 36	**Responsibility for regular desludging of household septic tanks** Examples of writing of Article 36 'Responsibility for regular desludging of household septic tanks'

	[Option 1] 'Owners of houses or buildings shall have the sludge accumulated in their on-site wastewater treatment facilities be emptied at the regular intervals to be established by the relevant department of DKI Government, which may vary depending on the size and the type of the facilities. Owners of houses or buildings shall pay the cost for the emptying and transporting services of the sludge to the operators who provide such services. Non-compliance to this article is subject to fines, the amount of which is to be determined by the relevant department of DKI Government.' [Option 2] 'PD PAL JAYA is responsible for providing the sludge emptying and transporting services to all the houses and buildings which are not connected to the separate sewer system. PD PAL JAYA"s cost for such services shall be compensated by the DKI Government.'
Article 37	**Qualification and training of desludging operators** Examples of writing of Article 37 'Qualification and training of desludging operators' [Option 1] 'The company or person who wants to conduct the emptying and transporting services of the sludge from the on-site wastewater treatment facilities (herein after referred to 'Desludging Operator') in DKI Jakarta area shall obtain the permission of DKI Governor. Such permission shall be given to the operator who meets all the technical standards set forth by the relevant department of DKI Government, one of such standards shall be the employment of the desludging technicians who possess the completion certificate of the training course for Desludging Operators administered by PD PAL JAYA. The permission shall be renewed every five (5) years. Once the Desludging Operator is proved not to meet such technical standards, or is engaged in unlawful activities, the permission shall be revoked by the DKI Governor. Non-compliance to this article is subject to fines, the amount of which is to be determined by the relevant department of DKI Government.' [Option 2] 'Only PD PAL JAYA, or the company or person who is subcontracted by PD PAL JAYA, has the right to conduct the emptying and transporting services of the sludge from the on-site wastewater treatment facilities in DKI Jakarta area. Non-compliance to this article is subject to fines, the amount of which is to be determined by the relevant department of DKI Government.'
Article 38	**Operation and Maintenance of Individual Treatment Plant (ITP) of commercial buildings and office buildings** An example of writing of Article 38 Operation and Maintenance of Individual Treatment Plant (ITP) of commercial buildings and office buildings 'For the Individual Treatment Plant (ITP) of the building not connected to the separate sewer system, the owner of the building shall employ or contract with the qualified ITP Operator or the original supplier of the ITP for the operation and maintenance of the ITP. For the ITP which treats the wastewater generated by more than 501 persons equivalent calculated based on the method prescribed in 'Population equivalent (PE) scale for ITP designation based on building usage type' in Governor Regulation No.122/2005, the owner of the building shall appoint an ITP Technical Supervisor

	who has the qualification of the ITP Operator with experience of operating the ITP of similar size for more than two (2) years. The ITP Technical Supervisor can outsource the operation and maintenance work and the desludging work of the ITP to the qualified ITP Operator or the original supplier of the ITP and to the qualified Desludging Operator. Non-compliance to this article is subject to fines, the amount of which is to be determined by the relevant department of DKI Government'
Article 39	**Qualification and training of ITP Technical Supervisors and ITP Operators** An example of writing of Article 39 'Qualification and training of ITP Technical Supervisors and ITP Operators' 'The company or person who wants to conduct the operation and maintenance service of the ITP (hereinafter referred to 'ITP Operator') in DKI Jakarta area shall register to the DKI Governor. The ITP Operator shall assign at least a person who has obtained the completion certificate of the training course for ITP Operator administered by [name of the institution designated as the training institution (to be decided. It can be a public institution or a private institution such as a group of the suppliers of ITPs which have the operation and maintenance section in Indonesia.)] to each operation and maintenance work of ITP.'
Article 40	**Inspection of ITP performance** An example of writing of Article 40 'Inspection of ITP performance' 'The owner of the building not connected to the sewer system in DKI Jakarta area shall make the effluent water quality of the ITP be inspected by BPLHD or other institutions designated by BPLHD twice a year. If the effluent water quality of the ITP does not meet the effluent water quality standard, the DKI Governor can order the owner of the building, the ITP Supervisor, the ITP Operator or the original supplier of the ITP to improve the operation and maintenance of the ITP so that it may meet the effluent water quality of the ITP. Non-compliance to this article is subject to fines, the amount of which is to be determined by the relevant department of DKI Government.'
Article 41	On-site Sludge treatment An example of writing of Article 41 'On-site Sludge Treatment' 'PD PAL JAYA shall develop the sludge treatment capacity for all the on-site wastewater treatment facilities in the DKI Jakarta area. PD PAL JAYA can charge the sludge treatment cost to the DKI Government.'
	Chapter 8 **Tariff**
Article 42	**Tariff collection** 1. Mayor of City levies sewerage charge on sewerage discharger. 2. Sewerage charge is collected through the method of bill collector, postal transfer form or account transfer in accordance with discharge at every month. 3. Sewerage charge shall be paid within ** days after the end of the previous month. 4. Sewerage charge of discharges from construction works or the other temporary work can be paid in advance if necessary. Bill clearance and succeeding repayment and/or additional imposition will be transacted when the discharger notifies the abandonment of private

	sewer to Mayor of City.
Article 43	**Tariff calculation** 1. Sewerage charge is determined based on the tariff in Table below accordant with the amount of discharged wastewater. 2 Amount of discharged wastewater is determined in accordance with followings: a. Amount of wastewater consumed water supply is deemed to the amount of supplied water. However, in case of two dischargers using one tap together and furthermore not able to determine the individual wastewater amount, Mayor of City will determine the allocated wastewater amount in accordance with water consumption manner. b. Amount of wastewater consumed other than water supply is determined to the actual consumed amount, and Mayor of City determines the amount in accordance with water consumption manner. c. Ice maker and the other business, who remarkably discharge less than supplied water, shall submit the documents of discharged wastewater amount and calculation basis in accordance with the regulation within ** days from the last day of each month. Mayor of City certifies the amount of discharged wastewater accordant with the submitted document in spite of Item 2, this Article. 3. In case that person who starts, suspends or resumes discharge, or abandons private sewer in the middle of the month, sewerage charge is calculated to one month charge. 4. On-site sludge treatment charge is based on ----------.
Article 44	**Request of data submission** Mayor of City can request the documents within necessary extent in order to determine sewerage charge.
	Chapter 9 **Financing**
Article 45	**Subsidy from National Government** Subsidy from National Government (Detailed provisions are stipulated by Government Decree.)
Article 46	**Loan from National Government** Loan from National Government (Detailed provisions are stipulated by Government Decree.)
Article 47	**Free use of national land for sewerage**
	Chapter 10 **Miscellaneous**
Article 48	**Order for improvement** Mayor of City have a right of order to improve the structure and/or the operating practice of private sewer and pretreatment facility. Improvement work shall be completed in the designated duration.
Article 49	**Approval of activity** Person, who applies the approval stipulated in Term 1, Article 24 of Sewerage Law (occupation and use of sewerage), shall submit the application form with drawings below. Person, who alters the licensed matter, shall also submit the application form. a. Layout plan describing the location of facility and/or other property excluding private sewer. b. Layout plan and structure of facility.
Article 50	**Amendment not required approval** Minor changes stipulated in Article of Sewerage Law (occupation and use of sewerage) means the additional attachment which, locates on the land, does not prevent the sewerage function nor affect sewerage facility. And construction works shall be performed in accordance with the licensed purpose of occupation and use of sewerage.
Article 51	**Occupation** Person, who installs objects in land and facility of sewerage and continuously occupies, shall submit the application form and accept the approval in accordance with the regulation.

	Person, who alters licensed matter, shall also submit the application form. a. Purpose of occupation of land and facility of sewerage. b. Duration of occupation of land and facility of sewerage. c. Location of occupation of land and facility of sewerage. d. Structure of occupier e. Plan of construction work f. Duration of construction work g. Restoring method of public sewerage 2 Mayor of City levies occupation charge on person approved by Term 1, this Article.
Article 52	**Survey on use of closed conduit** 1. Person, who installs the electric cable in closed conduit and continuously uses drainage system, shall apply the survey plan to Mayor of City in order to confirm the feasibility of sewerage use. 2. In case applied in accordance with Item 1, this Article, Mayor of City directs the survey method, if necessary, to person who applies the survey plan.
Article 53	**Use of closed conduit** Person, who installs the electric cable and uses the sewerage facility, shall submit the application form and accept the approval in accordance with the regulation. Person, who alters the licensed matter, shall also submit the application form. a. Purpose of use of closed conduit. b. Duration of use of closed conduit. c. Locations of use of closed conduit and installed area of electric cable. d. Structure of electric cable e. Plan of construction work f. Duration of construction work g. Restoring method of sewerage facility 2 In case that applicant executed by himself the survey stipulated in Article 21-2, the survey result shall be attached with the application form stipulated in Term 1, this Article.
Article 54	**Requirement for use of closed conduit** 1. Mayor of City can approve the use of closed conduit in case that application complies with whole requirements followings; a. Electric cable applied to use of closed conduit complies the technical requirements followings in this Items: - Area, where electric cable occupies, does not affect the wastewater drainage nor prevent the sewer operation. - Rate of areas of electric cable and closed conduit as well as number of cables do not affect the wastewater drainage nor prevent the maintenance of sewer. - Structure of electric cable is robust and smooth surface as well as durable, corrosion resistance and water proof. - Sand, soil, sludge and others do not deposit nor prevent remarkably the drainage due to installed electric cable. - Electric cable does not receive voltage in principal. - No other obstacle for sewer operation b. Methods provided by the applicant for construction works and operating practice of electric cable complies with the requirement on construction work and operating procedure. c. Application is not revoked due to the responsibility of applicant (including executive directors such as director, advisor and/or staffs involved to the application within 60 days before the revoked date). d. In case of corporation, there is no revoked directors stipulated in 3. Item 1, this Article. e. In case of personnel, there is no revoked directors stipulated in 3. Item 1, this Article. f. Applicant will not violate the regulation. g. In case that the use of closed conduit is stipulated by the Road Law and the other laws for public infrastructure management, occupation can be permitted (including alteration).

	h. There is an existing plan of electric cable for sewerage management and other public service in proposed closed conduit as well as the applied electric cable plan available for joint construction work. 2. Mayor of City will determine the approval or the rejection within one month after application. 3. In case that the determination is not concluded on the approval or the rejection, Mayor of City will notify the written reason to applicant. 4. In case of the rejection stipulated in Item 1, this Article, Mayor of City will notify the written reason to the applicant. 5. Mayor of City levies the user charge of closed conduit to the applicant.
Article 55	**Requirement of approval** Mayo of City issues the requirement of approval stipulated in Item 1, Article 54 a. In case to suspend the use of closed conduit due to own responsibility, the applicant shall remove the electric cable and restore the closed conduit by own expense. b. In case not to renew the closed conduit use at expiration of permission, the applicant shall remove the electric cable and restore the closed conduit by own expense. c. In case of revocation of the closed conduit use, the applicant shall remove the electric cable and restore the closed conduit by own expense.
Article 56	**Duration of occupation** Duration of the occupation of land and facility of sewerage stipulated in Article 51 is five years or less.
Article 57	**Duration of closed conduit use** 1. Duration of the closed conduit use stipulated in Item 1, Article 53 is five years or less. 2. Mayor of City approves the closed conduit use in case that the owner of electric cable applies the renewal of use in advance to expiration of the licensed use and the application complies with the requirements stipulated in Item 1, Article 54. However, the application of renewal may be rejected in case that Mayor of City admits the reasonable excuse.
Article 58	**Revocation of approval** Mayor of City can revoke in any of the requirement followings; a. Existing electrical cable installed in closed conduit does not comply with the requirement stipulated in Item 1, Article 54. b. User charge of the closed conduit is not paid. c. Electric cable has not been installed within the duration of closed conduit use. d. Closed conduit use is approved through false statement. e. Actual situation is significantly different from the application. f. User of closed conduit violates the requirement of approval. g. Mayor of City admits an inevitable reason for removing the electric cable due to public benefit.
Article 59	**Restoration** 1. Occupier shall remove his property and restore the closed conduit in case that the approval of occupation expires and/or the occupation is not required. However this Article may be not applied in case that Mayor of City admits the reasonable excuse.
Article 60	**Fee** 1. Mayor of City charges the fees of application in the following amounts; a. *** JPY for one registration of professional engineer b. *** JPY for one registration of plumber 2. Fees stipulated in Item 1, this Article are levied at the time of application. 3. Paid fee is not reimbursed.
Article 61	**Demand of user charge** 1. Mayor of City demands the recovery of arears attached with the demand letter in accordance with the regulation to a person who does not pay by due date. 2. Due date of the recovery of arrears stipulated in Term 1, this Article is within ** days after the demand letter issued. 3. Fee for the demand letter is levied to *** JPY per one demand.

	4. Penalty fee of the arrears is levied by calculation of daily pro-rate of ** % per year.
Article 62	**Reduction of and exemption from user charge** Mayor of City can reduce or exempt from the user charge, fee of recovery and/or arrears if necessary due to the public interest and the special circumstances.
	Chapter 11 **Penalty**
Article 63	**Application of penalty** Penalty of ****** or less is levied to the violations followings; a. Private sewer installation, rehabilitation, etc. without the approval stipulated in Article 13. b. Private sewer installation, rehabilitation, etc. violating the stipulation in Article 14. c. Registered professional engineer stipulated in Article 18 by false and wrongful means. d. Person without notification within due date stipulated in Item 1, Article 27 for the private sewer installation, rehabilitation, etc.. e. Person who violates the stipulation in Article 28 and Article 30. f. Person without notification stipulated in Article 32. g. Person who rejects or neglects the submission of documents stipulated in Article 37. h. Person who violates the order stipulated in Article 38. i. Person who does not obey the directions stipulated in Item 2, 3 or 4 in Article 59. j. Persons who submit the false documents stipulated in Item 1 in Article 13, Article 39, Item 2 in Article 13, Article 32, Article 34, c of Item 2 in Article 36 or Article 37.

