NATIONAL DEVELOPMENT PLANNING AGENCY
MINISTRY OF PUBLIC WORKS
THE PROVINCIAL GOVERNMENT OF DKI JAKARTA
THE REPUBLIC OF INDONESIA

PREPARATORY SURVEY ON CENTRAL SEWERAGE TREATMENT SYSTEM IN JAKARTA

FINAL REPORT

VOLUME 1 : MAIN REPORT

MARCH 2013

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ORIX CORPORATION
ORIENTAL CONSULTANTS
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Abbreviations and Glossary

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Abbreviations and Glossary

A2O	Anaerobic Anoxic Oxic Process
AAS	Atomic Absorption Spectrophotometer
ADB	Asian Development Bank
AMDAL	Analisis Mengenai Dampak Lingkungan (environmental social health impact assessment / ESHIA)
ANDAL	Analisis Dampak Lingkungan (part of AMDAL)
ATP	Affordability to Pay
ASP	Activated Sludge Process
BAPPEDA	Regional Development Planning Board
BAPPENAS	National Development Planning Board
B/C	Benefit Cost Analysis
BGL	Below Ground Level
BKPM	Capital Investment Coordinating Board
BOD	Biochemical Oxygen Demand
BOT	Build – Operate – Transfer
BPLHD	Regional Environment Management Board
BPN	Badan Pertanahan Nasional (Land Agency)
BPS	Central Statistics Agency (Badan Pusat Statistik)
BSL	Below Sea Level
BRWC	Barwon Region Water Corporation, Australia
BWSCC	Badan Wilayah Sungai Ciliwung Cisadane (Ciliwung Cisadane Region Agency)
CAPEX	Capital Expenditure
CAT	Cekungan Air Tanah (groundwater basin)
CI	Context Information
CIPTA KARYA	Directorate General of Human Settlements, PU
COD	Chemical Oxygen Demand
CSO	Combined Sewer Overflow
CVM	Contingent Valuation Method
DBOO	Design – Build – Own – Operate
D/E	Debt Equity Ratio
Dinas PU (DKI)	Department of Public Works, DKI
DKI Jakarta	Jakarta Capital City
DSCR	Debt Service Coverage Ratio
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return

EPC	Engineering – Procurement – Construction
FIRR	Financial Internal Rate of Return
FY	Fiscal Year
GCA	Government Contract Agency
GDP	Gross Domestic Product
GOI	Government of Indonesia
HR	Human Resources
IC	Interconnection Chamber
IIGF	Indonesian Infrastructure Guarantee Fund
IMB	Ijin Mendirikan Bangunan (Building Construction Permit)
IPAL	Instalasi Pengolahan Air Limbah
ISO	International Organization for Standardization
ITP	Individual Treatment Plant
IWA	International Water Association
JC	Joint O&M Company
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
JWSRB	Jakarta Water Supply Regulatory Body
Kelurahan	Urban village: the lowest level of government administration in urban area in Indonesia.
Kecamatan	Sub-district: subdivision of a city (kota), which is itself divided into kelurahan.
LARAP	Land Acquisition and Resettlement Action Program
MBBR	Moving Bed Biofilm Reactor
MBR	Membrane Bioreactor
MCK	Mandi Cuci Kakus (public toilet)
MLSS	Mix Liquor Suspended Solids
MOF	Department of Finance
MP	Master Plan
NDIR	Non-Dispersive Infra Red method
NGOs	Non−Governmental organizations
NJOP	Nilai Jual Obyek Pajak (Sales Value of the Tax Object)
NPV	Net Present Value
NRW	Non-Revenue Water
O&M	Operation and Maintenance
ODA	Official Development Assistance
OJT	On-the-Job Training

OPEX	Operating Expense
PAPs	Project Affected Persons
PBB	Pajak Bumi dan Bangunan (Land and Building Tax)
PDCA	Plan-Do-Check-Action
PFI	Private Finance Initiative
PI	Performance Indicator
PIP	Indonesia Investment Agency
PLN	Perusahaan Listrik Negara (State Electricity Company)
PPP	Public-Private Partnership
PSIF	JICA Private Sector Investment Finance
PT.SMI	PT. Sarana Multi Infrastructure
PU	Department of Public Works
PUB	Public Utilities Board, Singapore
RAP	Resettlement Action Plan
RKL	Rencana Pengelolaan Lingkungan (Environmental Management Plan)
ROW	Right of Way
RPL	Rencana Pemantauan Lingkungan (Environmental Monitoring Plan)
RT	Rukun Tetangga (Smaller neighborhood, which is an informal community organization that consists of adjacent 20–50 adjacent households)
RTH	Ruang Terbuka Hijau (green open space)
RTRW	Rencana Tata Ruang Wilayah (Regional Spatial Plan)
RW	Rukun Warga (larger neighborhood, which is a combination of some RTs)
Rp (IDR)	Indonesian Rupiah
SBR	Sequential Batch Reactor
SOP	Standard Operation Procedure
SPC	Special Purpose Company
SPV	Special Purpose Vehicle
SS	Suspended Solid
STO	Sentral Telepon Otomatis (Automatic Telephone Central)
STP	Sewage Treatment Plant = Wastewater Treatment Plant
TCLP	Toxicology Characteristic Leaching Procedure
TOT	Training of Trainers
TSP	Total Suspended Particulates
TSS	Total Suspended Solids

UMP	Upah Minimum Provinsi (Provincial minimum wage)
UPLLAT	Unit for Environmental Waste and Groundwater Management
USD	US Dollar
VAT	Value Added Tax
VFM	Value for Money
VGF	Viability Gap Fund
WTP	Willingness to Pay
WWTP (=STP)	Sewage Treatment Plant = Wastewater Treatment Plant

Chapter 1 Study Outline

1.1 General

This Interim Report was prepared based on the survey results, discussion and comments of the Joint Coordination Meeting held on June 21, 2012 and July 26, 2012.

1.2 Objectives of the Study

The objective of the Study is to confirm the effectiveness, efficiency and adequacy of the proposal of the Japanese private companies on the conditions that a Japanese ODA loan will be applied as the fund for Project implementation. The Study period is from January 2012 to October 2012.

1.3 Project Eligibility

The Project examined in this Study was screened according to the three conditions below;

- The Project contributes to the stability and socio-economic development of the concerned country.
- The Project matches the overseas assistance policy of the Japanese government.
- The Project involves at least one Japanese company as an investor.

This Project also passes the selection criteria below:

a) The Project components are funded by both independent private funding and independent public funding through Japanese ODA, and/or

b) The Project is implemented by private companies using both private funds and Japanese ODA as a public fund.

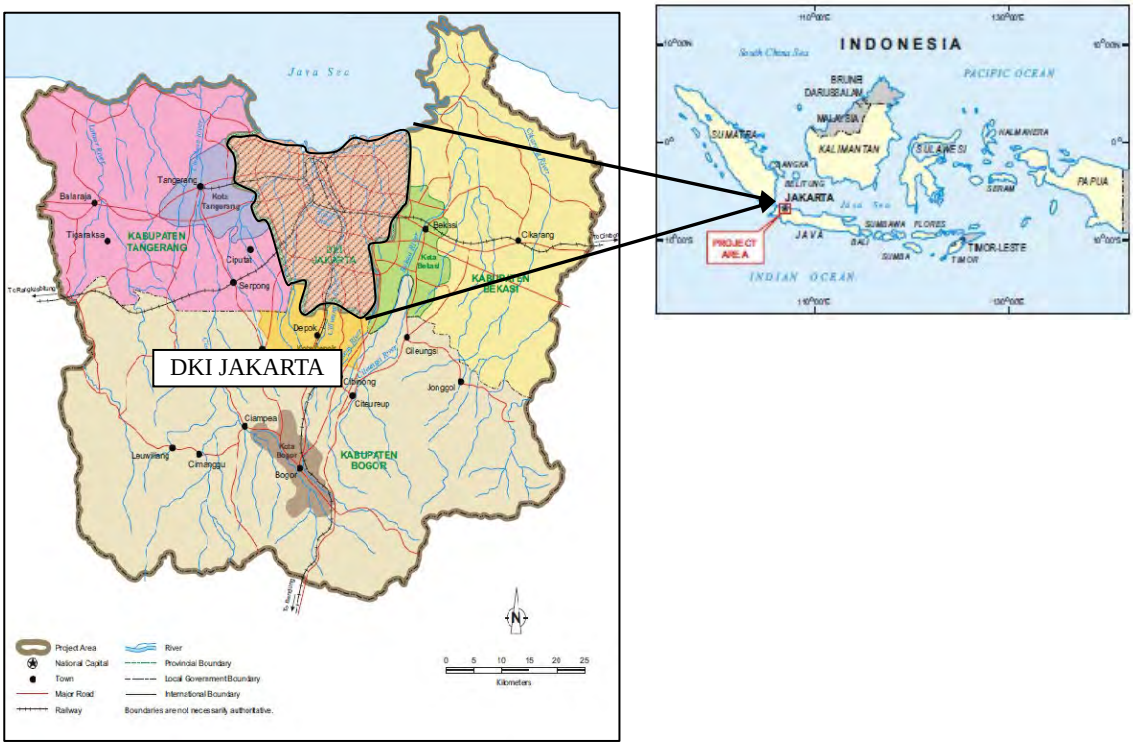
The Study disqualifies projects that invite a private company only for operation and maintenance and projects that do not contribute to the public benefit.

1.4 Background

DKI Jakarta, the capital city of Indonesia, has continuously been growing economically by centering on the national administration, commercial & trading and industries. However, the urban environment has worsened particularly the water and sanitary environment, due to the lack of a sewerage system to treat the increased amount of wastewater. At present, the Government of Indonesia as well as DKI Jakarta is aware of the necessity to improve the deteriorated urban environment. In line with the Millennium Development Goal approach, the National Development

Planning Board (BAPPENAS) has targeted the sewerage service coverage at 20% in 15 major cities by 2014.

The sewerage development in DKI Jakarta has been carried out since the 1980s; however, the progress has been very slow. Amongst the obstacles of the sewerage development, the requirement of huge funds for construction and operation & maintenance is the major issue. In this regard, this Study checks the feasibility of a public private partnership (PPP) scheme in the sewerage development in order to create synergy between the private sector's technical skills and funding capacity and the Indonesian government's legal and administrative power. In addition, the Study aims to create a cooperative relationship with PD Pal Jaya, Jakarta Sewerage Enterprise, for joint enhancement of O&M and project management skills.



Source: JICA PPP Study Team

Figure 1-1 Project Site (Country: Indonesia, Location: Jakarta City)

1.5 Study Approach

(1) Follow up the JICA Master Plan Review

JICA conducted the Jakarta Sewerage Master Plan Review (MP Review) in 2011-2012. The MP Review created a schedule for the sewerage development to cover all of the DKI Jakarta for the target years of 2020, 2030 and 2050. The MP Review divided the DKI jurisdiction into 15 sewerage

zones. Amongst the 15 zones, Zones no.1 and no.6 are given priority for implementation by year 2020 with nomination of the sewage treatment plant sites. (Refer to Figure 2-8)

(2) Effective Use of Sewage Treatment Plant (STP) Site

Acquiring land in Jakarta is very difficult. Thus, the precious amount of land allocated to the STP shall be utilized in the most effective way.

The regional secretary of DKI Jakarta nominated the Zone 1 STP site in Pejegaran by the Letter No. 1631/-1.774.13 on 16 December 2011. The STP layout shall be considerably effective to fit within the nominated STP site by applying the latest and most reliable technology for sewage treatment to avoid wasting land. Therefore, the process flow design may not only be both horizontal and vertical. In addition, the plant layout shall aesthetically fit the urban view.

Source: Image © 2012 Digital Globe

Figure 1-2 Nominated STP Site and Preliminary STP Layout with Capacity of 200,000m^3/d

(3) Demarcation Image of PPP Infrastructure Project Development

Taking into consideration of the timeframe of sewerage development and the PPP policy of GOI, this Study confirms the applicability of a public-private-partnership scheme for Zone 1 sewerage development. The Zone 1 sewerage development consists of sewers and the sewage treatment plant. For the Project framework in the Zone 1 sewerage development, the Study Team will explore the appropriate demarcation of responsibility between private and public sectors. At the moment, the Study Team considers the private sector will be responsible for the wastewater and its O&M, and the GOI will be responsible for the sewer construction. The Study Team also expects that BAPPENAS and MOF will have a major role in coordination of the Project planning and financing for sewer pipelines and the subsidy injected into the initial CAPEX of STP.

Table 1-1 Proposed Role Sharing between Public and Private Sectors

Facility	Land Acquisition	Planning & Design	Construction	O&M
Sewer Pipelines	-	Public (PU)	Public (PU)	Public (DKI)
STP	Public (DKI)	Private	Private	Joint Company

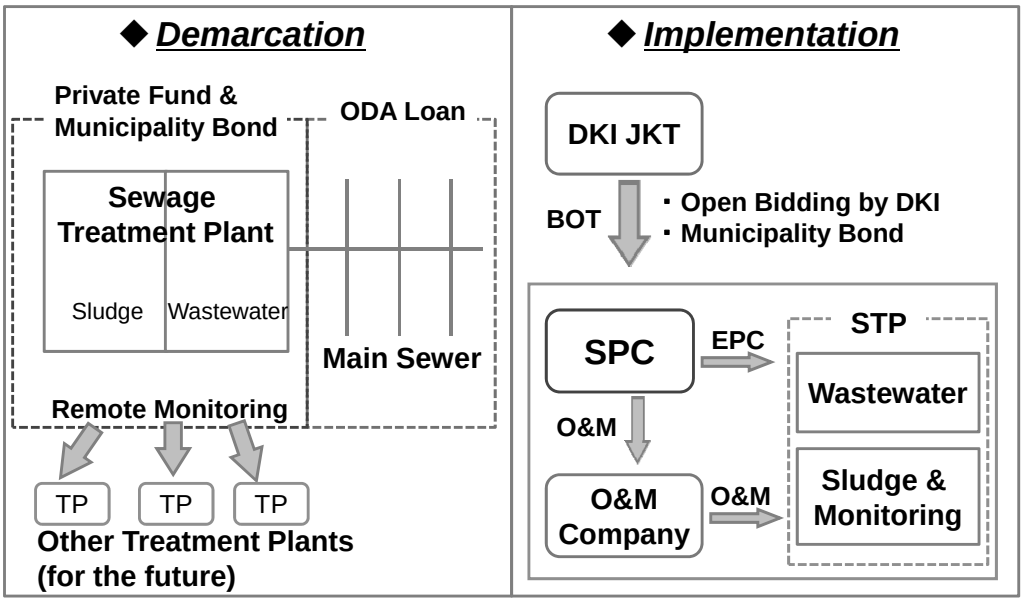
RWW: Reclaimed Wastewater

Source: JICA PPP Study Team

(4) Operation and Maintenance Plan

It is recommended that maintenance and operation of the STP be done integrally by an O&M company invested and set up by public and private sectors. The main staff for O&M works will be taught the necessary technology & know-how from a Japanese O&M company that will also make contributions to the integrated management.

Figure 1-3 Demarcation Image for Zone 1 Sewerage Development



Source: JICA PPP Study Team

(5) Research for Relevant Issues in PPP

At this stage, various issues surrounding this PPP sewerage project have been identified.

To complement the Study, the following have been examined:

1) Budgetary issues in DKI

Budgetary situation in DKI to identify financial feasibility to pay services fees

DKI is expected to bear the responsibility for the funding gap between service fees for the concessionaire and revenue from sewerage users by its budgetary measures such as general account expenditure. Therefore, it is necessary to clarify how such gaps will be subsidized by DKI.

Method of finance in DKI for the initial cost of the Project

This includes the research on institutional limitations for issuing municipal bond, limitation of utilization of bonds (whether bonds confine the purpose of utilization), the schedule for next issue, and limitation in general accounts in the DKI budget.

2) The gap finance for operational expenses

Although DKI is expected to bear the responsibility for the funding gap between service fees and revenue from sewerage users, there is a possibility that DKI cannot subsidize such a fund. In this case, it is necessary to seek other sources of finance from donor agencies.

a) To collect information of the funding scheme of donors (e.g. World Bank, ADB, GPOBA)

b) To analyze eligibility for the Project, procedure based on a)

3) Decision making process in stakeholders

Several government organizations will be involved in the decision making process for the Project. Because this Project will be the first case in DKI, the process has not yet been established. For smooth implementation of the Study, it is necessary to set up a process among stakeholders.

- To establish a decision-making flow chart through discussions with relevant officers. This includes identifying which organization is superior, which department can make final decisios, and who is the decision maker.
- To coordinate the decision-making process among stakeholders, upon request from the Study Team.

4) Framework for procurement of SPC

Since this Project will be the first case in DKI, there are no established procurement frameworks for PPP projects. The Study Team will develop the procurement process (including necessary procedures and flowchart), upon discussions with government officers.

5) Government guarantee, loans

Guarantee from the Government of Indonesia is essential for the implementation of the Project. The government guarantee (e.g. for payment guarantee, guarantee for regulation

change risks) is the most important for the equity investors and lenders. Specifically, the following issues should be reviewed.

a) Guarantee scheme of IIGF, especially applicability for the Project taking into account project risks (specific risks will be provided by the Study Team), conditions and procedures. Debt from public institutions of the Government of Indonesia will be one of the options to hedge exchange rate risks.

b) Scheme of PT.SMI, especially applicability to the Project, conditions and procedures

6) Analysis of PPP related laws/regulations, operation process, tax and accounting

In this Study, the following should be clarified and analyzed, with a view of identifying and analyzing potential issues and obstacles in relation to this Project under the PPP scheme:

a) Information in relation to any national, governmental or provincial rules and regulations relevant to the sewerage sector
b) Information in relation to PPP infrastructure rules and regulations
c) Information in relation to the bidding process
d) Investigation into the Project sites
e) Information in relation to foreign investment
f) Information in relation to tax and accounting

1.6 Further Investigation

(1) Survey on Optimized Sludge Recycling in DKI Jakarta

Since sewer sludge consists mainly of organic matter, dried and carbonized sludge is a solid fuel worth as much as low-grade coal. It is estimated to have as much as 60% of the calories of general coal. Sewer sludge treatment plant may have functions such as collecting sludge from wastewater treatment plants, converting sludge into fuel and supplying it to industrial facilities such as coal fired plants and cement factories. In addition, it is possible to utilize methane gas from the anaerobic digester as a fuel for drying machines and generators. Japan has advanced technologies and operating skills in this field.

(2) Survey on Optimized Monitoring and Control System

An integrated operation and monitoring system will be installed in the central wastewater treatment plant and will monitor the operating conditions of all wastewater treatment plants. The information constantly collected and analyzed will be fed back to the operating plan. Thus, it will be possible to decrease the consumption of electric energy and chemical supply without lowering the treatment performance. It is estimated that a 40% reduction in energy consumption can be achieved by the integrated monitoring control system even in Japan where energy saving has already been

introduced. In addition, operational conditions can be monitored in PD Pal Jaya, all treatment plants and even in Japan, and therefore it is possible to establish a speedy support system for accidents.

(3) Survey on Optimized Reservoir in DKI Jakarta

A storm water reservoir for flood control contributes to mitigating inundation and improving the water environment. This facility shall be implemented where habitual flooding seriously affects urban activity and river improvement cannot be attained. Storm water reservoir technology, which is well developed in Japan, can be applied to DKI Jakarta.

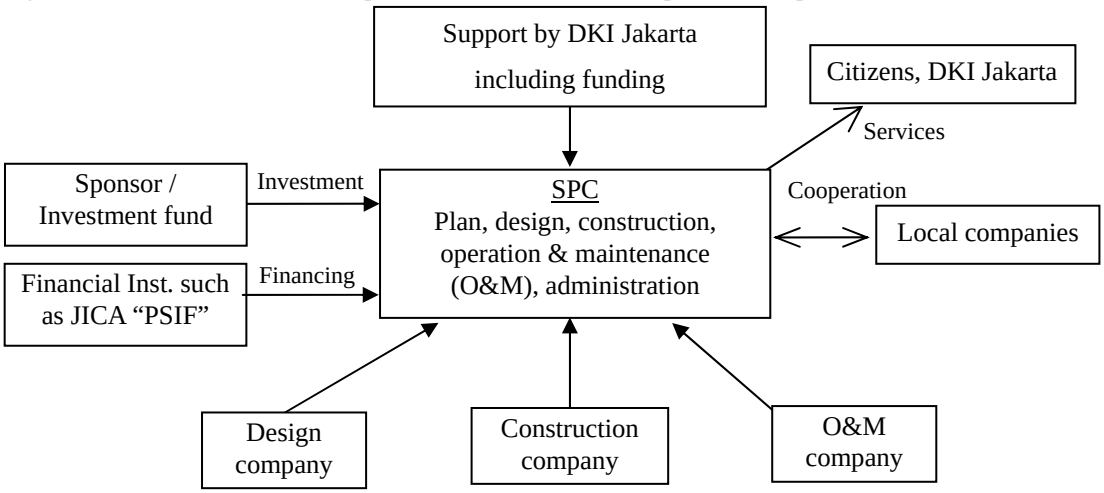
(4) Financial and Economic Analysis

PPP projects are intended to minimize construction and operation costs of the projects. The Study shall provide DKI Jakarta and PD Pal Jaya with an affordable tariff structure for beneficiaries and a financial plan and contract model of the Central Sewerage Treatment Project. Based on these analyses, the Study will determine tha financial gap between full cost recovery and tariff revenue. Then the Study will also determine the economic value by installation of the sewage system in order to cover the financial gap.

1.7 Study Concept

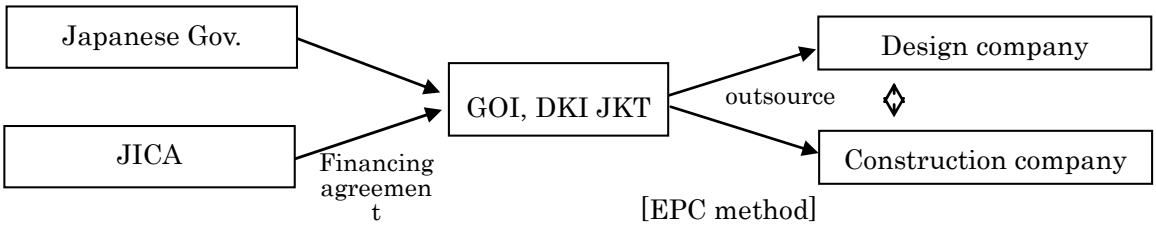
(1) Implementation Structure

Figures 1-4 and 1-5 show the implementation structures of private and public sectors.



Source: JICA PPP Study Team

Figure 1-4 Executing Agencies of Private Sectors



Source: JICA PPP Study Team

Figure 1-5 Executing Agencies of Public Sectors (ODA supposed)

(2) Counterparts

The counterpart agencies and organizations are mainly as follows:

- Ministry of Finance
- National Planning and Development Board (BAPPENAS)
- Directorate General of Human Settlements, Ministry of Public Works (CIPTA KARYA)
- Regional Planning and Development Board (BAPPEDA DKI Jakarta)
- Jakarta Sewerage Enterprise (PD Pal Jaya)

(3) Points to be Considered

1) Consensus building with counterparts

Capital sharing between the Japanese investor and the Indonesian government is a necessary condition to apply for a Japanese ODA Loan for the Project. To accomplish this, it is essential to listen to the views and opinions of stakeholders on both sides for options on the Project framework in terms of consensus building.

2) Coordination with JICA Study for Review of Jakarta Sewerage Master Plan

Results of the Study shall avoid discrepancy with the JICA Study for Review of Jakarta Sewerage Master Plan (MP Review) by sharing essential features of the Project and exchanging and coordinating outputs on both sides.

(4) Scope of Work

1) Review of current status of sewerage services in Jakarta and its future plan

a) Socioeconomic conditions of DKI Jakarta
b) Laws and regulations relating to PPP Projects
c) Current status of sewerage services in DKI Jakarta and its future plan
d) Government policy of finance and tariff for sewerage development and services
e) Interests of other domestic and foreign competitors in the Project

2) Facilitating measures for sewerage development and services in DKI Jakarta

a) Sludge

- Sludge collection area and sludge generation forecast
- Appropriate sludge treatment, disposal and reuse
- Sludge reuse plan (quality, quantity, price, etc.)
- Financial analysis of sludge treatment, disposal and reuse for all DKI Jakarta

b) Reclaimed Wastewater (RWW) Reuse

- Effect analysis of RWW Reuse for environmental improvement and commercial needs
- Needs assessment and measures on facilitation of RWW Reuse in urban development

c) Integrated Remote Monitoring System

- Monitoring objects, development concept, required facilities and equipment
- Cost merit analysis, effect analysis (qualitative and quantitative)
- Merit analysis of computerized O&M database

d) Financial Plan, Capital Sharing Plan

- Analysis on the social affordability for sewerage tariff taking into account household expenditure and low-income groups
- Analysis of the potential contribution of commercial & industrial customers to the sewerage services
- Analysis on appropriate sharing of CAPEX & OPEX between beneficiaries (domestic & non-domestic) and the government for sewerage development and services

e) Preliminary Design, Estimates of Development Costs and O&M Costs

- Preliminary design and construction plan of sludge treatment, disposal and reuse for all DKI Jakarta to be located within the Central Sewerage Zone
- Preliminary design and construction plan of sewage treatment plant, sewers, pumping stations(if necessary) to be located within the Central Sewerage Zone
- Preliminary design and construction plan of integrated remote monitoring system
- Estimates of the development costs with a cost-sharing plan between the private sector and government sector, development schedule and construction plan
- Estimates of O&M costs
- Financial analysis of the project (NPV, EIRR, FIRR), and cash-flow analysis of the private portion of the Project

f) Social Environmental Consideration based on the JICA Guidelines

g) PPP Project Scheme

- Sharing plan of costs & obligations between the public sector and private sector for sewerage development
- Analysis of the institutional framework and implementation framework (such as SPC, the government or a third-sector company)
- Financial procurement options
- Terms of PPP contract
- Risk analysis
- Task allocation plan between the public sector and private sector in the development stage and the O&M stage
- Risk allocation plan between the public sector and private sector
- Financial arrangement plan (tariff revenue, general account, subsidy)
- Bottleneck analysis of Project implementation by PPP
- Organization plan for development and O&M
- Capacity building plan for development and O&M
- Performance indicators

h) Feasibility Analysis and Project Implementation Plan

- Check the feasibility of technical, financial, environmental and institutional aspects
- Formulate the Project Implementation Plan

i) Invitation of Counterparts

To gain a consensus on the Project, training for key stakeholders shall be implemented. The training program shall comprise an introduction and technical background on sewage and sludge treatment including advanced wastewater treatment technology, the role of sewer systems in urban environmental management, etc.

Chapter 2 Present Water Supply and Sewerage Management in DKI Jakarta

2.1 Present Socio-economic Conditions

2.1.1 Socio-economic Conditions in DKI Jakarta

(1) Socio Economic Conditions

Indonesia is a young country rich in a work force of 20 to 30-year-olds. Since the Asian currency crisis in 1997-98 and the Lehman Shock in 2008 were overcome, Indonesia attained approximately 6% growth in GDP, which is equivalent to 3,469 USD/cap. in 2011, and is called a "Developed Country". Indonesia is rich in resources of oil, coal and natural gas, and also produces food at self-independent level. Industries have remarkably developed domestic manufacturing such as automobile production. Since human resources are rich in quality and quantity due to the improvement of the educational system, further development is expected.

Table 2-1 Socio-economic Trends in Indonesia

Year	2009	2010	2011
GDP			
GDP growth rate (%)	4.6	6.2	6.5
GDP (USD/cap.)	2,327	2,974	3,469
Consumer Price Index (%)	2.78	6.96	3.79

Source: JETRO Oversea Business Information

Jakarta is the center of Grater Jakarta, JABODETABEK, which is the second largest urban areas in the world with 24 million people. Population increases are seen not only for birth rate but also for migrant rates for business & education. In 20 years, Jakarta may exceed Greater Tokyo in population. Infrastructures such as electricity, water supply & sewerage and transportation are lacking and are affecting sustainable development.

DKI Jakarta is a designated province and affiliates six municipalities of North, West, East, South, Central and Islands listed in Table 2-2. The territory is 655.75 km^2 with 9.73 million people, which is equivalent to 149 people/ha.

Under the municipal government, there are kecamatan, level 3 (district) and kelurahan, level 4 (town) local governments.

Table 2-2 Population and Density of DKI Jakarta (2010)

No	Municipality (Kota)	District (Kecamatan)	Town (Kelurahan)	Population (people)	Area (ha)	Density (people/ha)
1	North Jakarta	6	31	1,554,003	13,903	112
2	West Jakarta	8	56	2,345,524	12,525	187
3	Central Jakarta	8	44	952,635	4,714	202
4	South Jakarta	10	65	2,280,406	14,573	156
5	East jakarta	10	65	2,585,628	18,990	136
	Municipal Total	42	261	9,718,196	64,705	150
6	Seribu Islands	2	6	20,684	870	24
DKI Total		44	267	9,738,880	65,575	149

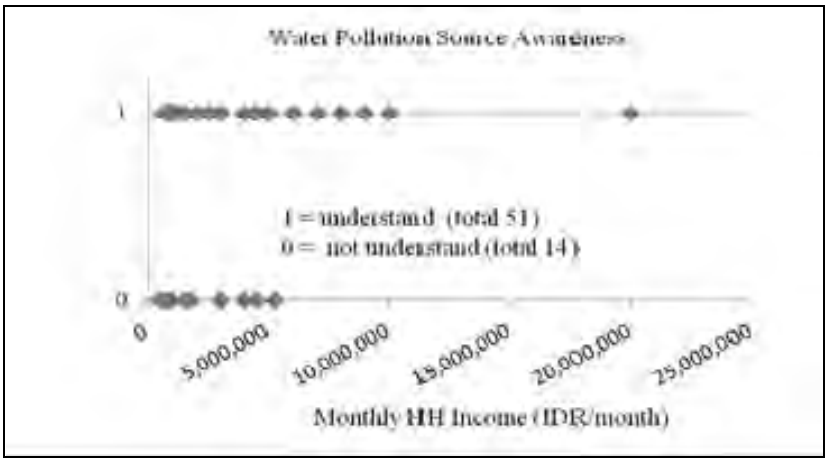
Source: MP Review

Jakarta Capital City's GDP in the fourth quarter of 2011 shows a growth rate of 6.6% compared to the fourth quarter of 2010. The highest growth was achieved by the transportation - communications sector with 13.8%, followed by the trade-hotel-restaurant sector with 7.7%, the services sector with 7.7%, the construction sector with 7.2%, the financial-real estate-corporate services sector with 5.2%, the electricity-gas-clean water sector with 3.7%, the manufacturing sector with 1.2%, the agricultural sector with 0.4% and the mining-excavation sector with minus 3%. (Source: DKI Jakarta government)

(2) Public Awareness on Water Environment

The public is aware that a poor water environment and environmental polution are caused by wastewater discharged without treatment. The sewerage service rate is only 2%, and as a result, municipal wastewater affects shallow wells, a principal water supply source. A social survey executed by the Study Team proves that the residents are aware that discharged wastewater and lack of sewerage are the principal causes of water pollution and that a sewerage system is the infrastructure required for water pollution control.

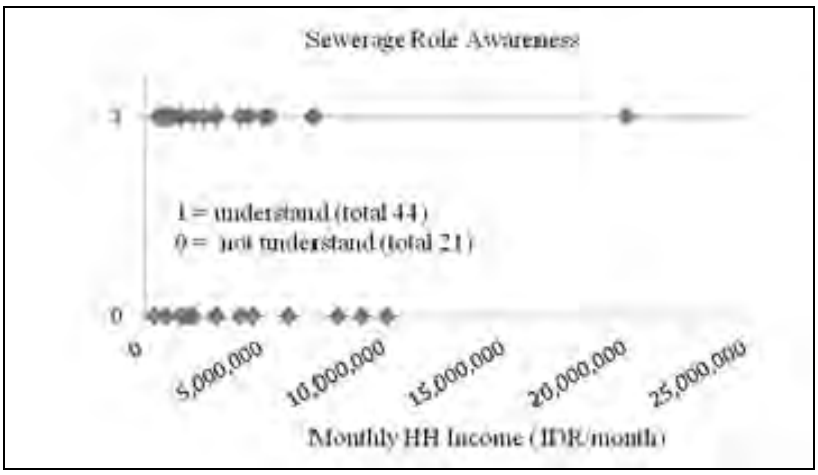
Surface water accounts for 50% of the municipal water supply volume and the remaining water comes from groundwater. Excessive water exploitation affects ground subsidence. The insufficient drainage system also affects traffic, the economy and national safety significantly.



Understanding:78% Not-understanding: 22%

Source: JICA PPP Study Team

Figure 2-1 Recognition on Water Pollution Source



Understanding: 68% Not-understanding: 32%

Source: JICA PPP Study Team

Figure 2-2 Recognition on Sewerage Role

(3) Wastewater Treatment of Building

Building owners who were surveyed (ten buildings) recognize the role of sewerage. Owners served by sewerage also recognize the sewerage system as a beneficial facility since they do not have to be bothered with the nuisance of wastewater management.

Owners of individual treatment facilities also recognize the importance of wastewater treatment; however maintenance of facilities is a burden to them. Owners of deteriorated activated sludge process and septic tanks face difficulty in complying with the wastewater discharge standards.

The water supply charge and the deep well tax are quite expensive at 12,500 IDR/m^3, which is almost the same as the water supply cost in European Countries and Japan. Deep wells are a provision for emergency use and accordingly, water saving equipment is generally used. Hotel

facilitates employ wastewater recycling facilities in order to conserve PDAM water since the water consumption rate is very high.

The other hotels that plan to facilitate wastewater recycle facilities cexpect the water supply charge will be reduced. However, residual of filtered wastewater is difficult to discharge, so the hotels are investigating how both wastewater recycling and public sewer connection can be compatible.

The Study found that all building owners except one hotel expect public sewerage service.

(4) Spatial Plan

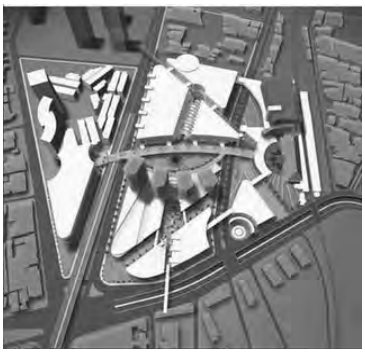
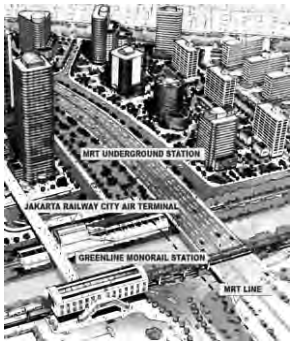
Spatial plan of 2011–2030 Regional Spatial Planning (RTRW) has been applied since July 2011, and according to RTRW, infrastructures such as land use, transportation and urban development are to be developed.

The central sewerage service area is designated as a commercial and government facility area (“Penkantoran, Perdagangan dan Jasa”) and intensive land utilization is assumed.

(5) On-going Urban Development Projects

MRT South-North, MRT East-West and Soekarno-Hatta International Airport Rail Link are going to be implemented or planned in the Central Business District where the central sewerage service zone is located. Large commercial complexes will be developed along with MRT stations.

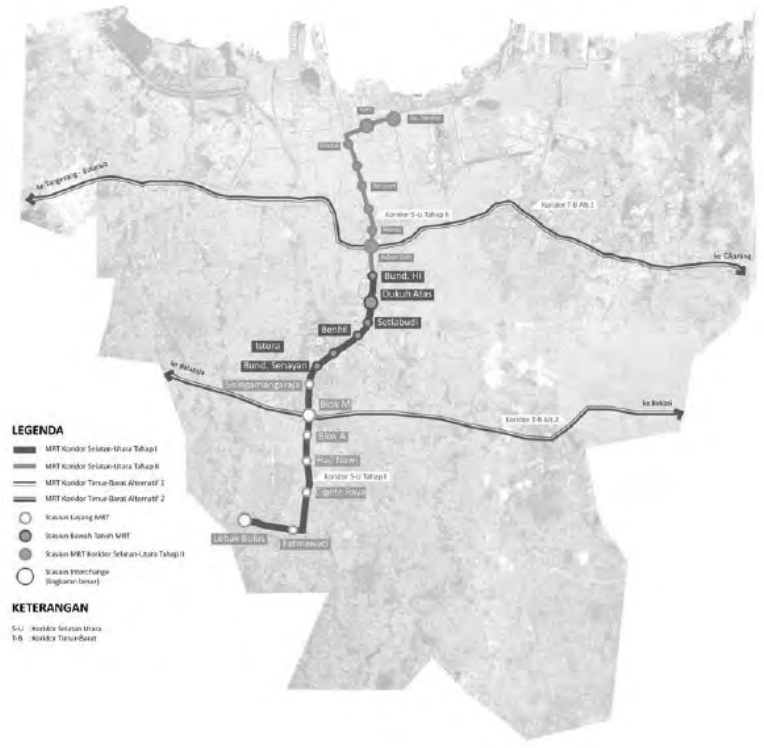
Project Location Map

1 Senen Area Redevelopment 	2 Sarinah Square Redevelopment 
3 Thamrin Office Park 	4 MRT Station Dukuh Atas 

Source: JICA PPP Study Team

Figure 2-3 Features of Urban Development Project in Jakarta

MRT (Mass Rapid Transit) Operation Target
Phase-1: 2016, Phase-2: 2018



Source: MRT Jakarta

Figure 2-4 Features of Urban Development Project in Jakarta

2.2 Regulatory System and Development Program of Water Supply and Sewerage

(1) Amendment to the Water Laws

New Water Laws describe background issues and policies against them. This is evaluated as an excellent approach since the focus on integrated river basin management was enhanced. Regarding wastewater management/water environment, it is expected the laws will play an important role in the following aspects: conservation of water resources, residence participation, mitigation of drought, flood mitigation in urban areas, and storm water reuse.

1) Water resources issues in Indonesia

- Degradation of water resources, both in quantity and quality
- Increase of sediments
- Poor performance of water resources and irrigation infrastructures
- Increase of flood and drought intensities
- Lack of beneficiaries' role and community participation
- Suspiciously low effective government investments on water resource infrastructure due to supply-side approach of investment

2) Water resources management targets

- Achieve water resources management pattern in an integrated and sustainable manner
- Control the potential of water conflict
- Control groundwater usage
- Improve the water capacity to fulfill the needs for household, settlement, agriculture, and industry with priority for domestic and traditional agriculture
- Reduce the impacts of flood and drought
- Control water pollution
- Protect coastal areas from abrasion especially in remote islands, strategic areas, and international boundary regions
- Enhance public participation
- Improve the quality of coordination and cooperation among stakeholders
- Establish a sustainable mechanism for water resources financing
- Develop a data and information system which is accurate, practical and accessible
- Revitalize water sources and water infrastructures conditions
- Ensure bulk water availability for public needs
- Control floods, particularly in urban areas

(2) Clean River Program

The Environment Impact Management Agency (BAPEDAL), in cooperation with local governments, promotes "PROKASIH (Clean River Program)" to mitigate water pollution, with the implementation of a ranking program for companies on water quality conservation activities. the Performance Level Evaluation Program (PROPER) is a company evaluation system adopted by BAPEDAL based on the environmental information from companies. The companies' categories classified as gold, green, blue, red and black are announced to the public. The companies evaluated to have an excellent environmental mitigation have met the following requirements. Moreover, these companies have adopted the total amount control / pollution charging system.

- Duty for reporting the activities on environmental mitigation
- Complied with water quality standard of discharge
- Complied with water pollution standard
- Complied with hazardous chemical substance disposal standard

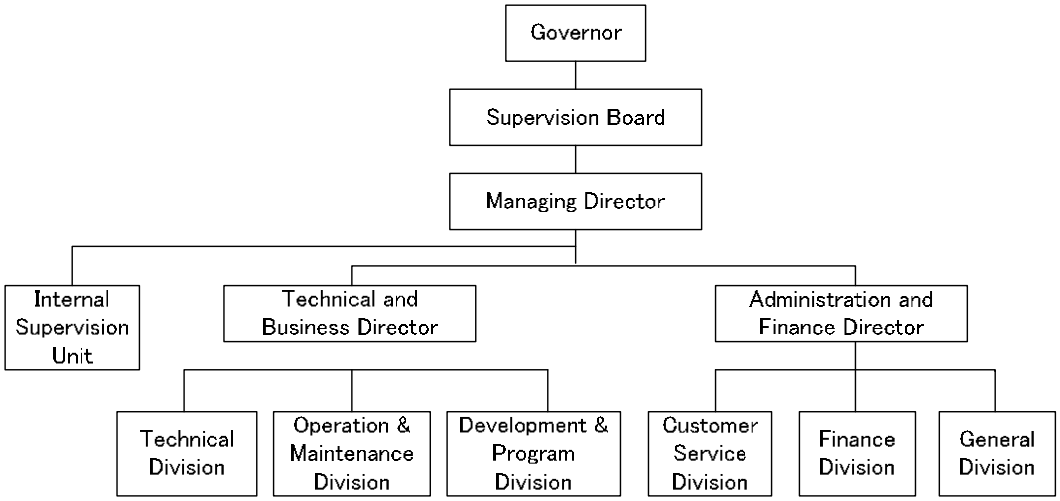
(3) PD Pal Jaya

PD Pal Jaya, which is as stipulated under PD Pal Jaya Managing Director Decree No. 12 of 2009, provides facility development and operation of sewerage system and on-site treatment plant in all of DKI Jakarta. PD Pal Jaya has contributed to the water pollution control and flood mitigation of river

and channels and the improvement of environmental sanitation on pathogen and insects through wastewater treatment.

Section 1: PD Pal Jaya's operational covers all of Jakarta city
Section 5: Provide sewerage system, on-site system and treatment services
Source: PD Pal Jaya homepage

The Supervision Agency of Governor assigns to the PD Pal Jaya General Director, two Directors of Technical Business and Administration & Finance, and 106 staff.



Source: PD Pal Jaya

Figure 2-5 Organization Structure of PD Pal Jaya (as of Jan. 2011)

Table 2-3 Staffing of PD PAL Jaya

Category		Number of Staff	
General Director		1	3
Director		2	
Technical & Business	Operation & Maintenance Div.	18	38
	Technical Div.	12	
	Development & Program Div.	8	
Administration & Finance	Customer Service Div.	12	65
	Finance Div.	13	
	General Div.	28	
Internal Audit Supervisor		9	
Others (contract based workers)		3	
Total			106

Source: PD Pal Jaya

(4) BPLHD

BPLHD, the Regional Environment Management Board, is an environmental management organization under Decree No. 10/2008 and Governor Ordinance 165/2009 having the following tasks:

- Creation of policy for environmental administration
- Monitoring related to environmental control facilities
- Wastewater and hazardous waste management
- Control and evaluation of surface water
- Technical guidance, management and supervision of environment impact assessment (EIA)
- Management of wastewater management administration including factory wastewater (Cleansing Agency, PD Pal Jaya)
- Guidance, proposal, licensing or monitoring, supervision and coordination for use of groundwater, factory waste including hazardous substances and for recovery of surface water resources

(5) Cleansing Agency

The Cleansing Agency is an organization under Decree No. 131/2009 having the following tasks:.

- Creation of technological policy related to implementation of cleansing management
- Management of solid waste and septic tank wastewater
- Promotion of education and training for improving sanitation and cleanliness of living
- Execution of laws in cleansing management
- Collection, management, storage and reporting of cleansing tax
- Construction, operation and maintenance of cleansing facilities

(6) Jakarta Water Supply Regulatory Body (JWSRB)

Water supply service was transferred to a private company with a concession contract of 25 years which started from 1998. The Jakarta Water Supply Regulatory Body established in 2002 overtakes public transparency, accountability and fair water supply operation.

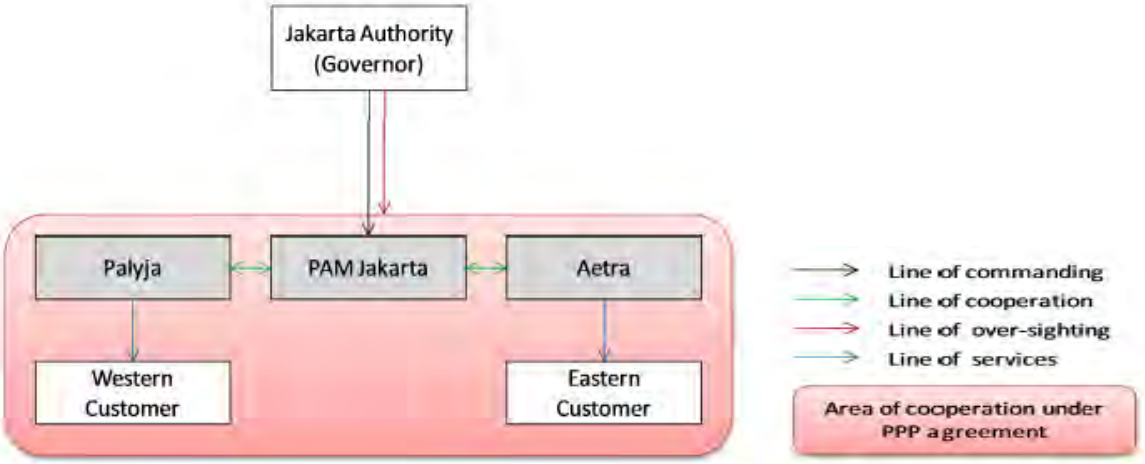
Stakeholders of the Jakarta water supply are the DKI Jakarta government, PAM Jaya, Thames (the company's name is Thames PAM Jaya or TPJ), Lyonaise (the company's name is PAM Lyonaise Jaya or Palyja) and the public, and they work with each other as regulatory body, PAM/evaluator, service provider and costumers as shown in Figure 2-6.

The institutions serve as an oversight body to the cooperation agreement among public-private partnership parties: PAM Jaya, Palyja, and Aetra - formerly Thames PAM Jaya/TPJ (Figure 2-6). Therefore, the primary and first responsibility of JWSRB is to assure that the cooperation between PAM and the operators will be conducted in compliance with the Agreement.

The board members have equal responsibility with four different fields of expertise as follows:

- Technical expertise
- Financial expertise
- Legal expertise
- Customer and Public Relations expertise

The Board has proposed a tariff system based on policy guideline as shown in Table 2-4. The approach for proposing new tariffs is based on the performance, with the recognition that water concession is related to whether the private partners have delivered their promise on the PPP contract. The possibility to propose a new tariff or not to propose a new tariff is 50:50.



Source: JWSRB

Figure 2-6 Structure of JWSRB

Table 2-4 Guidelines for Tariff Setting of JWSRB

	Performance	Financial requirement	Service quality improvement	Affordability	Judgment
1	Y	Y	Y	Y	Confirmed: new tariff proposed
2	Y	Y	Y	N	Proposed new tariff
3	Y	N	Y	Y	Proposed new tariff
4	Y	Y	N	Y	Proposed new tariff
5	Y	Y	N	N	Proposed new tariff
6	Y	N	N	N	Considering to propose new tariff
7	Y	N	Y	N	Considering to propose new tariff
8	Y	N	N	Y	Considering to propose new tariff
9	N	Y	N	Y	Not to propose new tariff
10	N	Y	Y	Y	Not to propose new tariff
11	N	Y	Y	N	Not to propose new tariff
12	N	N	Y	Y	Not to propose new tariff
13	N	Y	N	N	Confirmed: No: to propose new tariff
14	N	N	Y	N	Confirmed: No: to propose new tariff
15	N	N	N	Y	Confirmed: No: to propose new tariff
16	N	N	N	N	Confirmed: No: to propose new tariff

Source: JWSRB

2.3 Water Supply Development Program

The ratio of water supply service in Jakarta is 64.66% in the west area and 59.98% in the east area, and for NRW, it is 42.6% and 50.17% respectively.

PAM Jaya, at the time of privatization in 1997, made concessionaire contracts with water supply companies in which five performance requirements: volume of water sold, unaccounted for water, coverage ratio, quality and water pressure (shown in Table 2-5) every five years are specified. In case of lower performance than the contract, financial penalty shall be incurred. Coverage ratio and billed water are still lower than the agreed target of Year 5 of the contract.

Table 2-5 Target and Performance in 2010

Technical target	Palyja (West Jakarta)	Aetra (East Jakarta)
1. Water loss (NRW)	42.60%	50.17%
2. Production	269.79 million m^3	272.83 million m^3
3. Connection	419,776	385,377
4. Volume sold	147.27 million m^3	135.95 million m^3
5. Coverage ratio	64.66%	59.98%

Source: JWSRB, 2011

Table 2-6 1997 Agreement between PAM JAYA & Private Partners

	Year 5	Year 10	Year 20	Year 25
Volume of water sold	342 mil. m^3	398 mil. m^3	419 mil. m^3	428 mil. m^3
Unaccounted for Water (UFW)	35%	25%	20%	20%
Coverage Ratio	70%	75%	98%	100%
Quality	Clean Water at the end of Year 9		Potable Water at Year 10	
Water Pressure	7.5 m in all zones at the end of Year 5(except Pluit)		7.5 m in all zones before Year 10	

Source: Jakarta Water Supply, Kris Tutuko, PAM Jaya Jakarta Indonesia

2.4 Sewerage Development Program

(1) Sewerage and Sanitation in the MP Review

DKI Jakarta territorial area is divided to 14 sewerage service zones. The sewerage development plan target years are 2020 for the Short-Term Development, 2030 for the Mid-Term Development and 2050 for the Long-Term Development. Sewerage served ratio and connection rate for Short-Term Development are 20% and 15% respectively, and the sewerage service ratio in Long-Term Development is 80%.

Targeted river water quality is 10 mg/l for BOD which is designated as Group B in Governor's Decree No 582, 1995 and is applied to drinking water sources. Targeted river water qualities in Mid-Term and Long-Term Developments are 35 mg/l and 25 mg/l respectively.

The sewerage development plan also describes that river purification or dilution efficiency is expected to be three times the treated effluent volume and treatment process shall be selected to comply with treated effluent qualities of BOD 20 mg/l (daily average), TSS 20 mg/l (daily average) and fecal coliform bacteria 10,000 MPN/100 ml.

Table 2-7 Sewerage and Sanitation Development Plan

Year	Short-Term 2012–2020			Mid-Term 2021–2030		Long-Term 2031–2050			
	2012	2014	2020	2025	2030	2035	2040	2045	2050
Served Pop. (1,000 cap.)	12,665	12,665	12,665	12,665	12,665	12,665	12,665	12,665	12,665
Planned Pop. (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 Pop. (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 Pop. (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: MP Review

(2) Sewerage Service Zoning Plan

Table 2-8 and Figure 2-7 show the 14 sewerage service zones.

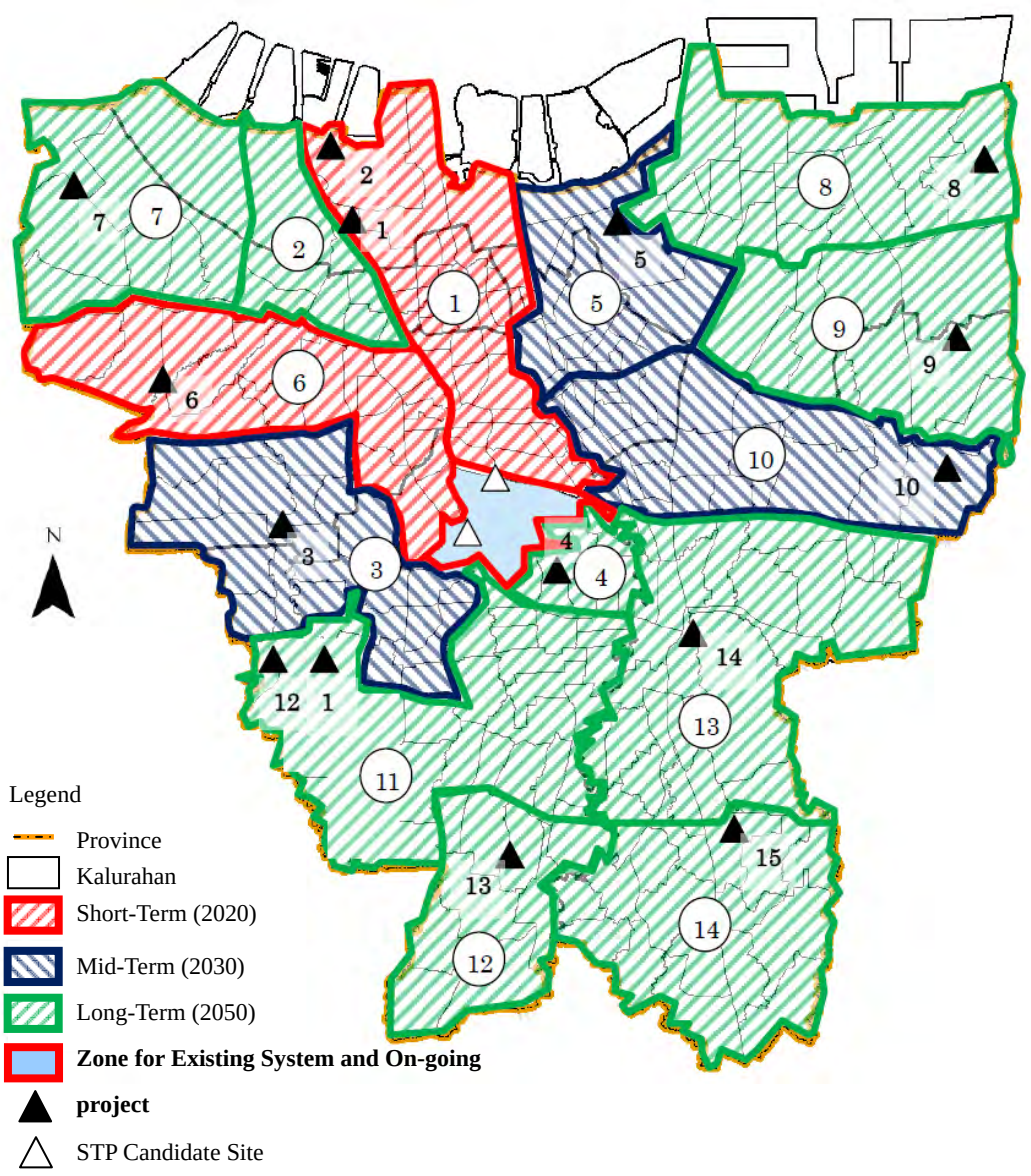
Development program prioritizes Zone 1 (Central Jakarta) and Zone 6 (West/South Jakarta) where sewerage system shall be developed urgently.

Existing sewerage area: Zone 4
Short-Term Project 2012–2020: Zone 1 & 6
Mid-Term Project 2021–2030: Zone 3, 5 & 10
Long-Term Project: Zone 2, 7, 8, 9, 11, 12, 13 & 14

Table 2-8 Sewerage Zones in DKI Jakarta

STP Service Zone	City	Estimated Population (cap.)		Sewerage Area (ha)	
		2020 (Short-Term)	2030–2050 (Mid/Long-Term)	2020	2030–2050
0	Timur/Pusat/Selatan	194,589	211,865	1,220	1,220
1	Timur/Barat/Utala /Pusat/Selatan	1,137,853	1,236,736	4,901	4,901
2	Utara/Barat	140,610	149,042	1,376	1,376
3	Barat/Selatan	628,092	721,501	3,563	3,563
4	Selatan	266,901	290,796	935	935
5	Utara/Pusat	696,849	795,109	3,375	3,375
6	Barat/Selatan/Pusat	1,275,209	1,465,718	5,874	5,874
7	Utala/Barat	610,146	692,649	4,544	4,544
8	Utara	974,636	1,100,137	4,702	4,702
9	Utala/Timur	451,714	537,477	5,389	5,389
10	Timur/Pusat	1,450,797	1,549,252	6,289	6,289
11	Selatan	1,458,528	1,578,573	8,246	8,246
12	Selatan	464,932	555,385	3,172	3,172
13	Timur	971,754	1,053,724	6,433	6,433
14	Timur	561,551	617,269	4,605	4,605
Reclaimed Land		0	110,049	2,573	5,146
Total		11,284,161	12,665,282	67,196	69,769

Source: MP Review



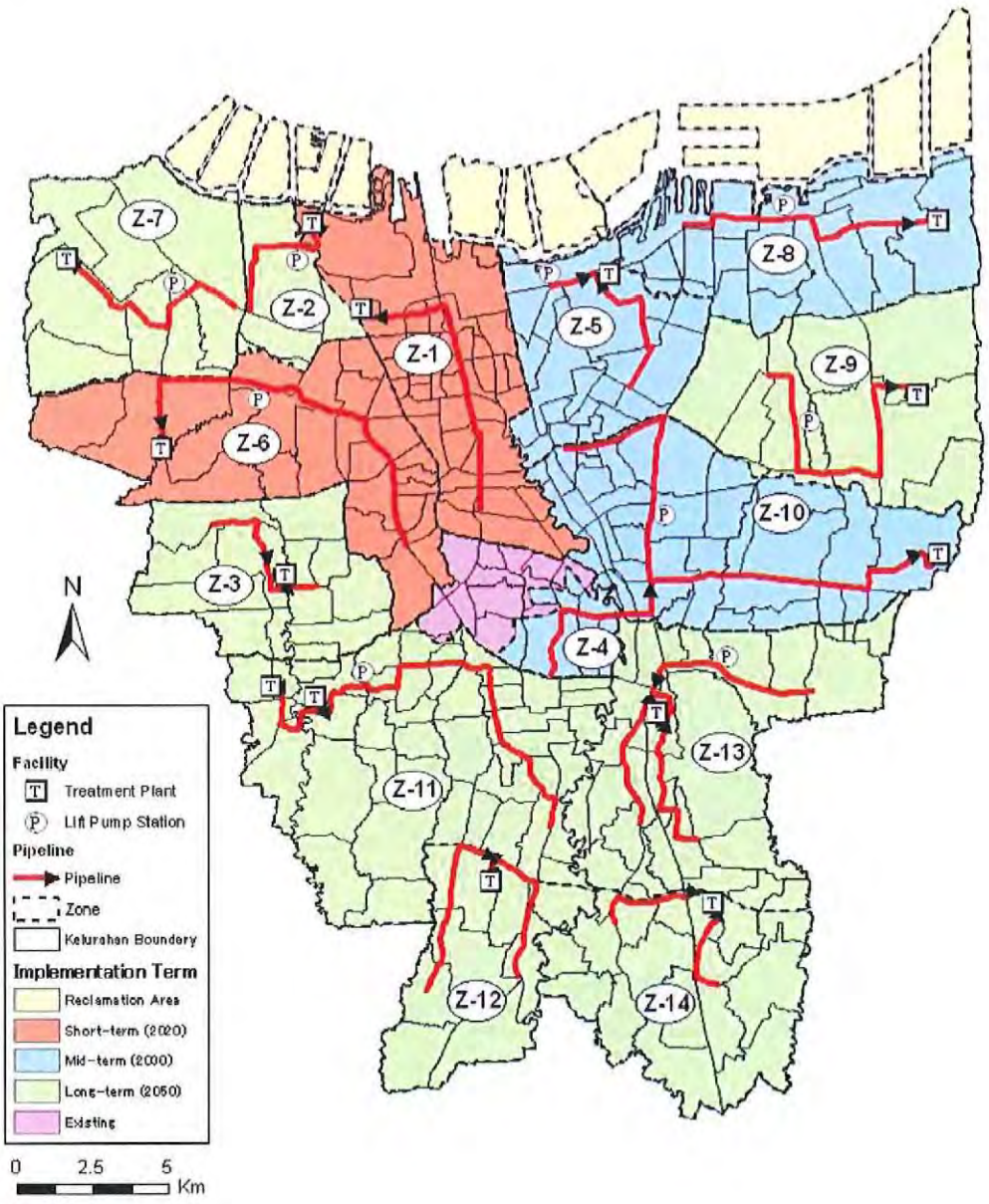
Sub-Zone No.	Site No.	Name of STP Candidate Site	Area [ha]
①	1	Pejagalan	7
②	2	Muara Angke	4 - 17
③	3	Srengseng City Forest Park	6
④	4	Tebet (PD Pal Jaya and Krukut)	2 - 5
⑤	5	Sunter Pond	5 - 11
⑥	6	STP Duri Kosambi	11
⑦	7	Kamal - Pegadungan	5 - 10
⑧	8	Marunda	7.5 - 17
⑨	9	Rorotan	4 - 7.5
⑩	10	STP Pulo 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: MP Review

Figure 2-7 Sewerage Zones and Candidate Sites for STPs

(3) Sewer Layout Plan

Figure 2-8 and Table 2-9 show the layout plan of conveyance sewer and features of the individual collection system. Sewer construction up to 2050 covers the sewerage service area of 63,404 ha, with a sewer length of 10,343 km and 1,297 thousand house connections. This means 250 km of sewer and 30,000 house connections per year.



Source: MP Review

Figure 2-8 STP Area & Conveyance Sewer Layout Plan

Table 2-9 Collection System

STP Zone	Area (ha)	House Connection	Secondary & Tertiary	Sub Main	Main Sewer	Conveyance Sewer	Total	Relay PS.
Short-Term: 2012–2020								
1	4,901	101,952	656,638	86,069	5,263	10,269	758,239	0
6	5,874	130,956	829,313	154,809	11,532	12,426	1,008,080	1
Sub-total	10,775	232,908	1,485,951	240,878	16,795	22,694	1,766,319	1
Mid-Term: 2010–2030								
4	935	21,398	133,518	28,375	2,313	304	164,510	0
5	3,375	71,253	445,534	102,462	6,369	3,079	557,444	1
8	4,702	93,841	587,691	147,192	5,400	3,333	743,616	1
10	6,289	140,385	876,530	192,932	6,860	8,726	1,085,048	1
Sub-total	15,301	326,877	2,043,273	470,961	20,942	15,442	2,550,618	3
Long-Term:2031–2050								
2	1,376	2,089	181,881	42,041	3,580	0	227,502	1
3	3,563	86,455	538,705	109,736	5,277	3,125	656,843	2
7	4,544	85,444	536,031	139,243	11,037	402	686,713	1
9	5,389	114,682	511,296	170,647	5,026	2,998	689,967	1
11	8,246	194,515	1,212,849	251,348	15,789	6,285	1,486,271	1
12	3,172	59,913	536,245	144,176	7,844	660	688,925	0
13	6,433	113,902	715,891	199,969	9,659	3,676	929,195	1
14	4,605	80,887	508,518	146,045	5,703	932	661,198	2
Sub-total	37,328	737,887	4,741,416	1,203,205	63,917	18,078	6,026,614	9
Total	63,404	1,297,672	8,270,640	1,915,044	101,654	56,214	10,343,551	13

Source: MP Review

(4) Wastewater Treatment

1) Design Criteria

Design criteria for the sewerage planning are shown in Tables 2-10 and 2-11.

Table 2-10 Wastewater Flow Rate

Category	Domestic	Commercial, Government and Industry	Total
l/cap./day	150	50	200

Source: MP Review

Table 2-11 Pollution Load

Wastewater		Wastewater (Total)		Black Water		Gray Water	
		g/PE/day	mg/l	g/PE/day	mg/l	g/PE/day	mg/l
Flow (l/PE/day)		150		25		125	
Load	BOD	30	200	12.5	500	17.5	140
	SS	30	200	12.5	500	17.5	140
	COD_{Cr}	60	400	25	1,000	35	280
	N	5.25	35	4.5	180	0.75	6
	P	1.2	8	0.625	25	0.575	4.6

Source: MP Review

Wastewater Treatment Process

Since Jakarta has restrictions regarding land acquisition but recruitment of operation engineers is easy, treatment processes with compact operation & maintenance facilities, which have a small foot print and high performance, will be selected. The MP Review recommends five processes as follows:

- Activated sludge process (ASP)
- Anaerobic – anoxic – aerobic process (A2O)
- Sequencing batch reactor (SBR)
- Moving bed biofilm reactor (MBBR)
- Membrane bioreactor (MBR)

A detailed study of alternative treatment process is committed to the FS stage. MBR is designated to be practicable if comprehensive knowledge and experience on biological treatment are provided. Also the MP Review recommends the activated sludge process, which provides multi-function and high quality of treatment performance, since Jakarta requires water environment improvement, wastewater effluent reuse and stringent wastewater regulation. MBR is designated as one of alternatives for wastewater effluent reuse in the future.

Table 2-12 Matrix for Selection of Wastewater Treatment Technology

Process	Effluent Quality	Coli forms Removal	Nitrification-Denitrification	Phosphorous Removal	Process Reliability	Land Use	Ease of Operation	Ease of Maintenance	Electrical Demand	Capital Cost	Track Record
Conventional Activated Sludge Process (ASP)	G	G	P	P	VG	G	VG	VG	AV	G	VG
Anaerobic Anoxic Oxic Process (A_2O)	VG	G	VG	VG	VG	G	G	G	AV	G	VG
Step-feed Biological Nitrogen Removal Process	VG	G	VG	VG	VG	G	G	G	AV	G	VG
Sequencing Batch Reactor (SBR)	VG	G	VG	VG	G	G	G	G	AV	G	G
Moving-Bed Biofilm Reactor	G	G	P	P	G	G	G	G	AV	G	G
Membrane Biological Nitrogen Removal Reactor (MBR)	VG	VG	VG	P	VG	VG	P	P	P	AV	AV
UASB + ASP	G	G	P	P	AV	AV	AV	VG	VG	VG	G
Extended Aeration	G	G	P	P	G	P	G	VG	P	VG	G
Aerated Lagoon	G	G	P	P	AV	P	AV	AV	P	VG	G
Stabilization Pond	AV	P	P	P	P	P	G	VG	VG	VG	AV

VG: Very Good, G: Good, AV: Average, P: Poor

Source: MP Review

2) Sludge Treatment

The MP Review recommends coagulation & thickening, anaerobic digestion (bio-gas exploitation), dewatering and processing & land reclamation at a land reclamation site. The MP Review does not recommends composting, cement material use nor recycling for road construction, bricks and fuel use which are facilitated in STP.

(5) Outline of Construction Project in Central Sewerage Zone of DKI Jakarta

The MP Review recommends Zones 1 & 6 as potential projects that will be implemented urgently (Table 2-13).

Central sewerage area Zone 1 has a served population of 1,236,736 and a sewerage area of 4,901 ha.

Table 2-13 Outlines of Potential Projects

STP Service Zone	City	Estimated Population (cap.)		Sewerage Area (ha)	
		2020 (Short-Term)	2030–2050 (Mid/Long-Term)	2020	2030–2050
1	Timur/Barat/Utala /Pusat/Selatan	1,137,853	1,236,736	4,901	4,901
6	Barat/Selatan/Pusat	1,275,209	1,465,718	5,874	5,874

Source: MP Review

Central STP is planned at a site of 6.9ha in Pejagaran with a daily average treatment capacity of 198,000 m^3/day and a daily maximum of 264,000 m^3/day.

Table 2-14 STP of Potential Projects

Zone	STP Site	Location	Area(ha)	Wastewater Flow	
				Average (m^3/day)	Day Max. (m^3/day)
1	2	Pejagaran	6.9	198,000	264,000
6	6	Duri Kosambi	8.2	235,000	313,000

Source: MP Review

Peaking Factor (PF)

Sewer PF = 4.02*(0.0864*Q)-0.154 Large Pumping Station PF = 2.0

Design Effluent Quality

BOD 20mg/l (Daily average)
TSS 20mg/l (Daily average)
Fecal Coli 10,000 MPN/100ml

2.5 Activities of Domestic/Overseas Private Companies and Donors

The existing sewerage system operated in Setia Budi has been developed by JSSP (Jakarta Sanitation and Sewerage Project) with financing by WB. Sewers have been developed by DKI Jakarta finance at present. WB recognizes sewerage projects in Jakarta as being financed by JICA, and the other donors do not consider financing.

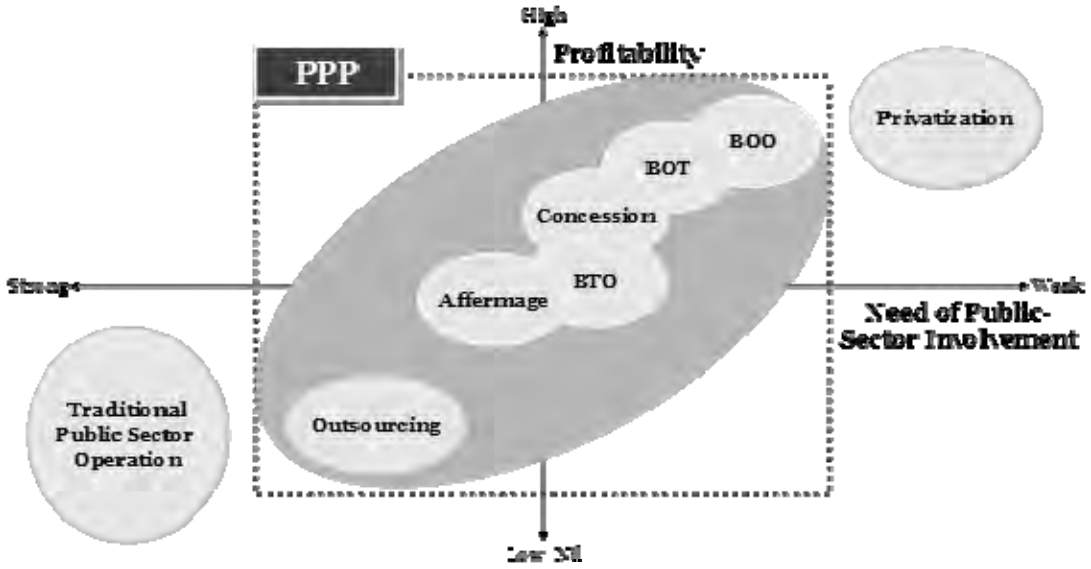
A small-scale sewerage project is underway and is technically supported by a French company. This project aims at upgrading the treatment and expanding service area, and provides effluent wastewater reclamation.

A machinery manufacture in Japan has supplied pipe jacking machines to Jakarta and Denpasar sewerage projects. Curved and long-distance pipe jacking technology is indispensable due to serious traffic congestion in Jakarta. Japanese pipe jacking companies are interested in sewer construction in Jakarta and they have been carrying out market research.

Chapter 3 Basic Characteristics of PPP and PPP in Sewerage Works

3.1 Basic Characteristics of PPP

The definition of PPP (Public-Private Partnership) is a little different in each country according to its background and executing institutions. Recently, PFI, concession, leasing, out-sourcing, and others are defined as PPP if these schemes are applied by the private sector to public works. In Indonesia, GOI has already published two books, the Private Partnership (PPP) Investor's Guide (2010, Coordinating Ministry of Economic Affairs) and Making PPP Work for Indonesia (2010, National Development Planning Agency), in order to boost PPP projects and they have adopted the same idea as above.



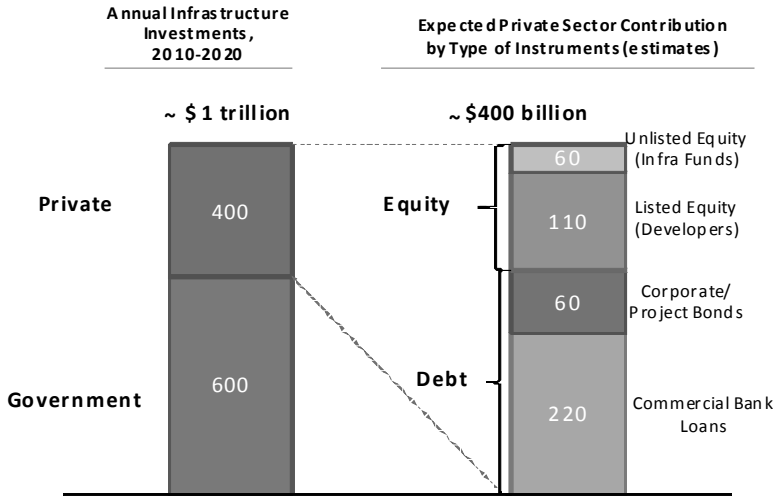
Source: "Strategyand Methods of Privatization", Yumiko Noda,Nikkei-Shinbunsha 2004

Figure 3-1 Characteristics of Various Contracts of PPP

3.2 The Current Situation of Infrastructure Projects and Necessity of PPP

(1) PPP Projects in Asia

The necessary amount of annual investment for infrastructure is calculated to be around 1 trillion US$ in Asia according to "Infrastructure Investment Projection 2010-2020." As possible expenditure by the governments is calculated to be around 60% of the amount, a huge financial gap remains.

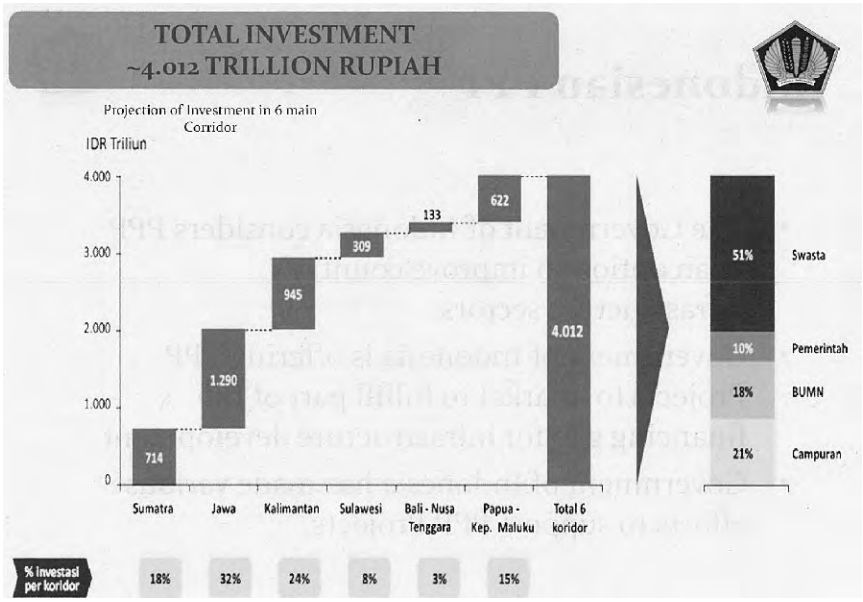


Source: Barrow, Michael (June 2010) "Private Financing of Infrastructure in Asia" ADB Workshop on APEC Growth Strategy, Sapporo, Japan

Figure 3-2 Finance Gap for Necessary Investment in Asia, ADB Calculation

(2) PPP Projects in Indonesia

GOI MOF states that Indonesia needs 4 trillion Rp for the infrastructure development during 2011–2025 in the "Master Plan on Acceleration and Expansion of Indonesian Economic Development (Mp3EI)." MOF also clarifies the policy in the plan that GOI's expenditure should be minimized to 10% of the necessary expenditure and the remaining amount should be covered by private funds. Thus, private funds are indispensable for infrastructure in Indonesia.



Source: Ministry of Finance, Mp2EI

Figure 3-3 Financing Sources during 2010–25 by GOI

3.3 Merits and Issues of PPP Scheme

(1) Merits of PPP Scheme

PPP schemes, in general, have the following merits for infrastructure development in comparison with conventional public works.

- They can produce better quality in service by utilizing experience, know-how, skilled management, updated innovation, etc. of the private sector.
- They can deduct the lifecycle cost by entrusting more tasks in one contract for design, finance, construction, and management.
- They can ensure the best efforts of the private sector to introduce the performance-based payment.
- They can utilize a long-term financing.
- They can transfer the risks to the private sector, which is able to manage them.
- They can transfer the deduction risk of asset value to the private sector.
- They can be managed by only one contract between public and private sectors.

(2) Issues of PPP Scheme

The following issues are often encountered especially in newly emerging countries. Both public and private sectors should clarify the related procedures and conduct projects based on a contract in order to avoid these issues.

- A system to properly monitor the performance of the private sector is necessary.
- Governments shall commit the annual expenditure over the long term, which may have an impact on financial adjustments in ordinary accounts.
- Governments shall pay service fees instead of the risk transfer of a project to the private sector.
- In general, financing costs of the private sector are higher than those of the public sector.

3.4 Key Points for Successful PPP Model in Sewerage Works

In introducing a PPP scheme, it shall be noted that effective role sharing between public and private sectors is essential. In particular, sewerage service cannot achieve full-cost recovery and needs the subsidies in the construction stage and/or operation stage. Therefore, sewerage service PPP should not adopt a financially independent type, but a service purchasing type. The public sector shall pay a service fee to the private sector based on the service fee purchasing contract. As discussed later in detail, the service fee basically consists of O&M cost (OPEX), repayment of CAPEX, replacement cost, and funding cost.

The revenue for a project comes from only tariff, which is insufficient for full cost recovery. The key to secure the sustainability of a project is how to compensating the gap between

service fees and tariffs. For the success of sewerage service PPP, obvious demarcation of each role between public and private sectors, concrete target performances levied on the private sector, and proper monitoring systems are indispensable.

(1) Agreement for Appropriate Cost Sharing among Beneficiaries, Municipalities and the Central Government (Basics)

Concerning cost sharing, the affordability for all related payers shall be considered first with cost sharing by the most financially vulnerable payer considered later. Thus, the affordable tariff level for beneficiaries shall be first considered in a sewerage project. In lessons learned from past experience, an affordable tariff level can be determined based on monthly average household expenditures. Subsequently, an affordable subsidy level shall be determined to account for around 1–2% of the annual ordinary account of a municipality. The remaining financial gap shall be subsidized by the central government through a Viability Gap Fund (VGF) because sewerage service is a basic national service that should be equally provided to people all over the country.

In an actual project, VGF and the municipalities' subsidy should be extended only to construction cost. Operation & maintenance costs should be covered only by tariffs in order to secure the sustainability of sewerage service.

(2) Balancing between Sewerage Tariff and Subsidies (Concerns)

In general, a sewerage project is not cost effective. Also, sewerage tariff is not adequate to cover operation & maintenance costs in most newly emerging countries because people's consciousness is not high enough regarding environmental improvement and for political reasons, city mayors tend to keep the tariff at a low level.

Therefore, it is very important to determine an affordable tariff for beneficiaries and then, compensate for the gap between the tariff revenue and service fees through municipalities' subsidies and VGF.

(3) Appropriate Risk Sharing between Public and Private (Concerns)

All the risks related to the Project shall be made clear and specifically assigned to each stakeholder to ensure that private sectors can avoid uncertainty damage for long-term investments.

(4) Calculation Method of Service Fee and Monitoring Method (Concerns)

The calculation method of service fees and monitoring method shall be stipulated in a contract so that both parties can confirm management results for targeted performances. Service level, its equivalent fee, and penalties shall be discussed in detail before the contract is made considering the risk sharing.

3.5 Legal Review (Laws and Regulations related to the Project)

3.5.1 Institutional Analysis

(1) The Legal Foundation of Public Conducting the Project

<Summary>

There is no clear stipulation as to which party should act as the Government Contracting Agency ("GCA") in the Project. The Study Team proposes that the DKI Jakarta provincial government should act as the GCA given that there is no restriction for the DKI Jakarta provincial government to do so. However, it should be noted that there are grounds to say that the Regional Company of Wastewater Management for DKI Jakarta ("PD Pal Jaya") should act as the GCA as follows;

1) Under Presidential Regulation No. 67 of 2005 on cooperation between the Government and Private Entities in Infrastructure Procurement which was amended by Presidential Regulation No. 13 of 2010 and lastly amended by Presidential Regulation No. 56 of 2011 ("**Partnership Regulations**"), where a sector-specific infrastructure procurement is carried out by a state-owned company or a regional enterprise, such company shall act as the GCA.

2) Under Decision of Governor of DKI Jakarta, No. 45 of 1992, on Wastewater Management Through Piping System in Jakarta ("**KepGub 45/1992**"), PD Pal Jaya is authorized and entrusted with the tasks of construction, operation and maintenance/management of, among other things, sewage treatment plants.

3) It seems that the relevant regulations on wastewater management do not clearly differentiate IPALs (installation for wastewater management - *instalasi pengolahan air limbah*) constructed by PD Pal Jaya and those constructed by Unit for Environmental Waste and Groundwater Management ("**UPLLAT**"); however, the following points may provide a conclusion that PD Pal Jaya should be in charge of construction, operation and management of IPALs (as envisaged in the proposed Project):

   a) Based on KepGub 45/1992, PD Pal Jaya is authorized and entrusted with the task of treating wastewater within Jakarta city through a piping system. Piping system is in turn defined under Regulation of the Governor of DKI Jakarta No. 122 of 2005 on Domestic Wastewater Management in DKI Jakarta as a wastewater management system where wastewater originating from recognized sources is channeled through transporting pipes into a communal/central IPAL.

   b) On the other hand, as may be seen in Regulation of Governor of DKI Jakarta No. 25 of 2011 on Formation of Unit on Environmental Waste and Ground Water Management, UPLLAT carries out the function of, among others, planning and construction of domestic communal IPALs in residential areas. In the related regulation, 'domestic communal wastewater management' is defined as an integrated domestic management

of wastewater produced by a community/group of communities using a certain method so that the applicable wastewater quality standards are satisfied.

c) Based on the aforementioned points, it can be said that PD Pal Jaya should be appointed as the GCA. However, there is no restriction against DKI Jakarta government becoming the GCA in a wastewater Public-Private Partnership project.

d) PPP Book 2012 states that the DKI Jakarta government would serve as the GCA for the DKI Jakarta Sewage Treatment Plant. However, based on information from Mr. Aley in BAPPEDA (Local Development Planning Agency), this statement is not final and, during or after the Study, BAPPENAS may designate a different GCA for the Project. For clarification purposes, further consultation with the relevant governmental institutions is necessary during the Study.

<Relevant Laws>

- Presidential Regulation No. 67 of 2005 on Cooperation between the Government and Private Entities in Infrastructure Procurement as amended by Presidential Regulation No. 13 of 2010 and lastly amended by Presidential Regulation No. 56 of 2011
- Regional Regulation for Jakarta Region No. 10 of 1991 as amended by Regional Regulation for Jakarta Region No. 14 of 1997 on Regional Enterprise for Wastewater Management in Jakarta
- Decision of Governor of DKI Jakarta No. 45 of 1992 Concerning Regulation on Wastewater Management through the Pipeline System in Jakarta
- Regulation of the Governor of DKI Jakarta No. 122 of 2005 on Domestic Wastewater Management in DKI Jakarta
- Regulation of Governor of DKI Jakarta No. 25 of 2011 on Formation of Unit on Environmental Waste and Ground Water Management

<Details>

PD Pal Jaya and UPLLAT

Under Regional Regulation for Jakarta Region No. 10 of 1991 which was amended by Regional Regulation No. 14 of 1997on PD Pal Jaya ("**Perda on PD Pal Jaya**"), functions of wastewater management by the public in Jakarta, in particular the construction and maintenance of sewage treatment plants, are entrusted to PD Pal Jaya.

In order to assist the regional government in improving the quality of public water and the environment in general and to provide services of drainage of wastewater and collection through a pipeline system and domestic system[1], as well as providing services of wastewater management

[1] A wastewater management system with the source/origin of the wastewater, installation of collection and management all in a single location, such as a Septic Tank, or an IPAL (either permanent, or mobile)

services, PD Pal Jaya was established based on Perda on PD Pal Jaya. It should be noted that PD Pal Jaya has the responsibility to construct, operate and maintain IPALs.

While PD Pal Jaya acts as a company that is profit-oriented in nature, the Board of Environmental Impact Control of Jakarta (”**BPLHD**") takes a role of regulator in this field. BPLHD is assisted by UPLLAT as a technical executor in waste management and control over utilization of groundwater. UPLLAT’s functions are, among other things, construction of IPALs in residential areas and conducting cooperation in operating installations for hazardous and toxic waste management ("**LB3**").

There is no clear differentiation between IPALs constructed by PD Pal Jaya and those constructed by UPLLAT. However, based on a verbal discussion with an official in UPLLAT[2], IPALs under UPLLAT are limited to those constructed in residential areas and cover only wastewater from the residential areas. Meanwhile IPALs constructed by PD Pal Jaya cover not only domestic wastewater in residential areas but also wastewater from offices, houses, home offices, shops, hospitals, malls, marts, meeting halls, hotels, enterprises and schools. IPALs under PD Pal Jaya have wider reach than those under UPLLAT.

Services by PD Pal Jaya

For wastewater management through the pipeline system, as maintained by PD Pal Jaya, KepGub 45/1992 stipulates that every owner, tenant, individual or legal entity who occupies or manages a building within areas in which public wastewater pipelines and/or inspection chambers[3] have been installed, shall dispose of its wastewater into those main pipelines through sewer pipes (pipa persil)[4] with permission from PD Pal Jaya, upon application by them as customers. The procedure for obtaining the permission is stipulated in the relevant regulation. This wastewater must also meet the requirements on domestic wastewater quality which are set by PD Pal Jaya, and shall be managed/treated first before being disposed into the public pipeline in case the applicable wastewater quality standard is not fulfilled.

PD Pal Jaya’s duty and responsibility in the construction, operation and maintenance of wastewater facilities and/or infrastructure includes:

(i) Connectors for sewer pipes
(ii) Network for public pipelines and their equipment
(iii) IPALs

[2] Consultation with Mr. Eko, Head of Technical Division at UPLLAT in BPLHD.
[3] An intermediary chamber between sewer and public pipes, which is used to preserve public pipes
[4] A pipe which is used to channel wastewater from a house/building into the main pipeline

(2) Types of Necessary License/Approval for Public to Cooperate with a Private Entity

<Summary>

DKI Jakarta provincial government or PD Pal Jaya (depending on which party is stipulated as the GCA) may, under the relevant regulations, cooperate with third parties in carrying out public functions of wastewater management including construction and maintenance of wastewater treatment plants.

In the context of PPP, DKI Jakarta provincial government or PD Pal Jaya (depending on which party is stipulated as the GCA) may be responsible to cooperate with a private entity in the construction and maintenance of wastewater treatment plants and thus be a responsible party for the Project (also see 3.5.2 (1)).

<Details>

Cooperation with a Private Entity in the Field of Wastewater Management

DKI JAKARTA PROVINCIAL GOVERNMENT

Under Government Regulation No. 50 of 2007 on Procedures of Implementation of Regional Cooperation ("GR 50/2007"), a regional government including DKI Jakarta provincial government may enter into a cooperation agreement with a third party including a private entity. Furthermore, under GR 50/2007, any plan of cooperation between the government and a private entity which (i) causes utilization of regional government's assets and (ii) burdens the society in the region (e.g., as a result of the cooperation, people are obliged to pay a sum of money) is required to be approved by the Regional House of Representatives if costs and expenses for the cooperation have not been included in the Regional State Budget.