Referred Ordinance and Law in Japan

White cell	Standard Sewerage Ordinance of Municipality Government in Japan
Green cell	Sewerage Law in Japan (National)
Skin cell	Jhokasou Law in Japan

Reference of Articles 28 and 29, Standard Model of Sewerage Ordinance

Example of Standards for Wastewater Characteristics for Discharge to Sewerage System

Material or Item				Discharge more than 50 m^3/d	Discharges less than 50 m^3/d
Hazardous Substances	Cadmium			Less than 0.1mg/l	Less than 0.1mg/l
	Cyan			Less than 1mg/l	Less than 1mg/l
	Organic Phosphorus			Less than 1mg/l	Less than 1mg/l
	Lead			Less than 0.1mg/l	Less than 0.1mg/l
	Six Equivalent Chromium			Less than 0.5mg/l	Less than 0.5mg/l
	Arsenic			Less than 0.1mg/l	Less than 0.1mg/l
	Total Mercury			Less than 0.005mg/l	Less than 0.005mg/l
	Alkyl mercury			Not detected	Not detected
	Polychlorobiphenyl			Less than 0.003mg/l	Less than 0.003mg/l
	Trichloroethylene			Less than 0.3mg/l	Less than 0.3mg/l
	Tetrachloroethylene			Less than 0.1mg/l	Less than 0.1mg/l
	Dichloromethane			Less than 0.2mg/l	Less than 0.2mg/l
	Carbon tetrachloride			Less than 0.02mg/l	Less than 0.02mg/l
	1,2-Dichloroethane			Less than 0.04mg/l	Less than 0.04mg/l
	1,1-Dichloroethylene			Less than 0.2mg/l	Less than 0.2mg/l
	cis-1,2-Dichloroethylene			Less than 0.4mg/l	Less than 0.4mg/l
	1,1,1-Tricholoroethane			Less than 3mg/l	Less than 3mg/l
	1,1,2-Trichloroethane			Less than 0.06mg/l	Less than 0.06mg/l
	1,3-Dichlotobenzene			Less than 0.02mg/l	Less than 0.02mg/l
	Thiuram			Less than 0.06mg/l	Less than 0.06mg/l
	Simazine			Less than 0.03mg/l	Less than 0.03mg/l
	Tiobencarb			Less than 0.2mg/l	Less than 0.2mg/l
	Benzene			Less than 0.1mg/l	Less than 0.1mg/l
	Selenium			Less than 0.1mg/l	Less than 0.1mg/l
	Boron and its compounds		to river	Less than 10mg/l	Less than 10mg/l
			to sea	Less than 230mg/l	Less than 230mg/l
	Fluoride and its compounds		to river	Less than 8mg/l	Less than 8mg/l
			to sea	Less than 15mg/l	Less than 15mg/l
Environmental and Other Parameters	Total chromium			Less than 2mg/l	Less than 2mg/l
	Copper			3less than mg/l	Less than 3mg/l
	Zinc			Less than 2mg/l	Less than 2mg/l
	Phenolic compounds			5mg/l	-
	Iron (soluble)			Less than 10mg/l	-
	Manganese (soluble)			Less than 10mg/l	-
	BOD	General		Les than600mg/l	-
		Manufacture, gas		Less than 300mg/l	
	SS	General		Less than 600mg/l	-
		Manufacture, gas		Less than 300mg/l	
	Normal Hexane Extract	Mineral oil		Less than 5mg/l	-
		Animal and vegetable oil		Less than 30mg/l	-
	Nitrogen			Less than 120mg/l	-
	Phosphorus			Less than 16mg/l	-
	pH	general		5 to 9	5 to 9
		Manufacture, gas		5.7 to 8.7	5.7 to 8.7
	Temperature	general		Less than 45℃	Less than 45℃
		Manufacture, gas		Less than 40℃	Less than 40℃
	Iodine consumption			Less than 220mg/l	Less than 220mg/l

Source : Example of ordinary city of Japan

(4) Activities for Understanding Legal Background on Sewerage Development and Management
Experience and know-how on sewerage development and on-site wastewater management in oversea including Japan were repeatedly introduced at seminar and workshop in order to foster understanding of relevant organizations because counterpart organization (Dinas Sumber Daya Air) and organizations of sewerage development and management are divided into cluster. Meeting and discussion with individual organization were efficient since concerns of individual organization differ. Necessary know-how were presented to respective person in charge of individual job such as sewerage planning, management of sewerage works, O&M plan, financing for construction and O&M, public relation and public hearing, and others. On-site sludge treatment service, which PD PAL Jaya implemented in 2016, in integrated to mid-term sewerage development program as well as sewerage management. Individual activities are shown in Table 2-81.

Workshop was held for concluding direction of sewerage development and management as well as understanding issues. Participants of BAPPENAS and KOMEKO（NCICD）of National Government, BPBUMD (Development Agency for Regional Enterprise) as administrative organization of PD PAL Jaya and working group member (BAPPEDA, Dinas Sumber Daya Air, BPKLH, DLH, PD PAL Jaya and DGHS) have discussed together. These organizations can share prioritized project, step-wised sewerage development, sewerage tariff, obligation on sewer connection, task and responsibility of on-site wastewater treatment, and others in order to secure sewerage project implementation and financial system.

During a series of activities, Textbook for Working Group “Establishment of Legal Framework for the Sewerage System”, which is introduced in (2) Textbook in ④ Result (Summary and Detail) , is distributed at early stage (June 2016), and revised repeatedly on October and December in 2016, January and March in 2017 through seminars and individual discussion. On-site sludge treatment is a supplemented subject of the textbook through discussion.

Table 2-81 Summary of Technology Transfer on Support for Formulation of Sewerage Regulations

(Yellow colored highlighted: Regional Sewerage Regulation)

No.	Main subject/discussion theme	Date	Form	Target Organization
1	Establishment of Organizational Structure and Legal Framework	4 April, 2016	Small Seminar	PD PAL Jaya
		5 April, 2016		Dinas Sumber Daya Air
		6 April, 2016		BAPPEDA
		7 April, 2016		DGHS
2	Key Points of Legal System on Sewerage Management Governor's Degree No. 41/2016 Financial Policy for Sewerage Development in Japan	31 May, 2016	Special Seminar	BAPPEDA、BPLHD、Biro PKLH, Dinas Sumber Daya Air, PD PAL Jaya, PD PAM Jaya, DGHS
3	Legal Framework	3 August, 2016	Discussion	PD PAL Jaya
5	Sewage management law Revised wastewater standards	3 October, 2016	Discussion	DGHS
	Sewage management law / Wastewater regulation	4 October, 2016	Discussion	PD PAL Jaya
5	・ Accounting Sewerage Works of Municipalities in Japan ・Enhancing Financial Capacity ・ City of Kitakyushu's Experience on Wastewater Management ・Regulating the Operation and Maintenance of Individual Treatment Plants (ITPs) in Commercial Buildings	5 October, 2016	Small Seminar	DGHS
		6 October, 2016		PD PAL Jaya
6	Experience of Oversea and Recommendation to DKI Jakarta Operation and maintenance of on-site wastewater treatment plants in Japan	29 November, 2016	Small Seminar	PD PAL Jaya
7	Sewerage Development Project in Denpasar Domestic Wastewater Management in Bandung On-site Wastewater Management in Surakarta Sewerage Development in Overseas Cities and Recommendations to DKI Jakarta	1 December, 2016	Special Seminar	BAPPEDA, BPLHD, BiroPSKLH, DTA, KPLH, each Wali Kota, PD PAL Jaya, PD PAM Jaya DGHS,BAPPENAS
8	Financing Septage Management in Japan and other countries	26 January, 2017	Small Seminar	PD PAL Jaya
	Operation and maintenance of on-site wastewater treatment plants in Japan	6 February, 2017		BAPPEDA
9	Framework and road map of sewerage regulations in Jakarta Sewerage finance and fee structure	23 March, 2017 24 March, 2017	Workshop	BPBUMD, PD PAL Jaya, DGHS, KEMENKO (NCICD), BAPPENAS, BPKLH, DLH, BAPPEDA, Dinas Sumber Daya Air

No.	Main subject/discussion theme	Date	Form	Target Organization
10	Abstract : Report on Achievement of Technical Cooperation Project and Learning of overseas experience [Part 1] Regulations on Sewerage / Sewage Management [Part 2] Sewerage Development in DKI Overseas Sewerage Development Situations in Ho Chi Minh Overseas Sewerage Development Situations in Bangkok Overseas Sewerage Development Situations in Kuala Lumpur	23 May, 2017	Special Seminar	DGHS, KEMENKO, BPBUMD, PD PAL Jaya, PD PAM Jaya, BPKLH, DLH, BAPPEDA, Dinas Sumber Daya Air, KEMENKO (NCICD), BAPPENAS
10	Explanation session on how to use the textbook on sewerage regulations	30 May, 2017	Explanation Session	Dinas Sumber Daya Air

Source : JICA Expert Team

2-1-3-2-5 High Official Conference

High Official Conference was hold on 15 December, 2016. This conference was coordinated with JICA Indonesia office and its targets were the government officials over Director-Generals, who have the authority to decide on the policies (the level of Director-Generals of the central government and DKI Jakarta). It was aimed to gain inputs from the central government for the Mid-Term Sewerage Development Plan or the regulations which the Project supported to formulated, etc. through the conference.

Besides, since members of JICA Expert Team were absent in Jakarta at this time, the chief advisor attended the conference from the Project.

Table 2-82 Summary of High Official Conference

Date	7:00～10:00, 15 December, 2016, Thursday
Place	Mandarin Oriental Hotel
Participants	・Mr. Arifin Rudiyanto, Director of Regional Development, BAPPENAS (Chairperson) ・Mr. Wahyu Utomo, Deputy Minister for Infrastructure Acceleration and Regional Development, KEMENKO ・Mr. Dodi Krispratmadi, Director of Environmental Sanitation Development, DGHS, Ministry of Public Works and Housing ・Mr. M.Z. Fatah, Director of Water Resources and Infrastructure, KEMENKO ・Mr. Kurniawan Ariyadi, Director of Bilateral Foreign Funding, BAPPENAS ・Ms. Tri Dewi Vergiyanti, Director of Urban, Housing and Settlements, BAPPENAS ・Mr. Donny Azan, Director of Water Resources and Irrigation, BAPPENAS ・Ms. Tuty Kusumawati, Head of BAPPEDA, DKI Jakarta ・Mr. Heru Budi Hartono, Head of BPKAD (Regional Asset Financial Management Bureau), DKI Jakarta ・Mr. Subekti, President of PD PAL Jaya ・Others, Managers of the related institutions and JICA concerned persons, etc. Total 40 participants
Key Discussions	(1) Opening remarks and Explanation of the aim of the conference (Chairperson) It is necessary to meet the Readiness Criteria for the green book publication. In addition, in DKI Jakarta, land use, budget allowance for construction of sub-trunk and house connection, and improvement of management of treatment plants are necessary. (2) Report on the progress of sewerage development in Jakarta (Director of Environmental Sanitation Development, DGHS, Ministry of Public Works and Housing) As for procurement of consultants for Zone-1, we wait for LKPP to reply. And we plan to report the next step to JICA after our receipt of the response. We would like to start construction in December, 2018. For Zone-6, we hope to promote implementation by Design-Build method, but has not received a clear answer from JICA yet. Also, we think that it is possible to conduct the basic design of Zone-6 in the consultant agreement to be hired at Zone-1, but it is necessary to

	discuss this point with JICA in the future. [Mr. Wahyu Utomo, Deputy Minister for Infrastructure Acceleration and Regional Development, KEMENKO] This project is the national strategic project and it is necessary to start construction within 2018. In the current schedule, it is planned to start construction at the end of 2018, but we would like to consider further promotion measures. (3) Explanations and Comments (the Government of DKI Jakarta [Ms. Tuty Kusumawati, Head of BAPPEDA, DKI Jakarta] We would like to confirm the coverage of the detailed design to be implemented by the central government with loan. Also, we would like to know which cooperation scheme are used, MRT type or BBWSCC (NCICD) type. (MRT type is more convenient for DKI Jakarta). [Iwan, Head] We understand the burden of DKI Jakarta is simple APBD without use of loans etc. [Mr. Dodi Krispratmadi, Director of Environmental Sanitation Development, DGHS, Ministry of Public Works and Housing] Detailed design, including the responsibilities of DKI Jakarta', is carried out by a consultant employed by the central government. [Mr. Heru Budi Hartono, Head of BPKAD (Regional Asset Financial Management Bureau), DKI Jakarta] There are 3 options for the site of Zone-1. I think ② is good, but ③ is also possible. Return land use rights (HGP) to BPKAD. However, the process of returning the right to use takes a considerable amount of time. First of all, JAPRO calls the shareholders' meeting, gets approval from the governor, goes to the local council, and eventually revises the regional regulations. The Governor instructs JAPRO to use the site as a sewage treatment plant and JAPRO approves it. However, in this case, it is necessary to discuss the cooperation scheme between PDPAL which will be operators of sewerage treatment plants) and JAPRO. Conclude land loan agreement. Independent appraisal is required for loan charge setting. (4) Explanations and Comments (JICA Indonesia office) Regarding the application of Design Build Method in Zone-6, it will be considered in supplementary survey. As for the supplementary survey, JICA considers it best to remove all facilities, but accepts 2 alternatives argued by DKI Jakarta, and considers the feasibility in the survey. If it is not agreed, the survey can not be carried out fully and the schedule will be late. We would like to agree early and to sign before December 19 in order to promote the project. Also, we would like you not to add or change the existing facilities (such as affecting the survey). until the end of the survey. [Mr. Wahyu Utomo, Deputy Minister for Infrastructure Acceleration and Regional Development, KEMENKO] For private investment, Availability Payment can be applied, so there is an option to use the same scheme. [JICA] For Zone-6, FS and the supplementary survey are undertaken on the premise of using ODA loans. We would like to tell that additional investigation will be required if PPP scheme is implemented. JICA plans to conduct consultations on the provision of a loan to Zone-6 next year. If you are going to change the fund scheme and wish to implement it in PPP, we would like you to share information