PD PAL JAYA

In expanding its business, PD Pal Jaya may cooperate with state-owned companies, other regional companies, cooperatives and/or third parties. Under Perda on PD Pal Jaya, for PD Pal Jaya to, among other things, enter into an agreement which is valid for more than one year and conduct and perform principle matters pertaining to the performance and maintenance of PD Pal Jaya, the board of directors of PD Pal Jaya must first obtain approval or a power of attorney from the Governor of DKI Jakarta. The governor will give the approval or the power once it receives considerations from BPLHD.

Furthermore, under Decision by the Minister of Internal Affairs and Regional Autonomy No. 43 of 2000 on Guidelines on Cooperation Between Regional Enterprises and Third Parties ("KepMen 43/2000") and Decision by Governor of DKI Jakarta No. 39 of 2002 on Execution of Cooperation Between Regional Enterprises and Third Parties in Jakarta ("KepGub 39/2002"), cooperation may be in the form of joint operation or establishment of a joint venture company, without altering or transforming the legal status of the regional enterprise concerned. The cooperation must also be

first approved by the Governor of DKI Jakarta (if the cooperation is valid for more than 5 years) or the Supervisory Board of DKI Jakarta (if the cooperation is valid for less than 5 years).

Role of DKI Jakarta provincial government or PD Pal Jaya in a PPP Scheme

DKI JAKARTA PROVINCIAL GOVERNMENT

Under the Partnership Regulations, the infrastructure procurement can be held through (i) a partnership agreement entered by the Minister/Head of Institution/Head of Region and a private entity OR (ii) a business license granted by the government to a private entity for infrastructure procurement. Hence, there may be an argument to say that DKI Jakarta provincial government should act as the GCA and should be responsible for the execution of the Project.

PD PAL JAYA

Notwithstanding the elaboration above, according to the Partnership Regulation, when a public function by virtue of the prevailing laws is delegated to a public/regional government-owned company, then that company would be the one responsible for the execution of cooperation with a private entity in a PPP scheme. Thus, it may be concluded that PD Pal Jaya, being the regional government-owned company entrusted with the task of managing wastewater in Jakarta would be appointed and responsible for the execution of the Project. This is also consistent with the laws establishing the existence and scope of PD Pal Jaya in Jakarta. It was also confirmed by an official in BAPPENAS[5] that upon the completion of the bidding process (necessary in every project in a PPP scheme to determine the party entitled to undertake a certain project, in cooperation with the government), a public/regional government-owned company can be appointed to cooperate with the private entity in a PPP scheme.

<Relevant Laws>

Government Regulation No. 50 of 2007 on Procedures of Implementation of Regional Cooperation

Regional Regulation for Jakarta Region Number 10 of 1991 as amended by Regional Regulation for Jakarta Region No. 14 of 1997 on Regional Enterprise for Wastewater Management in Jakarta

Presidential Regulation No. 67 of 2005 on Cooperation between the Government and Private Entities in Infrastructure Procurement as amended by Presidential Regulation No. 13 of 2010 and lastly amended by Presidential Regulation No. 56 of 2011

Decision by the Minister of Internal Affairs and Regional Autonomy No. 43 of 2000 on Guidelines on Cooperation between Regional Enterprises and Third Parties

Decision by Governor of DKI Jakarta Number 39 of 2002 on Execution of Cooperation between Regional Enterprises and Third Parties in Jakarta

[5] Consultation with Mrs. Diah, Directorate of PPP of BAPPENAS, Jakarta.

3.5.2 Law and Regulation Analysis

(1) Consistency with the Applicable Laws and Regulations

To secure consistency with the relevant laws and regulations, the following major aspects should be settled.

PPP ARRANGEMENT

<Summary>

PPP may be executed through a partnership agreement or granting of a business license by the government.

For a SPC under a certain partnership agreement, an additional authorization from the Governor in this regard is necessary in line with what has been stated above.

<Details>

According to the Partnership Regulations, cooperation projects can be executed through the following schemes:

(i) Partnership agreement ("Partnership Agreement") entered into by the Minister/Head of Institution/Head of Region ("government") and a private entity, or
(ii) A business license granted by the government to a private entity for infrastructure procurement.

The Partnership Agreement means a written agreement for infrastructure procurement made between the government and a private entity. The business license means a license for infrastructure procurement granted by the government to a private entity.

If a SPC has already entered into a partnership agreement for infrastructure projects, it is not necessary to obtain a business license. However, it should be noted that there may be additional requirements to be fulfilled by the SPC if it intends to work on the infrastructure project in certain businesses/fields. (Authorization from the Governor of DKI Jakarta is needed if a private entity (e.g., SPC) cooperates with PD Pal Jaya in the construction and maintenance of wastewater treatment plants).

<Relevant Laws>

Presidential Regulation No. 67 of 2005 on Cooperation between the Government and Private Entities in Infrastructure Procurement as amended by Presidential Regulation No. 13 of 2010 and lastly amended by Presidential Regulation No. 56 of 2011; and

Minister of National Development Planning/Head of National Development Planning Agency (*Menteri Negara Perencanaan Pembangunan Nasional/Ketua Bapennas*) Regulation No. 4 of

2010on General Guidelines of Implementation of Cooperation between the Government and Private Entities in Infrastructure Procurement.

THE STATUS OF THE PROJECT (SOLICITED)

<Summary>

The proposed Project would be considered as a solicited one, given that it is contained within the most recent list of priority projects.

<Details>

Any infrastructure procurements must first be initiated through public tender or auction by the government. Therefore, to be eligible to enter into a partnership agreement with the government or to be granted a license, a company must be stipulated as an awardee of a public tender or auction (for a business license). The public tender and auction can be held based on the (project) identifications made by the government. Based on results from the project identification and public consultation, the Minister/Head of BAPPENAS/Governor set out list of priority projects.

The proposed Project of wastewater management is already contained in PPP Book 2012 – Potential Projects. Thus, it should be considered as a solicited project.

<Relevant Laws>

Presidential Regulation No. 67 of 2005 on Cooperation between the Government and Private Entities in Infrastructure Procurement as amended by Presidential Regulation No. 13 of 2010 and lastly amended by Presidential Regulation No. 56 of 2011

ENVIRONMENTAL QUALITY STANDARDS

An important aspect of environmental law which particularly applies to companies relates to the obligation to comply with various environmental quality standards. The occurrence of environmental contamination will be determined by measuring the excess of any environmental quality standards that are applicable to each particular business or activity. These include, among other things, quality standards pertaining to water, wastewater, seawater, ambience, air emission, nuisance (e.g., vibration, noise and odor), and other quality standards as may be further determined in accordance with science and technological developments. Law No. 32 of 2009 on Environmental Protection and Management ("**Environmental Law**") provides a mandate to the government to issue implementing regulations on environmental quality standards, which was issued in October 2010. To date, such several implementing regulations have been issued by the Minister of Environment on, among other things, activities of exploration and exploitation of coal bed methane, sugar industries, cigarette industries, and industrial areas.

All businesses and activities are prohibited from violating the applicable quality standards. The national environmental quality standards are currently governed by government regulations or

ministerial decrees. The provincial/regional government is also authorized to issue a regional regulation on regional/municipal quality standards. It is therefore important for companies to also review the local regulations on quality standards.

The quality standards applicable to wastewater are set out in Decision of State Minister of Environment No. 112 of 2003 on Quality Standards of Domestic Wastewater ("**KemennegLH 112/2003**") and PerGub 122/2005. In these regulations, 'quality standards for wastewater' are defined as content limits for polluting elements or other components that may be present in wastewater that is intended to be disposed of or released to public waters. Quality standards for domestic wastewater generated from real estate areas, office areas, business districts, apartments and restaurants with an area of more than 1,000 m^2 and dormitories with more than 100 residents are governed under KemennegLH 112/2003 while quality standards for domestic wastewater generated from individual homes are governed under PerGub 122/2005.

(2) Analysis of the Legal Risks

Based on the review of the relevant regulations, the following may potentially create confusion as to which entity should undertake the proposed Project:

- There is no clear and explicit definition of 'Sewage Treatment Plant' in the relevant regulations.
- There are inconsistencies between definitions of 'wastewater' and 'domestic wastewater,',while they both refer to wastewater generated from household activities.
- There is no clear division between IPALs constructed by PD Pal Jaya and those constructed by UPLLAT.

3.5.3 Legal Matters related to PPP Project Formulation

(1) Financing for the Project

i) Regulations/restrictions for capital investment from the public to SPC

There are no requirements or restrictions for capital investment from the public to a SPC in the relevant regulations.

ii) Regulations/restrictions for subsidies for working capital from the public to SPC

There are no requirements or restrictions for subsidies for working capital from the public to a SPC in the relevant regulations.

(2) Regulations on Tariff Mechanism and its Adjustment in the Sewerage Sector in the Public

<Summary>

- Customers, ranging from individuals to entities, who rely on the services of PD Pal Jaya shall pay a certain amount of tariff which is set out in the relevant regulation.
- The amount of tariff is determined on the basis of the customers' nature/type of building and size of the buildings.

<Details>

The Decision by Governor of DKI Jakarta No. 1470 of 2006 on Determination of Fees for the Services of Wastewater Disposal and Connection to PD Pal Jaya's Wastewater Pipeline ("**KepGub 1470/2006**") sets out the extent and calculation of fees for the services rendered by PD Pal Jaya, which are disposal of wastewater and connection to the main pipeline. For fees for wastewater disposal service, KepGub 1470/2006 stipulates that monthly fees are determined on the basis of the customers' natures/types of building and size of the buildings. In regard to fees for service of connecting local/domestic sewer pipes into PD Pal Jaya's public pipeline, KepGub 1470/2006 stipulates that fees applicable to customers that already have local wastewater treatment installations or even those without local installations are determined on the basis of the types of building and their width as well. There are also supervision fees for planning, administration and monitoring.

<Relevant Laws>

Decision by Governor of DKI Jakarta No. 1470 of 2006 on Determination of Fees for the Services of Wastewater Disposal and Connection to PD Pal Jaya's Wastewater Pipeline

(3) Ownership of the Project

Regulations for types of ownership of the Project

Theoretically speaking, a company cannot own a project as the project is an object under Indonesian law. However, a company can execute and carry out a project. Given that the Project is a PPP project, then in the context of PPP, a company can be a partner of the public (i.e., the government) in executing and carrying out the Project.

3.5.4 Legal Matters related to Private Sector

(1) License for Business Entity

1) Types of necessary licenses/approval for the Project

<Summary>

Private entities, as third parties, wishing to cooperate with regional government-owned companies in public-domain lines of business in Jakarta must obtain authorization from the Governor of DKI Jakarta.

<Details>

LICENSING REQUIREMENT APPLICABLE TO SPC UNDER THE PROPOSED COOPERATION WITH PD PAL JAYA

Under Perda on PD Pal Jaya, PD Pal Jaya may cooperate with state-owned companies, other regional government-owned companies, cooperatives and/or third parties in conducting activities of wastewater management.

Further, under KepMen 43/2000 in conjunction with KepGub 39/2002, a third party (i.e. SPC being a private party) wishing to cooperate with a regional government-owned company must have:

- Legal status in accordance with prevailing laws and regulations;
- A tax payer registration number (if the third party is an Indonesian company);
- Principal authorization from the Governor of Jakarta;
- Credibility and reliability; and
- Valid evidence of ownership rights over the assets (being the object of the cooperation).

In addition to the above, in the context of PPP schemes, the SPC will also need to enter into a Partnership Agreement or be granted by a business license by the government (refer to "*General Legal Issues in the Project - How to make sure that the Project is consistent with applicable laws and regulations*").

(2) Foreign Investment

1) General Framework of Foreign Investment Regulations

<Summary>

- An investment will have to be registered at BKPM prior to establishing a company (or prior to establishing an Indonesian subsidiary). Furthermore, the Negative List (as defined below) will have to be considered by all foreign investors prior to making an investment in Indonesia.

- Foreign investment activities in Indonesia must be done through a limited liability company.
- There is no restriction on foreign ownership in the field of wastewater management.

<Details>

Foreign direct investments in Indonesia are generally governed by Law No. 25 of 2007 ("**Investment Law**"), Presidential Regulation No. 36/2010 on List of Businesses which are Closed and Open with Requirements in the Field of Capital Investment ("**Negative List**") and their implementing regulations. The Investment Law and the Negative List set out the rules for investing (both domestic and foreign) in Indonesia. Investment in Indonesia will need to be registered at the Capital Investment Coordinating Board ("**BKPM**"). Therefore, registration to the BKPM must be made prior to making a capital investment in a company (or prior to establishing an Indonesian subsidiary).

The Negative List sets out the lines of business that are restricted or limited to foreign investment. Theoretically, a line of business that is not stipulated in the Negative List is 100% open for foreign investment. However, some uncertainty for foreign investors will remain, as the Negative List states that all sectors are open for investment unless otherwise prohibited. The Negative List will have to be considered by all foreign investors prior to investing in Indonesia.

2) Types of legal entity which may be used for foreign capital to conduct a project

As regulated in the Investment Law, a foreign investor has to undertake its foreign investment in Indonesia through an Indonesian limited liability company (*perseroan terbatas penanaman modal asing* or "PT PMA Company").

3) Possibilities for foreign investors to hold 100% share ownership of a company that conducts a project

In Indonesia, the Central Statistics Bureau (*Biro Pusat Statistik*) periodically issues a list of classification of the lines of business that exist in Indonesia called the Indonesian Lines of Business Standard Classification (*Klasifikasi Baku Lapangan Usaha Indonesia* – "**KBLI**"). The KBLI categorizes the lines of business into different categories each represented by different numeric codes.

The KBLI in turn is used in the Negative List to refer to the lines of business that are closed for foreign investment or are open but with certain restrictions. Note that one KBLI number can refer to several lines of business and that, according to the Negative List, in the event a KBLI number covers more than one line of business then the restrictions that are stipulated under the Negative List only apply to the specific line of business mentioned in the Negative List.

Under the latest KBLI (Version II), Head of Central Statistics Bureau Regulation No. 57 of 2009 ("**KBLI 57/2009**"), the Project may fall under KBLI No. 37000, waste management

(*pengelolaan limbah*). The business activities under this KBLI number include (a) collecting, (b) transporting and (c) treating wastewater, originating from household or industrial activities, which may be done by the government or private entities. It should be noted that the Project (i.e., planning & design, construction and operation & management of wastewater treatment plant and sludge reuse) is not contained in the Negative List. Thus, it can be concluded that a project may be done by an Indonesian limited liability company whose shareholding is 100% held by foreign entities. This has also been confirmed by an official at BKPM[6].

<Relevant Laws>

Law No. 25 of 2007 on Investment

Presidential Regulation No. 36 of 2010 on List of Businesses which are Closed and Open with Requirements in the Field of Capital Investment

Head of Central Statistics Bureau Regulation No. 57 of 2009

(3) Establishment of Business Entity

1) Legal foundation for the establishment of business entity

<Summary>

Establishment of SPC shall be preceded with an application to BKPM. BKPM's current policy on capital requirement requires that the total investment of an SPC shall be at least USD1,200,000 of which at least USD300,000 must be in the form of equity.

The maximum amount of loans that can be obtained by an SPC may be ten times the amount of its share capital (debt-to-equity ratio (DER)).

In the context of PPP, a foreign investor that manages to win a public tender is required to establish an SPC within six months after the bidding.

<Details>

ESTABLISHMENT OF A PT PMA COMPANY

Prior to establishing a limited liability company in Indonesia (PT PMA Company), which will be explained in detail below, the prospective foreign shareholders will also need to apply to BKPM for approval of the PT PMA Company.

CAPITAL REQUIREMENT FOR A PT PMA COMPANY

A PT PMA Company must be established and maintained by at least two shareholders. There is no regulatory requirement on minimum or maximum capital to be inserted in a BKPM application for the establishment of the PT PMA Company.

[6] Consultation with Mr. Ndang, Head of Services for Investment Licensing (*Kasubdit Pelayanan Aplikasi*) at BKPM.

However, based on BKPM's current policy, the minimum amount of investment in a PT PMA Company is USD1,200,000 of which at least USD300,000 must be in the form of share capital (equity), with the remainder (if any) being in the form of loans. The equity portion as stated in the BKPM application will need to be injected into the PT PMA Company immediately after the signing of the deed of establishment of the SPC (i.e., after BKPM's approval of the PT PMA Company has been obtained).

DEBT-TO-EQUITY RATIO (DER) FOR A PT PMA COMPANY

BKPM usually imposes a maximum debt-to-equity ratio of 3:1 for PT PMA Companies. Therefore, the maximum amount of loans that can be obtained by the SPC is three times the amount of its share capital (equity). The DER (3:1) is not governed under a specific regulation but is more an unwritten policy of BPKM. Therefore, based on our experience, the DER may be negotiable.

Based on the verbal discussions with an official at BKPM,[7] a PT PMA Company established for projects with an estimated cost of more than USD200,000,000 is usually required to maintain a maximum DER of 10:1.

TIMING FOR THE ESTABLISHMENT OF A PT PMA COMPANY FOR A PPP PROJECT

If foreign investors are stipulated as awardees of a public tender, they are required to establish a PT PMA Company within six months after they win the public tender. It shall be noted that to participate in a public tender, a foreign company does not need to establish a limited liability company.

<Relevant Laws>

Law No. 25 of 2007 on Investment
Law No. 40 of 2007 on Limited Liability Companies

2) Incorporation procedure for a foreign capital company

<Summary>

Establishment of SPC shall be preceded with an investment approval granted by BKPM.

The approval would allow the founding shareholders to execute the deed of establishment of the SPC, drawn before a public notary. That deed would then be submitted by the notary to the Ministry of Law and Human Rights for approval, so that the SPC can be granted limited liability status.

[7] Consultation with Mr. Ndang, Head of Services for Investment Licensing (*Kasubdit Pelayanan Aplikasi*) at BKPM.

<Details>

APPLICATION FOR THE INVESTMENT LICENSE

Foreign investors wishing to invest in Indonesia must first secure an Investment Approval before they set up a PT PMA Company in Indonesia, expected to carry out the Project with PD Pal Jaya. Under the current regulations, an application to obtain the Investment License can only be processed at the BKPM.

APPLICANTS

Law No. 40 of 2007 on Limited Liability Company ("Company Law") requires at least two shareholders to establish and maintain a limited liability company. If there are still fewer than two shareholders after establishment, then within six months the remaining shareholder must find a second shareholder or otherwise the company would lose its limited liability status.

LINE OF BUSINESS

In line with what has been stated above, the first order of priority of any foreign investor seeking to establish an operating company in Indonesia is to determine whether the proposed line of business is open, open with conditions, or completely closed to foreign investors. This will involve examination of the Negative List.

APPROVAL FOR INVESTMENT

BKPM would then issue a foreign investment approval letter as the provisional Investment License for the investors, the content of which includes details of the approved project and usually reflects the substance of the submitted application.

The provisional Investment License allows the investors to form a PT PMA Company and start actual investment in Indonesia. The Investment License will expire if the investors do not perform any actual investment within twelve months to three years after the date the Investment License was issued, depending on the terms of the provisional Investment License.

EXECUTING THE DEED OF ESTABLISHMENT

Only after having obtained the Investment License from BKPM will the founding shareholders be able to execute the Deed of Establishment of the new PT PMA Company containing the proposed company's Articles of Association, before a public notary in Indonesia. This Deed of Establishment should be drafted in a manner consistent with the Joint Venture Agreement (if any), the Company Law and the Investment License. Certain commercial matters in the Joint Venture Agreement are not normally stated in the Deed of Establishment.

OBTAINING APPROVAL OF THE DEED OF ESTABLISHMENT FROM THE MINISTER OF LAW AND HUMAN RIGHTS

The public notary responsible for drawing up the Deed of Establishment would then submit it to the Ministry of Law and Human Rights for approval. The submission will include the taxpayer registration number (NPWP)[8] of the newly established company and a bank statement regarding the PMA Bank Account,[9] showing evidence of payment of the capital from the founders. Normally, within one or two months after the Deed of Establishment has been filed with the Ministry of Law and Human Rights and examined by its employees, the Minister of Law and Human Rights will grant approval. Upon this approval, the PT PMA Company would start to exist as a limited liability company.

<Relevant Laws>

Law No. 25 of 2007 on Investment
Law No. 40 of 2007 on Limited Liability Companies

3) Documents required for the incorporation of a company

The documents include, but are not limited to:

- Investment Approval from BKPM
- Deed of Establishment
- Copy of KTP/Passport of the Shareholders and the Management, at least two persons
- Certificate of Domicile
- Taxpayer Registration Number (NPWP)
- Tax Registered Certificate (*Surat Keterangan Terdaftar Pajak*)

(4) Share of SPC

1) Restriction on share transfer in SPC in terms of relevant laws/regulations

<Summary>

Transfer of shares in a SPC in a PPP scheme before commercial activities commence is prohibited.

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[8] After the parties have executed the Deed of Establishment, they may apply to the Directorate General of Taxation of Foreign Companies ("Foreign Tax Office") for their Taxpayer Registration Number. Normally, an NPWP can be obtained within one week.

[9] The applicable regulations of Bank Indonesia require that all banking transactions of the newly established PMA Company with respect to (i) paying in capital (cash) by both the foreign and the Indonesian party, (ii) administering loans which are part of the approved intended investment, and (iii) paying for imported capital equipment and raw materials be transacted through a special foreign investment account opened with an approved foreign exchange bank in Indonesia. Separate operating accounts will normally be opened at the same time. These accounts can be opened after the Deed of Establishment has been executed and a copy of the Deed is submitted to the bank along with appropriate authorization letters to the individual operating the account. Each bank will have its own set of documentation requirements to be followed.

<Details>

REGULATION ON TRANSFER OF SHARES IN AN SPC UNDER THE PARTNERSHIP REGULATIONS

Under the Partnership Regulations, there is a prohibition on transferring shares in a SPC before commercial activities of the SPC commence. This may be implied from the fact that the regulations mandate that a clause regulating this prohibition must be contained in the Cooperation Agreement between the private entity and the government.

However, transfer of shares in the SPC may be done upon approval by the Minister, the Head of BAPPENAS or the Governor on the condition that such a transfer does not impede or postpone the operation schedule of the cooperation project.

<Relevant Laws>

Presidential Regulation No. 67 of 2005 on Cooperation between the Government and Private Entities in Infrastructure Procurement as amended by Presidential Regulation No. 13 of 2010 and lastly amended by Presidential Regulation No. 56 of 2011

2) Restriction of capital reduction under relevant laws/regulations

<Summary>

There is no restriction on capital reduction in the relevant regulations.

<Details>

Neither the Company Law nor the Investment Law restricts capital reduction in a company, but they do regulate how it could be done. Capital reduction may be done upon approval by shareholders of the company and upon publication of the action in at least one national newspaper. Capital reduction that automatically results in changes to the company's articles of association must also be approved by the Minister of Law and Human Rights.

<Relevant Laws>

Law No. 25 of 2007 on Investment
Law No. 40 of 2007 on Limited Liability Companies

3) Possible exit strategy in equity investment

<Summary>

The identifiable exit strategies that may be employed are sale of shares and dissolution.

<Details>

SALE OF SHARES

The sale of shares to another entity would generally be subject to the transfer of shares

provisions under the Company Law and under the articles of association of the relevant company.

Under the Company Law, the company can buyback shares that have already been issued provided that: (i) the buyback of shares does not cause the net assets of the company to become smaller than the amount of the issued capital plus mandatory reserves and (ii) the nominal value of the shares bought back by the company and pledge of shares or fiducia security over the shares held by the company and/or other companies whose shares are owned directly or indirectly by the company does not exceed 10% of the amount of the capital issued in the company.

DISSOLUTION

Dissolution and subsequent liquidation are subject to the procedure set out in the Company Law and under the articles of association of the relevant company.

<Relevant Laws>

Law No. 40 of 2007 on Limited Liability Companies

(5) Dispute Resolution

1) Desirable governing law and jurisdiction

<Summary>

The cooperation agreement between JICA and the Governor of Jakarta on this matter would be governed under Indonesian laws.

Choice of jurisdiction is left to the discretion of the parties.

<Details>

Generally, the Indonesian civil code adopts the freedom of contract principle which essentially allows parties to freely decide on the terms of their agreement as long as they do not conflict with any prevailing law or regulation in Indonesia. Therefore, parties to a contract may freely decide on the governing law of their contract.

As set out in the Partnership Regulations, the governing law of a certain cooperation agreement between the government and a private entity must be Indonesian law. This may be implied from the fact that a clause to that effect must be contained in the cooperation government, pursuant to the Partnership Regulations. Furthermore, in line with the abovementioned explanation on establishment and incorporation of a SPC as a PT PMA Company in Indonesia, designed to effectuate JICA's investment activities in Indonesia, it is thus clear that as an Indonesian company, the SPC would be governed under Indonesian laws.

As regards choice of jurisdiction, the Partnership Regulations do not stipulate any restriction or regulation pertaining to this matter. Thus, it can be concluded that the parties are free to decide the most convenient forum to dispute settlement.

<Relevant Laws>

Presidential Regulation No. 67 of 2005 on Cooperation between the Government and Private Entities in Infrastructure Procurement as amended by Presidential Regulation No. 13 of 2010 and lastly amended by Presidential Regulation No. 56 of 2011; and Indonesian Civil Code

2) Enforceability of execution of security interest

<Summary>

The enforcement of security interest basically depends on the type of the security interest being provided. Generally, enforcement can be conducted through public action or private sale mechanisms.

<Details>

The enforcement of security interest depends on the type of the security interest. Security interests over movable goods are established through pledge and fiduciary security; while security rights over immovable goods are established through *hak tanggungan* (land mortgage) and hypothec. Each of the security interests generally can be enforced through public action or private sale mechanisms.

<Relevant Laws>

Indonesian Civil Code

(6) JICA's Legal Position

JICA's legal position as an equity holder of SPC in case JICA invests in a portion of SPC and provides its authority

Under the Investment Law, JICA will be treated as a foreign entity. If JICA intends to invest in a SPC, it will be a shareholder under the Company Law. (Refer to the explanation on "(2) Foreign Investment" above.)

3.6 Tax and Accounting

3.6.1 Tax Issue

(1) Types of Legal Entity and Applicable Tax

Under Presidential Regulation no.56/2011 on PPP, foreign investors are required to establish special purpose companies in the form of a limited liability foreign investment company (PT PMA Company: see 3.5.4 above) to carry out the designated projects once the respective bidding processes are completed. A project company is established to perform a special project, activity or special purpose.

A limited liability foreign investment company is subject to 25% of Corporate Income Tax on worldwide income with tax credit which is made available in respect of foreign income. In addition, distribution of profits to non-resident made by a limited liability company is subject to 20% of a gross basis withholding tax.

	Resident tax payer/P.E	Note
Income tax	25%	
Withholding Tax for dividend (resident)	15%	
Withholding Tax for dividend (non-resident)	20%	

(2) Tax Treaty for Japanese Company

In case that Japanese investor establishes a limited liability foreign investment company (PT PMA Company) in Indonesia, the tax treaty can be applied for;

1) Dividend

If PT PMA Company pays dividend to the Investor in Japan, the tax rate applied is in accordance to the structure of share ownership as follows:

- Portfolio, **tax rate is 15 %** if the share ownership is less than 25%
- Substantial Holding, **tax rate is 10%** if the share ownership is 25% or more

2) Interest /royalties

If PT PMA Company pays Interest/Royalties to the investor, the tax rate applied is 10%.

(3) Tax Declaration

1) Monthly Tax Obligation (related to the project company)

- VAT

- Income tax article 21 (personnel salary), article 23 (fee for rental, consultant, etc) article 25 (corporate income tax), article 26 (dividend, interest, royalty)

2) Annual Tax Obligation

- Corporate income tax
- Individual income tax
- Property tax

(4) Tax Implication on Build, Operate and Transfer (BOT)

Currently, regulations regarding income tax treatment for fixed assets under Build, Operate, Transfer (BOT) agreement and PPP concession agreement are parallel enforced in Indonesia. **MOF decree no. 248/KMK.04/1995** concerning Income tax treatment towards parties performing cooperation in the form of BOT agreement is currently still valid, while **ISAK 16** concerning Service Concession Arrangements was issued on February 1, 2011. ISAK 16, which is an adoption of International Standard IFRIC 12 published in November 2006.

3.6.2 Accounting Standard in Indonesia

Year 2012 is the starting point for Indonesia to implement SAK convergence (Indonesian Accounting Standard) based on IFRS. Although until now IFRS convergence is still not entirely finished, however has been targeted for completion in the end of 2012. The followings are major difference between ISAK 16 and the Indonesian accounting standard.

(1) Asset Recognition

A fundamental difference in accounting treatment of public sewerage in PPP concession arrangement is "asset recognition". It is regulated in the ISAK 16. In the concession arrangement, the operator is not allowed to recognize the construction of infrastructure as a fixed asset. The way of recognition depends on how to receive revenues.

- **An intangible asset model:** the case that operator may have right/license to charge the public service user, and does not have an unconditional contractual right to receive cash
- **A financial asset model:** the case that the operator may have unconditional contractual right to receive cash or another financial asset from the grantor.

(2) Revenue Recognition

In case of financial asset model, the operator will recognize an interest income over the life of arrangement and a service income towards any additional services (e.g. for operation and

maintenance). In case of intangible asset model the amount collected from user is recognize as income.

In practice all of the accounting treatment set and agreed upon in the concession agreement.

(3) Accounting of Financial Assets Model

1) Initial recognition

An entity shall recognize a financial asset and/or financial liability on its financial position statement (i.e. balance sheet), only when the entity becomes a party of the contractual provision of the instrument.

2) Initial measurement

When a financial asset/financial liability are recognized at initial stage, an entity shall measure it at its fair value, in case that financial asset/financial liability are not at fair value through a profit or loss, the fair value added by transaction cost that directly attributable to the acquisition or issue of the financial asset/financial liability.

3) Subsequent measurement

For the purpose of measuring a financial asset subsequent to initial recognition, financial assets are classified into four categories:

- Financial assets measured at fair value through profit or loss
- Held to maturity (HTM) investment,
- Loan and receivable
- Available for Sale Financial Assets (AFS)

The entity may use other description for these categories when presenting information on the financial statement.

4) Assets on Financial Asset Model

Assets on Financial Asset Model are as follows.

a) Cash

b) Equity instrument issued by another entity

c) A contractual right
To receive cash or other financial asset from another entity; or
To exchange financial asset or financial liability with another entity under a condition that is potentially profitable to the entity,

d) Contract that will or may be settled by using equity instrument issued by the entity, like derivative

Chapter 4 Consideration for Sewerage PPP Model in Zone 1

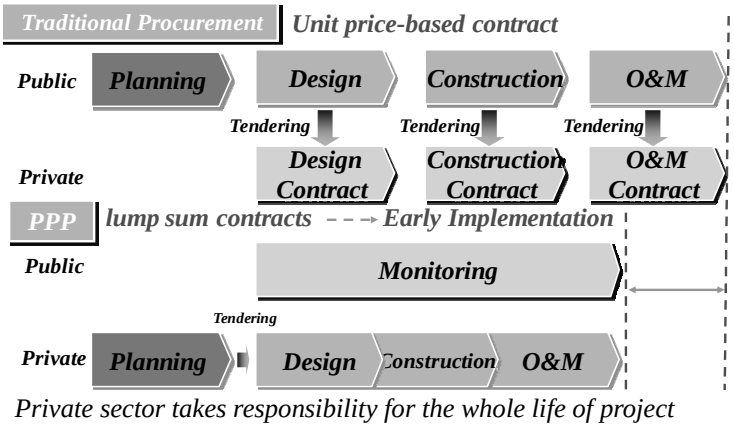
4.1 Most Appropriate PPP Model of Sewerage Development in DKI Jakarta

4.1.1 Impact of Cost Reduction by PPP Scheme

PPP projects are conducted by a performance specification contract, while general public works are conducted by a designated specification contract. In the former method, owner's consultants conduct designing for detailed specifications of all facilities and a construction contractor and operator are selected through open biddings. The owner conducts the evaluations in each stage and the contractor in each stage does not have any responsibility for performances of subsequent stages. Therefore, a contractor only completes his task in the stage under his responsible and does not consider the best performance from the viewpoint of total function of the plant. For example, although some parts of the functions should be fulfilled not by machinery systems but by operation know-how in order to reduce the total cost, the contractor cannot realize such an idea due to characteristics of the designated specification contract. Furthermore, the owner's consultants cannot reflect the idea of the best performance considering aspects from construction to operation and maintenance because they have to neutrally design the facilities in order to secure competitiveness for bidding in each stage.

In the latter method, contractors have to fulfill the required performance of the facilities in operation. They must ensure enough allowance in designs and adoption of main machinery in order to realize the best cost performance considering the life cycle of the plant.

Figure 4-1 shows the frame and differences of two procurement methods to understand not only the appropriate risk sharing throughout the life cycle of the project, but also the streamline of time consumption. In England, it is reported that PPP schemes could reduce VFM by 15 to 17% on average.



Source: JICA PPP Study Team

Figure 4-1 Designated Specification Contract and Performance Specification Contract

4.1.2 Introduction of PPP Model for Sewerage Development in Jakarta

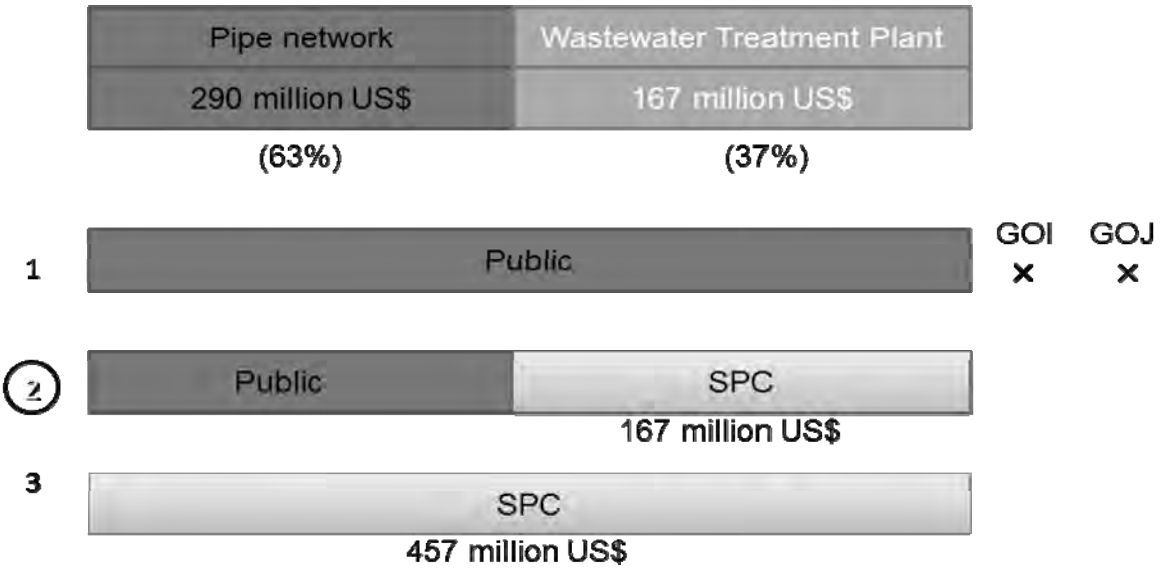
The Project cost is composed of Capital Expenditure (CAPEX) in the development stage and Operational Expenditure (OPEX) in the O&M stage. Past sewerage works throughout the world have taken decades or even a century for development. Taking into account the entire cost of the sewerage operation, OPEX tends to be much larger than CAPEX. Therefore, it is important to examine the cost sharing between the public and private sectors in both the development stage and the O&M stage for the PPP scheme of the Project.

In introducing the PPP scheme, it is important to consider how the most appropriate combination of public and private sectors can be set up. Figure 4-2 shows simplified models to discuss this issue. Model 1 is the case where the public sector takes responsibility for the whole sewerage project. On the contrary, the private sector takes responsibility for the whole project in Model 3. In the case of Model 2, the public sector could be in charge of pipe construction and their O&M and the private sector could be in charge of treatment plants.

Model 1 is not a PPP scheme but a very traditional example of public work and most of the stakeholders are familiar with this model. However, the main policy of GOI for infrastructure developments is to accelerate PPP projects to avoid an increase in foreign debt. Therefore, Model 1 is not recommended for sewerage development in Zone 1 in JKT.

Model 3 is also not recommended mainly for the following three reasons. First, if the private sector provides the whole investment for both pipe and treatment plants, the service fee to be paid in the operation period would become very high because it is beyond the affordability of municipality annual budget. Secondly, even if the private sector utilizes its know-how and experience, the cost reduction effect would be limited to pipe construction. Finally, it is difficult for the private sector to play a main role in social responses such as traffic regulation and official response to residents.

Judging from the above discussions, Model 2 is recommended as an appropriate PPP scheme for sewerage development in Jakarta. In Model 2, the private sector can provide its know-how and experience to lower the life cycle cost of the Project from various points of view.



Source: JICA PPP Study Team

Figure 4-2 Typical Model of Investment

4.1.3 Consideration for Demarcation of Roles by Public and Private Sectors

As discussed in the previous section, it is proposed that the private sector should be responsible for the construction and O&M of Pejagaran STP and PD Pal Jaya should be responsible for the construction and O&M of sewers. In line with this proposal, it is assumed that private funds will be utilized for STP and public funds (GOI and/or DKI) will be utilized for sewers in introducing the PPP scheme for the sewerage development in Zone 1.

Although further details are described in Section 4.3, DKI Jakarta expects subsidies from the central government in lieu of using their own budget for implementing the Project. The central government is considering the transfer of Japanese ODA Loan to DKI Jakarta by on-lending. Therefore, public funds come from a Japanese ODA Loan in this Project. In the case of utilizing private funds, a BOT scheme may be adopted because there are many examples and thus, it is well known among relevant people for various PPP schemes in Indonesia. The SPC (Special Purpose Company) will take responsibility for all aspects of the Project throughout designing, construction and O&M under the BOT scheme. Table 4-1 shows the demarcation of responsibilities and roles in the sewerage development in Zone 1.

Table 4-1 Sewerage Development & O&M in Sewerage Zone-1

	Budgetary Source	Management	Implementation
Construction of STP	Private	DKI Jakarta	Private
Construction of Sewers	ODA Loan	GOI / DKI Jakarta	GOI / DKI Jakarta
O&M of STP	Tariff & Subsidy	DKI Jakarta	Private
O&M of Sewers	Tariff & Subsidy	DKI Jakarta	DKI Jakarta

1. Joint company will be set up by DKI Jakarta and a Japanese Investor for O&M of STP.
2. One contract to cover EPC and O&M is applied to STP.

Source: JICA PPP Study Team

In JICA MP Review E3.8.5 “Possible PPP Option for the Sewerage Projects in DKI Jakarta,” the same message as mentioned above is described as follows:

“Therefore, the Concession model, in which the private operator assumes investment, financial, and tariff risks for the entire facility, from STPs to the piping system, is absolutely not possible to be realized. Therefore, when considering introduction of PPP, the area to be covered by PPP needs to be confined to the portion for which the private sector can assume the risk.”

“The BOT model, in which the private operator is responsible for the construction and operation of the STPs and the public sector is responsible for the construction and maintenance of the piping system, and the public sector pays the bulk sewage treatment fee to the private operator, would be one of the realistic PPP option for the sewerage system.”

“Tariff & Subsidy” is shown in the column of “Budgetary Source” in Table 4-1, but as discussed and confirmed in Chapter 3, there is no record of achieving full-cost recovery in sewerage projects in the past. It also can be said that full-cost recovery is not possible from the lessons learned through the failures of privatizations in mid-south American countries in 1990s.

Thus, it is proposed that “Service Purchasing Type BOT,” but not “Self-Sustaining Type BOT,” should be adopted as the PPP scheme for Pejagaran STP. In fact, Service Purchasing Type BOT is common in England where various PPP schemes have been developed. In this type, private sectors are responsible for providing funds, conducting EPC, and implementing O&M throughout the BOT period. They receive “service fees” in exchange for these works to compensate for their funds and expenses.

4.1.4 Consideration for Affordability of Tariff to Secure Sustainability

The service purchasing type BOT should be adopted for the Pejagaran STP Project as discussed in the previous section. In this scheme, it is indispensable to confirm affordability for burden of expenses of residents and municipalities’ annual budgets as discussed in Section 3.3. It is quite obvious from the past lessons learned in other countries that tariff by residents is remarkably insufficient to achieve full-cost recovery in sewerage works. Therefore, central governments basically provide funds not only for the construction of sewers but also for the construction of STPs. In this section, appropriate cost sharing between tariff by residents, subsidy by municipalities and VGF (Viability Gap Fund) by central governments is discussed according to the basics of the financial simulation in Chapter 5 to find the most proper model for the Pejagaran STP Project is provided.

(1) Main Idea of Tariff Settings

Tariffs for households (HH) and non-households (N-HH) are set up as described below for the financial simulation in Chapter 5. Conservative values and conditions as assumptions are adopted so that the simulation results will not turn to the negative side in the implementation stage of the

Project. As the result of the simulation, the tariff revenue amount is similar to that in the MP Review although the simulation was carried out based on a different method than the MP Review; i.e., based on a "Floor Area based Tariff System," which is currently adopted in DKI Jakarta.

[New Tariff for HH]

The current tariffs for households are applied at the commencement of O&M, and the following assumptions are taken for price escalation.

1) Cumulative 3-year growth rates of real GDP in Jakarta should be reflected every 3 years as a tariff increase factor. Increase of HH income is bigger than real GDP growth in newly emerging countries, especially in metropolises. However, conservative assumption that HH income increases at the same rate as the economic growth in Jakarta is adopted.

2) According to Indonesia Statistics, the average yearly growth rate of GDP in Indonesia for the past 5 years is 6.03%. Therefore, the cumulative 3-year growth rate is currently 19% (=1.06^3-1). The tariff revenue is estimated to increase by 19% every 3 years. Although real GDP growth of a metropolis is generally much larger than that of the national average, the national average is adopted as a conservative value.

3) The number of HH is assumed not to change during the O&M period.

4) Tariff collection rate for HH is estimated at 75% throughout the O&M period as written in the MP Review.

[New Tariff for N-HH]

As for tariffs for N-HH, only tariffs for Large Commercial are raised to 2 times the current level, and the following additional assumptions are taken for price escalation.

1) Cumulative 3-year growth rates of real GDP in Jakarta should be reflected every 3 years as a tariff increase factor. (Same as tariff of HH)

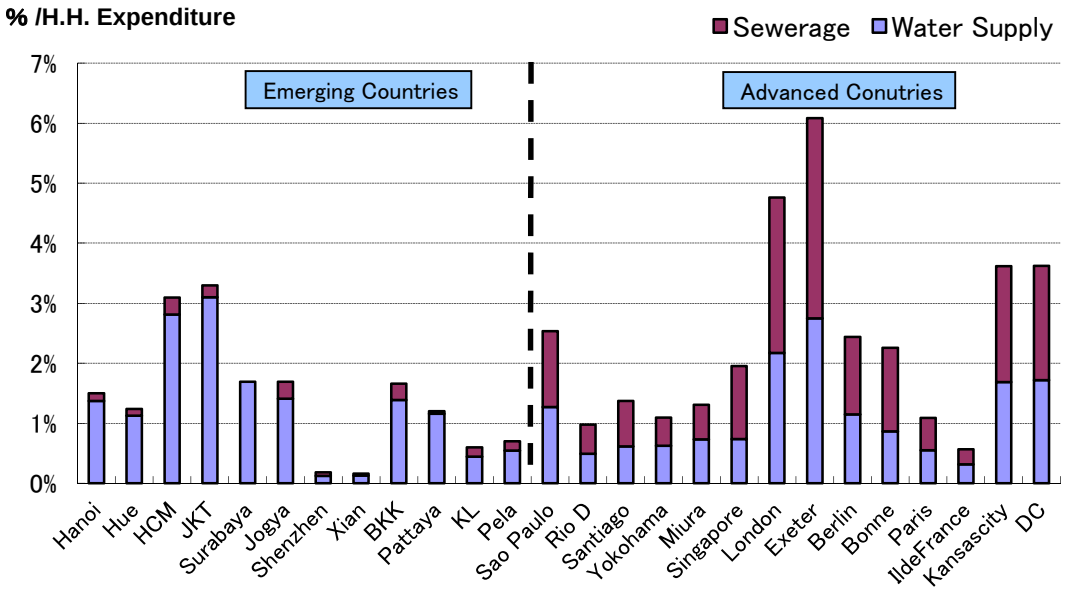
2) Floor area for N-HH is estimated to increase by 6.6% every year during the O&M period. Land value basically increases along with real GDP growth. However, it is very difficult for owners of real estate assets to raise the price for tenants at the same rate of the increase of land value. Owners, to overcome this situation, usually increase the floor area by constructing multistory buildings and thus the increasing rate of floor space is much higher than the real GDP growth. The average yearly growth rate of GDP is 6% in Jakarta. It is assumed on the conservative side that the increasing rate of floor space is 1.1 times the GDP growth.

3) Tariff collection rate is assumed at 100% throughout the O&M period because the current rate is already approximately 100% due to direct deposit payments into bank accounts as shown in the MP Review. The same method should be adopted for tariff collection from N-HH in Zone 1,

(2) Consideration for Affordability to Pay

The current level of sewerage tariff is merely 0.4% for monthly household expenditure. Figure 4-3 shows the water and sewerage tariff ratio for household expenditure in various countries. Sewerage tariff is almost the same or more expensive in the countries where advanced technologies are applied for sewerage. Therefore, if DKI Jakarta adopts conventional activated sludge methods or its equivalent level technologies, sewerage tariff should be at around 3%, the same as water tariff.

In fact, ADB and WB strongly recommend that tariff in recipient countries should be at around 3% for monthly household expenditure in order to secure sustainability.



Source: PWC Japan

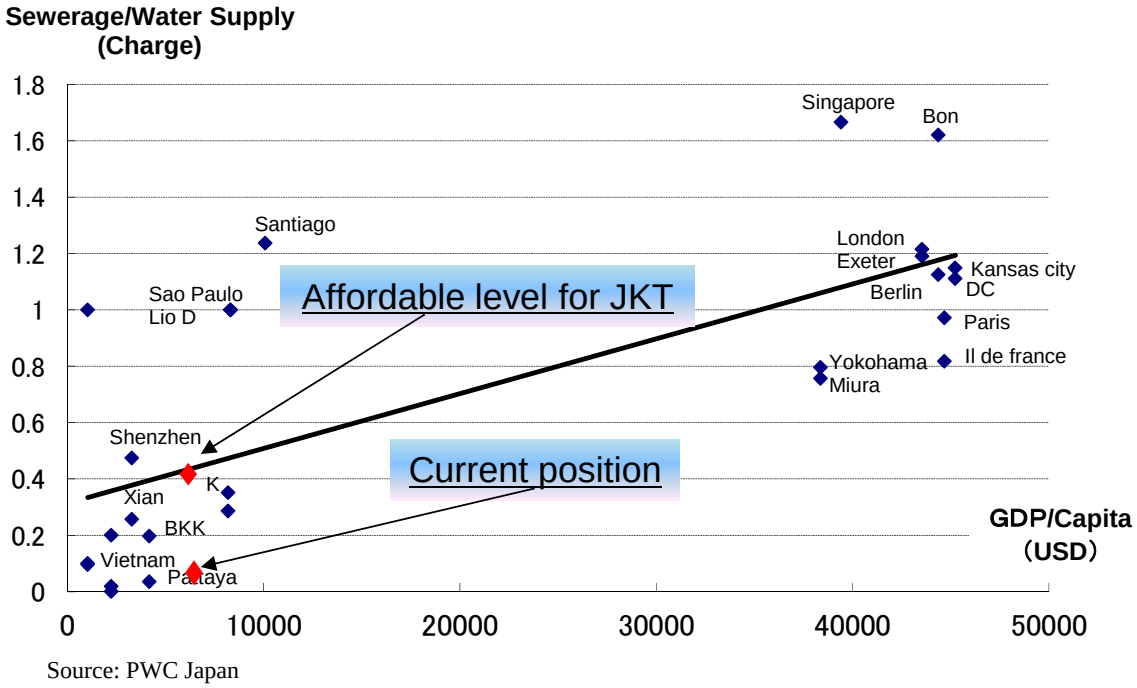
Figure 4-3 Water and Sewerage Tariff Ratio for Household Expenditure

People in newly emerging countries tend to consider water tariff rather than the occupancy for household expenditure as reference to sewerage tariff. In line with such a point, Figure 4-4 shows the proportion of sewerage tariff to water tariff. The proportion is lower in low GDP countries but steadily increases according to the increase of GDP growth. It is considered that people's consciousness regarding the surrounding environment and WTP tend to increase according to GDP growth.

The GDP in DKI Jakarta is about 5,000 USD/cap. From this value, it is considered that the sewerage tariff can be set at around 40% of the water tariff in DKI Jakarta, which is more than 4 times the current tariff level. In this Study, it is proposed that the tariff be raised to 2–2.5 times the current level at the commencement of the sewerage service in order to mitigate the impact on the people.

The current tariff system for N-HH is "floor area based tariff system" in DKI Jakarta. Tariff is calculated not according to the consumed amount but the floor area and it is a similar structure

to the "asset value based tariff system" adopted in England and Brazil. The initial tariff level is supposed to be 2 times the current one (only for Large Coomercial). Considering that a about 4-times higher tariff of the current level is still affordable for HH, it is judged that a 2-times increase from the current tariff for Large Commercial will be affordable for them. However, the affordability of the increased tariff should be re-evaluated based on an additional survey to compare the existing cost of ITPs and the increased tariff.



Source: PWC Japan

Figure 4-4 Water and Sewerage Tariff Ratio for Household Expenditure

4.1.5 Four Cases to be Discussed Toward the Most Appropriate Model

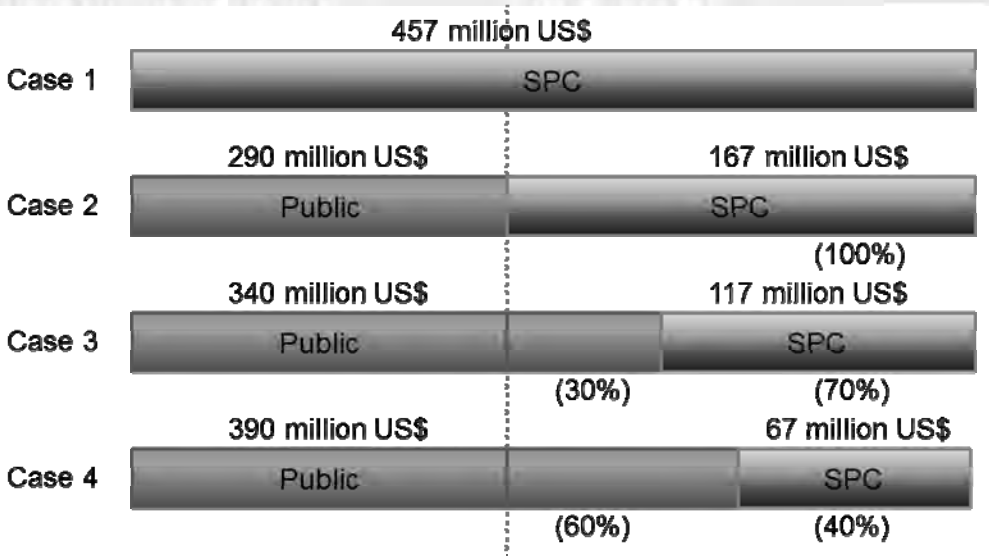
It is indispensable to confirm affordability for burden of expenses of DKI Jakarta's annual budget in the service purchasing type BOT as discussed in the previous section. For the sake of such confirmation, it is necessary to calculate the total necessary subsidy to secure the sustainability of the Project considering the tariff level discussed in the previous section. In addition, it is necessary to discuss burden sharing of the subsidy between the central government and DKI Jakarta. Affordability for a municipality's annual budget shall be carefully considered in this discussion. In order to facilitate the discussion, the Study Team assumes the following four cases and conducts the financial simulation in Chapter 5.

It should be noted that, in general, subsidy from a central government basically shall be appropriated to the construction cost while subsidy from a municipality shall be appropriated to the O&M and/or construction. In Case 1, the central government does not have to provide subsidy because a private company provides funds for both sewers and an STP. Thus, the municipality (DKI Jakarta) shall pay service fees in exchange for the funds for the whole construction cost and have to

appropriately subsidize in addition to tariff revenue. In this process, the municipality shall confirm how much subsidy can be appropriated from the annual account. This process is the confirmation of affordability for the municipality.

Often, the subsidy from the municipality is far beyond its affordability as seen Case 1. Therefore, the financial simulations for Cases 2, 3 and 4 are conducted in Chapter 5 to evaluate the impact on the subsidy. Furthermore, the necessary amount of Viability Gap Fund (VGF) in case that DKI Jakarta does not want to pay subsidy as much as possible in the operation period of the Project is also confirmed by the simulation in Chapter 5. Here VGF is defined as the subsidy by which a project aims to achieve full-cost recovery only with tariff revenue throughout the O&M period.

	Pipe Network	Wastewater Treatment Plant
Management	Public	SPC
Construction Cost	290 million US$	167 million US$



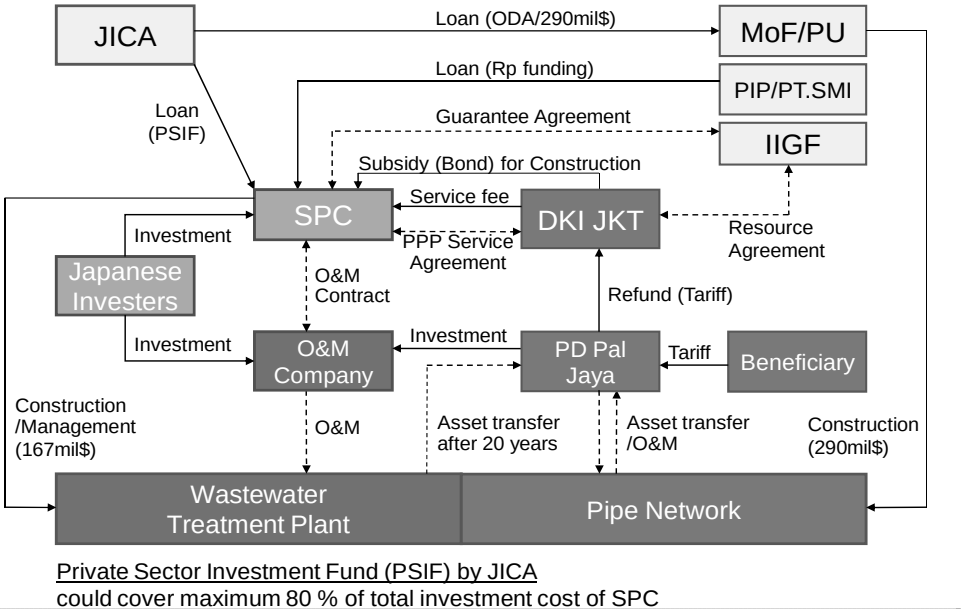
Source: JICA PPP Study Team

Figure 4-5 Case Study for Impact Analysis of Subsidy

4.2 Consideration for PPP Implementation Structure

4.2.1 PPP Implementation Structure (Implementation and Stakeholders)

The figure below shows the project implementation structure. In the next stage, the Study Team will clarify each institution's responsibility and applying procedures.

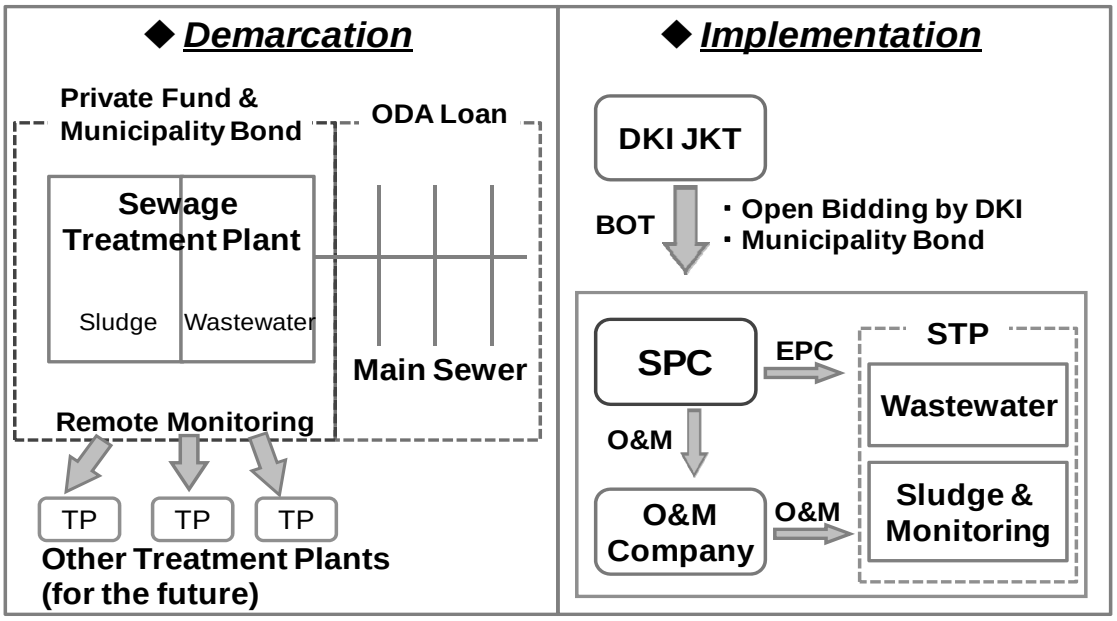


Source: JICA PPP Study Team

Figure 4-6 Overall Structure of PPP Implementation

The structure is mainly divided into two parts. The blue part on the right side consists of public institutions that are responsible for construction and management of sewer pipes by public funding. The red part on the left side consists of private sectors and SPC who are responsible for construction and management of the sewage treatment plant. The aqua part on the upper side consists of financing related institutions and JICA, who is expected to provide Japanese ODA Loan for the public portion and PSIF to SPC. Other financing institutions' roles are described in detail in Section 4.3.

Figure 4-7 focuses on the implementation structure. The Study Team supposes that PSIF and DKI Jakarta bond will be appropriated to the investment for the treatment plant, and that the Japanese ODA Loan will be appropriated to the investment for sewer pipes.



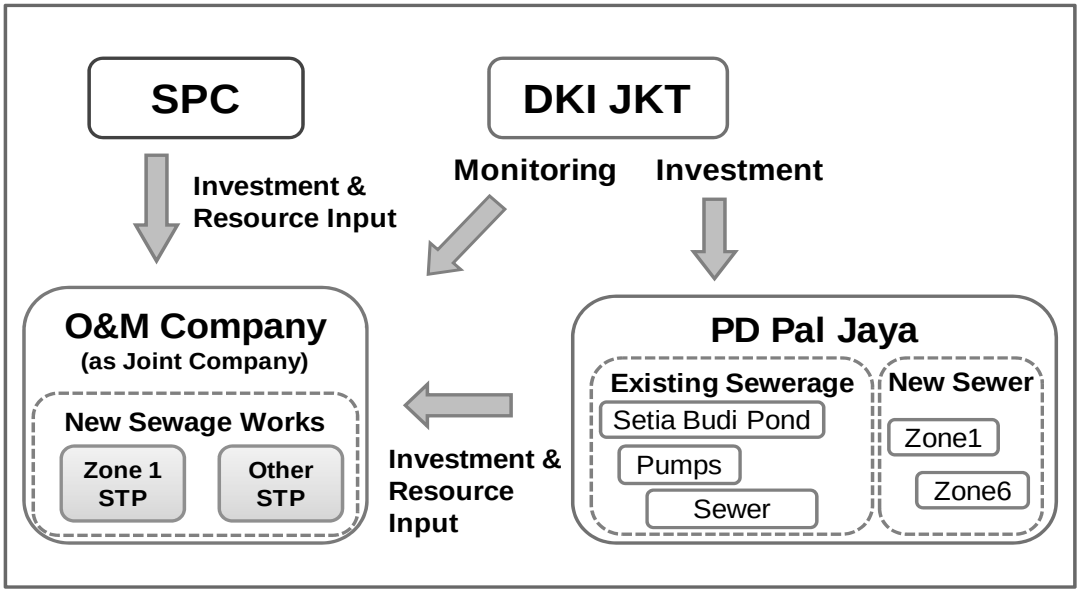
Source: JICA PPP Study Team

Figure 4-7 Demarcation of Role and Implementation Structure

4.2.2 Basic Role of SPC

SPC is the main player of the proposed sewerage PPP Project and consists of several Japanese investors. SPC will conclude a BOT contract with DKI Jakarta and entrust EPC work to a contractor and O&M work to JC (Joint O&M Company). The EPC contractor and JC shall be responsible for each work based on contracts with SPC. Then, the main roles of SPC are financial arrangements, negotiations with stakeholders, and selection and supervision of appropriate contractors in each stage of the BOT Project.

In this Study, the Study Team proposes the establishment of JC for O&M work by PD Pal Jaya with SPC in order to share the profit of the BOT Project as much as by Indonesia and Japan.



Source: JICA PPP Study Team

Figure 4-8 O&M Implementation Structure

4.2.3 Business Plan of Joint Operation Company (JC)

(1) Necessity of JC

In the previous section, the Study Team proposed the establishment of JC for carrying out the O&M work but there are basically three options for O&M work as follows:

- Option-1: done by PD Pal Jaya with training by SPC
- Option-2: done by the O&M company to be established by SPC
- Option-3: done by JC to be jointly established by PD Pal Jaya and SPC

Among the options above, Option-3 has merits of a) to d) below and, therefore, it is judged that JC should be established by PD Pal Jaya to work with a Japanese company that has adequate skills in both technical and financing fields. Once a PPP model proposed by the Study Team is officially accepted by the Indonesian side, the Study Team will start intensive discussions with PD Pal Jaya towards the establishment of JC.

a) JC can learn qualified skills and knowhow on technical, management, and financing aspects from Japanese companies.
b) JC can get technical assistance and transfer from Japanese public entities.
c) JC can utilize human resources and native know-how of PD Pal Jaya.
d) JC can expand the activities to the fields of engineering service, training service and construction works in other areas.

JC is expected to do the following tasks and Figure 4-9 shows the prospective JC structures.

a) Initial Stage

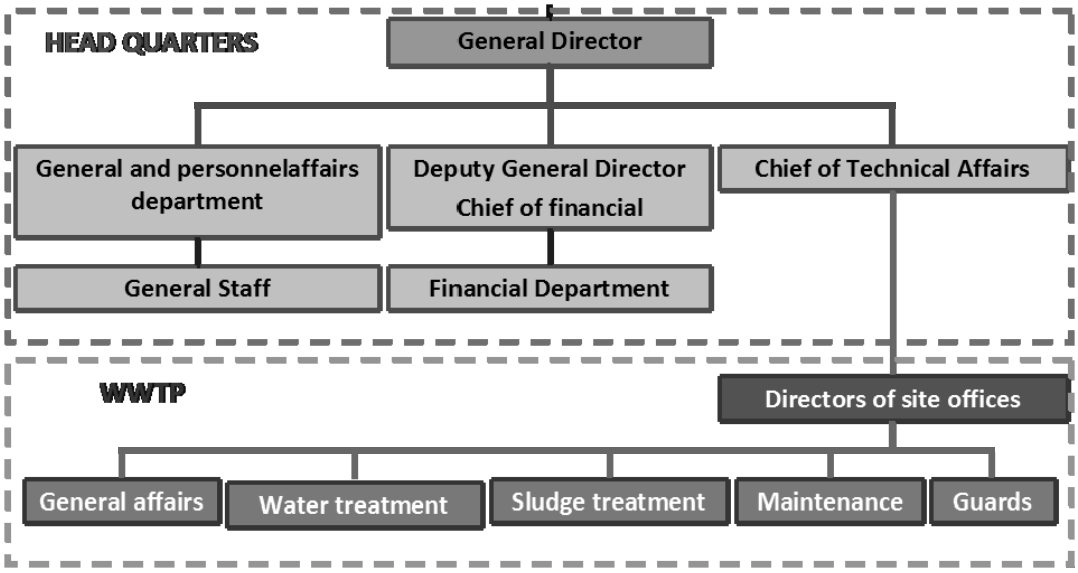
The initial stage is supposed last 20 years after the commencement of operation of Pejagaran Treatment Plant and SPC entrust its O&M work to JC.

b) Development Stage

JC is expected to expand the following business fields after getting enough skills and know-how through O&M work at Pajagara.

- Entrusting O&M work to other STPs in DKI Jakarta and in other cities
- Technical transfer and training for other cities
- Consulting services and EPC works for sewerage projects all over Indonesia

The O&M works include daily O&M and periodical repair and replacement of equipment. The contract period of the above O&M services is until December 2037.



Source: JICA PPP Study Team

Figure 4-9 Company Structure of JC

4.3 PPP Project Plan

4.3.1 Financial Plans and Government Support / Government Guarantee

(1) Financial Options (Debt Financing)

The Study Team envisages that debt in Rupiah for the private portion should come from PT SMI or PIP, while the major part of debt is expected to come from JICA's financing scheme to the private sector. The Study Team has had several opportunities to discuss this with PT SMI and PIP. Both banks have common recognitions that continuous discussion is necessary at the F/S stage. Although, as an official process, appraisals for the Project by both banks will be made based on the F/S after its completion, consultation has been carried on from the preparation stage of the F/S.

Through the discussion with them, it is understood that:

- PT SMI targets economically feasible projects, while PIP targets projects that could gain social benefit/low profitable projects due to their nature.
- Dual policy lending (i.e., financing from both PT SMI and PIP) to a private entity in a project is not allowed.

For further consideration, this section provides a brief explanation for the financial scheme in both organizations to the private portion. In addition, JICA's private sector investment finance scheme is briefly reviewed.

1) PT SMI

For the debt financing portion, considering the public nature of the Project, the possibility of a full-scale utilization of Indonesia's public infrastructure financial institution, PT SMI (PT Sarana Multi Infrastruktur), is assumed. Maximum utilization of the PT SMI for debt financing will be prioritized.

PT SMI was established in February 2009 as a national policy financial institution, 100% funded by the Government of Indonesia (via the Ministry of Finance) in order to accommodate the expected demand growth for Indonesian infrastructural growth. In October 2009, by the Ordinance of the Minister of Finance (No. 396/KMK.010/2009), PT SMI received its license as a "Infrastructure Finance Company." Reasons for its establishment are indicated as follows:

- To be an institution promoting infrastructure development within the Government of Indonesia.
- To provide an alternative financial source for infrastructure projects.
- To resolve the lack of long-term funds for infrastructure projects.
- To provide an optimally appropriate financial solution by quickly responding to market needs through the cooperation of government, investors, banks, international organizations, and regulatory organizations.
- To expand the capacity as an infrastructure financing source by increasing the scale and efficiency through various partnerships.

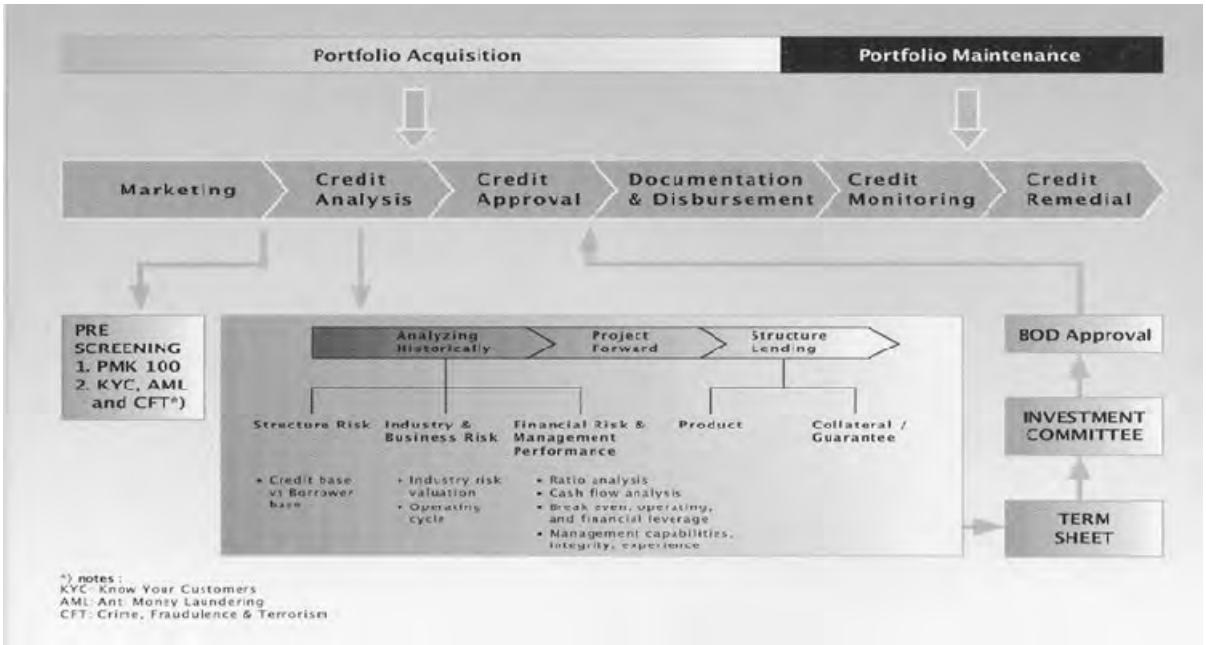
As of July 2011, the company has a credit balance of two trillion rupiah (interview based) and provides a range of products as indicated below. Sectors eligible for financing are road, transport, oil and gas, telecommunications, sewerage and waste treatment, electricity and power, irrigation, and water. The proposed wastewater management Project is included in the list.

Table 4-2 Primary Products Offered by PT SMI

Senior Loan	Subordinated/ Mezzanine Loan	Convertible Loan	Equity Investment	Contract Financing	Invoice Financing
Loan Financing to infrastructure projects where PT SMI acts as senior lender to the project	Loan Financing to infrastructure projects where PT SMI acts as junior lender to the project	Financing scheme with conversion scenario to equity at loan maturity date	Direct investment to infrastructure projects through equity ownership	Working capital loan financing to contractors who build infrastructure projects. Disbursement of the loan is based on contracts granted by project owner.	Working capital loan financing to contractors who build infrastructure projects. Disbursement of the loan is based on receivables of the project.

Source: PT SMI

Based on an interview with PT SMI, while there was a preface indicating that the "credit conditions will be determined through a review process and conditions for the Project will be determined through a review of the results of F/S," as an image, the average credit terms are as follows: maximum loan period of 15 years (with a deferred principal during the construction phase), applicable interest rate (fixed) at approximately 10-11% per year (with assumed inflation rate of 6-7% annually), and a commitment fee rate of approximately 1% per year. Furthermore, the Project review requires approximately 1-2 months generally.



Source: PT SMI

Figure 4-10 Credit Appraisal Process at PT SMI

However, since payment structure under a PPP service agreement is designed as a Service Purchase Type (i.e., payments from the client will be regularly paid as fixed amount), the risks

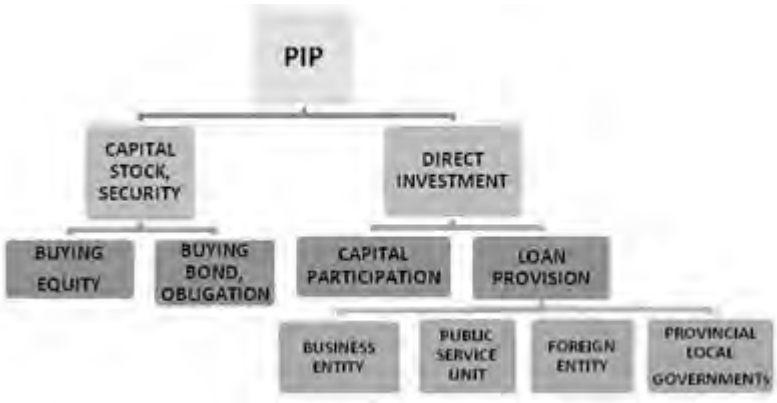
pertaining to income are considered to be relatively small compared to other projects handled by the PT SMI. Therefore, a more favorable loan conditions could be expected.

2) PIP (Indonesia Investment Agency)

General Information of PIP

PIP is a government investment unit established in 2007 to act as a world class Government Investment Agency that focuses on the national interests. The mission of PIP is to stimulate the national economy through investment activities in various strategic sectors that give optimal returns with measurable risks. Funding sources of the PIP may come from: (1) the national budget, (2) revenue from previous investments, and (3) other sources.

Partners of the PIP may include: (1) local governments, (2) private business entities, (3) foreign companies, (4) financial institutions, and (5) state owned companies. The scope of investment and the coverage of sectors that are served by the PIP are shown in the following diagram.



Source: PIP

Figure 4-11 Scope of Investment

Scheme for PPP Projects and Foreign Partners

PIP can also provide loans to PPP projects. In this regard, legal bases employed for such a purpose include Perpres 67/2005, Perpres 13/2010 and Perpres 54/2011. PIP may collaborate with foreign partners in infrastructure provision through co-financing schemes or capital participating investments. In the future, more infrastructure projects are expected to be implemented using these schemes.

3) JICA's private sector investment finance

JICA's private sector investment finance scheme aims to achieve economic cooperation by using private sector investment finance as a form of support for private sector activities. JICA's private sector investment finance supports private corporations attempting to conduct business in developing countries that face difficulties in getting loans because of high risks

and low profitability. This scheme supports those corporations by the two financial perspectives of "investing" and "financing."

a) Eligible projects/areas

- Infrastructure & accelerate growth and two other areas
- Highly-effective development projects that cannot be financed by existing financial institutions, while the business itself is expected to be accomplished
- Projects that are judged to be essential to demonstrate the added value out (e.g., country risk mitigation, pump-priming effect for private funds) of a JICA loan

b) Loan terms

- Amount: Up to 70% of the total project cost (up to 80% for exceptional cases)
- Interest rate: Around 2-3% (Upon considering the borrower's credit rating and the loan period)
- Loan Period: Up to 20 years (Maximum 25 years)
- Grace period: Up to 5 years (Basically construction period)
  - Grace period can be applied for both principal and interest during construction
  - Interest during construction can be additionally borrowed, and can be repaid by concessionaires fund/equity)
- Loan scheme (lending flow): The following two schemes will be available
  - JICA (Yen) → SPC
    * Foreign exchange risk is borne by borrower.
  - JICA (Yen) → local financial institutions → (local currency) → SPC
    * Exchange risk costs and margins are charged by local banks. Though SPC doesn't bear the exchange risk, the total financial cost is higher.

c) Issues in JICA's private sector investment finance

- This scheme has just re-started, and there are still uncertainties regarding possibilities/ flexibility to apply the scheme to the Project
- Since the loan currency is Yen, if the hedging risk costs are added, competitiveness in terms of financing costs in private corporations would decrease.

4.3.2 Government Support / Government Guarantee

The proposed Project would be considered a solicited project, given that it is contained in PPP Book 2012 – Potential Projects. Due to the nature of the Project, both government support and government guarantee stipulated in the Partnership Regulations[10] may be utilized.

[10] "**Partnership Regulations**" indicates Presidential Regulation No. 67 of 2005 on Cooperation between the Government and Private Entities in Infrastructure Procurement as amended by Presidential Regulation No. 13 of 2010 and lastly amended by Presidential Regulation No. 56 of 2011

4.3.3 Relevant Laws

- Regulation by the Minister of Finance, No. 100/PMK.010/2009 on Infrastructure Financing Companies
- Minister of Finance Regulation No. 260/PMK.011/2010 on Implementation Guidelines of Infrastructure Guarantee in the Cooperation Projects made between the Government and Private Entities
- Presidential Regulation No. 78 of 2010 on Infrastructure Guarantee in the Cooperation Projects made between the Government and Private Entities conducted through the Infrastructure Guarantee Private Entity

4.3.4 Government Support

Under the Partnership Regulations, private companies who implement solicited projects may be granted government support. Availability of government support must be stipulated in the public tender or auction documentation. The government support may be in the form of fiscal contribution (in financial form), tax incentives, facilitation for licensing issues, land acquisition, and/or partial construction. With regards to tax incentives and financial fiscal contribution, these may be approved by the Minister of Finance ("MOF") based on a recommendation from the government.

The government support in the form of financial fiscal contribution must be stipulated in the state revenues and expenditures budget and/or regional revenues and expenditures budget. The Partnership Regulations do not stipulate the forms of the fiscal contribution. However, based on a verbal discussion with an official in the Fiscal Policies Board of the MOF, fiscal contribution as stipulated in the Partnership Regulations should be in the form of cash. This would only be granted in the event that a certain project, to be undertaken in a PPP scheme, is not financially feasible, pursuant to the result of assessment carried out by the MOF.

It was also confirmed that the MOF has been deliberating on the content of a new MOF regulation that will regulate the scheme/process of granting of government support. This official also commented that until today, no private investors in PPP projects have ever applied for government support on the basis that they are financially feasible.

4.3.5 Government Guarantee

(1) Contents of Government Guarantee

The government guarantee can be provided by PT Indonesia Infrastructure Guarantee Fund (IIGF) against infrastructure risks. This government guarantee is purposed to ensure that relevant Government Contracting Agencies (GCAs) fulfill their financial obligations as written in the respective cooperation agreements. As the authorized infrastructure guarantee business entity in

PPP mechanism, IIGF enters into Guarantee Agreements with project companies/investors specifically against risks that have been allocated to the public under the respective cooperation agreements. In providing such a guarantee, IIGF would require GCAs to enter into recourse agreements with it. In the event a GCA fails to abide by its obligation under a cooperation agreement (with a project company), IIGF will make payment to the project company against the claim lodged. Subsequently, in accordance with the agreed recourse agreement, IIGF will obtain reimbursement from the GCA.

Under Minister of Finance Regulation No. 260/PMK.011/2010 on Implementation Guidelines of Infrastructure Guarantee in Cooperation Projects made between the Government and Private Entities, risks that can be guaranteed are those that are due to:

i) Actions conducted by the government, or absence of actions of the government either as the contracting party to a partnership agreement or as an institution
ii) Policies issued by the government either as the contracting party to a partnership agreement or as an institution
iii) Arbitrary decisions taken by the government either as the contracting party to a partnership agreement or as an institution
iv) Breaches of the contract of the government as the contracting party to a partnership agreement.

(2) Requirement of Government Guarantee

According to the Partnership Regulations, in order to qualify for a government guarantee, a partnership agreement must contain the following: (The government guarantee must be stipulated in the public or auction document.)

i) Distribution of risks
ii) Efforts to mitigate risks
iii) Total financial obligation of the government
iv) Sufficient period for the government to pay its financial obligations
v) Procedures to determine whether the government is in default (in paying its financial obligation)
vi) Choice of forum for dispute settlement, and
vii) A provision that the law of the Republic of Indonesia is the governing law.

It is also stipulated in Presidential Regulation No. 78 of 2010 on Infrastructure Guarantee in Cooperation Projects made between the Government and Private Entities conducted through the Infrastructure Guarantee Private Entity (“PR 78/2010”) that a guarantee may be given if the government as the contracting party to a partnership agreement is willing to:

i) Issue a statement letter on the validity of the partnership agreement

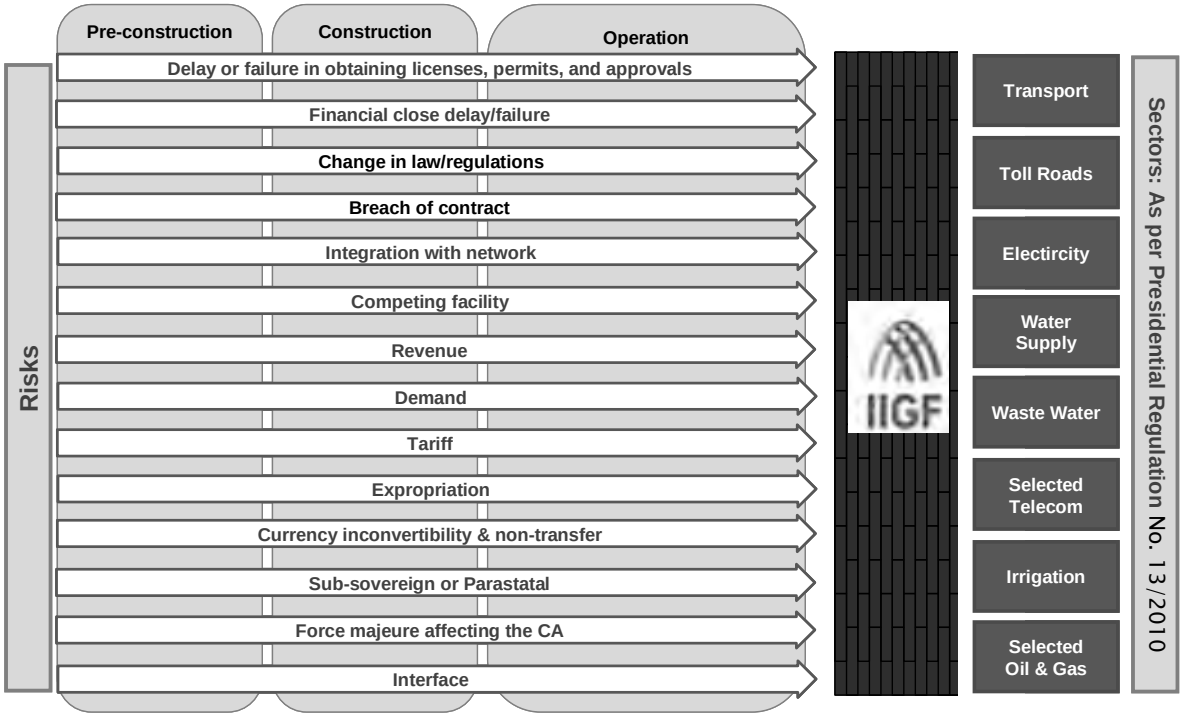
ii) Provide a written commitment to a guarantor (i.e., IIGF) that the government will make its best effort to control, manage or prevent any risks

iii) Pay regress as stipulated in an agreement made between the government (given its status as the contracting party to a partnership agreement) and the guarantor (i.e., IIGF). Regress means the guarantor's rights to claim from the government items including monies that have been paid by the guarantor to the private entity.

4.3.6 IIGF

IIGF was established in December 2009 in order to achieve the following agenda: 1) improving the quality and creditworthiness of PPP Infrastructure Projects through framework improvements of evaluation and implementation of guarantees, 2) improving governance and implementation systems of guarantee provisions, 3) procedures streamlining for contract agents, and 4) strengthening of government guarantee debt management. The Indonesian government invested one trillion rupiah initially, and plans to increase this by one trillion rupiah annually until 2014. The World Bank will assist in the said institutional design, and an AAA rated IIGF credit/guarantee facility is planned.

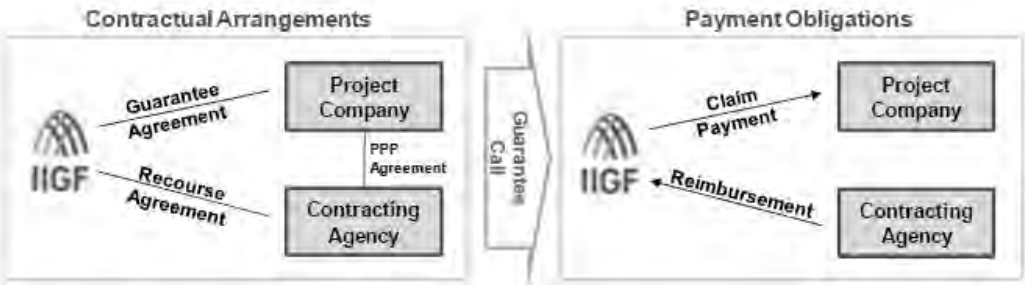
The agency has a mission to "provide guarantees which play an important role in the promotion of private capital injection, essential for accelerating domestic economic growth," specifically with the objective of: 1) providing guarantee products with high transparency, 2) integrating single-window guarantee services through professional management and strong capital strength, and 3) improving the credit quality of infrastructure projects in Indonesia. As indicated in the Presidential Decree No 2010/13, the target sectors are roads and bridges, transportation/logistics, water, irrigation, electricity, telecommunication, energy, as well as waste management and ***sewage water***. Thus, the proposed Project is included in the target sector.



Source: IIGF

Figure 4-12 Sectors and Risks Covered by the IIGF Guarantee

The structure for a general guarantee scheme is shown in the figure below. Specifically, upon request from GCA concluding a PPP contract with the investor, IIGF will sign a guarantee contract with the investor and a recourse contract with the GCA. Through such measures, IIGF will supplement the GCA with power to guarantee, allowing the GCA, who is the central player of the guarantee event (such as changes in policies), to heighten transparency towards investors in order to mitigate disadvantages, and act as a function to strengthen the discipline of the GCA.

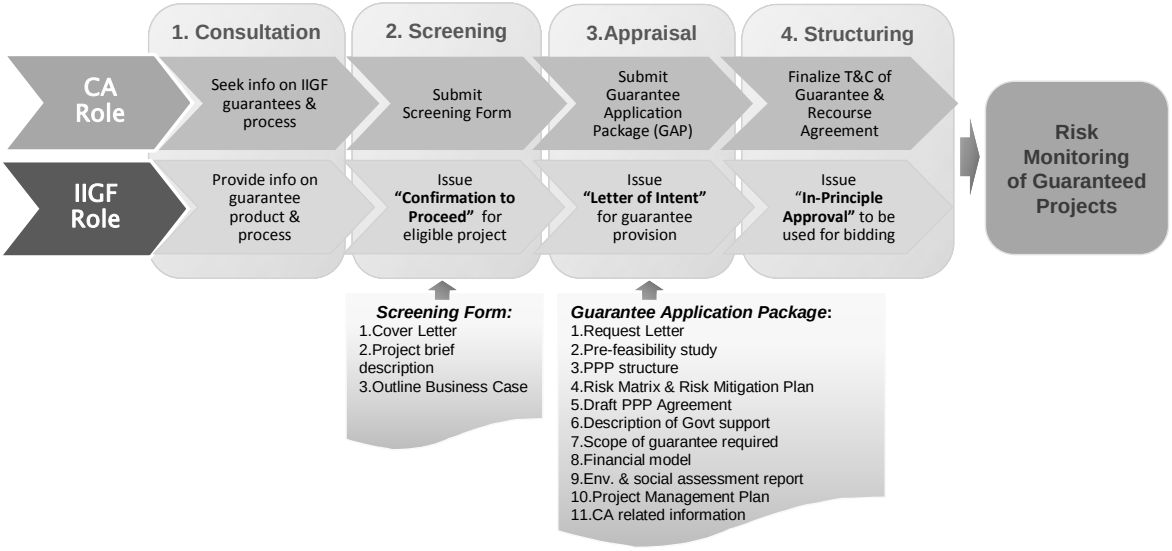


Source: IIGF

Figure 4-13 General Scheme for PPP Guarantee

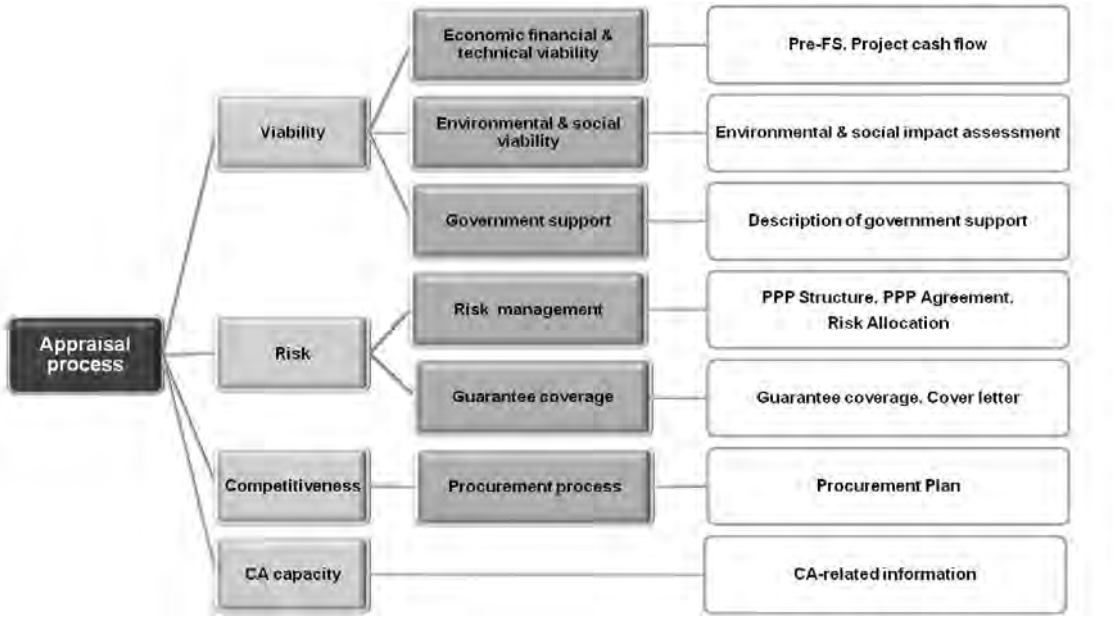
Guarantee Process at IIGF

For proposed PPP projects, IIGF will reach a guarantee agreement after the process shown in the figure below. For this Project, there will be a screening process after the completion of this Study. Furthermore, materials and results from this Study will be submitted to IIGF as part of the application package for the review.