	as soon as possible. [Mr. Arifin Rudiyanto, Director of Regional Development, BAPPENAS] It is not necessary to worry about Zone-6 because it was decided by the conference to be implemented under ODA loan. The PPP scheme should be considered for other zones. [Mr. Donny Azan, Director of Water Resources and Irrigation, BAPPENAS] As for NCICD, we are considering the use of clean water and wastewater treatment. In particular, we would like to consult on use of clean water with the Ministry of Public Works and Housing in the future.
Summary	1. Detailed design to be implemented by the central government through loans is not limited to implementation for the part that the central government constructs, but the entire construction work of this project. 2. Zone-1 is implemented not by PPP scheme but by foreign loan (APBN) and net APBD (without subleasing loan). 3. For the site of Zone-1, a land loan agreement shall be concluded with JAPRO. The matters concerning the site shall be resolved before the FF mission (around March, 2017). The related documents shall be submitted to JICA before the appraisal. 4. Regarding the selection of consultant in Zone-1, the Ministry of Public Works and Housing will notify JICA about the next steps after receiving a reply from LKPP. 5. It is necessary to conclude concerning the sharing of funds and the allocation of roles of each stakeholder between the central government and DKI Jakarta. 6. Regarding the layout of the site of Zone-6, BAPPENAS compiles the contents of each site by December 19 under each institutions confirming the contents. If all parties agree, the Minutes will be signed. 7. The Design Build Method for Zone-6 is discussed between JICA and Ministry of Public Works and Housing continuously.

2-1-3-2-6 Workshop in Camping

Workshop in Camping was held on 2 days, 23 and 24 March, 2017 at Bogor. Chief Advisor and JICA Expert Team formulated plan, supervised the workshop and arranged the logistics with the support of JICA Indonesia office. The aims of this workshop was for staffs of the states (Ministry of Public Works and KEMENKO) and DKI Jakarta / PD PAL Jaya, which are mainly responsible to sewerage / the environmental policy, to understand process of formulating the plan and regulations and develop the awareness of their owners, by the form to consult and propose solutions by group work regarding main themes related to the formulation of Mid-Term Development Plan and regulations. In each session, active discussion was given by group work, and common sense was created among participants concerning the direction of the Mid-Term Development Plan and the regulations. The summary of the workshop is shown below:

Table 2-83 Summary of Workshop in Camping

Date	23, Thursday～24 March , 2017, Friday
Place	Rancamaya Golf Estat Bogor, meeting room
Participants	・KEMENKO ・Sub-Directorate of Wastewater, Directorate of Environmental Sanitation Development, DGHS ・BAPPEDA, DKI Jakarata ・DLH, DKI Jakarata ・Biro PKLH, DKI Jakarata ・BPLHD, DKI Jakarata ・Dinas Sumer Daya Air, DKI Jakarata ・BPBUMD, DKI Jakarata ・PD PAL Jaya ・JICA Indonesia office ・Project Team (Japanese Experts and Local staffs) Total 36 participants
Lecture Contents	・Criteria and evaluation regarding the Mid-Term Development Plan ・Project implementation plan and the goal for the next 5 years ・Framework and road map of sewerage regulations in Jakarta ・Sewerage finance and fee structure
Key Discussion	1. Criteria and evaluation regarding the Mid-Term Development Plan ・Major criteria are consistency with the NCICD plan, and other adjustments with PPP and socio-economic conditions should be added to the criteria, too. ・Regarding the priority order, the zone in coast has higher priority like Zone-8. [Mr. Matsumoto, Chief Advisor] Impact by NCICD is very large. Although it is evaluated the priority of Zone-8 is high, there is also a possibility of being changed. Politically, water supply and MRT have higher priority than sewerage development. Under such circumstances, it is important to secure profitability from fee collection from commercial districts and residential districts. [Mr. Kanai, Chief Advisor / Sewerage Service Policies and Sewerage Development Plan] The most important thing to start sewerage projects is whether site of treatment plant can be secured or not. If the site is secured, it is not difficult to implement sewerage project. 2. Project implementation plan and the goal for the next 5 years ・In formulating the plan of decentralized sludge treatment, 1,000 communal facilities (SANIMAS) can be achieved, for which cooperation and participation of DKI Jakarta, local autonomous community (kelurahan) and local residents are essential. ・Regarding the achievement targets for the next five years, it is necessary to set practical and measurable indicates. It is also formulated in consideration of finance, process of design and construction, operation and maintenance and political background. [Mr. Imam, BPBUMD, DKI Jakarta] Currently, there are 31 existing sludge collection vehicles, but how many additional vehicles does DKI Jakarta need? [Mr. Haley, BAPPEDA] As well as adding PD PAL Jaya's sludge collection vehicles, it is necessary to expand the capacity of the existing sludge treatment facilities in Duri Kosambi and Pulo Gebang, and it is an

	urgent issue to secure budget sources. [Mr. Johan, PD PAL Jaya] Assuming that it is necessary to remove sludge from 800,000 households in 3 years by 2022, it is estimated that 270,000 households or 739 sludge collection vehicles are needed per year. If the amount collected per day is increased doubling, it will be 370 vehicles to be need. This is aimed at achieving by collaborating with the private sector, and it is also planned to be included in PD PAL Jaya's medium term plan. PD PAL Jaya plans to collaborate with the private sector instead of monopolizing it. [Mr. Albert, DGHS, Ministry of Public Works and Housing] Regarding SANIMAS, I visited the sites of Zone-1 and 3. The facilities are built at 5-6 places in one village/city and I was impressed that the quantity is realistic. Therefore, if the target village/city actively conducts land acquisition etc., it will be possible to implement the facilities at 1,000 places. [Dr. Kim (Operation and Management of Facilities)] Many officials think that the project ends after completion of facilities and his responsibility ends up. But, it is not in in reality. Even regarding SANIMAS, it is necessary to consider operation and maintenance of it. And there are cases where the quality of discharged water (treated water) is not improved so much, for example. Therefore, policies are needed on how to do operation and maintenance, and to manage the cost. Same as sewerage, we like not you to forget that operation and maintenance is the most important. Completion of the facility is not the end of the work but the beginning [Mr. Matsumoto, Chief Advisor] Although construction process and step-wised development plan were presented in the presentation, I would like to ask you how to consider securement of budgets and traffic congestions to be expected according to plan A to complete main facilities in the prioritized 6 Zones until 2022. Is it practically / technically feasible? In plan A, the maximum annual budget is 8 trillion IDR. On the other hand, according to Mr. Haley's information, the annual budget of DKI Jakarta is 60-70 trillion IDR. Is it realistic to take more than 10% of the annual budget of DKI Jakarta on sewerage projects that are not high prioritized? Also, it takes time to lay sewage pipeline and construct treatment plant. Generally it takes 3-4 years on the premise that the site is secured. It has been experienced that it takes more than 1 year for pipe laying construction with a distance of 300 m, a caliber of 1 m and a depth of 6 m by a jacking method, due to the necessity to deal with underground buried objects. In other words, it is necessary to take into account that physical difficulties are encountered when construction starts for main trunk /interceptor sewer, but also secondary & tertiary pipe or house connection. The time actually taken for construction must be considered. [Dr. Kim (Operation and Management of Facilities)] As for construction of treatment plant, the detailed design (DED) is required first. In this schedule, it is planed that the detailed design is implemented from 6 months to 1 year and construction work is done for 2 years, but in practice it will take 1 year to prepare for construction and 3 to 10 years for construction. In other words, this plan is not realistic, and we better see the reality more

	3. Framework and road map of sewerage regulations in Jakarta ・Constitution and main article: It is important to include allocation of duties, obligation of connection to sewerage, fee system, penalties etc. as is seen in examples of other cities. General matters, obligations, certain contents that will not be changed in the future are included in the regulations, the details of fee etc. and the contents to be changed are included in the Governor Degree. ・Roadmap up to the enforcement of regulations: With regard to the importance of wastewater management, it is necessary to improve the awareness of citizens in Jakarta through public relations and residents' awareness raising activities, and promote the issuance of sewerage regulations. 4. Sewerage finance and fee structure ・Distribution of the regional and national resources in sewerage finance will be determined at a later date. ・Revision of fee and the burden on society are responded to the service level and are necessary for strengthening social recognition and responsibility. [Yakuro INOUE (Establishment of Organizational Structure and Legal Framework)] The target of development of sewerage in Jakarta is 65 %, which is a very high numerical value. Management of miscellaneous wastewater remains even on site and water pollution control. Planning for periodic sludge removal is very easy and on the schedule sewage management and development plan for the service area by DKI Jakarta can reach 100%. However, the population of sewerage service is still low, so I would like you to consider how to approach it to the goal of Master Plan. In our proposal, it is expected to step-wisely develop in accordance with the administrative policy of project implementation. 5. General Remarks [Mr. Matsumoto, Chief Advisor] This kind of workshop has been held at the first time since the project began 1 year and a half ago. Although, a total of 8 small seminars by JICA Expert Team was held until now, this time it is very meaningful that the officials in the Indonesian side could exchange opinions. Technology transfer is also important, but support for capacity building support is important as well. Various results were seen for each group through discussion. We need to undertake sewerage project in Jakarta. This process is very useful, although not all of the participants are responsible for formulating medium-term plan and business plan, and may not have decision-making right on their positions. Do you want to join another workshop next time? Though I do not know your impressions, it was a very good argument to me. [Mr. Eko, Dinas Sumer Daya Air] I thank JICA for holding this workshop. Our discussion together this time will lead to the government of DKI Jakarta re-recognizing sewerage project. I am grateful that all the participants engaged actively in the discussion and provided input and suggestions to promote sewerage development in Jakarta. This workshop is the first step to raise awareness of sewerage management.

	6. Conclusion Participants are willing to participate as well as this time if there is a workshop on other agenda. This discussion will be reflected in sewerage development in Jakarta. This workshop is one of the capacity building activities for DKI Jakarta. In addition, through this workshop we were able to exchange information and opinions among the officials related to sewerage in Jakarta, in an effort to promote improvement of sewage / wastewater management in Jakarta.

Workshop in Camping (Day 1)
(23 March, 2017)

Workshop in Camping (Day 1)
(23 March, 2017)

Workshop in Camping (Day 1)
(23 March, 2017)

Workshop in Camping (Day 1)
(23 March, 2017)

Workshop in Camping (Day 2)
(24 March, 2017)

Workshop in Camping (Day 2)
(24 March, 2017)

2-1-3-3 JCC

JCC meeting was held on 1 June, 2016 and the information regarding the current progress of the Project and the future plan of the activities was shared between the Indonesian side and the Japanese side. The summary of the JCC is shown below. Also, as for the minutes of the JCC, refer to “Annex 4 “Minutes of Discussion (R/D, M/M and Minutes of JCC)””.