Source: IIGF

Figure 4-14 Guarantee Process at IIGF



Source: IIGF

Figure 4-15 Project Assessment Criteria by IIGF

4.3.7 Financial Sources in Public Sector

DKI Jakarta is expected to bear the gap between the service fees for the Project company and the revenue from sewerage users, especially at the early stage of the Project period. Therefore, in order to recognize the financial ability of DKI Jakarta to make payments of the service fee to the Project company, it is important to examine their budgetary situation.

The table below is the budgetary situation of DKI Jakarta for three years from 2009 to 2011. Regarding the revenue side, the main source is taxes and the total revenue increased by 7% and 18% in the years 2010 and 2011 respectively. On the expenditure side, the total expenditures increased by 10% in 2010 and 15% in 2011. This can be mostly attributed to the increase of goods and services expenditure and capital expenditure. The capital expenditures increased by 14% in 2010 and 19% in 2011, which mostly came from machine & equipment expenditures and building construction expenditures. The personnel expenditure decreased by 26% in 2010 and 11% in 2011, mostly due to the decrease of personnel.

For the past three years, deficits in the budget of DKI JKT have continuously occurred. In each year, the deficit was covered by previous year's budget remainder (the cumulative balance of fund remainder from the past budget implementation). DKI JKT did not have to use the provincial reserve fund to fund the deficit. As of 31 December 2010, the balance of budget remainder amounted to IDR 4.9 trillion (audited balance). DKI JKT did not need to provide funds for the budget's deficit from outside sources, from the central government or other institutions. The ultimate decision for the use of the budget remainder to fund the subsidy will be made by the discretion of Executive (The Governor) and Legislative (The Provincial House of Representatives / DPRD).

Table 4-3 The Budget of DKI Jakarta

Unit: million IDR

	2011		2010		2009
Revenue	26,079,201	18%	22,172,060	7%	20,674,548
Expendeture					
Indirect Expnedeture	9,534,313	18%	8,065,046	20%	6,742,210
Direct Expendeture					
Personal Expendeture	1,212,460	-11%	1,368,138	-26%	1,850,283
Goods and Service Expendeture	9,071,100	12%	8,077,184	6%	7,602,104
Capital Expendeture	8,057,934	19%	6,774,979	14%	5,944,871
Total Expendeture	27,875,807	15%	24,285,347	10%	22,139,468
Deficit	-1,796,606	-15%	-2,113,287	44%	-1,464,920

Source: JICA PPP Study Team

(1) Analysis

The budgetary situation in DKI Jakarta has been good and stable for the past three years. The total expenditures increase every year by more than 10%. In May 2012, PT Pemeringkat Efek Indonesia (the biggest rating agency in Indonesia) provided the rating of "idAA+"[11] and "Stable Outlook" for the Provincial Government of DKI Jakarta for the period of May 2012 until May 2013. DKI Jakarta is the first provincial government in Indonesia that has been rated by a rating agency. The AA rating

[11] The (+) sign means the rating given is relatively stronger and above of the related category (in this case the "AA" category).

means that the DKI Jakarta only is close to receiving the highest rating and has a very strong capability to fulfill its long-term financial obligation compared to other Indonesian entities.

The great financial capacity of DKI Jakarta makes it possible for DKI Jakarta to bear the gap between service fees for concessionaire and revenue from sewerage users. The budget scale of DKI Jakarta in fiscal year 2011 is as follows:

- Total expenditure: 27.9 trillion IDR
- Indirect expenditure including pay: 9.5 trillion IDR
- Direct expenditure: 18.3 trillion IDR

Impact on DKI Jakarta's budget in case of implementing the project under a PPP scheme is shown in Page 6-5 and Table 6-2. It can be said that financial burden on DKI Jakarta is not large.

(2) Municipal Bonds

One method for the DKI Jakarta provincial government to fund the Project is to issue municipal bonds. Municipal bonds are bonds issued by a provincial/regional government, offered to the public through the capital market. These bonds are not guaranteed by the central government and thus all risk associated with the issuance of these bonds becomes the responsibility of the provincial/regional government.

The regulations for municipal bond are:

- Law No. 8 of 1995 regarding Capital Market
- Law No. 33 of 2004 regarding Finance Proportionality Between Central Government and Regional Government
- Government Regulations No.30 of 2011 regarding Municipal Loan
- Government Regulations No. 58 of 2005 regarding Regional Financial Management
- Ministry of Finance Regulation No. 147/PMK.07/2006 regarding Procedures for Issuance, accountability, and Information Publication of Municipal Bond

Based on Government Regulation No. 30 of 2011, the issuance of municipal bonds could only be used to finance investment activities in infrastructure for public services that generate revenue for the provincial budget (APBD), which derive from tariff charges from the utilization of that infrastructure. The type of bond that could be issued as a municipal bond is only "revenue bond," which means that activities/projects funded by the bond must be able to generate revenue, but do not necessarily have to achieve full cost recovery. If the activities do not generate enough revenue, the difference would be covered by other sources of revenue on the provincial budget (e.g., taxes, other revenue).

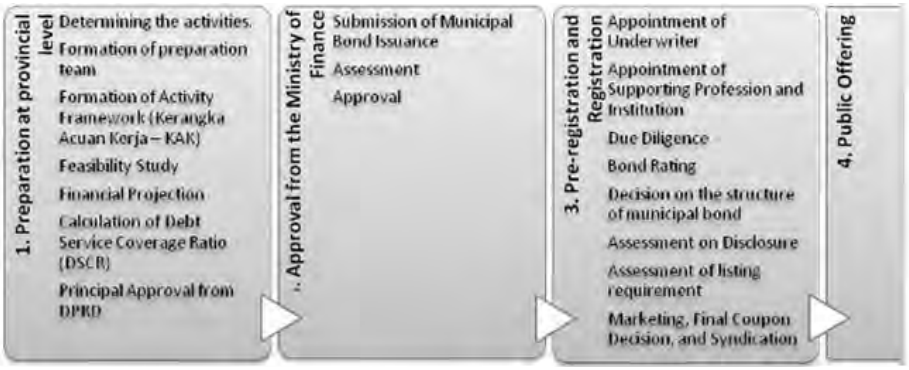
The provincial/regional governments are responsible for paying the loan principal and interest on the due date, and are issued a penalty if there are any delays. The payment schedule must be budgeted in APBD every year until the end of the loan period.

The characteristics of municipal bonds are:

- Long-term loan from the general public - usually for period of 5 years or more
- Issued through public offering at domestic capital market
- Denominated in Indonesian rupiah
- The proceed from bond issuance is used to fund public sector investment that generated revenue and benefit the general public
- The bond value at redemption is equal with bond nominal value at issuance.

"Trash and waste management (including sewerage and treatment plants)" is categorized as an eligible activity for municipal bonds.

The process of issuance of municipal bonds is as follows:



Source: JICA PPP Study Team

Figure 4-16 The Process of Issuance of Municipal Bond

The limitation on DKI Jakarta Provincial Budget / Finance:

1) Total loan amount

The total of loan shall not exceed 75% of the revenue of the previous year. The loan capacity of DKI Jakarta excluding municipal loan described above is IDR 16 trillion in 2012 and 2013, and will continue to increase to IDR 47 trillion in 2021.

2) DSCR

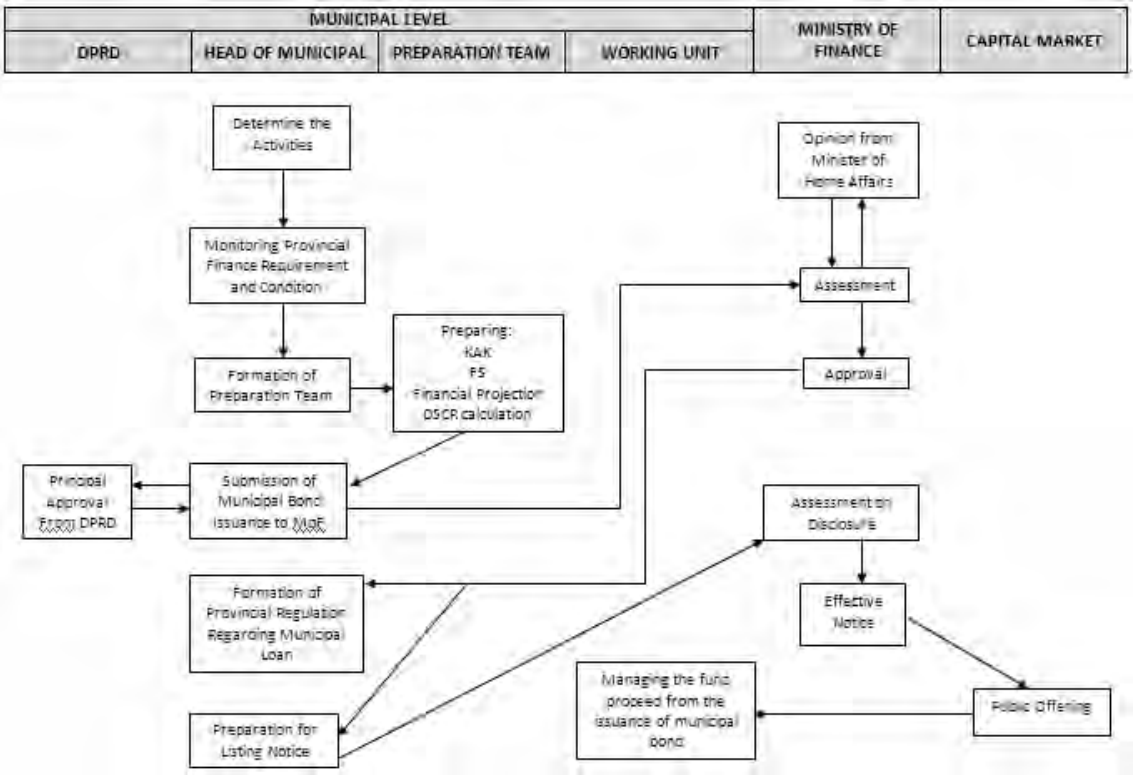
Debt Service Coverage Ratio (DSCR) should not be less than 2.5 (minimum 2.5). DSCR should be higher than 2.9 if possible.

3) Debt to the Central Government

DKI Jakarta should not have outstanding loan to the central government. Loans to the central government means municipal loans to the central government excluding municipal bonds (municipal bonds are classified as loans to the public). DKI Jakarta does not have any outstanding loans to the central government.

4) Approval given by DPRD for the issuance of municipal bond

The figure below shows a flowchart/process for issue of the municipal bond.



Source: JICA PPP Study Team

Figure 4-17 Flowchart and Workflow of Municipal Bond

4.3.8 Financial Resources to Implement the Project

(1) Project Framework for Zone 1

As for the Project framework in the Zone 1 sewerage development, it is assumed that the private sector will implement the construction and O&M of STP, and that the public sector (GOI and/or DKI) will implement the construction and O&M of sewers.

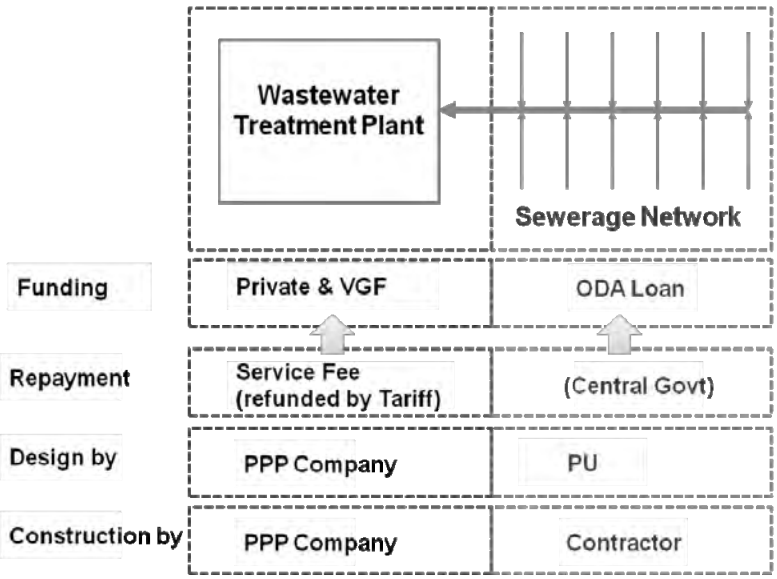
Table 4-4 Sewerage Development & O&M in Sewerage Zone-1 proposed by PPP-FS

	Budgetary Source	Management	Implementation
a.Construction of STP	Private & VGF	DKI Jakarta	Private
b.Construction of Sewers	ODA Loan	GOI / DKI Jakarta	GOI / DKI Jakarta
c.O&M of STP	Tariff & Subsidy such as General Account Expenditure	DKI Jakarta	Public (Joint Company)
d.O&M of Sewers	Tariff & Subsidy such as General Account Expenditure	DKI Jakarta	DKI Jakarta

1. Joint Company will be set up between DKI Jakarta and a Japanese Investor for O&M of STP.
2. Single contract to cover EPC and O&M (BOT Concession agreement) is applied to STP.

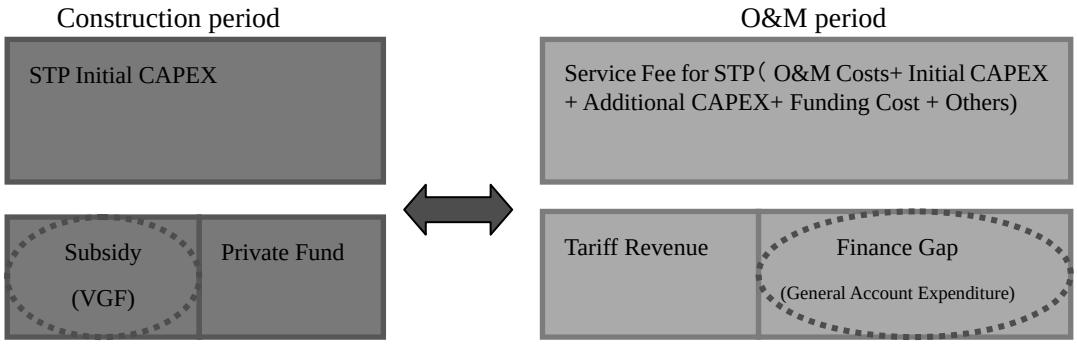
Source: JICA PPP Study Team

The figure below shows how the whole Project will be implemented in terms of funding, repayment, design and construction in relation with the Table 4-4.



(2) Relations of Tariff Revenue, General Account Expenditure and Governmental Subsidy in the Project

For STP development, financial resources in the construction and O&M periods are as follows. Pipe network construction is not considered because it should be a public project.



If the BOT scheme for STP is assumed, the amount to fulfill the initial CAPEX for construction, O&M costs, replacement costs (optional), interest, dividend for private investment, etc. should be paid to SPC by DKI Jakarta as service fees.

If the tariff revenue is insufficient to cover the service fees to SPC, DKI Jakarta has to make up the financial gap (shortfall) by using other finance resources such as ordinary account expenditure.

A STP project is regarded as a public service and is not profitable. However, it creates social benefits such as reduction in individual sanitation costs, improvement of public sanitation, improvement of the living environment, improvement of quality of public waters, rise in land values and tourism recuperation. Therefore, it is reasonable to say that DKI Jakarta should collect tariffs from beneficiaries based on the polluter-to-pay principle and, if tariff revenue is not enough, supplement the financial gap by ordinary account expenditure. Beneficiaries mean residents in the interceptor installed area. This method is institutionalized not only in Europe and USA, but also in neighboring countries in Asia in which tariff payment duty is incurred upon installation of interceptors in planned sewerage development areas. The DKI Jakarta administration should make the same judgment as above. This is an assumption in the Study.

As benefits from sewerage development are enjoyed through the O&M period, it is considered adequate that beneficiaries bear the construction costs during the O&M period from the standpoint of intergenerational equity. Therefore, issuing of municipal bonds by DKI Jakarta to cover the construction costs is reasonable. In general, in Japan, a part of capital costs is deferred to future fiscal years and current fiscal burdens are reduced by issuance of fund leveling bonds.

After the initial CAPEX, if additional CAPEX and funding costs are very large, tariff revenue will not be able to cover service fees. The following three measures are important to mitigate this problem.

- Subsidies in the construction period
- Reduction of funding cost by private in the construction period (reduction of loan interest, in particular)
- Reduction of initial CAPEX, additional CAPEX and O&M costs through originality and ingenuity by private sectors

1) Subsidies in the construction period

Subsidies to the initial CAPEX could reduce not only the private fund portion, but also the whole construction cost assuming application of low interest funds. This will reduce the service fee level during the O&M period. Japan and USA apply a subsidy for about 60% of the whole construction cost in order to promote sewerage development.

Municipal bonds issued by DKI Jakarta may be a potential source of subsidy in the construction period. In addition, the VGF (Variability Gap Fund) system was established last December. It will enable DKI Jakarta to settle the financial gap between the revenue and the service fees throughout the O&M period.

2) Funding cost reduction by private sector (reduction of loan interest, in particular)
SPC should explore low interest rate loan funding. For instance, SPC will be able to enjoy a relatively low interest rate by utilizing the PSIF (Private Sector Initiative Fund) provided by JICA, PT SMI and PIP.

3) Reduction of initial CAPEX, additional CAPEX and O&M costs through originality and ingenuity by private sector
Reduction of initial CAPEX, additional CAPEX and O&M costs should be explored by the private sector. The contract to be applied to this Project is not a traditional (unit-price based) one but it will be a BOT contract or concession agreement. Therefore, there is room for originality and ingenuity in the private sector to reduce costs in the lifecycle period. As a result, high cost-effectiveness will be expected by utilizing the experiences of the private sector.

4.3.9 Assumptions for Financial Analysis and Economic Analysis

(1) Assumptions for Financial Analysis

Financial analysis for this Project is conducted assuming the BOT scheme. FIRR, EIRR and B/C are calculated based on the following assumptions.

- The financial analysis is for checking profitability of the Project from the standpoint of general contractor (DKI Jakarta). Assumptions for the financial analysis are composed of seven items: “schedule, project scheme and macro information,” “tax,” “fundraising,” “initial CAPEX, accounting treatment and other costs” “O&M costs,” “revenue” and “reserve account.”
- Currency used in the calculation is Indonesia Rupiah (IDR).

1) Schedule, project scheme and macro information

Items	Assumptions
Role sharing in the Project	DKI Jakarta • DKI Jakarta provides SPC the BOT license (concession right) during the Project period. • DKI Jakarta pays a service fee to SPC every year in return for

<table>
<tr><th>Items</th><th>Assumptions</th></tr>
<tr><td></td><td>construction works and O&M based on the BOT contract.
• Project facilities will be delivered from SPC at the Project termination date based on the BOT contract.
SPC
• SPC conducts the scope stipulated in the BOT contract during the Project period. (Additional CAPEX for renovation is included in the O&M. SPC does not receive additional CAPEX costs on all such occasions but receive its cost equally through service fees during the O&M period.)
• SPC delivers the Project facilities to DKI Jakarta at the Project termination date.</td></tr>
<tr><td>Schedule</td><td>• Construction period
2 alternative STP construction plans are taken into consideration.
Case1: All of the construction works related to the STP (treatment capacity 198,000 m^3/daily average) will be finished within three years (2014–2017).
・Bidding-Detail Design:1 year
・Construction:30 months
・Test run:3 months
Case2: Half of the above construction works except for bidding and detail design (mechanical and electrical works equivalent to treatment capacity 99,000 m^3/daily average) will be conducted in the period from 2014 to 2017 and the remaining mechanical and electrical works will be constructed in the period from 2019 to 2020. On the other hand, all of the civil works will be conducted from 2014 to 2017. Treatment capacity will reach 198,000 m^3/daily average at the end of 2020.
• O&M period：20 years (2017–2036)
• Project period:23 years (construction and O&M period)</td></tr>
<tr><td>Treatment capacity</td><td>• STP installed at Pejagalan copes with gray water collected through pipes in Zone 1
• Treatment capacity 198,000 m^3/daily average.</td></tr>
<tr><td>Assumed influent water volume (m^3/daily average)</td><td>• Influent waster water quantity at the end of fiscal year
<table><tr><td>2017</td><td>2018</td><td>2019</td><td>2020</td><td>2021</td></tr><tr><td>37,000</td><td>79,000</td><td>91,000</td><td>118,000</td><td>145,000</td></tr></table><table><tr><td>2022</td><td>2023</td><td>2024</td></tr><tr><td>158,000</td><td>165,000</td><td>198,000</td></tr></table>• 198,000 m^3/daily average after 2025
• The sewerage system is one of the infrastructures that should be reconsidered in accordance with future changes of spatial planning and land use. The above estimation of influent water volume is calculated based on the current conditions and information.</td></tr>
<tr><td>Scheme and calculation object for the financial analysis</td><td>• BOT scheme (SPC will be set up for implementing the single Project. It will build, own and operate the Project during the Project period. Project facilities will be transferred free of charge to DKI Jakarta at the Project termination date.）
• Construction, O&M and additional CAPEX of STP
• The Project owner in the contract is DKI Jakarta.
• Financial analysis this time is focused on STP related projects and does not include construction, O&M and additional CAPEX of pipe network.</td></tr>
</table>

Items	Assumptions
	• FIRR is calculated considering initial CAPEX, O&M and additional CAPEX of STP as items of expenditure and tariff as item of revenue.
Inflation	From 2012 to 2020: 6% (yearly) From 2021 to 2030: 5.5% (yearly) From 2031 to 2036: 4% (yearly)
Currency rate	As of the end of January, 2012 9012.5 (IDR/USD), 76.21 (JPY/USD)

2) Tax

Items	Assumption
Tax items and rate	• VAT: 10% VAT on service fee that DKI Jakarta pays to SPC is considered in a financial simulation. The Study Team assumes that it is offset by VAT to be borne by SPC during construction and O&M periods. VAT on the initial CAPEX during the construction period which SPC has to bear is not considered in the financial simulation because the Study Team assumes that SPC will be able to claim for refund of VAT during the construction period. (SPC will not have any sales during the construction period.) • Income tax: 25% • Withholding tax(for dividend): 10%(considering Japan Indonesian TAX Treaty) • Withholding tax (for loan interest): 20% • Doesn't consider loss carried forward (maximum 5 years) • PBB (land and property tax): 15% (average tax rate against NJOP) Property tax on STP is calculated in the simulation by "amount of civil works multiplies the average tax rate". • Import duty: 15% against all import items for this Project (assumption)
Preferred tax	• Doesn't consider investment incentive or tax holiday

3) Fundraising

Items	Assumptions
Fundraising of SPC	• Fundraised by debt and equity • Initial CAPEX from which subsidy (VGF) amount is deducted • VGF is explained later.
D/E ratio	• Proportion of Debt and Equity is 70% : 30%.
Conditions of loan	• Commencement of Drawdown: 2014 • Grace period: 3 years • Repayment period of both interest and principal in equal installments for 15 years after the grace period • Loan period is 23 years from the beginning of construction to the end of O&M period. Loan is expected to be provided by JICA PSIF. • Interest rate: 9% (IDR) (Yen loan by JICA PSIF will be changed to IDR one by currency exchange or currency swap.) • Commitment fee is 1%. • Commitment fee means lender's fee for the remaining quota of debt agreed between SPC and lender. This fee is included in loan principal in the grace period at present. The agreement will be changed through consultation between SPC and the bank.

Items	Assumptions
	• In Case 1, the loan is prosecuted gradually in accordance with construction periods (from 2014 to 2017) within the agreed commitment line. • In Case 2, the loan is prosecuted gradually in accordance with construction periods (2 times; from 2014 to 2017 and from 2019 to 2020). • Loan interest incurred during the grace period is added to loan principal every year. (As SPC does not receive any sales (earnings) as service fee from DKI Jakarta before the O&M period, SPC cannot pay loan interest to lenders. Therefore, loan interest incurred during grace period is added to the loan principal every year.)
Conditions of equity investment	• In accordance with loan prosecution and the loan interest changing to principal, equity investment or capital increase will be conducted by SPC to keep the D/E ratio at 30% in both Case 1 and Case 2. Equity IRR is defined as internal rate of return, calculated by equity investment, dividend, and repayment at the termination date. • Legal capital reserve (up to 20% of SPC capital) is saved up during O&M period.
Service fee	• Service fee to be paid by DKI Jakarta to SPC considering loan principal, loan interest, equity principal, equity dividend, O&M costs, additional CAPEX, debt reserve, tax and others.
Subsidy	• A certain amount of initial CAPEX is subsidized. • Case 1: Either GOI or DKI Jakarta subsidizes the initial CAPEX from 2014 to 2017. • Case 2: Either GOI or DKI Jakarta subsidizes the initial CAPEX from 2014 to 2017 and from 2019 to 2020. • The study team assumes that amount of VGF is some portions (%) against total initial CAPEX including its import duty.

4) Initial CAPEX, accounting treatment and other costs

Item	Assumption
Initial CAPEX (Construction cost)	• In Case 1, 167 mil. USD (direct cost, tax and inflation not considered) • On the other hand, inflation and indirect costs such as insurance cost, SPC expences and PBB are considered in the financial calculation. Construction costs are paid in installments during construction period (from 2014 to 2017). • In Case 2, 174 mil. USD (direct cost, tax and inflation not considered) • On the other hand, inflation and indirect costs such as insurance cost, SPC expenses and PBB are considered in the financial calculation. Construction costs are paid in installments during construction period (from 2014 to 2017 and from 2019 to 2020).
Accounting treatment	• IFERS Financial Asset Model is adopted; therefore depreciation is not applied in the financial simulation. • The Study Team calculates predicted financial statements such as B/S, P/L and FCF by adopting accounting treatment of reduced-value entry of acquired property. Therefore, SPC does not recognize the same amount as VGF on its predicted B/S. Calculation of P/L and FCF are also affected.
Other costs	• Bid bond accounts for 5% of yearly average service fee amount. This is current assumption by the Study Team and should be further examined. • Performance bond amount during construction period accounts for

	20% of construction contract one. This is current assumption by the Study Team and should be further examined. • Performance bond amount during O&M period accounts for 10% of O&M cost and additional CAPEX. This is current assumption by the Study Team and should be further examined.

5) O&M related costs

O&M costs	• O&M costs are composed of labor cost, utility costs, sludge disposal cost and others. • The amount of costs is 180 mil. USD in Case 1, 187 mil. USD in Case 2. (Tax and inflation not considered)
Additional CAPEX	• Replacement costs for facilities that reach the end of their useful life • The amount of direct costs is 120 mil. USD in Case 1 and 109 mil. USD in Case 2. (Tax and inflation not considered)

6) Revenue

Service fee	• SPC receives service fee from DKI Jakarta periodically during the O&M period. This fee should be increased gradually at a constant rate every year. In case 1, the annual increase rate is currently 1.3%. • Service fee is composed of loan principal, loan interest, equity principal, equity dividend, O&M costs, additional CAPEX, tax and others.
Tariff Revenue	• Tariff revenue is a backfinance resource for DKI Jakarta to pay the service fee to the SPC. • Detail is described in 5.4.1, (2). Total tariff revenue during O&M period (20 years) is 8.47 Trillion IDR.
Other revenue	• Deposit interest on reserve accounts - from 2012 to 2020 : 5.0% (IDR) - from 2021 to 2030 : 5.0% (IDR) - from 2031 to 2036 : 5.0% (IDR) - from 2012 to 2020 : 0.16% (USD) - from 2021 to 2030 : 0.16% (USD) - from 2031 to 2036 : 0.16% (USD)

7) Reserve account

Reserve accounts are set for future additional CAPEX, repairs and debt service (loan principal and interest).

Reserve account for additional CAPEX and repairs	• Necessary amount for future expenditures such as additional CAPEX and repairs during the O&M period is saved in an exclusive bank account. • The above amount is reserved periodically.
Debt service reserve account	• Necessary amount worth debt service (loan interest and principal) for one time is reserved in an exclusive bank account to avoid a situation of that SPC cannot pay loan interest and principal to lenders in case of SPC's cash shortage.

(2) Assumptions for Economic Analysis

Assumptions of economic analysis are composed of "Framework to consider the project schedule," "Economic cost items" and "Items of economic benefits." Currency utilized in the calculation is Indonesian rupiah (IDR).

Economic analysis is conducted for DKI Jakarta to judge whether its decision for the Project investment in Zone 1 is appropriate or not in terms of social benefit. Social effectiveness and impacts caused by the Project investment are counted quantitatively as economic benefits. Economic benefits are compared with necessary costs for implementing the Project.

1) Framework to consider the Project schedule

Base year to evaluate the Project	Year 2013 • Final report for this Study will be submitted in February 2013, and the fiscal year in Indonesia starts from January. Therefore, the base year is set at the year 2013.
Capital opportunity cost	• 12% (the same value as in the MP Review)
Calculation objects for economic IRR and B/C ratio	• EIRR is calculated by using quantitative economic benefits and Project costs. • B/C is calculated through the following procedures. At first, the total amount of economic benefits and project costs are respectively discounted to present values by the capital opportunity cost (12%). Next, the respective present values are divided to calculate B/C ratio. • If EIRR is larger than 12%, decision on the Project investment in Zone 1 is appropriate for DKI Jakarta in terms of economic costs and benefits. • If B/C ratio is larger than 1, decision on the Project investment in Zone 1 is appropriate for DKI Jakarta in terms of economic costs and benefits. • Project cost consists of two parts: ✓ Initial CAPEX, O&M costs and additional CAPEX for STP, and ✓ Initial CAPEX and O&M costs for pipe network. • As the useful life of pipe network, 50 years, is longer than the Project period (23 years), additional CAPEX for the pipe network is not considered. • Economic benefits are described later.
Construction period and pipe network cost	• Considering necessary time for ODA related procedures, pipe network construction will start in 2015 and end in 2024(Construction period is 10 years in both Case 1 and Case 2.) • Construction cost is 290 mil. IDR in total for 10 years. (Tax and inflation not considered) • Conditions for ODA lending Middle-income country, Preferential condition, Option 2, Interest rate 0.50%, Loan period 20 years (including grace period of 6 years)
Timing when economic benefits occurs	• From 2019 to 2036 • O&M for STP will start from 2017, but main sewers' construction will not have been completed by 2019. The Study Team assumes that economic benefits, excluding land price increase, will not occur until 2018.

The Study Team estimates economic benefits by implementing only off-site development in Zone 1.

2) Economic cost items

Items	Contents	Details, Remarks
Sewerage development plan	Initial CAPEX, additional CAPEX and O&M costs for STP Initial CAPEX and O&M costs for pipe network	• As the useful life of pipe network is assumed to be 50 years and is longer than O&M period (20 years), additional CAPEX for pipe network is not considered in the economic analysis calculation. • Pipe network related costs are considered. This is deferent from the financial analysis. The Study Team assumes that economic benefits occur by construction and O&M activities of pipe network.

3) Items of economic benefits

The following are regarded as economic benefits:

- Effect of reduction in wastewater treatment cost
- Effect of improvement in public sanitation
- Effect of improvement of the living environment
- Effect of rise in land value
- Effect of tourism recuperation
- Effect of reclaimed water utilization

Items	Contents	Detail, Remarks
Effect of reduction in wastewater treatment cost	Reduced O&M cost of ITP (Individual Treatment Plant)	• Non-households are forced to install an ITP based on the drainage regulation of 2005. The Study Team estimates alternative effect such as O&M cost reduction of ITP by accessing the new sewerage system. • Pipe installation cost will not be necessary because of adopting the interceptor method in the Project. • The Study Team assumes that 25% of the planned influent wastewater volume into the STP is from non-households. • Total cost of O&M and depreciation for ITP is 7,900 IDR/m^3 on average. O&M cost for ITP (unit price/wastewater volume): 6,200 IDR/m^3 Depreciation cost for ITP: 1,700 IDR/m^3 • Reduced O&M cost of ITP is calculated by (average O&M cost) × (influent wastewater volume from non-households). • "Reduced cost of regular desludging from septic tanks," "Reduced cost of upgrading to modified septic tank" and "Reduced construction and O&M cost of sludge treatment plants" described in the MP Review are not calculated because the respective economic benefits amount are not significant, and

Items	Contents	Detail, Remarks
		there is a probability that these benefits will be largely affected by personal activities. As a result, economic benefits are calculated conservatively.
Effect of improvement in public sanitation	• Reduced medical treatment cost by reducing the number of patients suffering from waterborne disease • Increased benefit by reduction of absence from work due to waterborne disease • Increased economic value by saving deaths from waterborne disease	• By improving the condition of wastewater underground percolation, improvement in water quality of wells used for living water and drinking water are expected. As a result, the Study Team assumes reduced medical treatment cost by reducing the number of patients suffering from waterborne diseases. • Waterborne disease occurs in the situation of water flooding and percolation of pollutants into groundwater. If a new sewerage system is developed, these situations are expected to be prevented. (Effect of no overflow will be revealed.) • These are calculated by (WTP) × (the number of households in Zone 1). • WTP (Willingness to Pay, 26,822 IDR/household /month) was investigated through CVM method by the social survey. • One household is assumed to have 5 people. The planned sewerage population in Zone 1 is 989,389. Therefore, the number of households is calculated as 989,389÷5. As land in Zone 1 has already been saturated, the number of independent houses may not increase from now on. The Study Team assumes that the number of households will not increase during the Project period.
Effect of improvement of the living environment	• Reduced cost of covering small and medium-sized open channels • Reduced cost of dredging open channels	• Effect of improvement of the living environment is calculated by CVM. (Calculation method is the same as above.)
Effect of rise in land value	Increased value of land	• Total amount of PBB (land and real estate tax) in Zone 1 is 475,916 mil. IDR in 2011. • Average tax rate: 0.15% (average of 0.1% and 0.2%) • The value of real estate as assessed for local government tax (NJOP) in 2011 can be calculated as (total amount PBB) ÷ (average tax rate). • NJOP has increased by about 10% on average in these five years. Its increase rate is conservatively assumed to be 6% per year at this time. (This increasing rate is the same as the average real GDP growth rate in DKI Jakarta in the same period.) • Reflecting on the new sewerage system development, NJOP is assumed to increase by 5% additionally at the beginning of the O&M period as an effect of rise in land value. (As a result, NJOP increase rate in 2017 becomes 11%.) • The MP Review also estimates the increased value of land by 5% in its economic analysis.

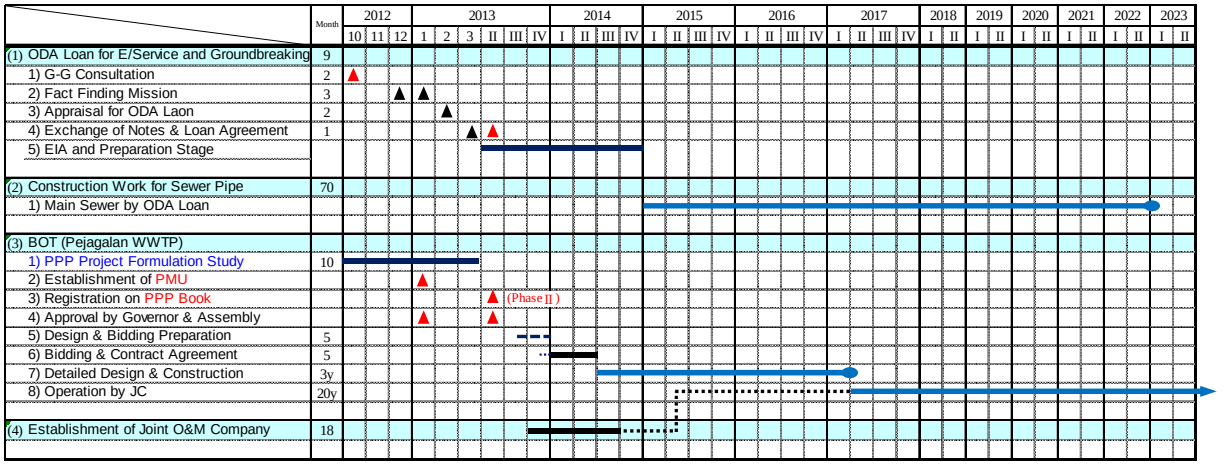
Items	Contents	Detail, Remarks
Effect of tourism recuperation	Increased tourist expenditure by decreasing rate of water borne disease	• This economic benefit is calculated as follows: ✓ Number of annual foreign tourists to DKI Jakarta: 1,534,785 people (From "Jakarta in Figures 2008") ✓ Incidence of diseases (severe): 1.8% (From World Bank Report) ✓ Final target of incidence of diseases when sanitary condition is completely improved: 0% ✓ Incidence of diseases after sanitary condition is improved (with case): 1.8%-(1.8%-0%)×(Improvement rate of incidence of diseases) ✓ Improvement rate of incidence of diseases is assumed to be equal to sewerage coverage rate. ✓ Number of annual foreign tourists to become sick with waterborne diseases = (Number of annual foreign tourists) × (Incidence of diseases) ✓ Daily expenditure of a foreign tourist = 100 USD / day/person ✓ Average length of episode: 3days ✓ Loss of tourist expenditure due to waterborne diseases of foreign tourists = (Number of annual foreign tourists to become sick with waterborne diseases) × (Daily expenditure of a foreign tourist) × (Average length of episode) ✓ Attribution of sanitary improvement to decrease the waterborne diseases: 5% (From World Bank Report) ✓ Increased tourist expenditure after incidence of waterborne diseases is decreased = (Tourist expenditure (with case)) – (Tourist expenditure (without case)) × (Attribution of sanitary improvement to decrease the waterborne diseases) • Increased tourist income by improving hotel occupancy examined in the MP Review is not considered because it is not directly linked to the new STP development.
Effect of reclaimed water utilization	Reduction of water purchase cost by substituting treated water at STP as water sprinkling	• If MBR is adopted as wastewater treatment method, water quality of treated water will be relatively good compared with other treatment methods. It is assumed that treated water at STP can be used for industrial uses such as water sprinkling at neighboring golf courses. The alternative effect is expected. • It is assumed that treated water at STP, 1,000 ton/day, can be sold at 7,000 IDR/ton, which is equivalent to the groundwater tax.

The following items are not considered as economic benefits.

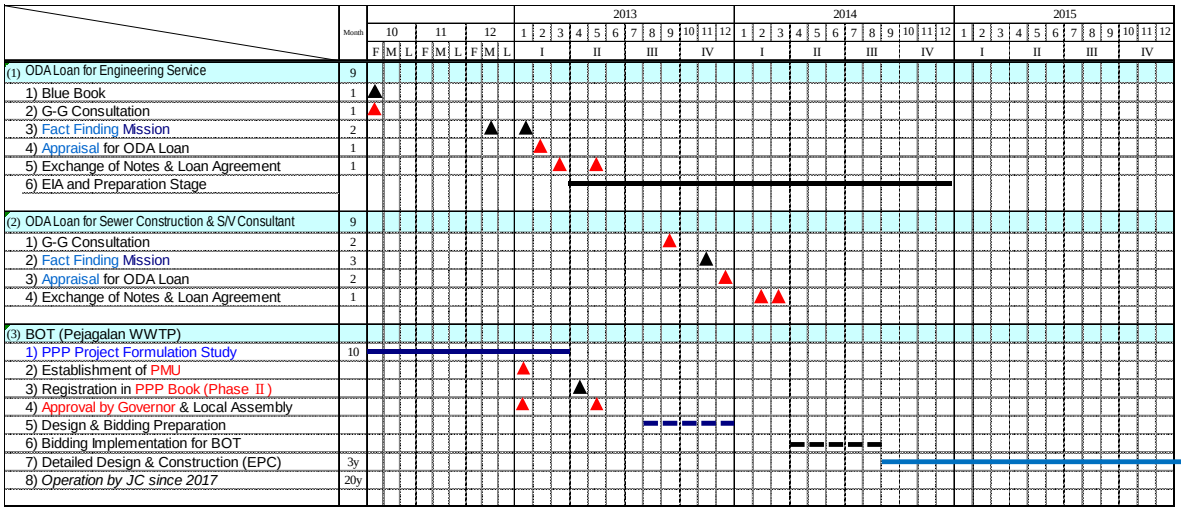
Items	Detail, remarks
Effect of improvement in quality of public waters	• "Reduced cost of purifying water at waterworks facilities" described in the MP Review is not considered in the calculation because there are no water treatment facilities that have sluice gates in the downstream of the planned discharging location of the STP. • As the Study Team has not traced damage realities in agriculture and fishery fields downstream of the planned discharging place, "effect of mitigation on agricultural and fishery's damages" is not also considered.
Effect of prevention against inundation	• As the Study Team assumes that effect of prevention against inundation is included in "effect of rise in land value," this economic benefit is not calculated individually.
Effect of water quality preservation by introducing high-grade treatment	• As the Study Team does not assume high-grade treatment at the STP, this economic benefit is not calculated individually.

4.3.10 Implementation Plan

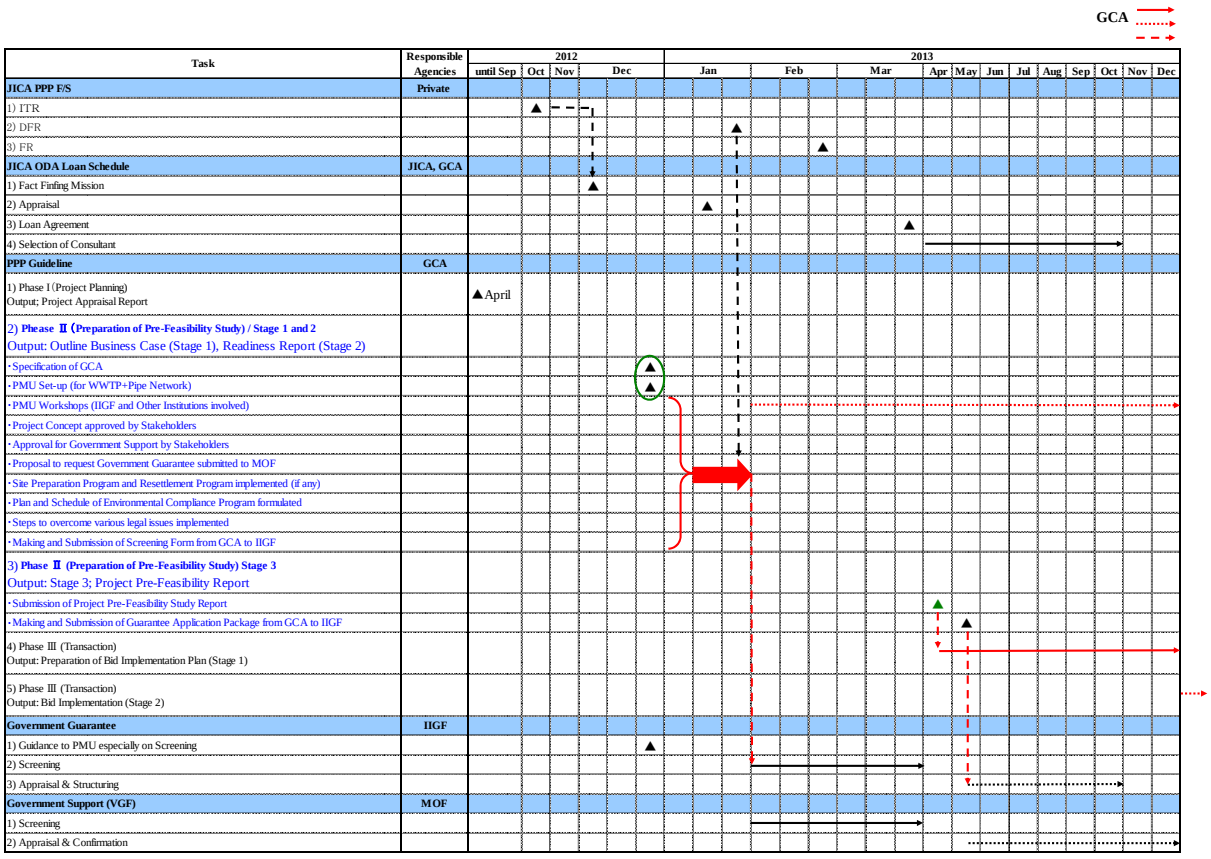
(1) Mid Term Project Plan



(2) Short Term Project Plan



(3) Necessary Step for Project Implementation



Chapter 5 PPP Project of Jakarta Central STP

5.1 Jakarta Central STP Development

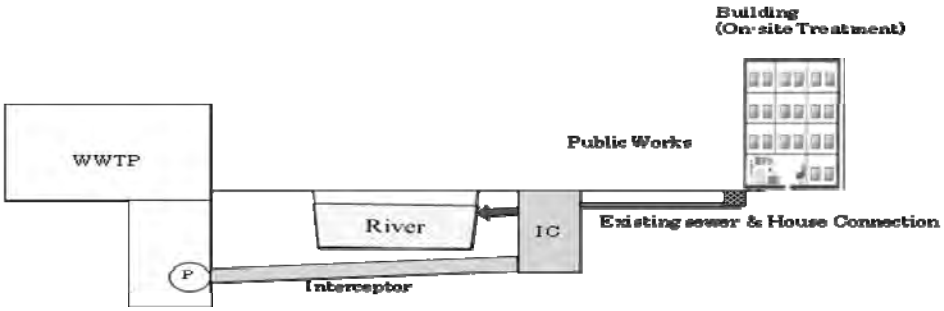
5.1.1 Step-wised Sewerage Development applying Interceptor Sewer

(1) Conventional Sewer and Interceptor Sewer

Two types of wastewater collection are applied to sewerage systems. Combined sewerage collects combined wastewater and storm water, and separate sewerage collects wastewater and storm water separately.

Sewer development methodologies are also divided into two types. The EU and USA employ conventional sewerage systems that consist of treatment plants, trunk sewers, secondary and tertiary sewers and house connections. Interceptor sewers intercept wastewater from the existing drainage and are a transitional technology for conventional sewerage (Figure 5-1 & Table 5-1).

A step-wised approach of sewer construction is applied in Zone 1. At first, an interceptor sewer is constructed and operated. After the sewerage service starts, secondary and tertiary sewers and house connection follow and are integrated to the separate sewerage system (Figure 5-2).

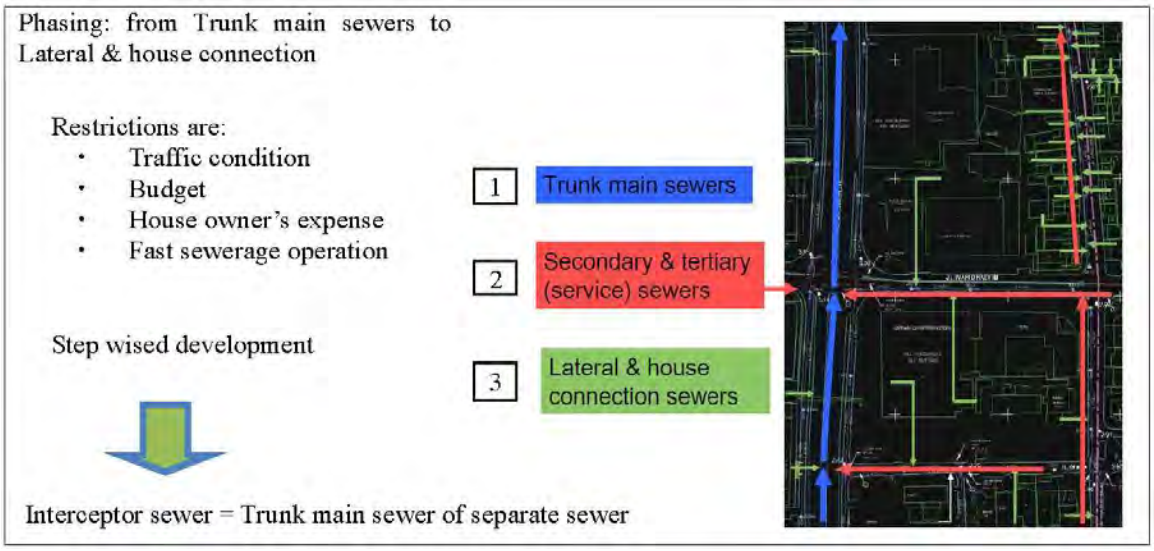


Source: JICA PPP Study Team

Figure 5-1 Interceptor Sewer

Table 5-1 Type of Sewer Development

Sewer Type	Characteristics	Levy on Property
Conventional sewer	Sewer, generally applied in EU & USA, consists of STP, trunk sewers, secondary and tertiary sewers and house connections. Gray water and human waste are collected.	House owners are obligated to remodel the existing sewer to a separation.type..
Interceptor sewer	STP and trunk sewers are prioritized and treat gray water of the existing drainage. Human waste is treated by septic tanks and supernatant is drained to the interceptor. Wastewater drainage and water pollution control are prioritized as principal roles of sewerage.	No obligation for house owners for the time being. Sewer separation in house will be obligated at the stage of connecting with the public sewer.



Source: JICA PPP Study Team

Figure 5-2 Step-wised Sewerage Development

Conventional sewerage, which is applied in western countries and Japan, collects wastewater through house connections. Sewerage systems have been historically developed to combine wastewater and storm water in an urban area. Lateral sewers were constructed to collect building wastewater in the beginning stage. After the urban area expanded, trunk sewers and pumping stations were constructed to transport wastewater far from the urban area. Recently, a wastewater treatment plant has been constructed for water pollution control, and is integrated to the present conventional sewerage.

Modern sewerage in Japan also consisted of sewers and pumping stations. Human waste was collected from cesspits and used as fertilizers for farms. Human waste reuse, however, was suspended during the economic growth period. Toilets became a national need, and then treatment plants were supplemented. Accordingly the existing sewerage facilities were integrated to the present conventional sewerage system.

Thus, the role of sewerage has been upgraded to the water environment improvement from the viewpoint of sanitation and drainage.

Interceptor sewers focuse on wastewater drainage and water environment improvement, which are the most principal roles of sewerage, and can produce a good effect on sewerage projects early. Wastewater (gray water) is collected from the existing channels and treated. Human waste is treated by a septic tank and its supernatant is collected and treated with the gray water.

Households are responsible for the cost of house connections, which is a part of private property, therefore, charges for individuals are an obstacle of conventional sewerage projects in Asian countries. Bangkok and Ho Chi Minh, which are mega cities like Jakarta, adopted the step-wised sewer construction approach by which the interceptor sewer is first developed and then it is

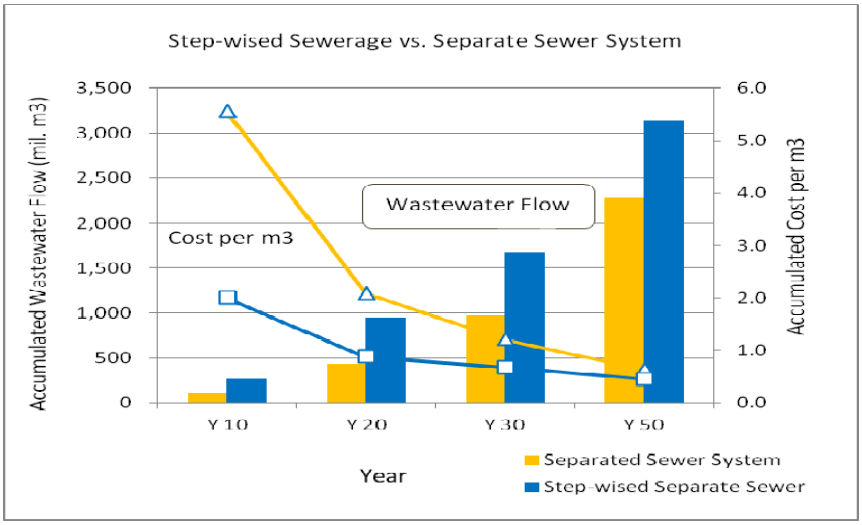
gradually shifted to the separate sewerage system. This approach has significantly contributed to the water environment improvement while mitigating the financial burden.

Once the trunk sewer is constructed, second and tertiary sewers are easily constructed and then house connection to the public sewer can be achieved. Projects such as housing and urban development can also construct a separate sewer in the Project area and connect to the public sewer. Accordingly, sewerage service including human waste can be upgraded.

(2) Benefits of Interceptor Sewer

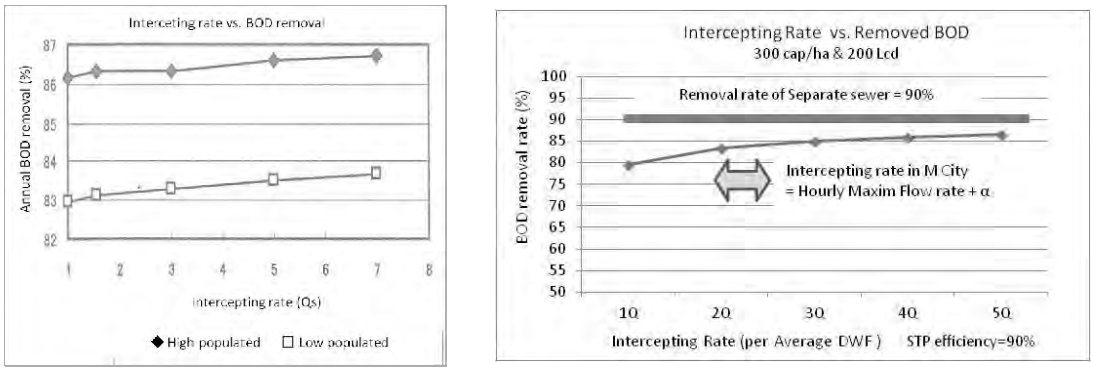
Sewerage facilities will be developed by step-wised sewer construction considering quality and flow rate of wastewater collected from the existing drainage. The step-wised sewerage development is advantageous for the following reasons;

a) Wastewater can be intercepted once the trunk sewer is constructed. The wastewater collection rate increases more rapidly than for conventional sewers which collect wastewater through house connections (Figure 5-3). STP will be constructed in line with the trunk sewer construction program.
b) Flow and quality of collected wastewater are affected by the existing drainage system and rainfall. In dry weather conditions, BOD is lower than that of conventional separate sewer because wastewater influent is mixture of gray water and supernatant of septic tanks. In wet weather conditions, storm water flows into sewers and dilutes wastewater. The intercepted flow rate at a diversion chamber increases more than during the dry weather.
c) Interceptor sewers can collect approx. 80 to 85% of annual pollution load (Figure 5-4, Table 5-2). Pollution load reduction of separate sewerage depends on treatment efficiency (approx. 90%). Interceptor sewerage is almost the same level in cities like Jakarta where wastewater treatment for improvement of water environment has high priority (Figure 5-5).



Source: JICA PPP Study Team

Figure 5-3 Wastewater Flow Change Collected by Individual Sewerage System



CSO Mitigation in Japan　　Example in M City

Source: Design Manual of CSO Mitigation in Japan & JICA PPP Study Team

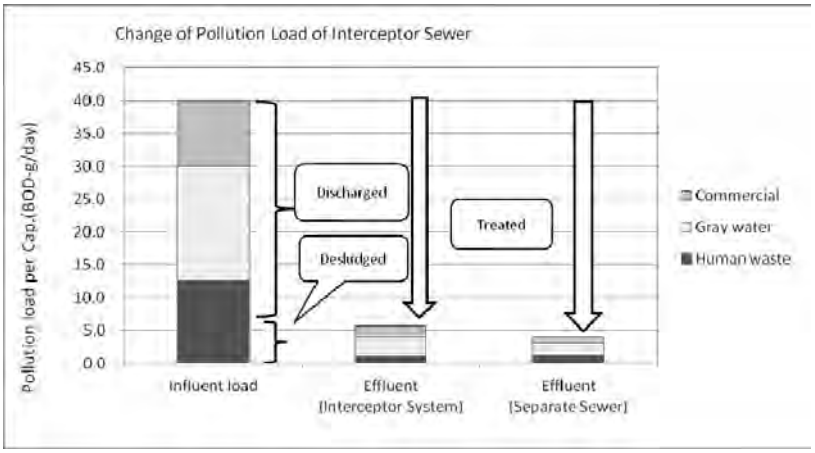
Figure 5-4　Pollution Control Efficiency of Interceptor Sewer

Table 5-2　Pollution Control Efficiency of Interceptor Sewer & Separate Sewer

Category	Removal rate(1)	Pollution load per capita			
		Domestic(2) (150 l/cap.day)		Commercial (1) (50 l/cap.day)	Total (200 l/cap.day)
		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)	3.0	1.7	5.8
Separate Sewer	90%	1.3	1.8	1.0	4.1

Commercial: Same concentration as Domestic

Source: (1) JICA PPP Study Team, (2) MP Review, (3) ST removal rate 50%

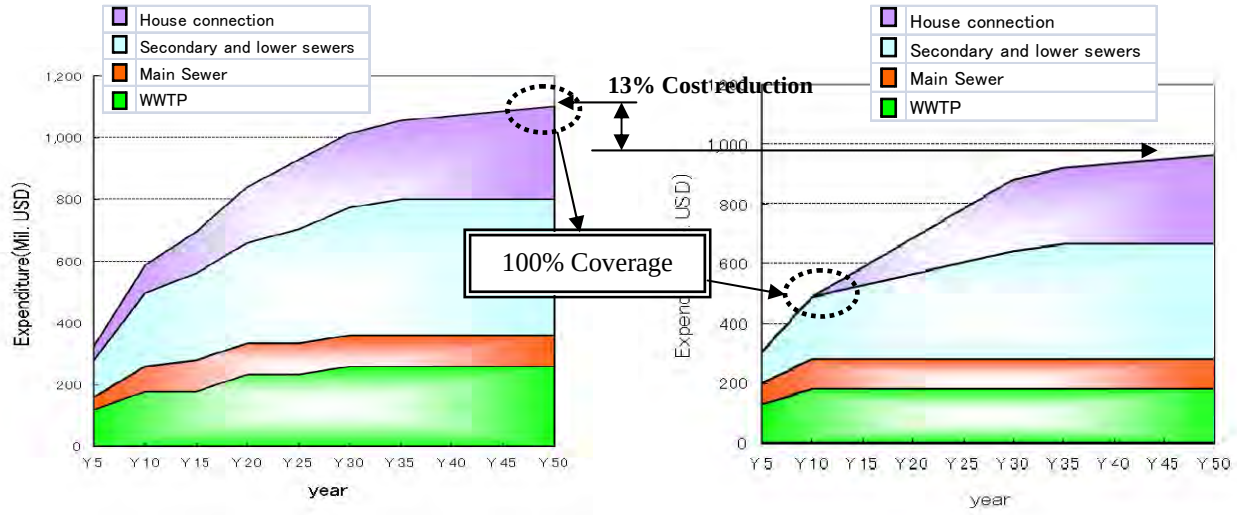


Source: JICA PPP Study Team

Figure 5-5　Water Pollution Control of Sewerage

(3) Financial Mitigation

Costs of sewerage projects consist of sewer and house connections and STP (Figure 5-6). The finance capability of a government is generally restricted; therefore, a sewerage construction program should be more practicable by prioritizing not a conventional sewerage system, but a trunk sewer and STP and then in subsequent years constructing second and tertiary sewers and house connections that otherwise would be a burden on the government and households. As such, the interceptor sewer can mitigate the financial burden of the government and enable efficient use of the government budget.



Separated Sewer System Step-wised Separate Sewer

Source: JICA PPP Study Team

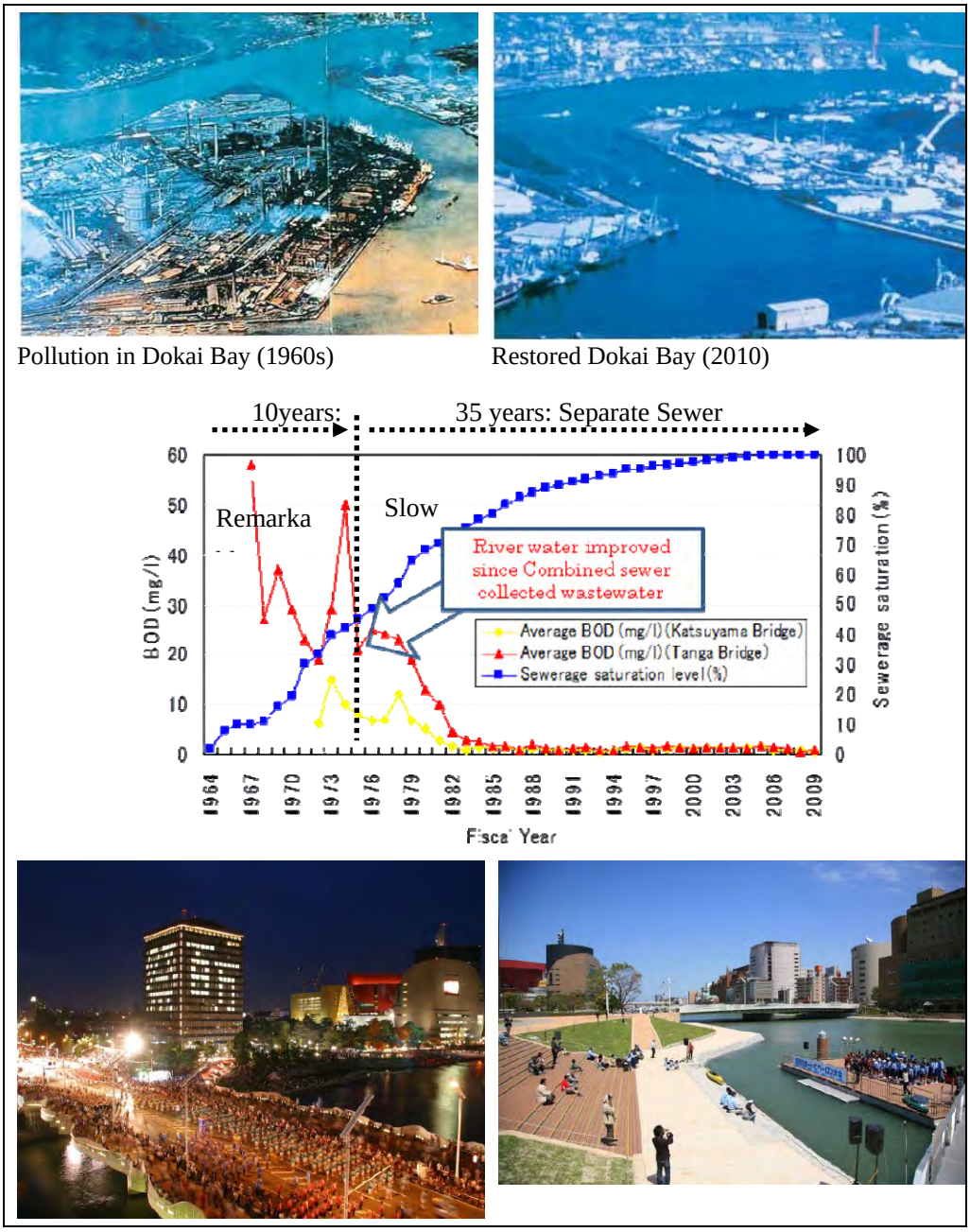
Figure 5-6 Financial Mitigation Methodology

(4) Interceptor System in Overseas

1) Kitakyushu City

A sewerage project in Kitakyushu was started to restore the seriously polluted water environment. At the beginning of the sewerage project, traffic congestion was also a serious concern in the city center where sewers were constructed under narrow roads. Kitakyushu had a plan for a separate sewerage system in future development; however, separate sewer construction would be delayed due to traffic congestion. Accordingly, the environmental and financial benefits of the sewerage project would also be delayed. Thus, an interceptor sewer (combined sewer), which utilizes existing drainage system, was applied for the period of ten years from the commencement of sewerage development through which the effect of environmental improvement emerged earlier and financial burden was also reduced. After sewerage was facilitated in the central district, the separate sewer was gradually developed in the entire residential area over a period of 35 years.

This sewer construction approach contributed to drastic improvement of the water environment in only ten years. The river revitalization and water environment improvement provides water front as a public amenity at present.



Source: JICA PPP Study Team

Figure 5-7 Change in Water Environment & Sewerage Development

2) Kaoshiung City, Taiwan

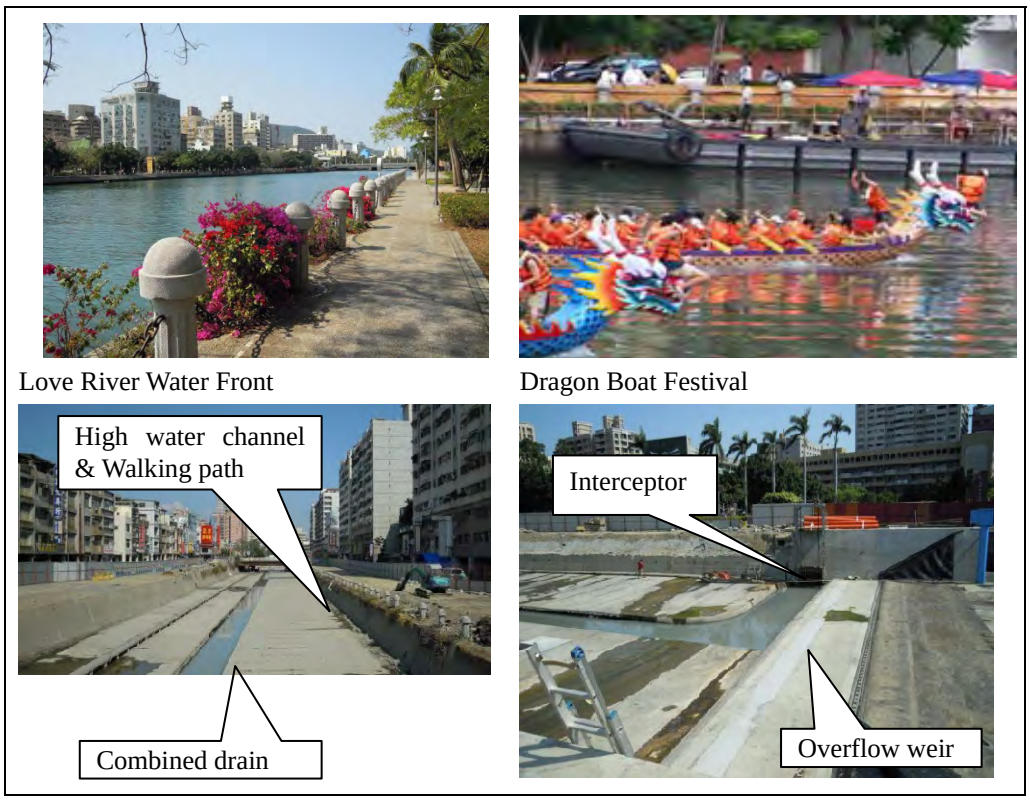
Kaoshiung City was a fishermen's village, but it has been developed as an international port city since the port opened in 1935. The Love River, which flows in the city center, was seriously polluted due to increased population during the economic growth. The City Government adopted an interceptor sewer system That can contribute to water environment

improvement earlier. At present, the citizens enjoy the beautiful riverfront and international tourists also visit the city.

Table 5-3 Step-wised Sewerage Development Project in Kaoshiung

Phase 1: 1977～1986 1. Sewer: About 24.4 km of the main trunk and sewer pipes 2. Pump Stations: 2 3. Sewage Treatment Plant: 1 (12.6 ha with 400,000 m^3/day) 4. Outfall to the Sea: 1 (1.8 m inner diameter, 3 km in length.) 5. Sewage interception stations: 11
Phase 2: 1990～2001 1. 127 km of main trunk, sewers and networks of branch sewers 2. 1 sewage lift station, 2 interception stations
Phase 3: 2001～2007 1. 320 km sewer pipes, interception facilities 2. Renewal of the Sewage Treatment Plant

Source: JICA PPP Study Team



Source: JICA PPP Study Team

Figure 5-8 Interceptor Sewer, Kaoshiung, Taiwan

5.1.2 Principal Project Components

(1) PPP Project Components

In general, sewerage project components are wastewater collection and treatment, sludge management, storm water drainage, treated wastewater reclamation and sewage sludge reuse. These project components need to be financially sustainable to work towards urban wastewater management.

These project components are divided to direct benefits and indirect benefits for sewerage users. The direct benefits are wastewater collection and treatment, septic tank cleansing and storm water drainage. The indirect benefits are treated wastewater reclamation and sewage sludge reuse.

Sewerage systems in DKI Jakarta have been developed only in limited areas and have not yet been developed in Zone 1. The Project in Zone 1 first requires an agreement on a sewerage charge system with sewerage users who will be levied. In addition, only Project components with direct benefits to sewerage users shall be implemented. On the other hand, among direct benefits, there is an operator who provides the septic tank cleansing service. Storm water drainage is a public service, and accordingly cannot levy a beneficial charge. This PPP Project focuses on wastewater collection and treatment that can levy charges on service users.

Wastewater management projects consist of wastewater collection/treatment and sewage sludge treatment/disposal. Wastewater collection, which consists of sewer construction and management, requires road occupation permits and public awareness during the construction stage. Administrative procedures for wastewater collection are usually public affairs and are less advantageous for private companies. Accordingly, this PPP Project focuses on wastewater and sewage sludge treatment.

Table 5-4 Project Components Proposed for PPP Project

Project Component	Applicability to PPP Project	Remarks
Wastewater collection	×	Administrative procedure is required for road occupation permits and public awareness during the construction stage, and wastewater collection is less advantageous to the private sector.
Wastewater treatment	○	Service users easily exploit benefits, and service fee can be levied. Appropriate as a PPP project.
Sludge management	○	No direct benefits for service users. However, sludge management is indispensable for wastewater treatment, therefore contained in the PPP Project.
Storm water drainage	×	Storm water drainage is a public service and cannot levy charge. Not appropriate as a PPP project. Storm water retention is effective for pollution control (CSO mitigation). Collaboration of wastewater management and drainage sector is indispensable.
Treated wastewater reclamation	△	If there are definite needs, service fee can be levied. If needs are not confirmed, not appropriate as a PPP project.

Project Component	Applicability to PPP Project	Remarks
		Reclamation is useful for public works as ground water recharge and an alternative of water supply resource.
Sewage sludge reuse	△	Need of sludge recycling is not clear, therefore not appropriate as a PPP project. Restricted land reclamation site and land acquisition of recycling plant are indispensable.
Septage treatment and reuse	×	Since the service provider exists, not appropriate as a PPP project. Implementation of septage treatment plant project as a part of STP, in the case that expansion of the existing septage treatment plant is necessary, may be possible. Collaboration with the cleansing sector is indispensable.

Source: JICA PPP Study Team

(2) Roles of Public and Private Sectors

Sewers, STP and treated wastewater reclamation facilities make up the united sewerage system; however, management of these facilities is divided between the public (DKI Jakarta) and the private sector. Wastewater collection is to be managed by the public and STP while the pumping station is to be managed by the private sector. Therefore, the following sewerage administration is recommended:

- Facilities shall be planned so that they are structurally separated into facilities managed by the public and those managed by the private sector. Flow rate and quality of wastewater treatment can be monitored in these facilities.
- Agreement on volume and quality of wastewater is required between the public and the private. For unexpected situations, some administrative measures such as regular information exchanges shall be taken.

(3) Cost Reduction through Utilizing of Private Knowhow

A PPP project can attain cost reduction utilizing know-how of bidders for construction and operation. Unlike the public procurement in which design specifications are necessary to secure the fairness, in a PPP project, it is possible to entrust details of design and O&M methods to bidders. Accordingly, facilities in the PPP Project are optimized to reduce the LCC (life cycle cost) from the design to the O&M stages.

5.2 Outline of Development Plan of Jakarta Central STP

5.2.1 Sewer Development Plan

(1) Concept of Sewer Development Plan

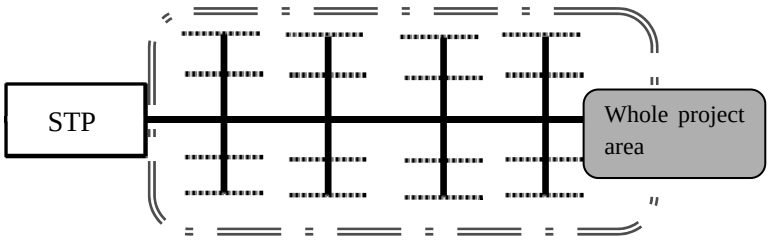
Initially, the trunk sewer should be developed in the whole central sewerage area in order to provide a legal basis for sewerage construction and operation. The constructed trunk sewer can collect wastewater from large offices and commercial buildings. As a result, the sewerage charge can legally be levied on high-income users.

Collaboration with large urban development projects will contribute to expanding the sub-trunk sewers and house connections. Furthermore, because the existing buildings do not always manage their on-site facilities properly, effluent quality monitoring and instruction for these facilities could be useful in promoting the connection to the public sewer.

(2) Step-wised Sewer Development

It is proposed that the step-wised sewer development be adopted, by which wastewater in the central district of Zone 1 can be collected after the Phase 1&2 projects and the sewerage system will be upgraded to the conventional separate sewer supplemented with house connections in the mid and long term.

a) Phase 1: Trunk main sewer, plus sub-trunk sewer in Jl. Thamrin District
b) Phase 2: Trunk main sewer remained plus sub-trunk sewer in the whole Zone 1 area
c) Future projects: Conventional separate sewer of secondary and tertiary (service) sewer and lateral & house connections. Urban development project and road construction contribute to the sewer development.

Construction Phase	Phase-1 Phase-2&3
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 area 2nd & 3rd sewer and house connection is implemented in future projects	

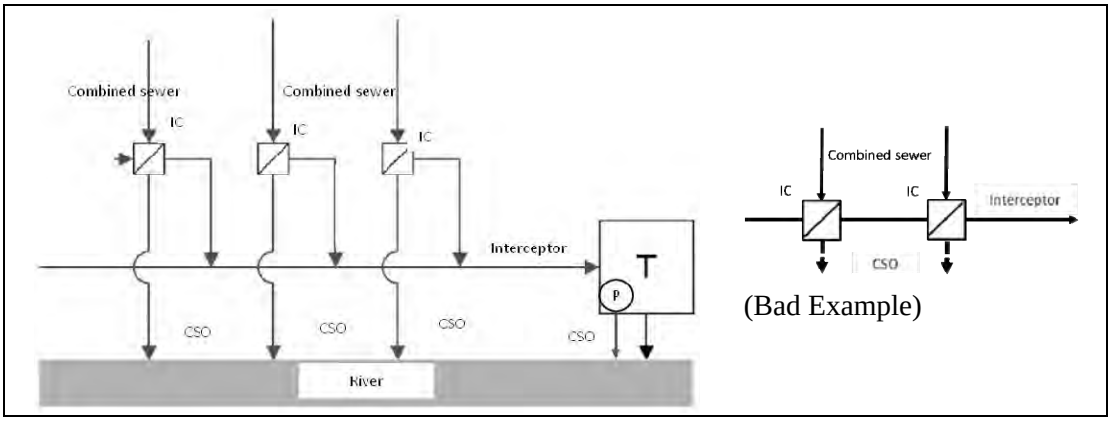
Source: JICA PPP Study Team

Figure 5-9 Concept of Step-wised Sewer Development

(3) Interception at IC

An interceptor sewer is a trunk sewer that intercepts wastewater at an IC (interception chamber). IC diverts design flow to STP. Excess wastewater overflows to rivers, which is called CSO (combined sewer over flow). CSO is diluted wastewater with storm water.

IC facilitates fixed weir and flow control used for CSO mitigation technology such as orifices, vortex valves and water surface control devices.



Source: JICA PPP Study Team

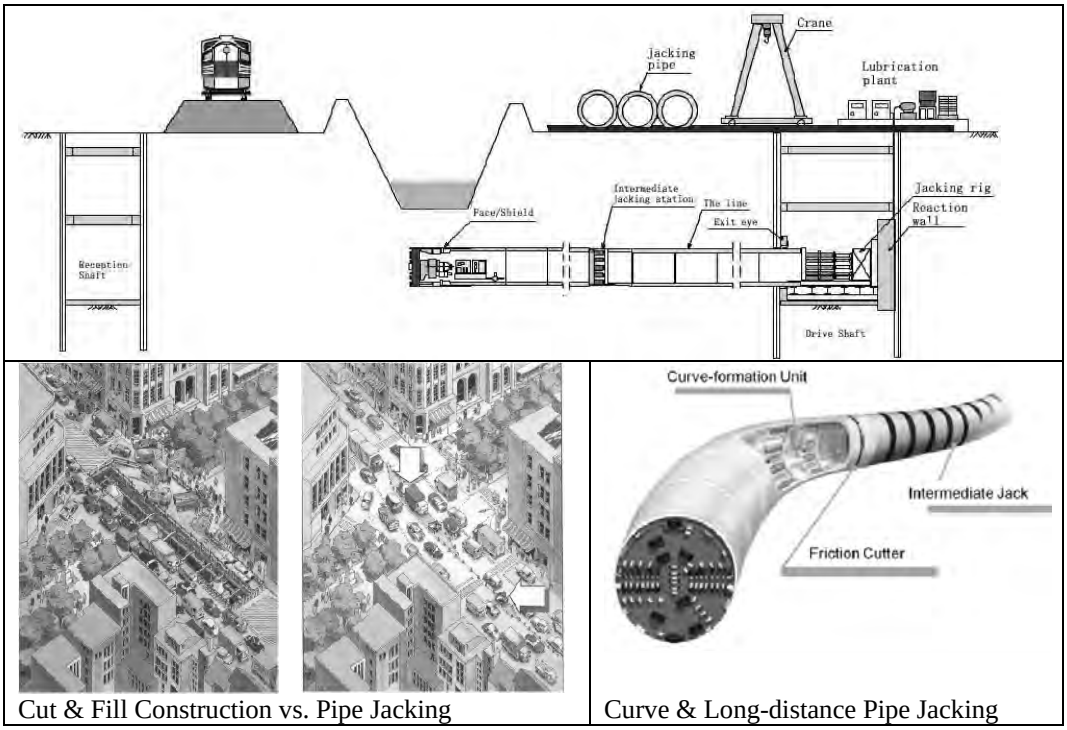
Figure 5-10 Layout Plan of Interceptor Sewer and IC

House connections shall be connected to the interceptor sewer downstream of IC, so that human waste is prevented from flowing into rivers.

(4) Sewer Construction Method

Since road construction causes serious traffic congestion in Jakarta, the cut & fill sewer construction method is regulated in the main roads with two or more lanes. Accordingly, the pipe jacking method is to be applied for the sewer construction.

The pipe jacking method is a trenchless pipe construction method in which a pipe is forced forward from a drive shaft at the end of sewer to a reception shaft. Since the curve and long distance pipe jacking method supported by survey and machine control technologies has been developed in Japan, it is possible to undertake pipe jacking passing under a street intersection without serious traffic congestion. Pipe jacking is a prioritized sewer construction method.



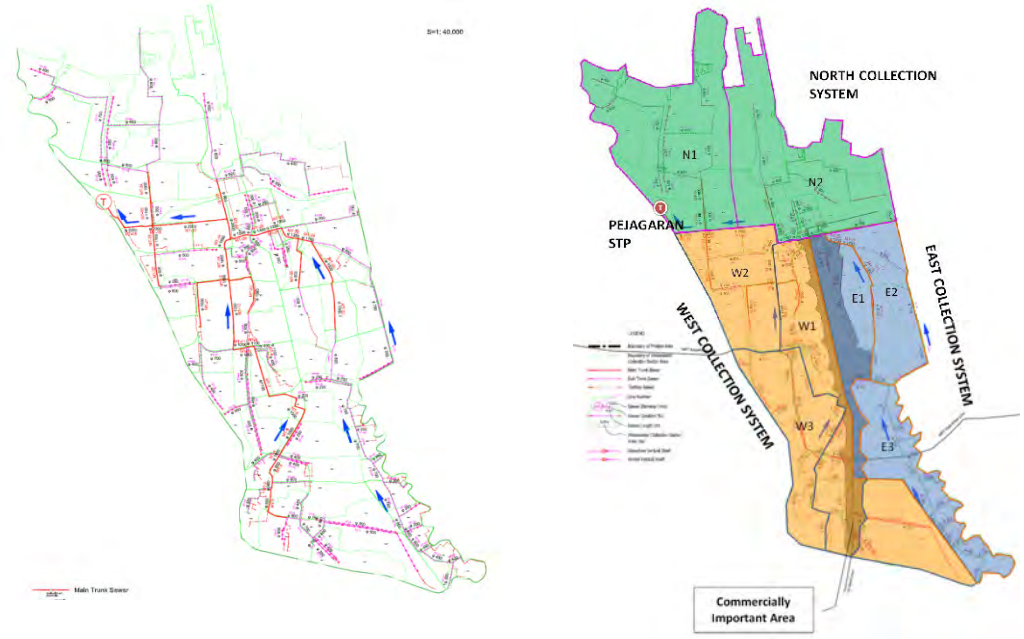
Source: JICA PPP Study Team

Figure 5-11 Pipe Jacking Method

(5) Step-wised Wastewater Collection

The Project applies interceptor sewers at the beginning of sewerage development. Collected wastewater flow rate is attributed to sewer construction speed.

This Study divides Zone 1 into three sub-zones of West, East and North. Also, the trunk sewer will avoid crossing the MRT line.



Source: JICA PPP Study Team

Figure 5-12 Trunk Sewer Layout and Sub-zones

Design flow factors of sewers such as wastewater production and peak factors are taken from the MP Review. There is a trunk sewer with a diameter of 900–2,200 mm and 22.6 km in length and a sub-trunk sewer with a diameter of 150–800 mm and 66.8 km in length. Accordingly, the total sewer length is 89.4 km. Sewer construction methods are pipe jacking for 64.3 km and cut & fill for 25.1 km in accordance with construction regulations in Jakarta. Since standards of sewer construction speed are not available in Indonesia, the sewer construction schedule refers to data on construction speed in Japan,.

Four alternative cases were studied for sewer construction. Case 1 is an ideal type that collects all wastewater in the catchment area by constructing secondary and tertiary sewers as well. In Case 2 through Case 4, it is estimated that 70% of wastewater will be collected in the catchment area.