Table 2-28 Summary of 2nd JCC

Date	8:30～13:00, 1 June, 2016, Wednesday
Place	Mercure Jakarta Sabang Hotel
Participants	・BAPPEDA (City Infrastructure and Environmental Division), DKI Jakarta ・BAPPENAS ・BPLHD, DKI Jakarta ・Biro PKLH, DKI Jakarta ・Dinas Sumber Daya Air, DKI Jakarta ・PD PAL Jaya ・Sub-Directorate of Wastewater, Directorate of Environmental Sanitation Development, DGHS ・JICA Indonesia office ・Project Team (Japanese Experts and Local staffs) Total 39 participants
Seminar Contents	
9:00-9:10	Opening Remarks (Ms. Tuty (*Head of BAPPEDA*)
9:10-9:20	Outline of the Project (Mr. Matsumoto (*Chief Advisor*))
9:20-9:40	Sewerage Plan in DKI Jakarta (Ms. Tuty (*Head of BAPPEA*))
9:45-10:45	Progress of the Project and the future plan for the activities (Mr. Nabeta (*Project Coordinator*) and Mr. Kanai (*Chief Advisor / Sewerage Service Policies and Sewerage Development Plan*))
10:45-11:50	Questions and Answers / Comments
11:50-12:00	Closing Remarks (Ms. Tuty (*Head of BAPPEDA*))
12:00-13:00	Lunch
Questions and Answers	[Mr. Nugroho, Director of Settlement and Housing, BAPPENAS] With the implementation of the NCICD project, development of sewerage in Jakarta must be promoted as soon as possible. In order to process all the domestic wastewater in the capital by 2030, it is planned to carry out development promptly from the high priority (affecting NCICD directly) Zone, and DKI Jakarta is able to implement necessary budget measures to complete within the due date. Training for the Project should be content that directly affects accelerating sewerage development. [Ms. Tuty, Head of BAPPEDA] By reviewing the overall Master Plan based on the Acceleration Plan, I think that we can understand how difficult it is to lay sewer main pipes. I would like you to add such content in the next training. Also it is important that DKI Jakarta and the central government cooperate. [Mr. Tanozisochi, Directorate of Integration on Settlement Infrastructure, DGHS]

	I request to visit the preceding sewerage developing cities in Indonesia such as Yogyakarta and Denpasar for comparative study. [Mr. Erwin, PD PAL Jaya] I suggest the importance of on-site system for speedy wastewater management in DKI Jakarta and ask to incorporate more on-site system in the training plan. [Mr. Agus, Head of Wastewater Division, Dinas Sumer Daya Air] I propose to expand the number of target organizations for the next training in Japan, such as BPTSP (Jakarta One-Stop Integrated Services Agency), Biro PKLH (Bureau of City Planning and Environment) and D (Cleaning Office) etc. [Mr. Kanai, Chief Advisor / Sewerage Service Policies and Sewerage Development Plan] In Tokyo, it took 40 years to develop sewerage system in the whole area, and enormous amount of money was spent. It is assumed that the same amount of time and money will be spent on development in Jakarta of the same scale as Tokyo. For example, according to laying sewage main pipes, if the construction period is short, drilling work will be carried out all at once and cause further traffic congestion. Also, since pipe construction inside of the embankment is soft ground, it is very difficult. Based on these backgrounds, it is required to formulate and implement possible business plans. [Mr. Harada, Senior Representative, JICA Indonesia office] JICA already has been supporting loan projects for Zone-1 and 6. As JICA, it is a top priority to complete these Zones as soon as possible, and other Zones should be implemented with other sources of funding. I also understood the importance of development of on-site system.

2nd JCC
(1 June, 2016)

2nd JCC
(1 June, 2016)

2nd JCC
(1 June, 2016)

2nd JCC
(1 June, 2016)

2nd JCC
(1 June, 2016)

2nd JCC
(1 June, 2016)

3rd JCC was hold on 11 January, 2017 and JICA Expert Team also participated in it. Information concerning the progress of the activity in the first period and the future plans of the activities was shared between the Indonesian side and the Japanese side, and issues and the future directions in sewerage development in Jakarta were discussed. At this meeting, the Japanese side proposed to extend the term of long-term experts and it was confirmed that DKI Jakarta hope the Project is extended.

Furthermore, the participants acknowledged that DKI Jakarta is the main entity to formulate the draft of the sewerage regulations and Mid-Term Development Plan, and JICA Expert Team is in a position to support it technically.

Table 2-85 Summary of 3rd JCC

Date	8:30～13:00, 11 January, 2017, Wednesday
Place	Mercure Jakarta Sabang Hotel
Participants	・BAPPEDA (City Infrastructure and Environmental Division), DKI Jakarta ・BAPPENAS ・BPLHD, DKI Jakarta ・Biro PKLH, DKI Jakarta ・Dinas Sumber Daya Air, DKI Jakarta ・PD PAL Jaya ・Sub-Directorate of Wastewater, Directorate of Environmental Sanitation Development, DGHS ・Department of Water Resources, Directorate of Water Resources and Infrastructure, KEMENKO ・JICA Indonesia office ・Project Team (Japanese Experts and Local staffs) Total 31 participants
Seminar Contents	
9:00-9:20	Opening Remarks (Ms. Tuty (*Head of BAPPEDA*)
9:20-9:30	Self-Introduction by Participants
9:30-9:40	The plan of the activities approved at the 2nd JCC meeting (Mr. Matsumoto (Chief Advisor))
9:40-10:10	Progress of the Project and the future plan for the activities (Mr. Nabeta (*Project Coordinator*) , Mr. Eko (*Head of Division of Wastewater, Water Supply & Wastewater Planning, Dians Sumber Daya Air*) and Mr. Kanai (*Chief Advisor / Sewerage Service Policies and Sewerage Development Plan*)
10:10-11:50	Questions and Answers / Comments
11:50-12:00	Closing Remarks (Ms. Tuty (*Head of BAPPEDA*))
Questions and Answers	[Ms. Tuty, Head of BAPPEDA] As for regulations, it comes as a next step to formulate “Academic Paper” including fee structure, which Dinas Sumber Daya Air are considering. I would like you to refer to the examples of other cities in Indonesia and Tokyo / Kitakyushu etc. It is necessary to manage communal system or on-site in addition to wide-area sewerage in parallel and connect to sewer main pipes in the future. The environmental standards issued by Ministry of Environment and Forestry for E. coli is 3,000 MPN, and appropriate sewage treatment must be adopted. [Mr. Junifer, PD PAL Jaya] Regarding Communal System, is it possible to update existing treatment plant like the one in Malakasari district with the support of JICA? As for sewerage fee, it is also an idea to set the fee of Communal System and collect it in the district where the connection to the main sewer system is still ahead. [Ms. Tuty, Head of BAPPEDA] I would like to start construction / operation and maintenance of large-scale facilities, referring to the example of Malakasari district. In addition, it is necessary to proceed with the project, coordinating it with the related organizations in DKI Jakarta. For that, I would like to ask for further training to JICA.

	[Mr. Harada, Senior Representative, JICA Indonesia office] JICA is considering the development of a communal system through JICA's SME (Small and Medium-sized Enterprise) support scheme in Malakasari. Pilot project in Malakasari shows to be more relevant to impose fee system. It is necessary to start collecting user charge at Malakasari regardless of enough legal background. [Ms. Tuty, Head of BAPPEDA] We need the regional regulation regarding sewerage fees. ［Mr. Andro, Head of Environmental Impact Management Division, BPLHD］ BPLHD got involved in formulating Master Plan on sewerage system in Jakarta from 2011. According to Master Plan, 20 % of the area is not covered. And these areas are necessary to be covered with Communal System and on-site, and I think that the regulations on periodic sludge removal by PD PAL Jaya should also be included in the regulations. [Mr. Dandi, Division of Water Resource Conservation and Water Damage Control, Assistant Deputy for Water Resource Infrastructure, KEMENKO] Related to the capacity building, I would like to know the agenda for the next training in August or September, 2018 in Japan. We need material of training about calculating VFM (value for money) regarding AP (Availability Payment) for document bidding. [Mr. Matsumoto, Chief Advisor] We can arrange the course for PPP or AP scheme in the next training if the Project is extended. [Ms. Kitamura, Project Formulation Advisor] It is necessary to confirm about the pros and cons of the extension of the Project by 2018 at this JCC meeting. For that reason, we may compare the current situation with the goal and extend it if the project cannot be achieved by May this year. First of all I would like to confirm if it is extended or not. [Mr. Dandi, Division of Water Resource Conservation and Water Damage Control, Assistant Deputy for Water Resource Infrastructure, KEMENKO] If the Project cannot be extended, it is able to involve the lectures on AP, VFM and tender documents in small seminars, and it is not necessary to coordinate the trainings even particularly. [Ms. Tuty, Head of BAPPEDA] Whether the AP, VFM and tender documents are involved in small seminar, workshop or he next training, it is clear that DKI Jakarta government need those materials. [Mr. Harada, Senior Representative, JICA Indonesia office] As for the extension of the Project, JICA needs the request from the Indonesian side and JICA headquarters will decided if it can be extended or not. In fact, do you think that the extension is necessary? [Ms. Tuty, Head of BAPPEDA] We would be pleased if the Project can be extended until March, 2018 to improve future capacity

	for DKI Jakarta and the central government. [Ms. Erly, Directorate of Environmental Sanitation Development, DGHS] Regarding the Project extension based on the reason that it need to transfer knowledge from JICA Expert Team's output to local consultant since they will take in charge in May 2017. If there will be no project extension, the local consultant should be involved in before May 2017 and transferred knowledge from JICA Expert Team to the local consultant for 1-2 months. Regarding the promotion plan for sewerage development, for example, it is said that sewerage has been improved in Zone-0, but sewerage system has not been fully developed because the MBBR treatment plant is not in operation. Therefore, it is proposed the plan that 1,000 SANIMAS (community base sanitation) are constructed until 2019 as is mentioned by Vice Governor, is implemented in parallel with the projects in 14 Zones in order to promote sewerage development. 13 land locations in the Ciliwung River Basin belong to Regional Office of Ciliwung-Cisadane River Basin (Balai Besar Wilayah Sungai Ciliwung Cisadane) that can be used for wastewater treatment plant construction. Also, I would like you to share the Terms of Reference for JICA short-term expert that will be dispatched in two times. Confusion about the allocation of tasks in the Project is occurring. As for RPJMD, there are difference of priority between Master Plan and NCICD. I would like you to proceed with the recognition that 6 Zones which DED conducted by PD PAL Jaya targets have higher priority. In addition, it is preferable that JICA Expert Team refers to the survey results conducted by INDII-AUSAID, and the proposals of both shall be similar / correlated. Concession of underground structures must be resolved by coordinating with other relevant agencies. [Ms. Tuty, Head of BAPPEDA] Bidding for local consultant for regulation will be do immediately. Although DKI Jakarta is under formulating regulations about the sewerage related, but it does not have regulations regarding underground structures of MRT or pipes. [Ms. Yosi, Biro PKLH] There was a notice from Deputy Governor that the target district arranges the site for the treatment site of Communal System, but there is no district that currently secured the site. Zone-2 has small facility scale and is named as a treatment district following Zone-1 and 6, but discussion on the treatment site is required. I think that it will be able to start easily in the treatment area, which is public sites of DKI Jakarta or the government office. Regarding on-site, mainly PD PAL Jaya is prepared for the regulations on periodic sludge removal including fee. [Ms. Tuty, Head of BAPPEDA] I would like Working Group to seriously discuss these agendas. Regarding the priority order as well, it is necessary to reflect NCICD, apply budget measures in the prioritize Zone following Zone-6, and promote project implementation.

	[Ms. Erly, Directorate of Environmental Sanitation Development, DGHS] Although there was an expression called output by the consultant, who formulate the draft of the Medium Term Development Plan and the regulations? Is that a consultant? [Mr. Kanai, Chief Advisor / Sewerage Service Policies and Sewerage Development Plan] JICA Expert Team supports BAPPEDA and DKI Jakarta to draft the Mid-Term Sewerage Plan and the regulations. [Mr. Inoue, Establishment of Organizational Structure and Legal Framework] Dinas Sumber Daya Air is as a main actor of arranging regional regulation completely and JICA Expert Team supports it. Regarding the Record of Discussion (R/D) that signed in 2014, JICA Expert Team will give necessary guidance. It also mentioned in the plan of operation that DKI Jakarta draft the Mid-Term Sewerage Plan in consultation with JICA Expert Team. [Ms. Tuty, Head of BAPPEDA] I understood it. The main actor of the Project is DKI Jakarta and it implements the activities under the support of the JICA Expert Team. The details are discussed and shared in Working Group in the future.

3rd JCC
(11 January, 2017)

3rd JCC
(11 January, 2017)

4th JCC was held on 31 May, 2017. Regarding the extension of the Project (for only Chief Advisor and Project Coordinator), which was raised on the agenda at the previous JCC meeting, it was reported that the extension until March 2018 was approved. Also, since this JCC meeting is the last time for JICA Expert Team the consultant made a report on the activities and results of the output 2 of the Project. Regarding the Mid-Term Sewerage Development Plan and the sewerage regulations, it was agreed that the draft is formulated by the Project and DKI Jakarta finalizes it.

Table 2-86 Summary of 4th JCC

ate	12:30-16:00, 31 May, 2017, Wednesday
Place	DKI Jakarta Main Government Building (Balai Kota) 22F Meeting Room (Ruang Seribu Wajah)
Participants	・BAPPEDA (City Infrastructure and Environmental Division), DKI Jakarta ・BAPPENAS ・BPLHD, DKI Jakarta ・Biro PKLH, DKI Jakarta ・Dinas Sumber Daya Air, DKI Jakarta ・PD PAL Jaya ・Sub-Directorate of Wastewater, Directorate of Environmental Sanitation Development, DGHS ・Department of Water Resources, Directorate of Water Resources and Infrastructure, KEMENKO ・JICA Indonesia office ・Project Team (Japanese Experts and Local staffs) Total 42 participants
Seminar Contents	
12:30-12:50	Opening Remarks (Ms. Tuty (Head of BAPPEDA)
12:50-13:10	Self-Introduction by Participants
13:10-14:10	Progress of the Project and the future plan for the activities (Mr. Nabeta (*Project Coordinator*) , Mr. Eko (*Head of Division of Wastewater, Water Supply & Wastewater Planning, Dians Sumber Daya Air*) and Mr. Kanai (*Chief Advisor / Sewerage Service Policies and Sewerage Development Plan*)
14:20-15:50	Approval of the Results and Questions and Answers
15:50-16:00	Closing Remarks (Mr. Ozwar, *Deputy Governor of Spatial Planning and Environment Planning, DKI Jakarta*)
Questions and Answers	Proceedings were advanced by Dr. Oswar (Deputy Governor of Spatial Planning and Environment Planning, DKI Jakarta) after Ms. Tuty (Head of BAPPEDA) went away from the meeting. Main discussions and decisions are described below: ・Wastewater treatment should be the top priority project in Jakarta. ・Sewerage development takes long period. Therefore, considering communal sewerage plays an important role, the medium term plan of wastewater treatment development should be established in order to achieve Master Plan of sewerage development combining on-site treatment and sewerage. ・As for sewage treatment, the criteria of development plan should be NCICD. ・The Mid-Term Sewerage Development Plan is based on Case-B in consideration of leveling of the budget. As the Medium Term Development Plan to achieve the policy objective of “100 (clean water access) - 0 (slum area) - 100 (sanitation facilities dissemination)”, Case-C should be considered in addition to resolution of slum area / open defecation. We (JICA Expert Team) understand sanitation as basic infrastructure and comment on the current issues, priority of measures and the amount of development in the Mid-Term Sewerage Development Plan. It is considered that water pollution problems and hygiene issues should be discussed separately. Moreover, mapping and project cost which DKI requires are not included in the scope of the service of JICA Expert Team. (Items of discussion between JICA and DKI).