Table 5-5 Study of Step-wised Wastewater Collection

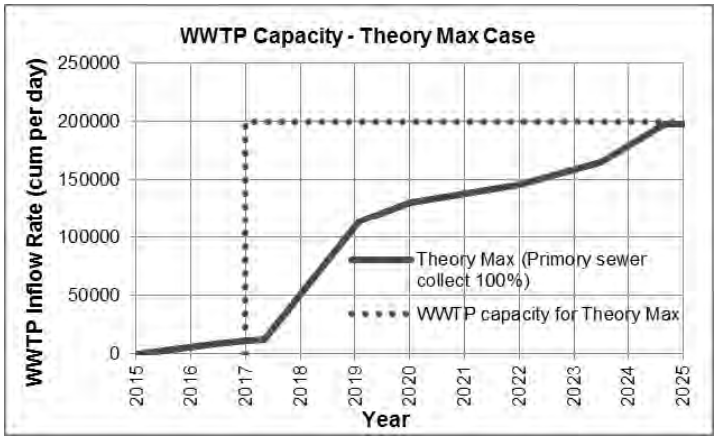
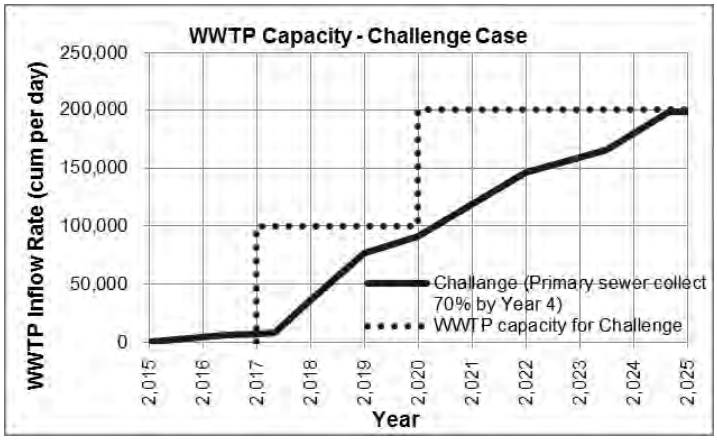
Case	Wastewater Collection Rate	Phase-1 Sewer Construction
1	100% (Secondary & tertiary sewer are required = Theory Max. case.)	Trunk sewer & sub-trunk sewer are constructed simultaneously
2	70%	Trunk sewer & sub-trunk sewer are constructed as simultaneously as possible
3	70%	Sub-trunk sewer construction follows the trunk sewer construction with 4-year delay
4	70%	Only west sub-zone is developed

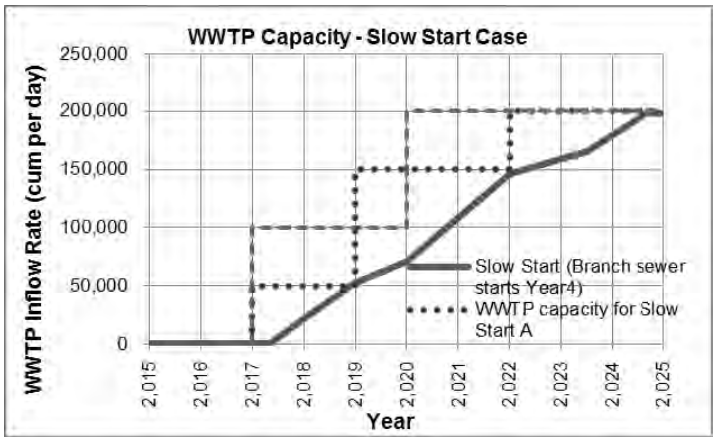
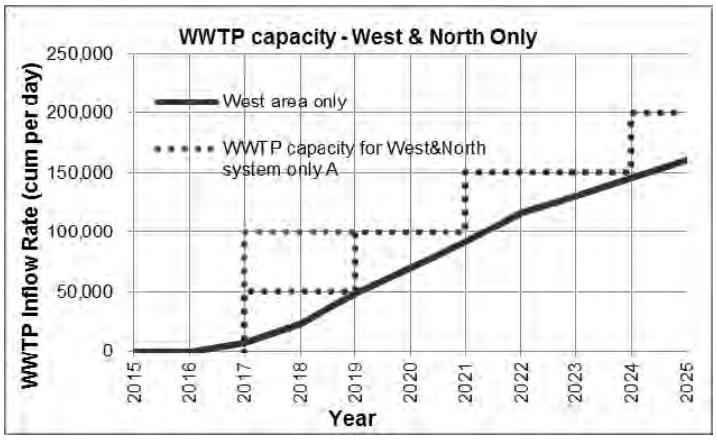
Source: JICA PPP Study Team

Table 5-6 Design Sewer Construction Speed

Pipe diameter (mm)	Pipe jacking (m/day)	Cut & fill (m/day)	Pipe diameter (mm)	Pipe jacking (m/day)	Cut & fill (m/day)
150	-	3.70	900	1.76	1.93
200	3.34	3.62	1,000	1.75	1.78
250	3.17	3.46	1,100	1.75	-
300	3.08	3.27	1,200	1.69	-
350	2.98	3.01	1,350	1.57	-
400	4.34	2.87	1,500	1.56	-
450	4.31	2.67	1,650	1.49	-
500	4.29	2.57	1,800	1.43	-
600	3.99	2.33	2,000	1.37	-
700	3.89	2.16	2,200	1.30	-
800	1.80	2.07			

Source: JICA PPP Study Team

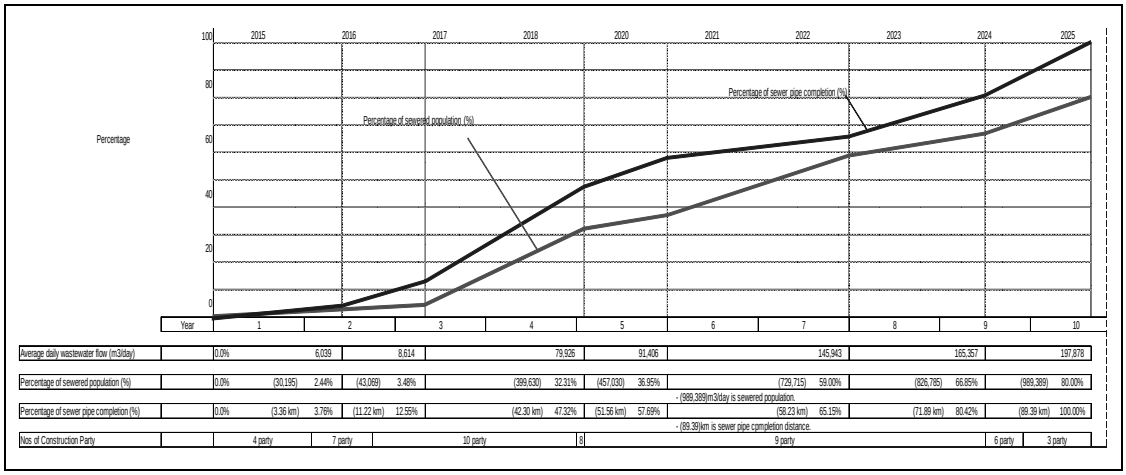
Case 1 Whole trunk sewer & sub-trunk sewer (secondary & tertiary sewer) are constructed.	
Case 2 Whole trunk sewer & sub-trunk sewer are constructed	

Case 3 Sub-trunk sewer follows the trunk sewer construction with 4-year delay	
Case 4 Only west sub-zone is developed	

Source: JICA PPP Study Team

Figure 5-13 Sewer Construction & Wastewater Collection Cases 1 - 4

Case 2 needs to employ 10 construction teams to construct the trunk sewer and sub-trunk sewer simultaneously. Case 2 starts the operation of STP in 2017 and completes the sewer construction in 2025. STP is constructed in two phases and then works with almost full capacity. Consequently, Case 2 serves 80% of the population in 2025 and also can provide sewerage service earlier than in Case 3 & Case 4.



Source: JICA PPP Study Team

Figure 5-14 Sewer Construction Plan

5.2.2 Wastewater Treatment Plan

(1) Wastewater Treatment Process

Pejagaran STP site has an area of 6.9ha and has been developed as a public park. It was decided after the MP Review that approx. 3.4 ha would be allocated as the STP site. Conventional Activated Sludge Process (CAS) and MBBR require 7.52 ha and 6.17 ha respectively and both processes affect the planning of the public park.

MBR does not require primary sedimentation or secondary sedimentation, and accordingly, MBR is a smaller footprint process than CAS. MBR can be arranged in the Pejagaran site because the underground of the public park can be utilized and/or roof of STP facility can be utilized for multi-purpose uses.

The Study Team proposes MBR due to not only site availability but also advantages of construction and O&M costs.

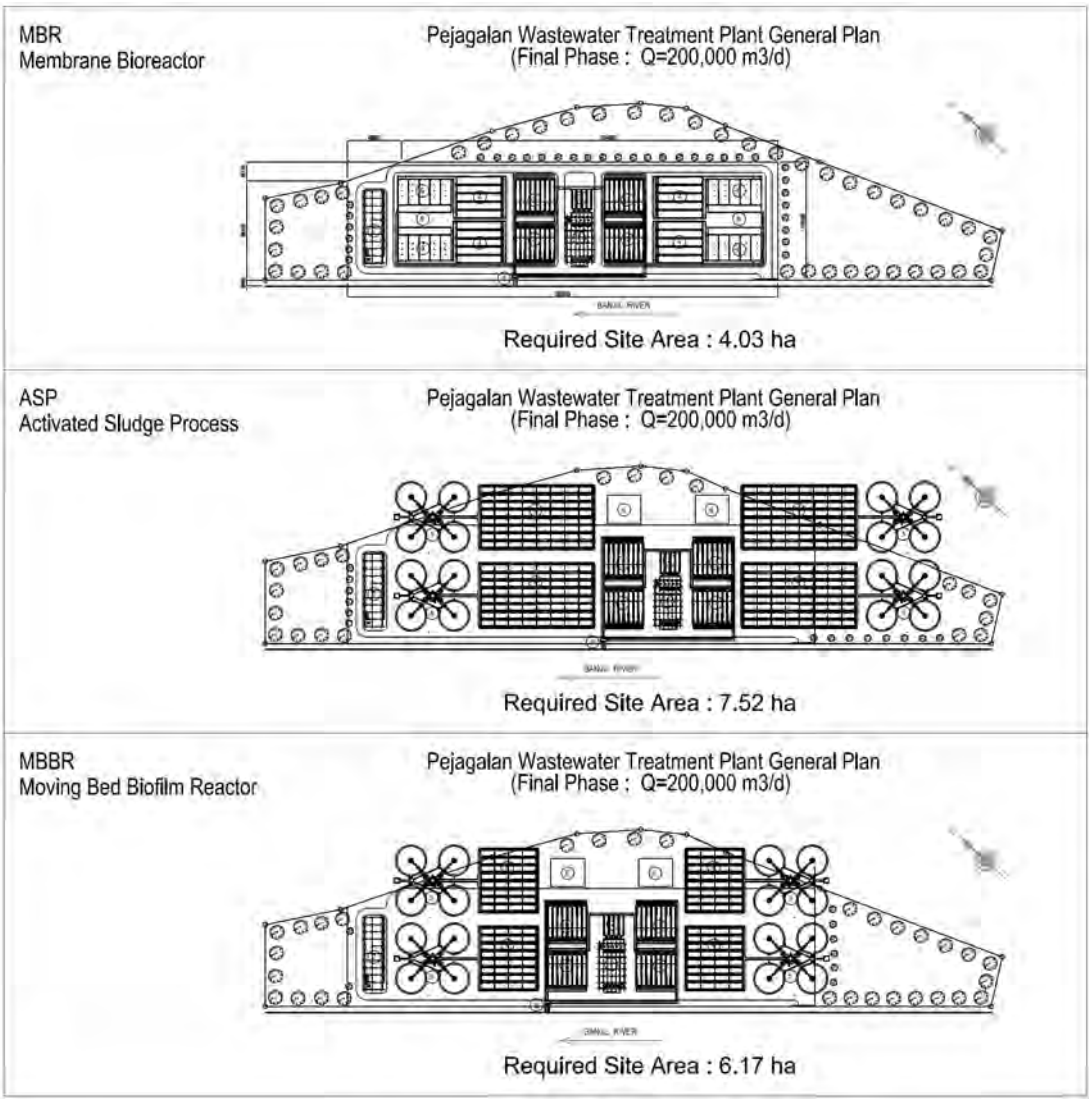
Since interceptor sewer receives storm water in rain events, wastewater flow increases and is diluted significantly. Interceptor sewers are designed to collect design flow properly. Flow regulators installed in an intercepting chamber prevent excessive inflow. Also, wastewater effluent shall comply with water quality standards. Wastewater exceeding MBR capacity is treated in a retention and sedimentation facility.

A two-phased construction plan should be adopted. Interceptor sewers can collect a sufficient amount of wastewater for treatment capacity from the existing drainage so that STP can efficiently operated. This plan is also advantageous from the aspect of life cycle cost.

(2) Sludge Treatment Process

Sludge treatment and disposal significantly affect sustainability of sewerage service. The treatment process of “thickening – dewatering – land reclamation” is recommended because the Pejagaran STP site area is limited.

Issues on the sewage sludge management will become serious when another two or three STPs start operation and then centralized sewage sludge treatment and sludge reuse projects will be required in order to mitigate sludge reclamation. The MP Review does not plan recycling facilities in STP sites. Sludge processing for reuse is committed to future projects.



Source: JICA PPP Study Team

Figure 5-15 STP Layout Plan (Daily Average Flow 200,000 m^3/day)

5.2.3 Construction Cost and O&M Cost

(1) Construction Cost of Sewer Pipes

Table 5-7 Construction Cost of Sewer Pipes

(Unit: Mil. IDR)

Facility	Pipe	Manhole	Interception Chamber	Service Sewer and Ancillary Facilities	Total
Trunk Sewer	883,095	4,122	9,113	35,152	931,482
Sub-trunk Sewer	998,978	24,230	42,762	114,421	1,180,391
Other				500,036	500,036
Total	1,882,073	28,352	51,875	649,609	2,611,909

Source: JICA PPP Study Team

(2) Construction Cost of STP

1) Initial construction cost

The initial costs of MBR, ASP and MBBR systems described in the previous paragraph are shown in Table 5-8.

Table 5-8 Initial Construction Cost of Each System (Daily Average: 198,000 m^3/d)

(Unit: USD)

Item \ System	MBR	ASP	MBBR	Remarks
Initial construction cost	158,640,000	174,500,000	166,570,000	
Engineering fee[1)]	7,932,000	8,725,000	8,328,000	5% of Construction cost
Total	166,572,000	183,225,000	174,898,000	

1) Engineering fee includes supervision cost and estimated by 5% for the blanket order of EPC.
2) The above cost was estimated by the Study Team and the cost estimated is value of June of 2012.
3) The above cost excludes VAT.

Source: JICA PPP Study Team

In addition, the breakdown of the initial construction cost for the MBR system is shown in Table 5-9.

Table 5-9 Breakdown of Initial Construction Cost for MBR System (Daily Average: 198,000 m^3/d)

Item	USD	Equiv. Mil. IDR	Remarks
Civil Works	73,799,200	665,115	
Mechanical Works	70,306,755	633,640	Excludes customs duties
Electric Works	14,534,045	130,988	Excludes customs duties
Sub Total	158,640,000	1,429,743	
Engineering Fee[1)]	7,932,000	71,487	5% of Construction cost
Total	166,572,000	1,501,230	

1) Engineering fee includes supervision cost and is estimated as 5% of the sub total owing to the blanket order of EPC.
2) The above cost was estimated by the Study Team and the estimated cost is value as of June of 2012.
3) Exchange rate (IDR/USD):9,012.5
4) The above cost excludes VAT.

Source: JICA PPP Study Team

The initial construction costs are estimated for two cases considering sewer construction condition. The detailed construction plans of each case are shown in Table 5-10, and each initial construction cost is shown in Table 5-11.

Table 5-10 Construction Plan for Each Case

Case	Construction plan
Case1	Treatment capacity of STP: 198,000 m^3/d (Daily average) Construction period: 3 years from 2014
Case2	Phase 1 Treatment capacity of STP: 99,000 m^3/d (Daily average) Construction period: 3 years from 2014 Phase 2 Treatment capacity of STP: 99,000 m^3/d (Daily average) Construction period: 3 years from 2018 The treatment capacity of 198,000 m^3/d will be finally completed in 2020. However, all inlet pumps will be completed in Phase 1 because the phasing of inlet pump construction would increase the construction cost.

Source: JICA PPP Study Team

Table 5-11 Initial Construction Cost for Each Case

Item	Case 1		Case 2	
	USD	Equiv. Mil. IDR	USD	Equiv. Mil. IDR
Civil Works	73,799,200	665,115	73,799,200	665,115
Mechanical Works	70,306,755	633,640	76,184,125	686,609
Electric Works	14,534,045	130,988	15,266,675	137,591
Sub Total	158,640,000	1,429,743	165,250,000	1,489,316
Engineering Fee	7,932,000	71,487	8,262,500	74,466
Total	166,572,000	1,501,230	173,512,500	1,563,781

1) Exchange rate (IDR/USD): 9,012.5
2) The estimated cost is value as of June of 2012.

Source: JICA PPP Study Team

2) Replacement cost

The replacement costs estimated for each business year for 20 years from 2017 are shown in Tables 5-12 and 5-13.

Table 5-12 Replacement Costs of Case 1 by Business Year

Business Year		2017	2018	2019	2020	2021
Replacement Cost	(USD/y)	0	0	0	0	0
	(Mil.IDR/ y)	0	0	0	0	0
Business Year		**2022**	**2023**	**2024**	**2025**	**2026**
Replacement Cost	(USD/y)	0	2,446,114	18,399,574	18,508,966	1,618,227
	(Mil.IDR/y)	0	22,046	165,826	166,812	14,584
Business Year		**2027**	**2028**	**2029**	**2030**	**2031**
Replacement Cost	(USD/y)	0	0	352,872	352,872	25,570,706
	(Mil.IDR/y)	0	0	3,180	3,180	230,456
Business Year		**2032**	**2033**	**2034**	**2035**	**2036**
Replacement Cost	(USD/y)	16,845,509	6,047,807	8,580,289	5,706,927	15,217,224
	(Mil.IDR/y)	151,820	54,506	77,330	51,434	137,145
Replacement Cost for 20 years	(USD)	119,647,087				
	(Mil.IDR)	1,078,319				

1) Exchange rate (IDR/USD): 9,012.5
2) The estimated cost is value as of June of 2012.

Source: JICA PPP Study Team

Table 5-13 Replacement Costs of Case 2 by Business Year

Business Year		2017	2018	2019	2020	2021
Replacement Cost	(USD/y)	0	0	0	0	0
	(Mil.IDR/ y)	0	0	0	0	0
Business Year		**2022**	**2023**	**2024**	**2025**	**2026**
Replacement Cost	(USD/y)	0	1,414,943	18,399,574	54,696	978,964
	(Mil.IDR/ y)	0	12,752	165,826	493	8,823
Business Year		**2027**	**2028**	**2029**	**2030**	**2031**
Replacement Cost	(USD/y)	0	20,325,607	54,696	1,516,287	18,752,446
	(Mil.IDR/ y)	0	183,185	493	13,666	169,006
Business Year		**2032**	**2033**	**2034**	**2035**	**2036**
Replacement Cost	(USD/y)	1,801,545	3,277,504	9,371,909	20,132,928	12,305,600
	(Mil.IDR/ y)	16,236	29,539	84,464	181,448	110,904
Replacement Cost for 20 years	(USD)	108,386,699				
	(Mil.IDR)	976,835				

1) Exchange rate (IDR/USD): 9,012.5
2) The estimated cost is value as of June of 2012.

Source: JICA PPP Study Team

3) O&M cost of STP

Influent rates and O&M costs for each business year for 20 years from 2017 are shown in Tables 5-14 and 5-15. Estimated O&M costs consist of the following items:

- Labor cost

- Utility cost (Electric cost, Chemical cost, etc.)
- Repair cost (Except replacement)
- Sludge disposal cost
- Expenses
- Environmental maintenance cost etc.

Table 5-14 Influent Rates and O&M Costs of Case 1

Business Year		**2017**	**2018**	**2019**	**2020**	**2021**
Influent rate (m^3/d)		22,500	55,000	85,000	107,500	135,000
O&M Cost	(USD/y)	2,445,130	3,843,872	5,616,313	5,766,757	7,243,672
	(Mil.IDR/y)	22,037	34,643	50,617	51,973	65,284
Business Year		**2022**	**2023**	**2024**	**2025**	**2026**
Influent rate (m^3/d)		155,000	165,000	185,000	200,000	200,000
O&M Cost	(USD/y)	9,579,748	9,329,089	9,638,221	10,169,280	9,698,774
	(Mil.IDR/y)	86,337	84,078	86,864	91,651	87,410
Business Year		**2027**	**2028**	**2029**	**2030**	**2031**
Influent rate (m^3/d)		200,000	200,000	200,000	200,000	200,000
O&M Cost	(USD/y)	16,244,614	9,713,346	9,745,221	10,503,690	9,635,685
	(Mil.IDR/y)	146,405	87,542	87,829	94,665	86,842
Business Year		**2032**	**2033**	**2034**	**2035**	**2036**
Influent rate (m^3/d)		200,000	200,000	200,000	200,000	200,000
O&M Cost	(USD/y)	9,323,012	10,228,037	9,409,526	10,005,415	11,140,789
	(Mil.IDR/y)	84,024	92,180	84,803	90,174	100,406
O&M Cost for 20 years	(USD)	179,280,190				
	(Mil.IDR)	1,615,763				

1) Exchange rate (IDR/USD): 9,012.5
2) The estimated cost is value as of June of 2012.

Source: JICA PPP Study Team

Table 5-15 Influent Rates and O&M Costs of Case 2

Business Year		**2017**	**2018**	**2019**	**2020**	**2021**
Influent rate (m^3/d)		22,500	55,000	85,000	107,500	135,000
O&M Cost	(USD/y)	2,445,130	4,084,114	5,719,296	6,037,460	7,424,056
	(Mil.IDR/y)	22,037	36,808	51,545	54,413	66,909
Business Year		**2022**	**2023**	**2024**	**2025**	**2026**
Influent rate (m^3/d)		155,000	165,000	185,000	200,000	200,000
O&M Cost	(USD/y)	9,690,781	9,144,524	9,884,336	10,601,699	11,726,422
	(Mil.IDR/y)	87,338	82,415	89,083	95,548	105,684
Business Year		**2027**	**2028**	**2029**	**2030**	**2031**
Influent rate (m^3/d)		200,000	200,000	200,000	200,000	200,000
O&M Cost	(USD/y)	13,385,789	10,948,707	10,447,201	11,316,870	10,566,298
	(Mil.IDR/y)	120,639	98,675	94,155	101,993	95,229
Business Year		**2032**	**2033**	**2034**	**2035**	**2036**
Influent rate (m^3/d)		200,000	200,000	200,000	200,000	200,000
O&M Cost	(USD/y)	10,335,176	10,478,416	9,968,393	10,268,227	11,993,119
	(Mil.IDR/y)	93,146	94,437	89,840	92,542	108,088
O&M Cost for 20 years	(USD)	186,466,013				
	(Mil.IDR)	1,680,525				

1) Exchange rate (IDR/USD): 9,012.5
2) The estimated cost is value as of June of 2012.

Source: JICA PPP Study Team

5.3 Revenue of Sewerage Tariff

5.3.1 Outline of Household Expenditure and Recommendation on Sewerage Tariff Level

(1) Willingness to Pay

Four studies in 2009 MP, MP Review in 2011, Sewerage Operation and Maintenance Know-how Transfer 2009 and this PPP Study executed WTP (Willingness to Pay) surveys. According to these studies, WTPs are 40,000 IDR/HH/month, approx. 7,000 IDR/HH/month, 21,000 IDR/HH/month and 27,000‐28,000 IDR/HH/month respectively.

1) Previous study

Table 5-16 WTP Studied in MP Review

Correspondences of WTP for the Price of ATP (1st bound "Yes")

Income Level	1% of Average HH Income (IDR)	1st bound	2nd bound	
		1% of Average Income	1.2% of Average Income	
		Yes	Yes	No
L-level	20,000	43.2%	61.9%	38.1%
M-level	50,000	38.7%	67.0%	33.0%
H-level	120,000	33.5%	78.7%	21.3%
Leader	50,000	54.8%	72.0%	28.0%
Total	-	42.5%	69.6%	30.4%

Correspondences of WTP for the Price of ATP (1st bound "No")

Income Level	1% of Average HH Income (IDR)	1st bound	2nd bound	
		1% of Average Income	0.8% of Average Income	
		No	Yes	No
L-level	20,000	56.8%	12.4%	87.6%
M-level	50,000	61.3%	11.0%	89.0%
H-level	120,000	66.5%	14.1%	85.9%
Leader	50,000	45.2%	9.3%	90.7%
Total	-	57.5%	11.9%	88.1%

Estimated WTP

	Yes/No Correspondence				Overall WTP % of HH Income
1st bound	1% of Average Income "No"		1% of Average Income "Yes"		
2nd bound	0.8% "No"	0.8% "Yes"	1.2% "No"	1.2% "Yes"	
Identified Price of WTP per HH Income	less than 0.8% (0.4%)	0.8 - 1.0% (0.9%)	1.0 - 1.2% (1.1%)	more than 1.2% (1.3%)	
L-level	49.8%	7.0%	16.5%	26.7%	
M-level	54.6%	6.7%	12.8%	25.9%	
H-level	57.1%	9.4%	7.1%	26.4%	
Leader	41.0%	4.2%	15.3%	39.5%	
Total	50.7%	6.8%	12.9%	29.6%	0.79%

Source: MP Review

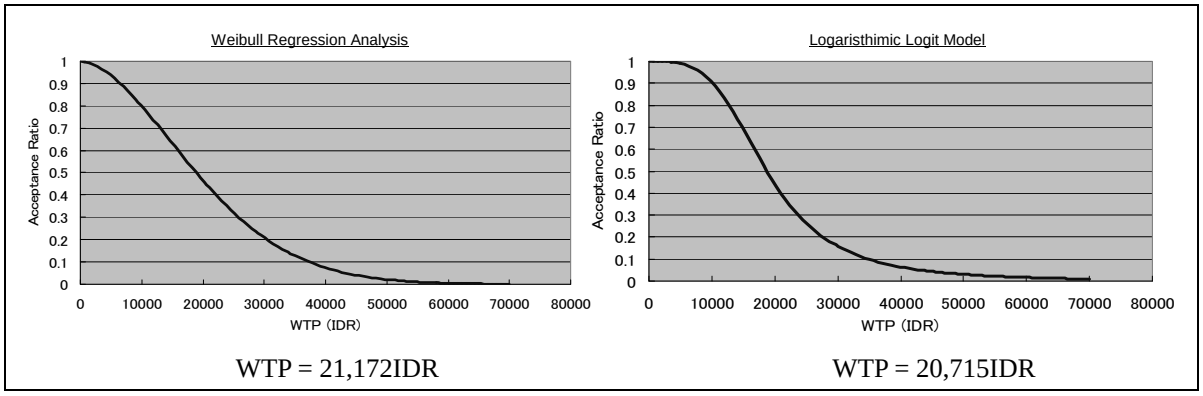
WTP is 0.8% of the household monthly income and is equivalent to 40,000 IDR for the Middle Income Class.

Table 5-17 WTP Studied in 2009 MP

Society Willingness to Pay on the Contribution		Total Respondent	Accumulated %
How much can you pay in 1 month	< Rp. 2,000	4.51%	100%
	Rp. 2,000-Rp. 3,000	4.75%	90.5%
	Rp. 3,000-Rp. 4,000	8.31%	80.4%
	Rp. 4,000-Rp. 5,000	16.63%	62.8%
	Rp. 5,000-Rp. 10,000	10.69%	27.6%
	>Rp. 10,000	2.38%	5.0%

Source: WTP Survey, 2009 MP, PD Pal Jaya

WTP in Table 5-16 is estimated as approximately 7,000 IDR/month/HH.



Source: JICA O&M and Operation Know-how Transfer

Figure 5-16 WTP Studied by Sewerage Operation and Maintenance Know-how Transfer 2009

2) PPP study

The WTP survey applied the double bounded dichotomous-choice method to 60 respondents (87% recall ratio). Respondents were proportionally distributed in accordance with income level in the sewerage service area, and the Study Team explained the water environment conditions polluted at present and improved by the sewerage Project. Water environment conditions explained consist of four levels following the previous surveys in MP Review and JICA O&M and Operation Knowhow Transfer.

Responses and analyzed WTP are shown below.

Questionnaire: WTP (Willingness to Pay) Survey

Please answer to Q-4 and Q-5&6, on the assumption that water environment is polluted and sewerage system restores as follows.

Q-4

Do you know the role of sewerage system as follows?

Yes ( ) No ( )

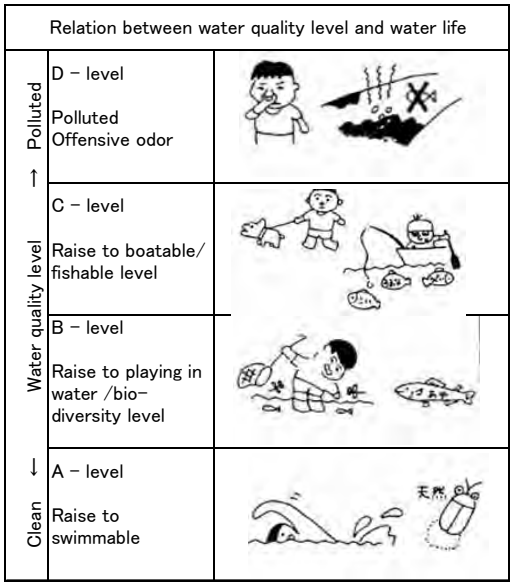
Q-5

Do you want to continue owned treatment plant or to connect to public sewer, if public sewerage system is developed?

Yes ( ) No ( ) ( ) depends on the Tariff (IDR/month)

Present water environment is (D-level) Polluted and offensive odor Debris deposits Unhygienic and caused habitual diarrhea
After sewerage system improves water quality level to: Boatable (C) Fishable (B)

Water cleaned up to be “Boatable”



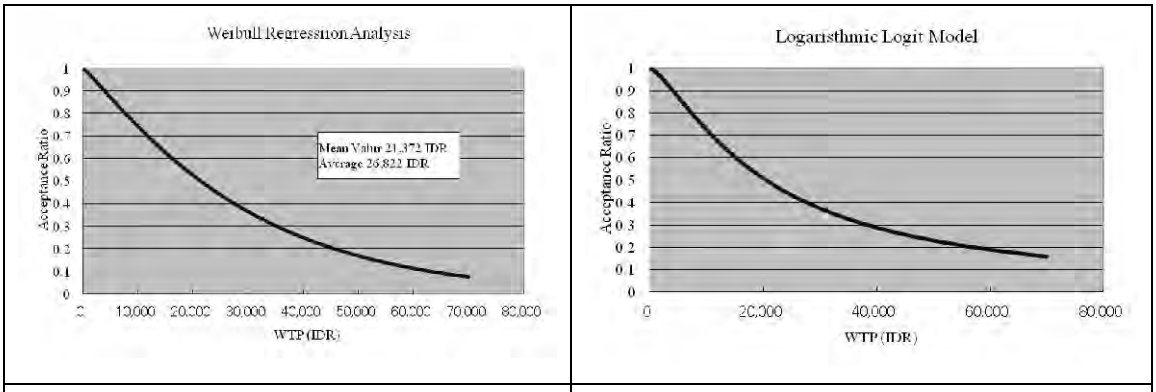
Source: JICA PPP Study Team

Figure 5-17 Questionnaire of WTP

Table 5-18 Responses of WTP Survey

1st bound (IDR)	2nd bound (IDR)		Number of respondents				Total
	TU	TL	YY	YN	NY	NN	
5,000	7,500	2,500	10	0	0	1	11
10,000	15,000	5,000	5	3	0	2	10
15,000	20,000	10,000	5	3	0	3	11
20,000	25,000	15,000	2	4	0	3	9
30,000	40,000	20,000	2	3	0	6	11
50,000	70,000	30,000	1	2	1	4	8
							60

Source: JICA PPP Study Team



WTP = 26,822 IDR	WTP = 28,759 IDR

Source: JICA PPP Study Team

Figure 5-18 WTP Studied in the PPP Study

(2) Affordability Survey

Categories of expenditure and response of the affordability survey are shown below.

ATP (Affordability to Pay) is almost same level as “Alcohol & tobacco,” “Medicine,” “Recreation” and “Others” at 1.0 to 1.5% of household expenditure.

- Sample Number: 65 HH
- Yes 78.5%,
- Responds are “Alcohol & tobacco,” “Medicine,” “Recreation” and “Others”
- Most probable value is “Others”
- No 21.5%
- ATP: Approx. 1.0‐1.5% of household expenditure

Table 5-19 Results of ATP Survey

Q-4 (ATP)										
Responded Nos.& %	BFT	H&O	FTP	A&T	N-C	A&F	MED	REC	OTHERS	NO
No. of Samples	0	13	1	4	3	3	5	4	18	14
%	0	0.2	0.015	0.062	0.046	0.046	0.077	0.062	0.277	0.215

Questionnaire

(1) BFT: Basic food stuffs
(2) H&O: Housing & household operation
(3) FTP: Fuel, transport & public service
(4) A&T: Alcohol & tobacco
(5) N-C: Non-consumables
(6) A&F: Apparel & footwear
(7) MED: Medicine
(8) REC: Recreation
(9) Others

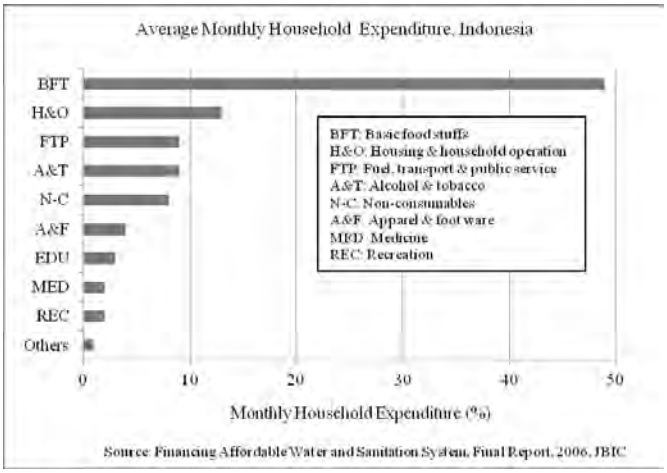


Figure 5-19 Questionnaire of ATP

5.3.2 Sewerage Tariff of Domestic, Commerce and Industry

(1) Present Tariff Structure

The present tariff structure adopts service charges based on floor area.

The customer category is divided into five groups, (1) domestic based on electricity contract, (2) small-scale commerce, (3) large-scale commerce, (4) social (public) and (5) industry. Each group is divided to 4 categories for the domestic customer, 8 categories for the small-scale commerce and 11 categories for the large-scale commerce. The tariff difference among categories in each group is 2.21 times for the domestic customers and 1.45 times for the large-scale commerce. The tariff for the large-scale commerce/industry is rated at 6.41 times Type A of the domestic. This means that cross subsidy from high income to low income is considered in the present tariff structure.

Since the water supply service is at a low level and shallow wells are prevalent among domestic users, the present tariff system is practicable to attain some amount of revenue. However, the present tariff system does not work towards water saving nor reflect the CPI (consumer price index).

Table 5-20 Sewerage Tariff Structure of PD PAL Jaya

No	Customer Category	Specific fee			Connection fee*1			
		IDR/m^2/month	Progressive rate (times)		Unit	IDR	Progressive rate (times)	
I	Household							
1	Household Type A (Electricity up to 450 Watt)	131	1.00		Unit	10,000	1.00	
2	Household Type B (Electricity up to 900 Watt)	184	1.40		Unit	10,000	1.00	
3	Household Type C (Electricity up to 1,300 Watt)	236	1.80		Unit	10,000	1.00	
4	Household Type D (Electricity over 2,200 Watt)	289	2.21		Unit	110,000	11.00	
II	Small Commercial							
1	Shop	525	4.01	1.00	Area of building per m^2	1,000	1.00	
2	Office (Building up to 3 Floors)	525	4.01	1.00	Area of building per m^2	1,000	1.00	
3	Hall	525	4.01	1.00	Area of building per m^2	1,000	1.00	
4	Salon	525	4.01	1.00	Area of building per m^2	1,000	1.00	
5	Small Restaurants/ Restaurants	525	4.01	1.00	Area of building per m^2	1,500	1.50	
6	Inn	525	4.01	1.00	Area of building per m^2	1,500	1.50	
7	Educational Institution	525	4.01	1.00	Area of building per m^2	1,500	1.50	
8	Others Small Commerce (Including: Low cost apartment for rent / rent house)	525	4.01	1.00	Area of building per m^2	1,500	1.50	
III	Large Commercial							
1	Office of high rise buildings	578	4.41	1.00	Area of building per m^2	1,750	1.75	1.00
2	Office of high rise buildings includes a restaurant and or Fitness	604	4.61	1.04	Area of building per m^2	1,925	1.93	1.10
3	Shopping Center/Mall/Supermarket/Show Room	604	4.61	1.04	Area of building per m^2	1,925	1.93	1.10
4	I, II, III, Star Hotel	604	4.61	1.04	Area of building per m^2	1,925	1.93	1.10
5	Low cost apartment	604	4.61	1.04	Area of building per m^2	1,925	1.93	1.10
6	IV Star Hotel	714	5.45	1.24	Area of building per m^2	2,625	2.63	1.50
7	Apartment/Condominium	714	5.45	1.24	Area of building per m^2	2,625	2.63	1.50
8	Place of Entertainment/Large Restaurant /Cafe	840	6.41	1.45	Area of building per m^2	2,800	2.80	1.60
9	Private Hospital	840	6.41	1.45	Area of building per m^2	2,800	2.80	1.60
10	V-star Hotel	840	6.41	1.45	Area of building per m^2	2,800	2.80	1.60
11	Other Large Commerce	840	6.41	1.45	Area of building per m^2	2,800	2.80	1.60
IV	Social							
1	Place of Worship	53	0.40	1.00	Area of building per m^2	550	0.55	1.00
2	Public School	263	2.01	4.96	Area of building per m^2	850	0.85	1.55
3	Public Health Center *(Puskesmas:)* (clinic that managed by Government)	263	2.01	4.96	Area of building per m^2	1,100	1.10	2.00
4	Government Institutions	315	2.40	5.94	Area of building per m^2	1,100	1.10	2.00
5	Other Institutions/Agencies	315	2.40	5.94	Area of building per m^2	1,100	1.10	2.00
6	Government's Hospital	315	2.40	5.94	Area of building per m^2	1,500	1.50	2.73
7	Clinic (usually private)	315	2.40	5.94	Area of building per m^2	1,500	1.50	2.73
8	Other Social Building	315	2.40	5.94	Area of building per m^2	1,500	1.50	2.73
V	Industry							
1	Small Industry	548	4.18	1.00	Area of building per m^2	1,000	1.00	1.00
2	Medium Industry	630	4.81	1.15	Area of building per m^2	4,200	4.20	4.20
3	Large Industry	788	6.02	1.44	Area of building per m^2	4,300	4.30	4.30

*1 : Connection fee must be paid only once when a customer applies for connection to the sewerage system.

Source: DKI Governor's Decree No.991/2012

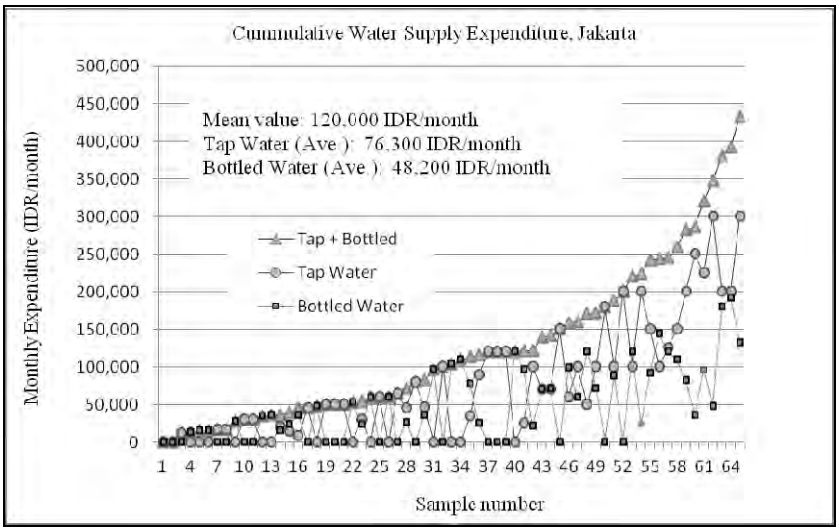
(2) Tariff Level of Domestic Users

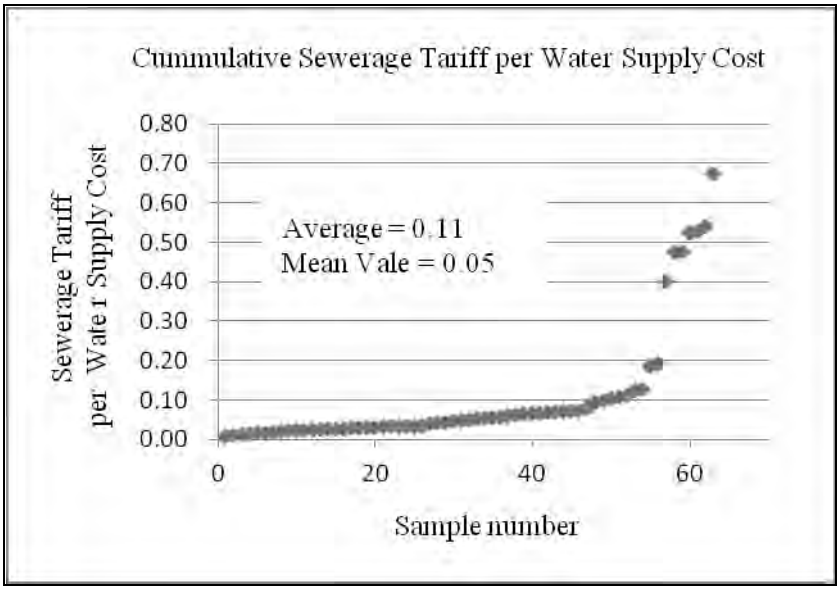
Expenditure for water supply is 120,000 IDR/HH/month as a mean value and is equivalent to 2.5 to 3% of the average household monthly expenditure that ranges from 4,000,000 to 5,000,000 IDR/month. Average expenditure of water supply is 76,300 IDR/month for tap water and 48,200 IDR/month for bottled water. The total is 124,500 IDR/month, and bottled water accounts for 38%.

The wastewater tariff in Zone 1 is estimated at 8,253 IDR/HH/month (131 IDR/m^2 x 63m^2). Affordability for the domestic customers is estimated at 1% of the household expenditure

according to the experience in overseas countries. Assuming that the wastewater tariff is 50,000 IDR/HH/month, it corresponds to approx. 40% of the expenditure for water supply, which is a sufficient level to bear the O&M cost of sewerage service.

Tariff shall be regulated considering how relevant stakeholders shall be affected by it. For example, sewerage cost of construction and O&M is allocated to wastewater service users and governments. The tariff level shall consider the method in which the polluter pays a principle to water supply users and balances it with the water supply charge. Central governments and municipal governments are also responsible for the public benefit of a clean water environment. Construction cost should be allocated to subsidies of the central government and DKI Jakarta and O&M cost including repair should be allocated to wastewater service users. Tariff level levied against O&M cost shall be designed to remain at an acceptable level for the domestic users.





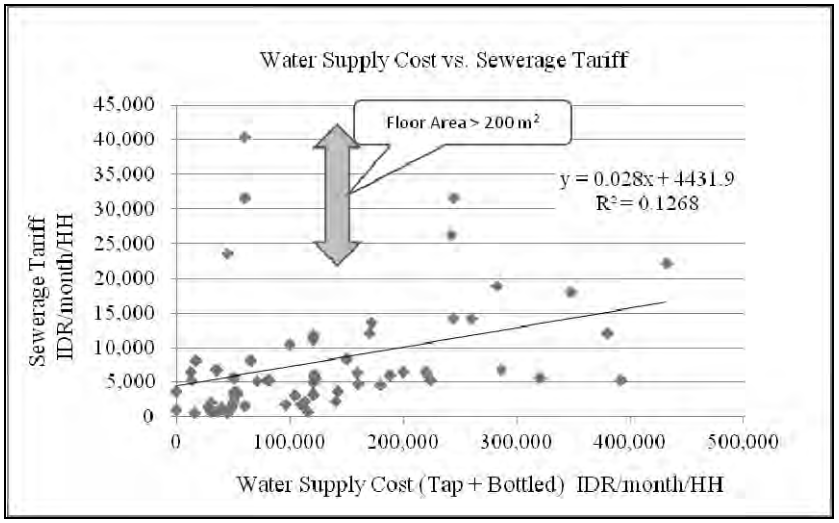


Figure 5-20 Tariff Level for Water Supply and Sewerage

(3) Mitigation for Low Income Household and Public Awareness

The present sewerage tariff level ranges from 0.1 to 1.6% of the household expenditure. Regarding low-income households (for example 1,000,000 IDR/month), the tariff level is less than 1.0% of their expenditure. This means that the present tariff level is affordable for the domestic users.

The social survey in the PPP Study does not collect information on individual situations of income, health or other expenditures. Therefore, the tariff system shall provide mitigation measures to low-income households and/or exemption from tariff collection.