4th JCC
(31 May, 2017)

4th JCC
(31 May, 2017)

4th JCC
(31 May, 2017)

4th JCC
(31 May, 2017)

4th JCC
(31 May, 2017)

4th JCC
(31 May, 2017)

2-2 Achievements of the Project

2-2-1 Outputs and Indicators

Outputs and indicators of the Project are stated as follows:

Table 2-87 Outputs and Indicators of the Project

Outputs	Indicators
(Output 1) Job allocation among relevant organizations in DKI Jakarta is clarified.	Job description required for sewerage works is clarified.
(Output 2) Planning capacity of staffs for sewerage system is enhanced.	Sewerage development plan is formulated.

(1) Achievement of Output 1

According to Output 1, implementation structure, its status and responsible duties of the relevant organizations for sewerage works in DKI Jakarta were confirmed, and the activities necessary for the execution of their duties in charge were specifically stipulated. Moreover, challenges on each organization concerning the implementation of sewerage projects were extracted, and methods for solving problems on them were examined.

(2) Achievement of Output 2

As is shown in the above table, the indicator of “Output 2 Planning capacity of staffs for sewerage system is enhanced.” is “Sewerage development plan is formulated,” and its achievement is explained below.

Although the details of “2-1-3-2-3 Activity 2-3 DKI drafts mid-term sewerage development plan in DKI Jakarta in consultation with JICA experts.” is explained, DKI Jakarta formulates a 5-year medium-term development plan on 14 fields of DKI Jakarta projects. The 5-year mid-term development plan is compiled by BAPPEDA, and sewage staffs of Water Resources and Environment Sanitation Division, which are Counterparts of the Project, are formulating the sewage field of the mid-term development plan.

At the time of project implementation, it was the stage of preparing for the next 5-year mid-term development plan “RPJMD” (2018-2022), therefore in the Project, it was agreed with the counterpart that the sewerage edition of the 5-year mid-term development plan is formulated. In the plan “RPJMD” (2018-2022), there is no chapter of sewage alone, and the information is

sprinkled in the above-mentioned 14 fields. This sewerage edition is regarded as a reference material, where information based on these one, is organized and summarized.

This time, the final version of the sewerage edition of the 5-year mid-term development plan "RPJMD" was submitted to the Indonesian side in May, 2017. On the basis of this, the next 5-year mid-term development plan "RPJMD" (2018-2022) will be approved through the following procedures in the future.

May, 2017 : Edit
October, 2017 : Assignment of a New Governor
April, 2018 : Finalization and Submission to the Provincial Assembly
June, 2018 : Approval by the Provincial Assembly
August, 2018 : Declaration

As a result, the indicator of Output 2-2 "Sewerage development plan is formulated.," at the end of the period of experts dispatch, organization of necessary information and acquisition of knowledge are ended, and they will be incorporated into the formulation of 5-year mid-term development plan "RPJMD" (2018-2022) by the Indonesian side from now on.

2-2-2 Project Purpose and Indicators

Project purpose and indicators of the Project are indicated below:

Table 2-88 Project Purpose and Indicators in the Project

Project Purpose	Indicators
Implementation structure of sewerage works in DKI Jakarta is strengthened.	Detailed regulations of Governor Decree, which prescribes organization and job description, is issued.

As is described in the above table, the indicator of "Project Purpose Implementation structure of sewerage works in DKI Jakarta is strengthened." is "Detailed regulations of Governor Decree, which prescribes organization and job description, is issued." and its achievement is explained as follows:

In the Project, support for formulation of regulations is implemented. (Refer to "2-1-3-2-4 Activity 2-4 DKI drafts Regional Regulation or compulsory rules to manage and operate the

entire development of centralized waste water system in consultation with JICA experts." in detail) During the dispatch of the experts (from Dec, 2015 to May, 2017), support for formulating the draft of regulations (framework) was conducted. And then, after the investigation / planning the draft by local consultant employed on the Indonesian side, approval by the parliament is following, and it is expected that the draft is issued finally after 2018.

The final version of supporting materials regarding formulation of the draft of regulations (framework) that that should be done by the dispatch period of experts, was submitted to the Indonesian side in JCC in May, 2017. Monitoring and supporting for future activities will be conducted continuously by Chief Advisor.

Consequently, according to the indicator of the Project Purpose "Detailed regulations of Governor Decree, which prescribes organization and job description, is issued.," at the end of the expert team dispatching period, the supporting materials regarding formulation of the draft of regulations (framework) was created, knowledge concerning the formulation of regulations using that materials was given, and the future activities of monitoring and supporting works were taken over by Chief Advisor.

2-2-3 History of PDM Modification

PDM and PO based on the results of the final year of the Project are indicated below:

2-2-3-1 PDM

PDM Ver. 1.0 (R/D signed on 4 July, 2014) and PDM Ver. 2.0 (M / M signed on 19 May, 2017) are shown on the next 2 pages.

Table 2-89 Project Design Matrix (PDM) Ver. 1.0

Prject Title : Project for Improving Planning Capacity for the Sewerage System in DKI Jakarta　　Period : June 2015 – May 2017
Target Group : DKI, PD PAL Jaya, Ministry of Public Works　　Ver. 1.0
Target Site : Jakarta　　Date : December 2014

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal Administrative capacity of sewerage management is improved.	■ Sewerage construction projects are ordered.	■ Bidding announcement of construction project	■ Sufficient budget for sewerage construction is secured.
Project Purpose Implementation structure of sewerage works in DKI Jakarta is strengthened.	■ Detailed regulations of Governor Decree, which prescribes organization and job description, is issued.	■ Detailed regulations	■ Sewerage development policies are not changed. ■ Qualified counterpart personnel is assigned.
Outputs 1 Job allocation among relevant organizations in DKI Jakarta is clarified. 2 Planning capacity of staffs for sewerage system is enhanced.	1 Job description required for sewerage works is clarified. 2 Sewerage development plan is formulated.	1 Job description of individual organization 2 Hearing to staffs of individual organization	■ Organizational structure of the project implementing agencies is not drastically changed.

Activities	Inputs		Pre-Conditions
【Activities on Output 1】 1-1 JICA scrutinizes the executing organization and practice of sewerage works in DKI in consultation with DKI. 1-2 JICA and DKI clarify the roles in terms of sewerage works of DGHS, DKI (BAPPEDA, Dinas PU, etc) and PD PAL Jaya. 1-3 DKI and PD PAL Jaya stipulates necessary activities for implementation of sewerage administration receiving advices from JICA experts. 1-4 JICA and DKI and PD PAL Jaya find issues on operation of sewerage works in DKI. 1-5 DKI and PD PAL Jaya consider how to solve issues on operation of sewerage works and stipulate executing organizations that tackle with the issues receiving advices from experts. 1-6 DKI decides executing organizations for sewerage works, authority and responsibilities of each organization. **【Activities on Outputs 2】** 2-1 JICA designs training programs in order to enhance capacity of staffs in charge of sewerage works through scrutinizing practical issues and needs in consultation with DKI. 2-2 JICA implements the training programs for sewerage works. 2-3 DKI drafts mid-term sewerage development plan in DKI Jakarta in consultation with JICA experts. 2-4 DKI drafts Regional Regulation or compulsory rules to manage and operate the entire development of centralized waste water system in consultation with JJCA experts.	**【Japanese Side】** ■ Human Resources : Long Term Expert ・Chief Advisor ・Project Coordinator Short Term Expert ・Sewerage Plan Expert Team ■ Training : Counterpart Training (Indonesia, Japan) ■ Local Cost : ・Expenses for hiring Local staffs (Secretary, translator, local consultant) ・Expenses for transportation of JICA experts	**【Indonesian Side】** ■ Human Resources : Counterpart Personnel and Administrative Personnel ・Sewerage Policy ・Financial management ・Sewerage planning ・Facility management ■ Facility : Project office (with office furniture, business machine and internet) ■ Local Cost : ・Expenses necessary for counterpart personnel including fee of transportation and accommodation ・Running expenses necessary for the implementation of the Project	Qualified counterpart personnel with sufficient budget is assigned.

Table 2-90 Project Design Matrix (PDM) Ver. 2.0

Prject Title : Project for Improving Planning Capacity for the Sewerage System in DKI Jakarta
Target Group : DKI, PD PAL Jaya, Ministry of Public Works
Target Site : Jakarta

Period : June 2015 – March 2018
Ver. 2.0
Date : March 2017

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal Administrative capacity of sewerage management is improved.	■ Sewerage construction projects are ordered.	■ Bidding announcement of construction project	■ Sufficient budget for sewerage construction is secured.
Project Purpose Implementation structure of sewerage works in DKI Jakarta is strengthened.	■ Detailed regulations of Governor Decree, which prescribes organization and job description, is issued.	■ Detailed regulations	■ Sewerage development policies are not changed. ■ Qualified counterpart personnel is assigned.
Outputs 1 Job allocation among relevant organizations in DKI Jakarta is clarified. 2 Planning capacity of staffs for sewerage system is enhanced.	1 Job description required for sewerage works is clarified. 2 Sewerage development plan is formulated.	1 Job description of individual organization 2 Hearing to staffs of individual organization	■ Organizational structure of the project implementing agencies is not drastically changed.

Activities	Inputs		Pre-Conditions
【Activities on Output 1】 1-1 JICA scrutinizes the executing organization and practice of sewerage works in DKI in consultation with DKI. 1-2 JICA and DKI clarify the roles in terms of sewerage works of DGHS, DKI (BAPPEDA, Dinas PU, etc) and PD PAL Jaya. 1-3 DKI and PD PAL Jaya stipulates necessary activities for implementation of sewerage administration receiving advices from JICA experts. 1-4 JICA and DKI and PD PAL Jaya find issues on operation of sewerage works in DKI. 1-5 DKI and PD PAL Jaya consider how to solve issues on operation of sewerage works and stipulate executing organizations that tackle with the issues receiving advices from experts. 1-6 DKI decides executing organizations for sewerage works, authority and responsibilities of each organization. **【Activities on Outputs 2】** 2-1 JICA designs training programs in order to enhance capacity of staffs in charge of sewerage works through scrutinizing practical issues and needs in consultation with DKI. 2-2 JICA implements the training programs for sewerage works. 2-3 DKI drafts mid-term sewerage development plan in DKI Jakarta in consultation with JICA experts. 2-4 DKI drafts Regional Regulation or compulsory rules to manage and operate the entire development of centralized waste water system in consultation with JICA experts.	**【Japanese Side】** ■ Human Recourses : Long Term Expert ・Chief Advisor ・Project Coordinator Short Term Expert ・Sewerage Plan Expert Team ■ Training : Counterpart Training (Indonesia, Japan) ■ Local Cost : ・Expenses for hiring Local staffs (Secretary, translator, local consultant) ・Expenses for transportation of JICA experts	**【Indonesian Side】** ■ Human Resources : Counterpart Personnel and Administrative Personnel ・Sewerage Policy ・Financial management ・Sewerage planning ・Facility management ■ Facility : Project office (with office furniture, business machine and internet) ■ Local Cost : ・Expenses necessary for counterpart personnel including fee of transportation and accommodation ・Running expenses necessary for the implementation of the Project	Qualified counterpart personnel with sufficient budget is assigned.

2-2-3-2 PO

PO is shown in the next page.

2-2-3-3 Modification of PDM

At the M/M signed on May 19, 2017, the project period was extended from “from June 2015 to May 2017” to “from June 2015 to March 2018”. And the period of activities in Indonesia by JICA Expert Team is not changed.

Table 2-91 Comparison between PDM 1.0 and PDM 2.0 (Implementation Structure)

PDM 1.0	Modification in PDM 2.0
Project Director Assistant Secretary for Economic Affairs, Regional Secretary Office of DKI	Project Director Head of BAPPEDA
Project Manager Head of BAPPEDA	Project Manager Head of Dinas Sumber Daya Air

This modification was brought by the reorganization of DKI in January 2015 that the former Dinas Tata Air became the executing agency of sewerage project, and the one in January 2017 that the former Dinas Tata Air was renamed to Dinas Sumber Daya Air.

Table 2-92 Comparison between PDM 1.0 and PDM 2.0 (Project Period)

PDM 1.0	Modification in PDM 2.0
About 2 years from the date when the first JICA expert arrives	June, 2015 to March, 2018 (about 2 years and 10 months)

It became necessary to extend the project period due to the progress of “Activity 1-4 JICA and DKI and PD PAL Jaya find issues on operation of sewerage works in DKI.,” “Activity 1-5 DKI and PD PAL Jaya consider how to solve issues on operation of sewerage works and stipulate executing organizations that tackle with the issues receiving advices from experts.” and “Activity 1-6 DKI decides executing organizations for sewerage works, authority and responsibilities of each.”

Table 2-93 Plan of Operation

Activities			Monthly Order	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
			Year	2015							2016															2017										2018	
			Fiscal Year	Fiscal Year 2015										Fiscal Year 2016												Fiscal Year 2017											
			Month	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
The Entire	JICA and DKI hold JCC.																																				
Activities on "Outpu 1 Job allocation among relevant organizations in DKI Jakarta is clarified."																																					
1-1	JICA scrutinizes the executing organization and practice of sewerageworks in DKI in consultation with DKI.	Original Plan (Nov, 2014)																																			
		Revised Plan (Mar, 2017)																																			
		Achievement (May, 2017)																																			
1-2	JICA and DKI clarify the roles in terms of sewerage works of DGHS, DKI (BAPPEDA, Dinas PU, etc) and PD PAL Jaya.	Original Plan (Nov, 2014)																																			
		Revised Plan (Mar, 2017)																																			
		Achievement (May, 2017)																																			
1-3	DKI and PD PAL Jaya stipulates necessary activities for implementation of sewerage administration receiving advices from JICA experts.	Original Plan (Nov, 2014)																																			
		Revised Plan (Mar, 2017)																																			
		Achievement (May, 2017)																																			
1-4	JICA and DKI and PD PAL Jaya find issues on operation of sewerage works in DKI.	Original Plan (Nov, 2014)																																			
		Revised Plan (Mar, 2017)																																			
		Achievement (May, 2017)																																			
1-5	DKI and PD PAL Jaya consider how to solove issues on operationofsewerage works and stipulate executing organizations that takle with the issues receiving advices from experts.	Original Plan (Nov, 2014)																																			
		Revised Plan (Mar, 2017)																																			
		Achievement (May, 2017)																																			
1-6	DKI decides executing organizations for sewerage works, authorityand responsibilities of each organization.	Original Plan (Nov, 2014)																																			
		Revised Plan (Mar, 2017)																																			
		Achievement (May, 2017)																																			
Activities for "Output 2 Planning capacity of staffs for sewrage system is enhanced."																																					
2-1	JICA designs training prorams in order to enhance capacity of staffs in charege of sewerage works through scrutinizing practical issues and needs in consultation with DKI.	Original Plan (Nov, 2014)																																			
		Revised Plan (Mar, 2017)																																			
		Achievement (May, 2017)																																			
2-2	JICA implements the training programs for sewerage works.	Original Plan (Nov, 2014)																																			
		Revised Plan (Mar, 2017)																																			
		Achievement (May, 2017)																																			
2-3	DKI drafts mid-term sewerage development plan in DKI Jakarta in consultation with JICA experts.	Original Plan (Nov, 2014)																																			
		Revised Plan (Mar, 2017)																																			
		Achievement (May, 2017)																																			
2-4	DKI drafts Regional Regulation or compulsory rules to manage and operate the entire development of centralized waste water system in consultation with JJCA experts.	Original Plan (Nov, 2014)																																			
		Revised Plan (Mar, 2017)																																			
		Achievement (May, 2017)																																			

2-2-3-4 Modification of Contract between JICA and JICA Expert Team

・ Addition of Lectures on Decentralized Wastewater Management

In the Project, modification of the Contract regarding adding lectures on "Decentralized Wastewater Management" was executed with JICA on 24 November, 2016. The summary of the modification is stated as follows:

Table 2-94 Summary of Modification of Contract
(Addition of Lectures on Decentralized Wastewater Management)

<table>
<tr><td>Contents of Modification</td><td>As trainings in Indonesia, lectures on sewerage development are implemented. In addition to these trainings, lectures related to newly requested "Decentralized Wastewater Treatment" is held.</td></tr>
<tr><td>Reason of Modification</td><td>According to the Jakarta Governor Ordinance (2016 No. 41), it was announced that, with regard to wastewater management in Jakarta, the percentage of sewerage development shall be 65% by 2022, and the rate of wastewater treatment shall be 100% together with improvement of decentralized wastewater treatment (on-site) (35%). Therefore, improvement of decentralized wastewater treatment became an urgent task and it was necessary to add training of this content.</td></tr>
<tr><td>Modification of Experts' Man-Month</td><td>
<table>
<tr><th>Position</th><th>in Indonesia</th><th>In Japan</th></tr>
<tr><td>Decentralized Wastewater Management 1</td><td>30 days (1.00MM)
(10 days x 3 times)</td><td>6 days (0.30MM)</td></tr>
<tr><td>Decentralized Wastewater Management 2</td><td>10 days (0.33MM)</td><td>－</td></tr>
<tr><td>Decentralized Wastewater Management 3</td><td>10 days (0.33MM)</td><td>－</td></tr>
</table>
</td></tr>
</table>

・ Addition of 3rd Training in Japan

In the Project, modification of the Contract regarding adding 3rd training in Japan was conducted with JICA on 30 June, 2017. The summary of the modification is indicated below:

Table 2-95 Summary of Modification of Contract (Addition of 3rd Training in Japan)

<table>
<tr><td>Contents of Modification</td><td>In addition to 1st (February, 2016) and 2nd (August, 2016) Training in Japan, 3rd Training in Japan is held.</td></tr>
<tr><td>Reason of Modification</td><td>The Indonesian site requested extension of cooperation period of the Project. In JCC (31 May, 2017), counterparts requested 3rd training in Japan during the Project period to be extended.</td></tr>
<tr><td>Modification of Experts' Man-Month</td><td>
<table>
<tr><th>Position</th><th>in Indonesia</th><th>In Japan</th></tr>
<tr><td>Chief Advisor / Sewerage Service Policies and Sewerage Development Plan</td><td>－</td><td>2 days (0.10MM)</td></tr>
<tr><td>Public Relations and Project Coordination</td><td>－</td><td>10 days (0.50MM)</td></tr>
<tr><td>Training Coordinator in Japan</td><td>－</td><td>10 days (0.50MM)</td></tr>
<tr><td>Training Lecturer (Operation structure of sewerage systems)</td><td>－</td><td>4 days (0.20MM)</td></tr>
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However, though the adjustment had been carried out to hold 3rd training in Japan, as a result of a new governor was taken in October 2017, large-scale personnel relocation, including the project stakeholders, was expected in January 2018 and selection of participants in the training could not be done from the Indonesian site. Therefore, it was decided to cancel the 3rd training in Japan during the project period.

2-2-4 Others

2-2-4-1 Capacity Assessment

In the Project, capacity assessment was implemented to measure effectiveness of the Project. Summary of the assessment is shown below:

(1) Purpose

The Project supports capacity development of counterpart's institutions regarding sewerage plan or operation and maintenance. Therefore, first of all, JICA Expert Team implemented the 1st capacity assessment in April 2016 at the beginning of the project and evaluated the current implementation structure and capabilities. And, based on the results, JICA Expert Team examined the functions / abilities and achievement policies of Counterparts' institutions that are necessary at all stages of planning, implementation and operation and maintenance of sewerage development project, and confirmed the specified supports for capacity development (including

training in Japan) by JICA Expert Team. Also, JICA Expert Team conducted the 2nd capacity assessment in April 2017 before completion of the Project and evaluated outputs of the Project, the status of its achievement and change in the capacity development of counterparts, comparing with the previous results.

(2) Method

1) Abilities to be assessed

Counterparts' institutions of the Project are 3 organizations, Dinas Tata Air and PD PAL Jaya. Besides, Dinas Tata Air is currently called Dinas Sumber Daya Air because of reorganization at the end of December, 2016. For the staff in charge of the sewage related works in these organizations, the abilities necessary for implementing sewerage development project were evaluated for organizations and for individuals.

Table 2-96 Abilities to be assessed and the Details

Classification	Ability	Details
Organization	Strategic planning and policy	・Strong leadership for implementation of plan ・Presence of policies / regulations for comprehensive planning / budget formulation ・Responsibility for decision-making at the appropriate level
	Project implementation and management	・Delegation of responsibility for implementation to appropriate level ・Presence of effective organizational structure and decision-making process ・Incentive for performance and pay for performance
	Financial and human resources	・Presence of effective capacity development / its utilization system for staffs ・Sufficient human and financial resources necessary to implement project according to the strategy
	Coordination and communication	・Presence of systems, abilities, incentives for all stakeholders to participate in the policy dialogue process ・Formulation of opinion exchange system by dialogue of all stakeholders and the Internet
	Mobilization of information and knowledge	・Use of statistics / database / information collection mechanism ・Presence of knowledge network within organization and with research institution ・Active attitude toward Research & Development and knowledge sharing
	Technical knowledge and skills	・Expertise, skill and experience on sewage field ・Ability of planning / design / implementation / monitoring of sewerage project

		・Ability of collecting information necessary for the draft of Medium Term Plan and the draft of regulations
Individual	Interest and motivation	・Motivation to own tasks and responsibilities ・Level of motivation for acquiring skills and knowledge
	Planning skills	・Ability to understand problems and consider solutions ・Ability to plan action plans and implementation budget ・Ability to organize multiple projects / processes / priorities
	Management skills	・Ability to effectively utilize the existing resources and act effectively ・Ability to handle and resolve problems ・Ability to manage and evaluate work performance
	Communication skills	・Effective collaboration with colleagues and other partners ・Ability to build cooperative relationships ・English skills
	Technical skills	・Understanding of technical topics on sewer system and sewage treatment ・Ability to comprehensive report ・IT skills for data analysis / facility design
	Knowledge development	・Educational background and training experience ・Opportunities for improving expertise and experience ・Technical leadership skills for subordinates

2) Implementation Method

Capacity Assessment was conducted by self-evaluation method using interview and questionnaire with the staffs of Counterparts' institutions. Questionnaires were divided into two categories, institutions and individuals. And responses were made in five grades from 1 to 5, with larger numbers indicating higher abilities.

Since the period of the Project is about one and a half, the timing and the number of times to execute capacity assessment are scheduled to be two times, the beginning and the end of the Project, by comparing the entrance and the exit. JICA Expert Team performed the 2nd assessment again before the project end (April 2017) as the baseline of the result of the 1st time (April 2016), and grasped the outputs of the Project, the status of achievement, change in capacity development of the counterparts.

In addition, respondents are expected to differ from the ones of the next Capacity Assessment due to the future personnel rotations, etc. Changes in the results of Capacity Assessments can not necessarily be regarded as changes in accurate capacity development. Therefore, JICA Expert Team evaluates the institutions' abilities. It is considered that it is possible to grasp the trend of abilities of the institutions as a whole, by obtaining answers from multiple people and

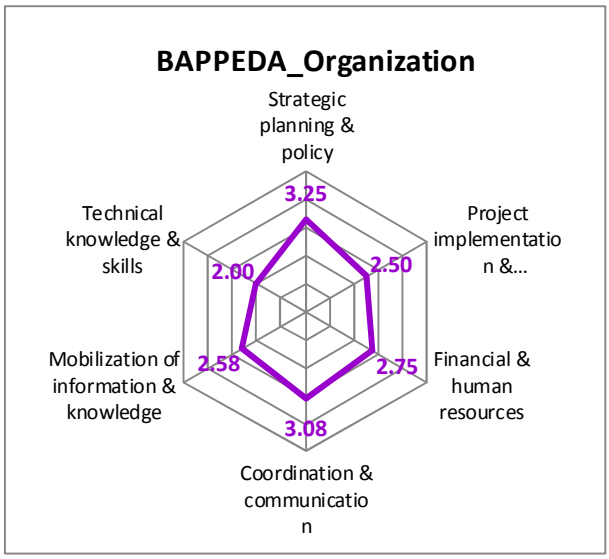
taking the average value to avoid the influence of change of the specific staff to some extent,

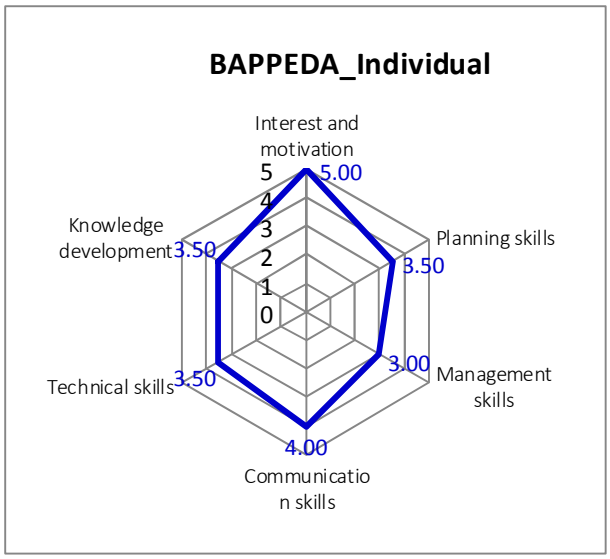
(3) Results of Assessment at the beginning

1) BAPPEDA

The department in charge of sewerage development in BAPPEDA is Sub-Division of Water Management, Hygiene & Environment, City Infrastructure and Environment Division, and only 2 staffs are in charge of sewerage at the time of implementation of Capacity Assessment. Participants gathered at the 1st Small Seminar held at BAPPEDA from other departments of BAPPEDA (Department of R&D and Department of Planning and Finance) and DKI's Departments (BPLHD and Biro PSKLH). However, the above Sub-Division of Water Management only engages in sewerage development as a regular duty.

Capacity at the organizational level was lowered for each item in addition to the evaluation by each expert of JICA Expert Team. Especially, the evaluation of knowledge and skills in the sewerage field were as low as 2.0. Therefore, it is necessary to strengthen knowledge on development plan or construction technology of sewer pipes / treatment sites, flood control measures and water quality management, etc.





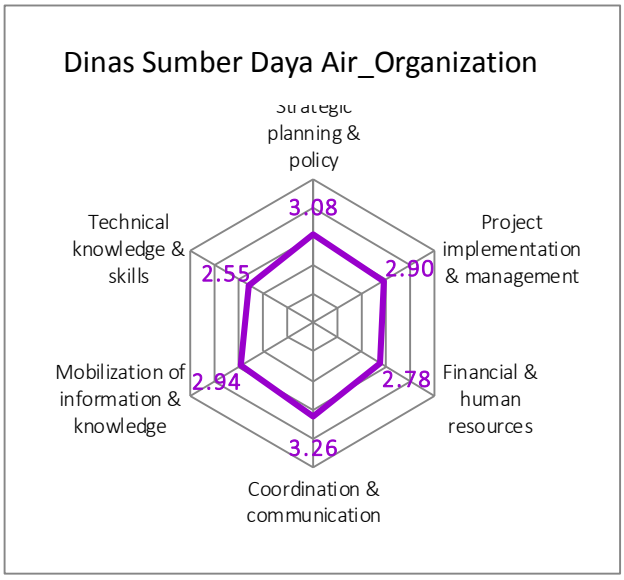
The individual's ability is self-evaluation, and the evaluation by JICA Expert Team is not taken into consideration. As is shown in the figure below, the interest and motivation to work are high, while the management ability is somewhat inferior. In addition, it shall be better to improve planning capacity, technical capacity and capacity building through the Project.

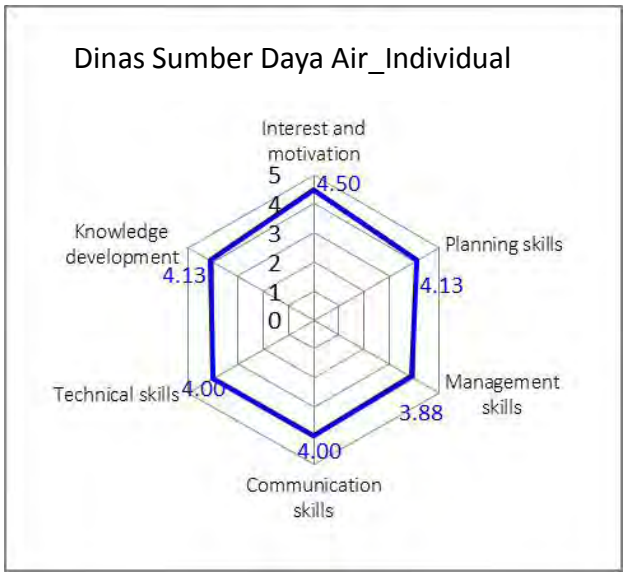
2) Dinas Sumber Daya Air (Fomer Dinas Tata Air)

Dinas Tata Air is an organization that Water Resources Management Office, which was once located under Dinas PU, was established as Water Resources Office to be responsible for rivers and water resources in 2015. And, Dinas Tata Air is currently called Dinas Sumber Daya Air because of reorganization at the end of December, 2016. Sub Division of Wastewater in it is in charge of sewerage development. The number of staffs in the division is 13. Also, it is divided into planning section, construction section and operation and maintenance section, and the main target is the planning section.

The evaluation of the organization was conducted for the entire Sub Division of Wastewater and evaluation by each expert of JICA Expert Team was taken into consideration. Although the capacity was unknown since the organization had just been established, the staffs in charge did not have any experience of sewerage project, and the evaluation was also the lowest in knowledge and skills in the specialized field. Therefore, in the Project, technology transfer is particularly desired for planning / design / construction management of pipeline, operation and maintenance of pipeline / drain, and measures against flooding / inundation.

Individual abilities are done by self-evaluation as well as BAPPEDA, and the results of the evaluations are as high as around 4 for every field of the ability.
As is shown in the figure below, the interest and motivation for works are the highest, and the management ability is somewhat inferior.
According to this results, the abilities of the staffs in Dinas Sumber Daya Air are high, but there are many points to be improved as an organization because the organization is new.

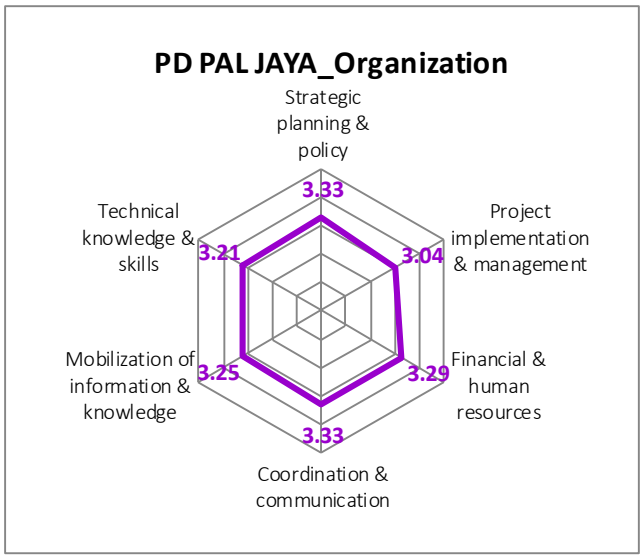


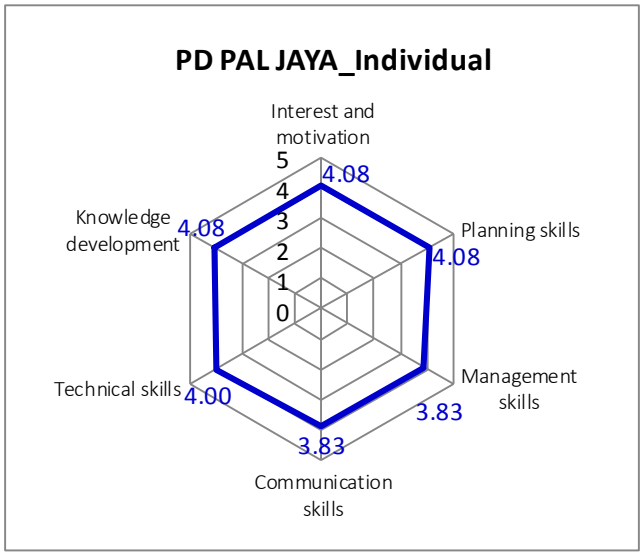


3) PD PAL Jaya

PD PAL Jaya was established in 1991 as DKI Jakarta Sewerage Corporation. Under the president (General Director), it is divided into Administrative & Finance Department and Technical & Business Department, and the number of staff as of January 2016 is 115 people.

Regarding the organization, it is appreciated that the current ability to manage sewage facilities and implementation structure of DKI are well organized from years of experience. On the other hand, when the currently planned sewerage project is implemented, it is an urgent issue to increase human resources, equipment and capacity of operation and maintenance necessary to provide sewerage services throughout the province. In the Project, training and technology transfer in various fields such as planning design of sewage pipeline covering the whole province, sewage pipeline construction technology, operation and maintenance of pipeline, sludge treatment by septic tank, sewerage financial management and sewage fee system, etc. is required.





Regarding individuals, it is the result of self-evaluation similar to the other organizations, but any capacity field is indicated with high value. Since PD PAL Jaya has many highly educated staffs and engineers and has many opportunities to participate in practical works on operation and management of existing sewerage and technical training, knowledge and experience in the sewerage field are so higher compared with staffs of the other organizations. As for the abilities of management and communication which are relatively low, improvement for those abilities is desired through training lectures such as sewerage financial management and public relations.

4) Results of Evaluation and Recommendations in Assessment at the beginning

Organizational Level

- Any organization has relatively high ability to formulate strategic plans / policies. This seems to be because policy, regulations and decision making process by organization regulations are clarified.
- As for the ability of implementation / management of project, it is necessary to strengthen the organization's capacity as sewerage project is processing in the future.
- There is a shortage of human / financial resources at each organization, and it is necessary to raise awareness of each organization concerning securing financial resources for new sewerage projects and increasing the number of staffs related to sewerage.
- The ability of coordination / communication was relatively high as each organization coordinates with others through the Working Group. In the future we will focus on the activities of public relations as external communication.
- With respect to utilization of information / knowledge, it can be evaluated that neither organization shares or accesses data as bad. The database, however, is developed only in PD PAL Jaya, and other organizations are also expected to develop sewer related data.
- Knowledge / technics in expertise was low for BAPPEDA and Dinas Sumber Daya Air. This is because none of the organizations have experience of sewerage projects. Therefore, capacity development is expected the most in this field through the Project.
- In response to this result, in the Project includes a support for formulating the Mid-Term Sewerage Development Plan by BAPPEDA and sewerage regulations by Dinas Sumber Daya Air, the policy was decided that JICA Expert Team strengthens the ability of planning and specialized knowledge by trainings at first, and supports indirectly for these activities proceeding smoothly.

Individual Level

- Any organization has high interest and motivation to work, and it can be said that they are prepared for capacity development.
- Although the minority of staffs in BAPPEDA and Dinas Sumber Daya Air studied in the field such as civil engineering and the environment, etc., there are many staffs who have practical experience or participation in the training on sewage or urban drainage.
- Many staffs in PD PAL Jaya acquired knowledge by either of academic background, work experience, or training participation.
- There is room for improvement in planning ability and management ability.

(4) Results of Assessment at the end

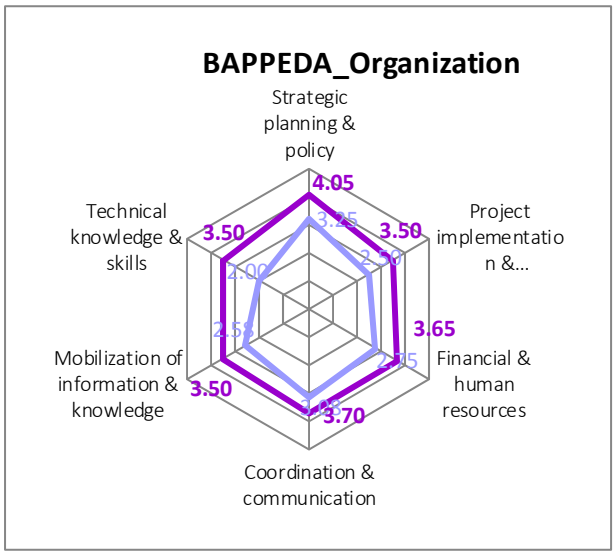
The activities of the JICA Expert Team of the Project are scheduled to be completed in May, 2017. Therefore, the 2nd Capacity Assessment was implemented from the end of March to April 2017. The results are summarized below:

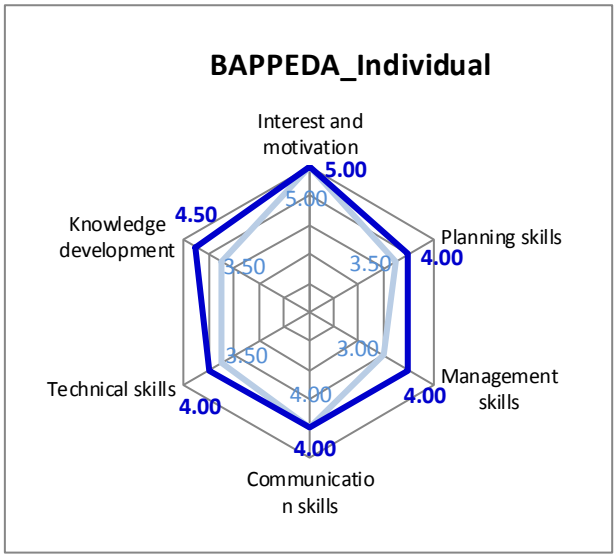
1）BAPPEDA

The department in charge of sewerage development in BAPPEDA is Sub-Division of Water Management, Hygiene & Environment, City Infrastructure and Environment Division, and only 2 staffs are in charge of sewerage at the time of implementation of Capacity Assessment. The number of the staffs had not been increased until the end of the Project. Participants gathered at the 1st Small Seminar held at BAPPEDA from other departments of BAPPEDA (Department of R&D and Department of Planning and Finance) and DKI's Departments (BPLHD and Biro PSKLH). However, the above Sub-Division of Water Management only engages in sewerage development as a regular duty. Also, due to personnel changes at the end of 2016, the chief in charge of sewage was relocated and a new chief was appointed since 2017. From such situations, in the 2nd assessment, JICA Expert Team asked other DKI departments related to sewerage projects (BPBUMD, DLH, BPKLH, BPLHD) for the assessment.

As for the ability at the organization level, the knowledge and skills in the sewerage field, which was particularly low at the 1st assessment, were greatly improved. It can be evaluated that knowledge on the development plan of sewer / treatment sites, construction technology, flood counter measure and water quality management, etc. was strengthened through implementation of trainings and seminars. In addition, the ability of project implementation / management and utilization of information / knowledge, which was evaluated as low last time, was greatly improved, and it is seen that regular works such as project implementation and management and share of information and knowledge, can be conducted smoothly.

The individual ability is assessed by self-evaluation, and the evaluation of JICA Expert Team was not taken into consideration. Compared to the previous assessment, interest / motivation for work was high continuously, and it was found that high motivation was maintained during the Project period. In addition, it can be seen from the following figure that the management ability and capacity improvement which was low last time was improved somewhat. Although the capacity for individuals still has room for improvement, it became a balanced form as a whole. Therefore, it is evaluated that the Project contributed somewhat to improvement of Counterpart's individual ability.



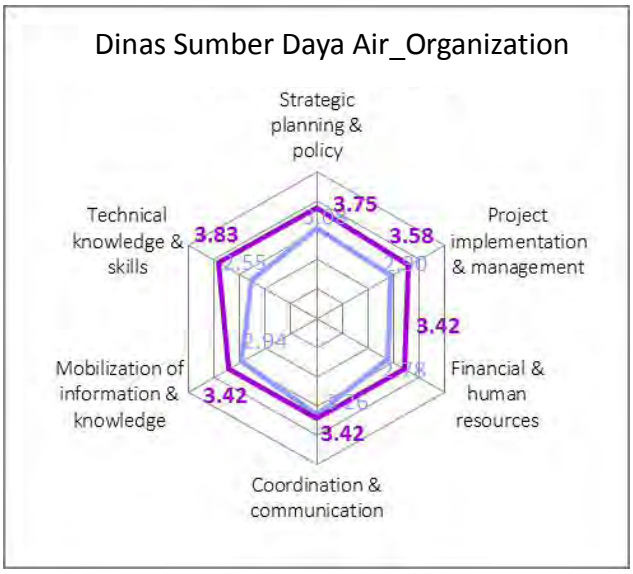


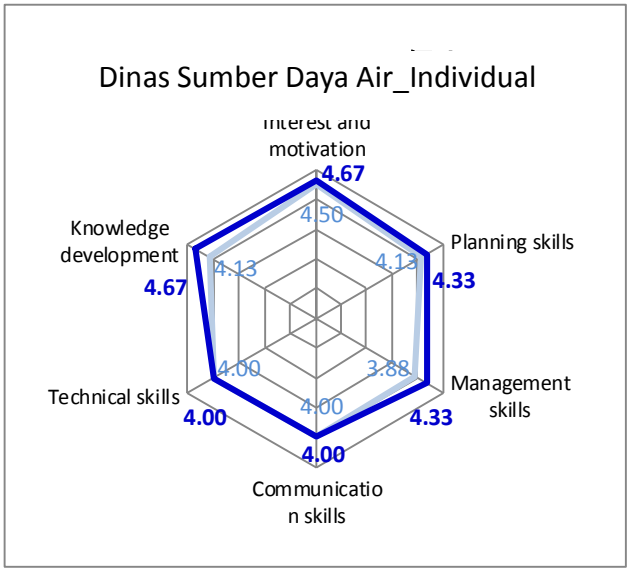
2) Dinas Sumber Daya Air (Former Dinas Tata Air)

Dinas Tata Air which is responsible for rivers and water resources became independent from Dinas PU in 2015 and was currently called Dinas Sumber Daya Air by reorganization at the end of December, 2016. Sub Division of Wastewater in it has been in charge of wastewater management and sewerage development continuously, and the constituent personnel in planning section, construction section and operation and maintenance section has not relocated greatly. The previous head of Maintenance and Surveillance of Sewerage System promoted to the head of Sub Division of Wastewater, Water Supply & Wastewater Planning.

The evaluation of the organization was conducted for the staffs in Sub Division of Wastewater, and the evaluation by JICA Expert Team was taken into consideration. At the time of the previous survey, the organizations' capacity was low as a whole because it was just after the organization was organized. However, this time the result of any ability field was high, around 4 or so. In particular, knowledge and skills in the sewerage field were lack, but it is worth noting that the evaluation of knowledge and skills of expertise was greatly increased as a result of the training and seminars which were repeatedly carried out in the Project. Also, the ability of strategic planning / formulating policy and the ability of project implementation / management was greatly improved compared to the previous evaluation, and it can be seen that the project positively influenced the organization. Individuals' abilities are assessed by self-evaluation as well as BAPPEDA, and every ability field was evaluated as high, exceeding 4 same as in the previous survey. As is shown in the following figure, the management ability which was somewhat low last time is up now, and it is evaluated that the ability was improved. In addition, the value in the field of interest / motivation for work and capacity improvement has been

increased by the efforts for work in the Project, creation of awareness of the parties, the technology transfer by training and regular exchanging opinions and discussion.





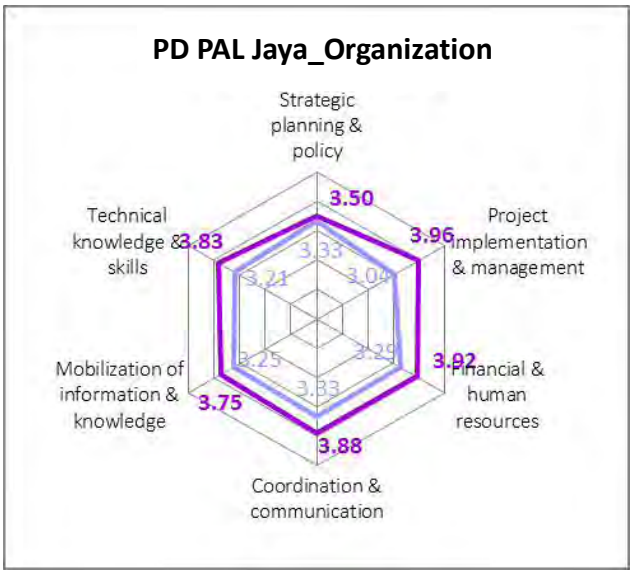
3) PD PAL Jaya

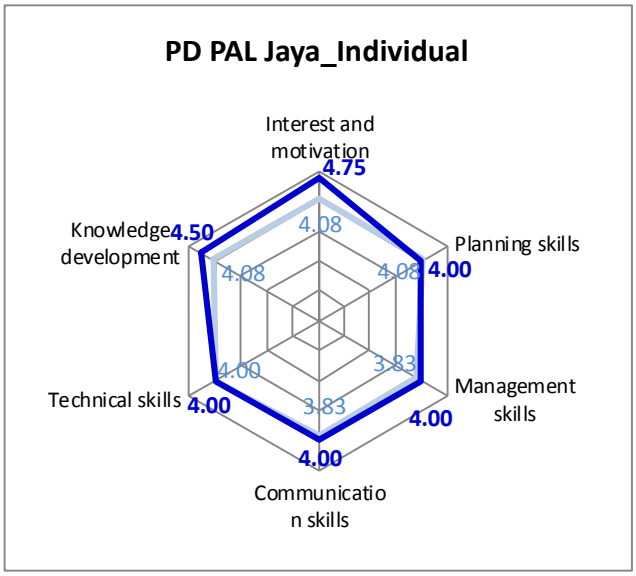
PD PAL Jaya, founded in 1991 as a sewerage corporation in DKI Jakarta, plans to merge with water supply corporation (PD PAM Jaya), between 2017 and 2018, and it is decided to be newly organized as a water supply and sewerage corporation. Therefore, the current president is from PD PAM Jaya, and adjustments are being made to control both organizations after the merger.

Regarding the organization's ability, it was remarkable that evaluation by staffs in PD PAL Jaya themselves were severe compared with the other two institutions. Especially, there are many staff who evaluated that the ability of formulating strategic plan / policy are still improved. It is clear that each staff is seriously facing on capacity development of the organization as a whole and it can be seen as issue for PD PAL Jaya that the strategic plan and policy are not defined. On the other hand, since PD PAL Jaya has many years of experience, the ability of project implementation / management and coordination / communication skills have been regarded as high. And it is evaluated that implementation of sewerage project and operation and management system are established reliably. Also, regarding strengthening of human resources, facility / equipment and the ability of operation and maintenance coordinated in the evaluation of the previous evaluation, it is not to be immediately reinforced in the period of one year, but it is hoped that it will be gradually increased with the expansion of the scope of sewerage projects and sludge collection / treatment. JICA Expert Team evaluated the ability in terms of utilization of knowledge / skills in specialized fields and information / knowledge higher than the other

two organizations, whereas comprehensive evaluation results in low compared with other organizations because self-evaluation justified it low.

According to individual ability, the result of self-evaluation did not change significantly from the previous result and each ability field was shown with high values similarly to other organizations. Management skill and communication skill, which were relatively low evaluation last time, have not changed greatly and it seems that a big effort by the Project was not able to be obtained. On the other hand, the evaluation on interest / motivation for work and capacity development became high. That is because the results of technical training and technical discussions / opinions exchange through the Project are reflected.





4) Results of Evaluation and Recommendations in Assessment at the end

Organizational Level

・The ability to formulate strategic planning and policy for PD PAL Jaya was evaluated as lower than for other institutions. It is considered that the basic problem of PD PAL Jaya, whose conditions of no access to DKI's budget, cannot be solved. Also, staffs are strictly evaluating their organizations, and PD PAL Jaya tends to be more competent than other 2 organizations for evaluation by JICA Experts Team. In other words, it can be said that the staffs in PD PAL Jaya make strict evaluations on their organizational capabilities, and on the contrary, they are correctly grasping the ability required of organization. Meanwhile, it seems that the evaluations of BAPPEDA and Dinas Sumber Daya Air were higher because the policy and decision-making process were clarified by regulation of organizational regulations in 2016.

・Regarding the ability of implementing and managing project, it is the stage when loan projects of Zone-1 and 6 have started now, and it will be clarified whether or not management ability, necessary to implement sewerage project effectively, will be demonstrated actually depending on the implementation situations in the future. Compared with the beginning of the Project, the ability of implementing / managing projects has improved in each organization, and it can be said that the organizational environment that is needed for the implementation of sewerage projects is being developed in the future.

・Regarding human / financial resources, in terms of developing and utilizing the capacity of staffs, it can be evaluated that the quality of human resources was improved because of the effect of capacity building support by the Project. Meanwhile, the personnel and funds required for the projects in each treatment area are lacking in each organization. For especially BAPPEDA and Dinas Sumber Daya Air, it is an urgent issue to secure financial resources for new sewerage projects and increase the number of the sewage-related staffs.

・Coordination / communication skill was evaluated as relatively high for BAPPEDA and PD PAL Jaya, while the skill was lower than other abilities for Dinas Sumber Daya Air. Even when JICA Expert Team make a discussion, several staffs from BAPPEDA and PD PAL Jaya attended each time, but only one or two staffs from Dinas Sumber Daya Air often participated. Therefore, it can be said that there is room for improvement in coordination and communication among stakeholders.

・Regarding the utilization of information and knowledge, aggressive information / knowledge sharing such as information provision at working group meetings and holding of study sessions on sewerage / sewage management by the stakeholders, etc. were carried out and it was improved from the beginning of the Project. The database is constructed only in PD PAL Jaya, but technical documents related to sewerage projects and legal documents collected during the Project period are also organized in BAPPEDA and Dinas Sumber Daya Air, respectively, and it can be expected to be used for future work.

・As for knowledge and skills of expertise, it is worth noting that the results of BAPPEDA and Dinas Sumber Daya Air, which had low evaluations at the beginning of the Project, became higher. Every organization has limited experience of implementation of sewerage project, but it can be evaluated that the technical level of the organization has improved by training and seminars of the Project.

Individual Level

・Interest and motivation to work were relatively high for every organization in the previous evaluation, but it was even higher in this result. High motivation of individual staff is an essential element for effective implementation of sewerage project and it is expected that staff of each organization continues to maintain this high motivation and perform his work to acquire his own technical knowledge and experience.

・As for planning ability and management ability, staffs of BAPPEDA greatly improved after the Project. It is considered that their abilities were improved through formulation of the Mid-Term Sewerage Development Plan supported by the Project.

・Results concerning communication skills were almost the same as in the previous evaluation for all organizations. A common SNS account is possessed among the sewerage related personnel to communicate together, and it can be said that each organization has good communication with colleagues and stakeholders.

・As for technical capabilities, BAPPEDA improved somewhat, but Dinas Sumber Daya Air and PD PAL Jaya had the same result as last time. On the other hand, because evaluation of capacity development exceeded the previous one at any organization, it can be said that training experiences and improvement of expertise, and increase of opportunities for technical guidance to subordinates are part of the results of the Project.

(5) Summary and Proposals

・In the Project, activities to support capacity development for Counterparts' staffs intermittently in seminars and discussion format were conducted for about a year and a half. As a result, all of the organizations of BAPPEDA, Dinas Sumber Daya Air and PD PAL Jaya showed some improvement in capacity from the beginning to the end of the Project. Compared with improvement of organizational capability, personal ability is not greatly changed, but it is worthy of evaluation that willingness / motivation and technical knowledge / capacity development for their works has been improved.

・On the other hand, if sewerage projects are implemented in each treatment area in the future, it is considered to improve the capacity further to the required level for all organizations to fully perform their responsible works from the current implementation structure and the capacity of

each organization.

- With regard to the abilities to formulate strategic plans / policies and to implementing / managing the projects, the Project supported especially BAPPEDA and Dinas Sumber Daya Air to formulate the Mid-Term Sewerage Development Plan and the sewerage regulations. Therefore, it can be said that both organizations have improved from the beginning of the Project, but it was regrettable that they lacked the subjectivity in the process of formulating the plan and the regulations. Although personal motivation / interest are high in the evaluation of individuals, the motivation of the organization as a whole has not been high throughout the Project period, and the motivation as organization is left as a future issue.

- In order to develop sewerage efficiently and manage it continuously from now on, it is necessary to continue securing and fostering personnel necessary for sewerage planning / development and operation and maintenance. In addition, inheritance of knowledge and experience within the organization and sharing the latest information may have been improved than before but there is room for improvement and further improvement is required along with coordination / communication skills within the organization.

- The contents required for capacity development support to the stakeholders concerned sewerage project in the future are as follows:
  - Establishment of financial system, sewerage fee and accounting method to ensure securement of funds for sewerage projects and sewerage management
  - Formulation of management plan to ensure accountability and transparency in sewerage development and management
  - Development and evaluation of appropriate technology, and formulation of sewerage design / standards for estimation