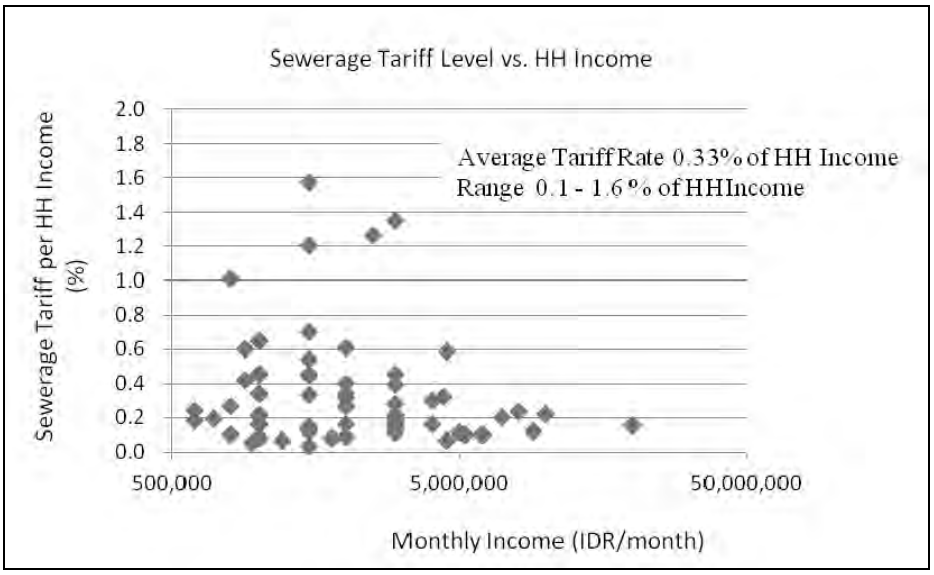


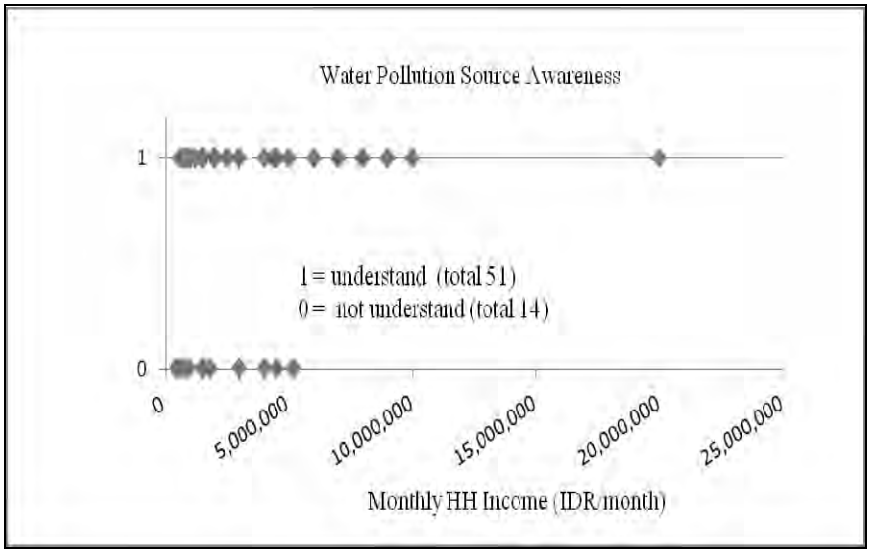
Figure 5-21 Estimated Sewerage Tariff Level

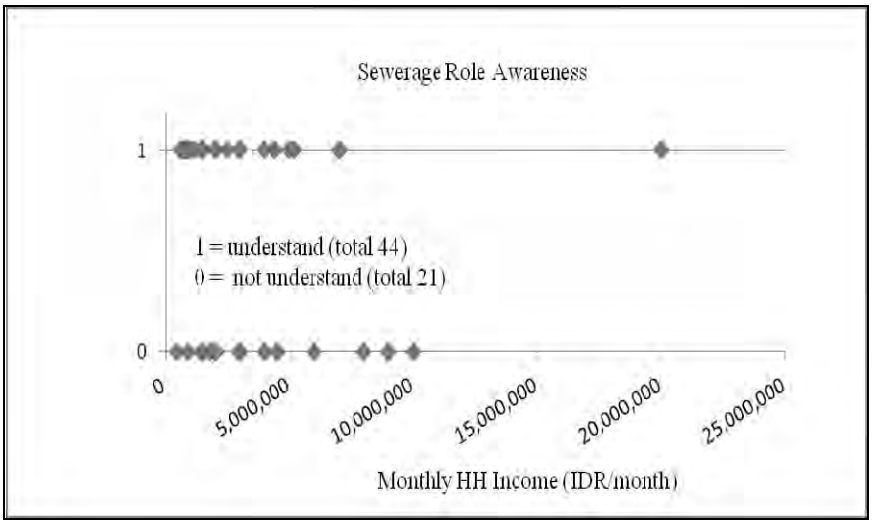
Almost all residents understand the relationship between water pollution and sewerage role in spite of the variety of income levels. However, 32% of respondents still do not understand the role of sewerage. It is important to disseminate the water environment improvement, the role of sewerage and the tariff system for financial sustainability.

Table 5-21 Awareness on Water Pollution Source and Sewerage Role

Awareness	Pollution Source	Role of Sewerage
Understand	51 (78%)	44 (68%)
Not understand	14 (22%)	21 (32%)

Source: JICA PPP Study Team





Source: JICA PPP Study Team

Figure 5-22 Awareness on Pollution Source and Sewerage Role

(4) Sewerage Tariff Level and Affordability of Building

Awareness on on-site facilities and public sewers by building owners according to the survey results is summarized as follows:

- All building owners understand the sewerage role.
- Maintenance of treatment facilities and employment of expertise staff are issues on their management.
- It is difficult to comply with the wastewater discharge standards due to aged facilities and the presence of septic tanks.
- Treated wastewater reclamation is advantageous for saving water supply cost in hotels since they consume a large amount of water. However, one hotel desires public sewer connection due to difficulty in the disposal of filtered residual and sludge.

Table 5-22 Issues on O&M

Issues on O&M	Yes (problematic)	Remarks
Offensive odor	0	
Maintenance	7	Difficulty in wastewater effluent quality management due to machinery failure.
O&M cost	2	
Expertise staff	2	
Floor area	0	
No problem	3	Two buildings already connected to the public sewer and one building owns a wastewater reclamation plant.

Source: JICA PPP Study Team

(5) O&M Cost of Commercial Buildings

Awareness of building owners on wastewater management and cost is indispensable in order to promote public sewer connection.

Since the wastewater management (treatment facility) can expect scale merit, affordability of buildings should be evaluated through a comparative study of life cycle cost (capital cost and O&M cost). Cost of the wastewater management in small buildings is estimated at 4 to 4.5 times, and in large buildings at 2 to 2.5 times the existing sewerage tariff level respectively.

The wastewater discharge quality standards are applied to houses and buildings (Table 5-23).

The wastewater treatment process in buildings shall comply with BOD removal (50 mg/l) and ammonia removal (nitrification); therefore, an activated sludge process or an equivalent method is required. For individual households, anaerobic septic tanks with media filters shall also have the function of ammonia removal.

The wastewater management cost is estimated based on the following assumptions;

- Activated sludge process in accordance with discharge standard
- Construction and OM costs referring to Asian cities. (Figure 5-23)
- Floor area of 20,000-40,000 m^2 and wastewater of 100-200 m^3/day

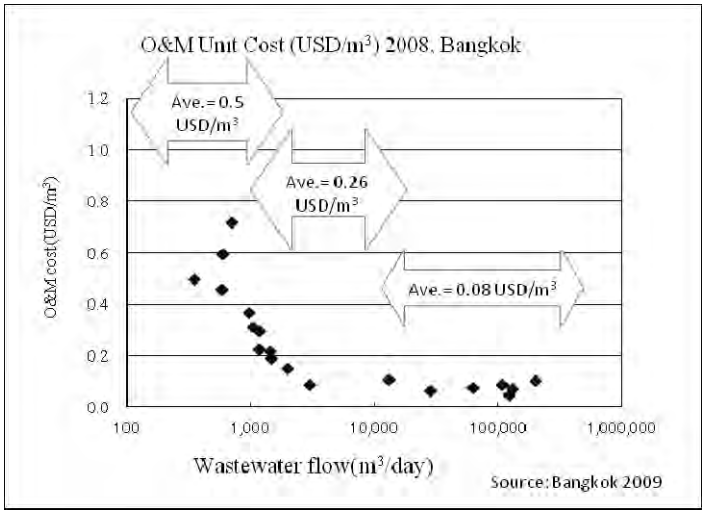
In order to promote public sewer connection, awareness of building owners on the following wastewater management and cost is indispensable.

- Awareness on wastewater discharge regulation and inspection by BPLHD
- Proper operation of on-site treatment facilities including desludging
- Promotion of public sewer connection

Table 5-23 Quality Standards of Liquid Waste

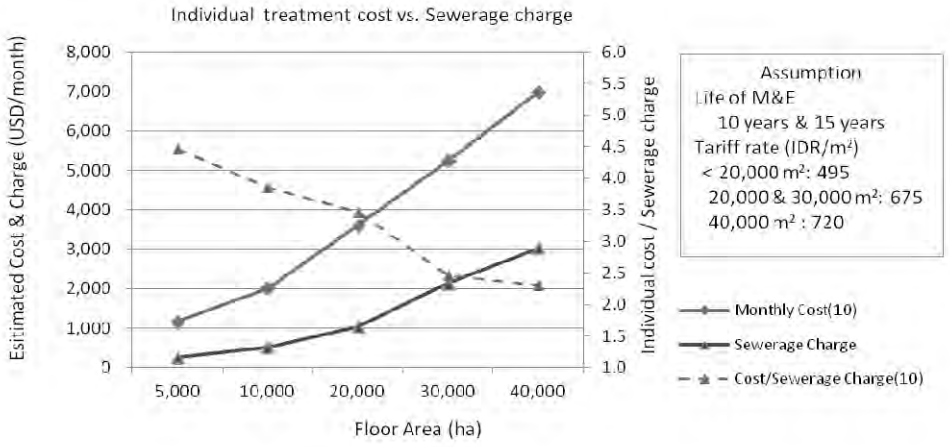
No	Parameters	Unit	Individual/household	Communal
1	pH	-	6-9	6-9
2	$KMnO_4$	Mg/L	85	85
3	TSS	Mg/L	50	50
4	Ammonia	Mg/L	10	10
5	Compound Blue Metillent	Mg/L	2	2
6	COD_{Cr}	Mg/L	100	80
7	BOD	Mg/L	75	50
8	Oil & Fat	Mg/L	10	10

Source: Decree No.122/2005



Source: JICA PPP Study Team

Figure 5-23 Economics of Treatment Scale



Source: JICA PPP Study Team

Figure 5-24 Cost of Building Wastewater Treatment (On-site vs. Public Sewer)

5.3.3 Recommended Sewerage Tariff System in Jakarta

(1) Experience of Manila

Sewerage systems in Manila in the 1990s were: combined sewerage in the central district where wastewater is discharged without treatment into Manila Bay, lagoon treatment in the populated district, and separate sewerage in the business district and small-scale community where the served population was 3%. The served population rate in east Manila increased by 30% in 2010 due to the development of small-scale separate sewerage in the 2000s. Since the water environment improvement in rivers and Manila Bay became a social concern in this period, sewerage system development was an urgent matter. Based on the financial principle of full cost recovery of investment and operation costs, the tariff system had to be amended from the viewpoints of financial sustainability, service level (type of service) and public awareness and fairness. Sewerage development was accordingly amended to interceptor sewer plus septage treatment from separate sewerage.

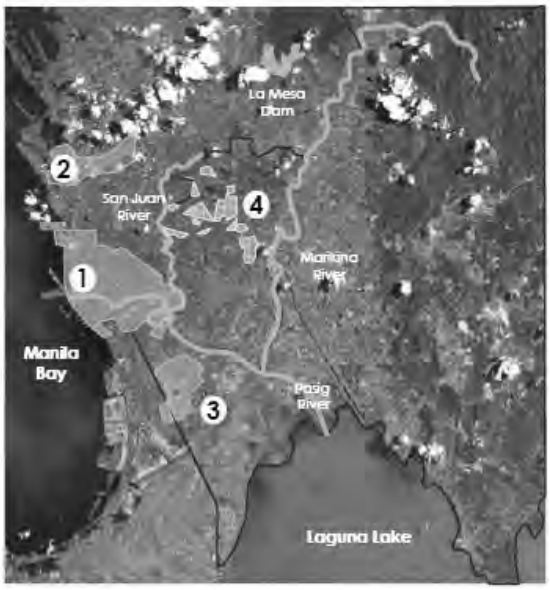
The sewerage tariff system was amended to cope with the sewerage service level (gray water collection and improvement of sanitation and water environment) and the domestic tariff was amended to levy all water supply users as follows:

- Wastewater charge was abolished.
- Environmental charge, in compensation, was increased to 20% from 12% of water supply charge.
- Environmental charge is levied to all households with water supply (coverage rate is 99%).

Development of sewerage systems may increase financial demand. Financial alleviation such as tariff review and cross subsidy from water supply may be required.

MWSS Sewerage in 1997

- **Before 1997**, less than 3% sewer coverage
  1. Manila's old sewer network
  2. Dagat-dagatan sewer network
  3. Makati CBD sewer network
  4. Scattered communal septic tanks in Quezon City, Cainta & Pasig
- **More than** 80% use septic tanks
  - **Most improperly designed**
  - **Not regularly maintained**
- ~10% **have no access to sanitary facilities**



Manila Water

7

Manila Water's Wastewater Facilities (2011)

YEAR	FACILITY		CAPACITY
1997	Makati South		40 mld
2005	UP Pagasa Fisheries Philam Heroes Hill Kalayaan Sikatuna Belarmino A Luna Palosapis MRH	Karangalan 1-9 Valle Verde Diego Silang Lakeview Maharlika Centennial Fortville BLC Makati Pabahay Guadalupe	40 mld
2010	Olandes Pineda East Avenue Road 5 Poblacion	San Mateo FTI Boni	55 mld

35 facilities with total capacity of >135,000 m³ per day

Manila Water

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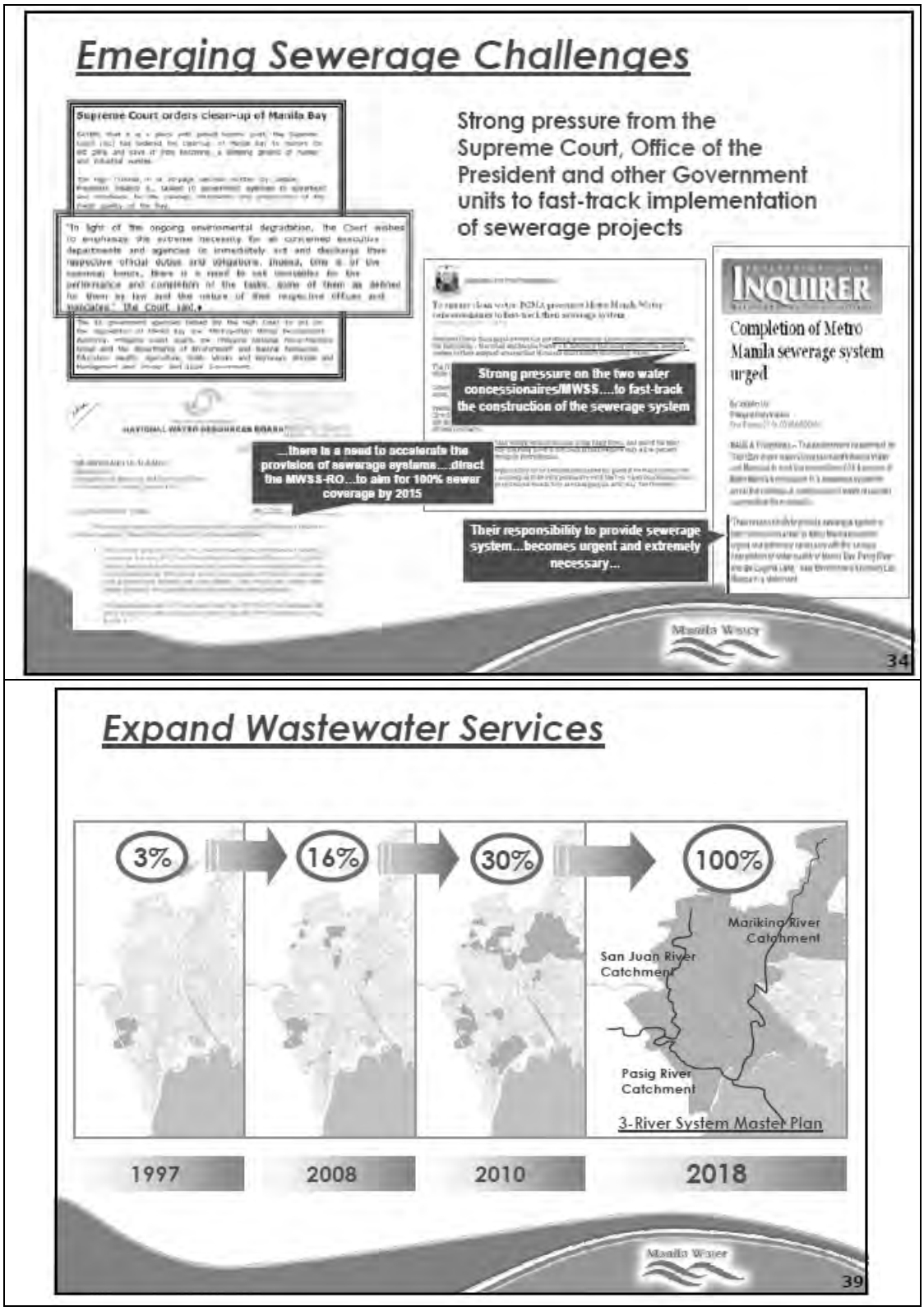


Source: Implementation Issues in Wastewater Management for Metro Manila 3rd International Workshop and 7th Annual Meeting of Water Environment Partnership in Asia (WEPA)

Figure 5-25 Sewerage Development in Manila (Part 1)

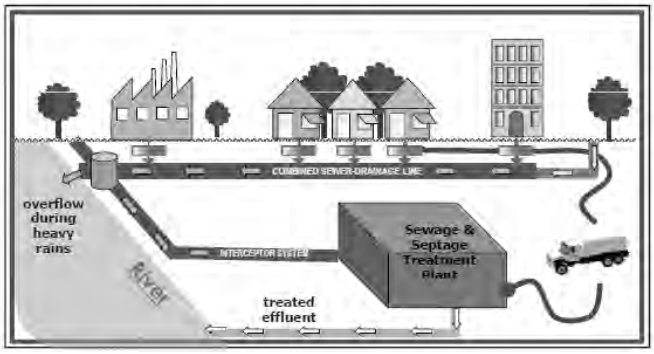
Challenges in project implementation and operations

- Infrastructure for collecting sewage "Retrofitting the city for sewage collection"

＝Combined sewer systems & Septage Service

- Adopted in 2005 MWSS Master Plan, as a transitional provision for wastewater collection until separate systems are in place
- No implementing rules and regulations yet from the DENR
- Issues on maintenance of street drains due to garbage accumulation (local government responsibility, not water utility's)

MWC's Combined Sewer System



- Land acquisition for treatment plants
- Nutrient removal requirements in the future
- Concept of effluent compliance for publicly owned treatment facilities
- Sustainability of wastewater tariff structure

Sustainability of current wastewater tariff structure

- 1997 Concession Agreement
- **10%** environmental charge for all customers
- **50%** sewer charge for those covered by sewer networks
- Adjustments 2008 onwards
- Combined sewers have no literal sewer connections
- Shift to **20%** environmental charge for domestic customers within 5 years

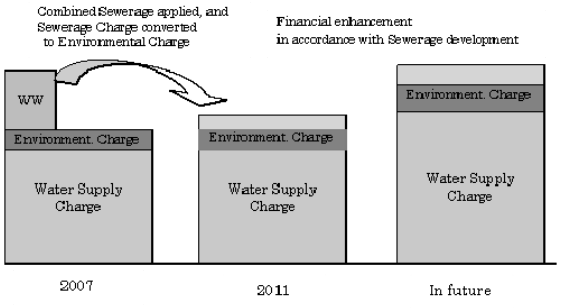
Tariff Category \ Year	2007	2011	2012
Environmental Charge (All Customers)	12%	18%	20%
Separate Sewerage			
Residential Sewer Charge	40%	10%	0%
Commercial Sewer Charge	45%	30%	30%
Combined Sewerage			
Residential Sewer Charge	0%		
Commercial Sewer Charge	0%		

Adjustments 2008 onwards

- Combined sewers have no lateral sewer connections
- In half a decade, the cost of collecting and treating wastewater will have overtaken that of water supply.
- Providing full wastewater treatment services is unavailable

Environmental Charge

= Sewerage service is "Gray water collection"
= Applied technology is "Combined Sewer" as transitional provision for separate sewerage system
= Charge is levied to whole sewerage service users
= Sustainable tariff structure for project implementation & operation



Source: Implementation Issues in Wastewater Management for Metro Manila, WEPA Sep. 2011

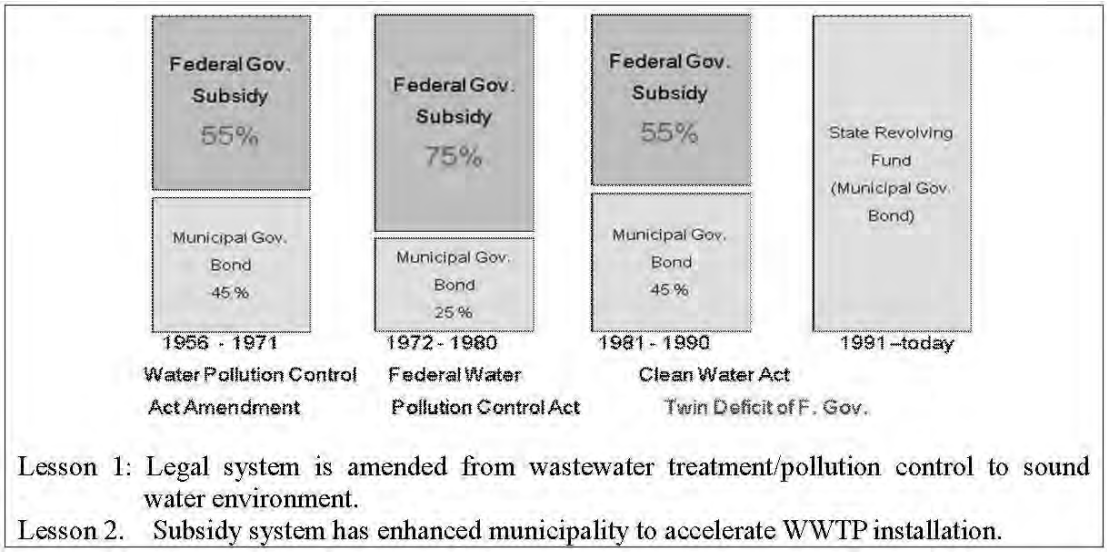
Figure 5-26 Sewerage Development in Manila (Part 2)

(2) Subsidy Systems in Japan and USA

Although sewerage systems that have strong public needs brings various benefits, full cost recovery is not realistic. Projects become financially feasible if national governments and/or municipal governments subsidize them.

Japan and USA have operated sewerage projects through comprehensive financing such as subsidy by national governments, municipal governments' expenditure and charges to beneficiaries.

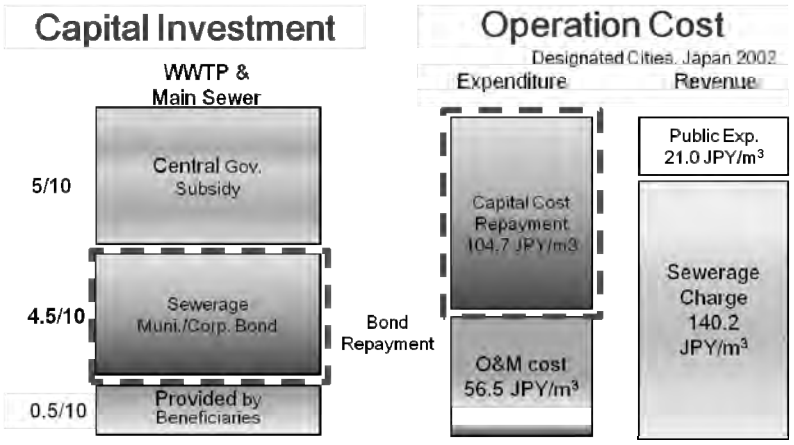
In USA, the sewerage systems were improved through federal government subsidy and municipal government bonds. The subsidy rate was 75% at the most. In the period from 1980 to 1990, sewerage treatment plants were constructed all over the USA and the financial situation of the federal government deteriorated. Accordingly, the Clean Water Revolving Fund which is operated by the state governments and subsidized by the federal government for interest, replaced the subsidy.



Source: Edited by the Study Team referring Municipal Sewage Treatment Plant Construction (US EPA National Center for Environmental Economics)

Figure 5-27 Change of Subsidy System in USA

In Japan, the sewerage finance is provided through national government subsidy and municipal government bonds like the USA. Large cities apply a corporate accounting system in which sewerage tariff is appropriated to O&M cost and repayment of bonds. However, public expenditure is also spent because water pollution control is an important public service of sewerage.



Lesson:

1. Considering sewerage role as national infrastructure, financial sources come from the Central Government, Municipalities, and Users.
2. Sewerage improves the "housing environment" for people; therefore, levies on house connection cost, taxes, and sewerage charges are on beneficiaries.
3. Since sewerage contributes to public water environment and urban aesthetics, Municipalities share a part of O&M costs.

Source: Edited by the Study Team referring to Perspectives of Sewerage Finance & Management with respect to Socio-economic Condition on Sewerage, Sewerage Finance & Management Sub-committee, Sewerage Policy Research Committee

Figure 5-28 Financial System in Japan

(3) Recommended Tariff System for Jakarta

Sewerage service in Jakarta will improve sanitation and the polluted water environment by treating wastewater like Manila. Pollution sources in Jakarta are domestic wastewater (human waste and gray water) and commercial wastewater including wastewater of home industries.

Sewerage service by interceptor wastewater collection and septage treatment is appropriate for Jakarta since interceptor sewers exploit the effects of sewerage projects early. The tariff system shall be accordant with the type and quality of sewerage service.

The present tariff system is based on floor area and the tariff structure applies the cross subsidy system from commercial to domestic and high income to low income. The present tariff system may be more acceptable to the public than a new tariff system with a different structure.

Building owners in the existing sewerage area are aware of the benefits of sewerage service; however, those without sewerage service do not always recognize the benefits of sewerage service.

Sustainable operation of sewerage service has to levy and collect sewerage charges from large commercial buildings. However, the estimated sewerage charge, which may exceed water supply cost and is equivalent to 30% of property tax (average rate of 2,000 IDR/m^2/month), is a newly levied cost.

Awareness of the sewerage role by building owners is indispensable. They should recognize the social significance of wastewater discharge regulation and the necessity of public sewerage service. It is also important to undertake strict monitoring for illicit wastewater discharge and promote connection to the public sewer as follows:

- To declare wastewater discharge regulation to be applied stringently. Illicit discharge is to be corrected from the viewpoint of fairness. Collaboration with BPLHD (Regional Environment Management Board) is indispensable.
- To promote recognition that the affordability of increased sewerage tariff is equivalent to or lower than biological treatment cost of an on-site wastewater treatment plant.
- Building owners who pay sewerage charges are exempt from refurbishing their septic tanks. Periodical septage cleansing, which is a transitional measure through connection to the public sewer, mitigates the foul effluent of septic tanks.

The present sewerage tariff collection in Jakarta is based on the contract of sewerage connection, and sewerage users agree to pay a sewerage charge.

The contract of public sewer connection cannot be agreed between users and DKI Jakarta since the interceptor sewer is applied. This differs from the present tariff system, which is endorsed by house connection approval.

Sewerage service in overseas countries sometimes applies combined tariff of water supply and sewerage, therefore intentional suspension of water supply can be an effective way to promote payment of sewerage charge by users. However, sewerage service in Jakarta cannot be a combined tariff system for water supply or electricity distribution. A sewerage ordinance shall regulate the sewerage tariff system. Tariff collection is to be carefully regulated in collaboration with the municipal service of the DKI Jakarta government.

5.4 Financial Plan for the Central STP Project

5.4.1 Income and Expenses in the Central STP Project

(1) Tariff Revenue (floor area base)

Following the tariff system adopted in Zone 0 (Setia Budi area), the new tariff system proposed in this Study is also on floor area base.

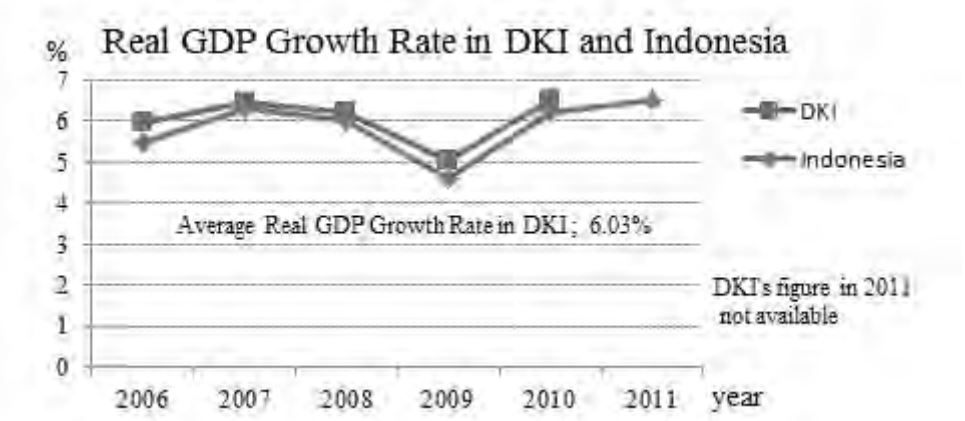
1) Tariff revenue from household

The Study Team assumes that population in Zone 1 is about 1 million and one household consists of 5 people referring to “Statistics (year 2000)” which shows 3.7 people/household and PALYJA (PT PAM Lyonnaise Jaya) whose water supply population is 5.5 people/ household. Therefore, the number of households is estimated to be 200 thousand.

Based on the present tariff system, the average floor area is estimated to be 63 m^2 /house and therefore wastewater tariff per house is calculated as follows:

Current wastewater tariff /house ＝8,253 IDR/month（131 IDR/m^2×63 m^2/house）

The number of households will not increase because land in Zone 1 has already been saturated. Therefore the Study Team does not assume any increase in floor area or the number of households. The Study Team also expects more tariff revenue from small offices and commercial buildings (Small Commercial) and large offices and commercial buildings (Large Commercial) since it is anticipated that the current houses will be rebuilt like high and medium-high buildings due to redevelopment projects in the future. In addition, household disposable income growth will be expected according to future real GDP growth in DKI Jakarta (average real GDP growth rate is 6% in these 5 years as shown in Figure 5-29). The Study Team assumes that tariff should be raised by about 19% (accumulated average real GDP growth rate for 3 years) every three years after the commencement of O&M.



Source: "Growth Rate of Gross Regional Domestic Product at 2000 Constant Market Prices by Provinces, 2006 - 2010 (Percent)", Statistics Indonesia and JETRO Website

Figure 5-29 Average Real GDP Growth Rate in DKI

Average disposable income of household in DKI Jakarta will be increased in pallarel with increasing of real GDP growth rate in DKI Jakarta. Even if household's unit tariff is raised by accumulated average real GDP growth rate for three years every three years, household's share of burden for sewerage tariff against household expenditure (Affodability to Pay) will not be changed so much. Therefore the study team thinks unit tariff revision by accumulated average real GDP growth rate for three years every three years will be accepted for household in DKI Jakarta.

According to "Table E3-13 Sewerage Tariff Collection Rate (2010 results)" in the MP Review, the actual sewerage tariff collection rate for households was 63%. In the case of batch collection by the representative of a community, the rate was 75%. The Study Team assumes that the tariff collection rate from households will be 75% considering that DKI Jakarta will

enlighten the residents on the necessity of sewerage development and tariff payment duty by 2018 (completion year of main trunk sewer).

Table 5-24 Assumption of Tariff Revenue from Households (on floor area base)

Initial tariff level	Current level (131IDR/m^2*)
Number of households	200,000 households
Average floor area	63 m^2 /household
Increase rate of floor area	NA
Increase rate of households	NA
Tariff collection rate	75%
Tariff revised (Unit tariff increase factor)	Raised by about 19% every 3 years (equivalent to the accumulated average real GDP growth rate in DKI Jakarta for 3 years)

* The current tariff level (131IDR/m^2) is based on "Domestic Type A (Electricity up to 450 Watt), the minimum in customer categories in household unit tariff, described at "Kep.Gubernur Provinsi DKI Jakarta, Nomor 991/2012,26 Juni 2012". The Study Team found proportion of poorest segment in the population in Zone 1 relatively high, based on field surveys in the same area. Therefore, it is considered appropriate that the minimum unit tariff in the household's category is utilized to calculate household's tariff revenue.

Source: JICA PPP Study Team

2) Tariff revenue from non-households

Tariff revenue from non-households is estimated based on assumptions of floor area and the number of buildings applied to LargeCommercial and Small Commercial referring to the current tariff system.

Large Commercial tariff is relatively high in the current tariff system and tariff revenue for Large Commercial occupies a major part in total tariff revenue. The number of Large Commercial buildings is counted using air photographs and lists of high-rise buildings.

The Study Team assumes that an average floor area is 20,000m^3 based on the survey in Zone 1 referring to the number of buildings in the existing treated area (in Setia Budi area, 140 buildings, total floor area: 3,815,146 m^2 , average floor area : 27,251 m^2).

Table 5-25 Data on Commercial Facilities in Zone 1

Survey result using air photographs	225 buildings
Lists of high-rise buildings (12 floors and higher)	113 buildings (average 24.1 floors)
Proposed number of buildings	200 buildings (average floor area 20,000m^2)

Source: JICA PPP Study Team

The Study Team assumes that the total floor area of Small Commercial is 1,000 buildings × 4,000 m^2, which is equivalent to the total floor area of Large Commercial.

The Study Team proposes that only Large Commercial unit tariff should be raised by 2 times the current level (1,208 IDR/m^2= 604 IDR/m^2×2).

Table 5-26 shows differences among unit tariffs adopted in October 2012 and in 2006. Increase rate of Large Commercial unit tariff is relatively low at 22%. The Study Team considered that there is room for raising Large Commercial unit tariff.

Table 5-26 Comparison of Unit Tariffs in 2006 and 2012

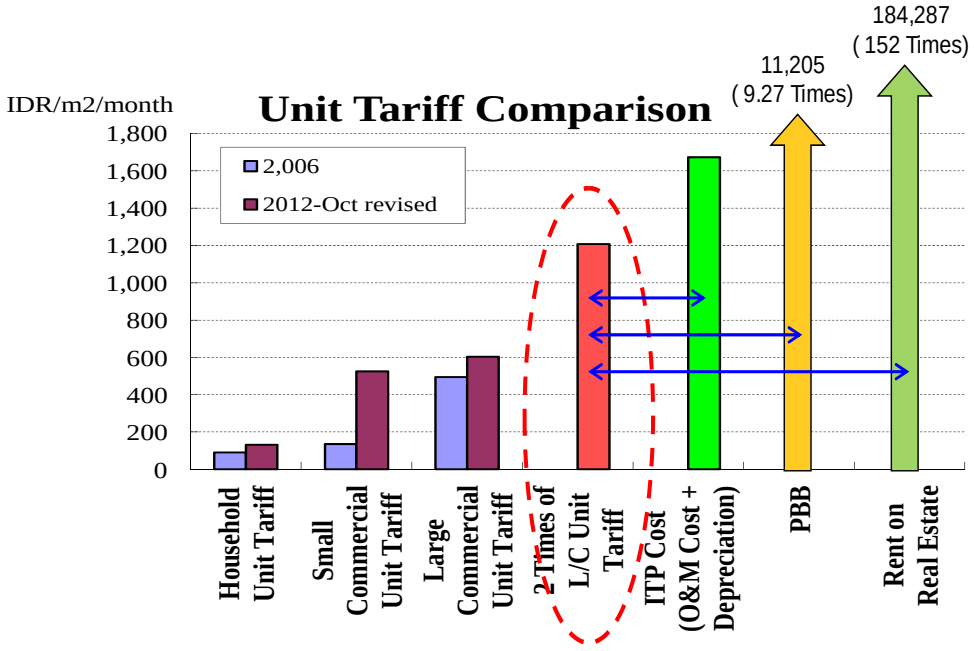
	2006	2012-Oct revised	Increase Rate
Household Unit Tariff (IDR/m2)	90	131	46%
Small Commercial Unit Tariff (IDR/m2)	135	525	289%
Large Commercial Unit Tariff (IDR/m2)	495	604	22%

* Small Commercial unit tariff (135 IDR/m^2 adopted in 2006) is the lowest in its category and conservative value. On the other hand, revised Small Commercial unit tariff adopted in October 2012 is 525 IDR/m^2 and all unit tariffs in Small Commercial category are the same. As for Large Commercial unit tariff, the Study Team adopts 604 IDR/m^2, the second lowest in its category, considering its customer distribution.

Source: JICA PPP Study Team

On the other hand, average cost of indivisual treatment plant (ITP) for non-household (Large Commercial + Small Commercial) that is composed of ITP's O&M and depreciation cost is 1,673 IDR/m^2/month. This figure is lower than the Large Commercial unit tariff raised by 2 times the current level (604×2=1,208 IDR/m^2/month). Paying sewerage tariff by connecting to newly developed sewerage system is more economical than keeping using the existing ITP and bearing its cost.

Furthermore, Figure 5-30 shows Large Commercial unit tariff raised by 2 times the current level is substancially lower than an average PBB (property tax, 11,205 IDR/m^2/month, 9.27 times the Large Commercial unit tariff) and rent on real estate (184,287 IDR/m^2/month, 152 times the Large Commercial unit tariff).



* The above average ITP cost and rent on real estate are based on social surveys. PBB is calculated by over-all average of the highest and lowest NJOP (IDR/m^2)s in respective areas listed on the "LIST OF YEAR 2012-CENTER OF JAKARTA" and "LIST OF 2012-WEST OF JAKARTA".

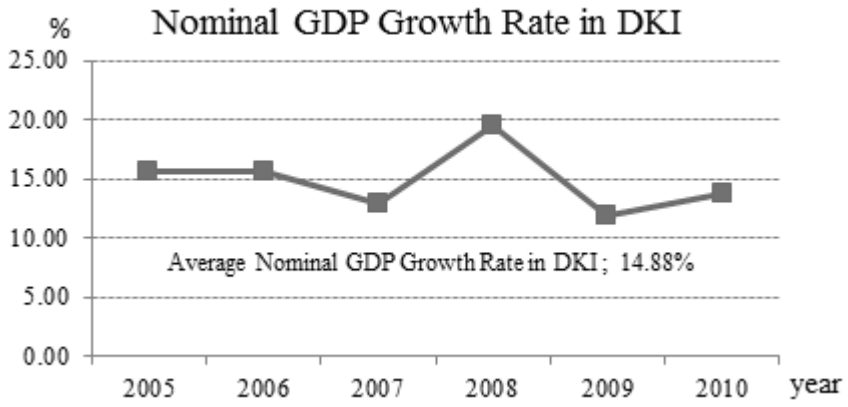
Source: JICA PPP Study Team

Figure 5-30 Comparison of Unit Tariff and PBB/Rent on Real Estate

It is reported that the number of high-rise buildings in the business center increases by about 5 to 10% every year. As an important matter to accelerate urban redevelopment, the MRT (high-speed train) bound for Dukh Atas and Kampung Bandan are scheduled to begin operations from now on. Dukh Atas station will become a connection point with the existing train (blue line). In addition, SHIARL (Soekarno-Hatta International Airport Rail Link) project has been also proposed. A transportation system that consists of cars, subways and buses will be established in the future.

As a result of development of transportation infrastructure, the demand for commercial and office buildings are expected to increase. In fact, many construction plans for high-rise buildings have been proposed so far. The existing residential areas will also be converted into commercial and office use as a result of rebuilding demand as has been observed in other large cities in Asia. Therefore the team assumes that an annual floor area growth rate will be 6.6% in Zone 1, which is larger than average real GDP growth rate in DKI Jakarta. (Average real GDP growth rate in these 5 years is 6%.)

In general, a change rate of property value is directly proportional to the nominal GDP growth rate. Based on the fact that the most recent nominal GDP growth rate in DKI Jakarta is over 10% (see Figure 5-31), property value in DKI Jakarta will increase by 10% per year.



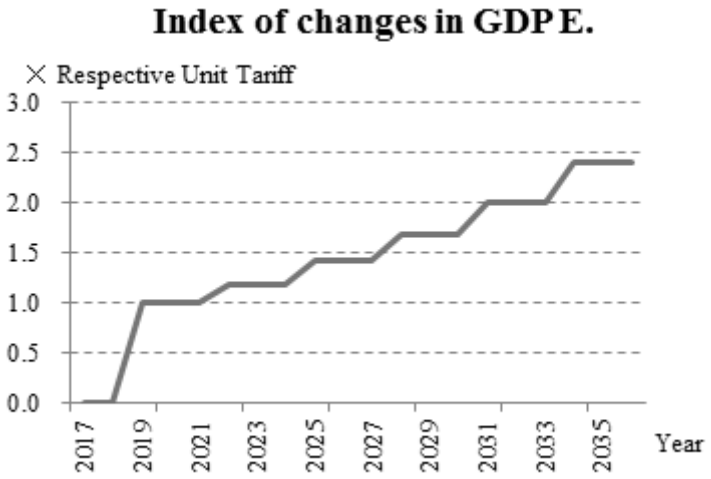
* Source; "Gross Regional Domestic Product at Current Market Prices by Provinces, 2004 - 2010 (Million Rupiahs)" Indonesia Statistics

Figure 5-31 Nominal GDP Growth Rate in DKI

It is considered that developers will build multi-storey buildings to recover their investment costs (construction costs). This means floor area of buildings will be increased more and more in the future. The Study Team assumes that the floor area increase rate would be 6.6% per year. (This is not unit tariff increase factor.) 6.6% increase per year is lower than the average nominal GDP growth rate (over 10%) and therefore, this assumption is considered conservative.

On the other hand, increase of non-household income will be predicted according to the real GDP growth in DKI Jakarta. Even if non-household's unit tariff is raised by the accumulated average real GDP growth rate for three years (about 19%) every three years, non-household's share of burden for sewerage tariff against their total expenditures (Affodability to Pay) will not be changed so much. Therefore, it is considered that unit tariff revision by the accumulated average real GDP growth rate for three years every three years will be accepted by non-household in DKI Jakarta.

Figure 5-32 concretely shows GDP escarlation factor (unit tariff increae factor) which should be considered in calculating tariff revenue.



Source: JICA PPP Study Team

Figure 5-32 GDP Escarlation Factor

According to "Table E3-13 Sewerage Tariff Collection Rate (2010 results)" in the MP Review, the average tariff collection rate from non-household is 99% because of the current method of directly depositing payment into a bank account. The Study Team assumes 100% of the sewerage tariff collection rate, for which strict application of the drainage regulation established in 2005 and dissemination regarding the payment duty of sewerage charges are necessary.

Table 5-27 Non-household Tariff Proposal

a) Large Commercial Buildings

Initial tariff level	2 times the current tariff level (604 IDR/m^2*×2 times)
Number of households	200 buildings
Average floor area	20,000 m^2/building
Increase rate of floor area	6.6% every year
Tariff collection rate	100%
Tariff revised	Raised by about 19% every 3 years (equivalent to the accumulated average real GDP growth rate in DKI Jakarta)

b) Small Commercial Buildings

Initial tariff level	Current level (525 IDR/m^2)
Number of households	1,000 buildings
Average floor area	4,000 m^2/building
Increase rate of floor area	6.6%every year
Tariff collection rate	100%
Tariff revised	Raised by about 19% every 3 years (equivalent to the accumulated average real GDP growth rate in DKI Jakarta)

Source: JICA PPP Study Team

(2) Tariff Revenue in the O&M Period based on the Proposed New Tariff System

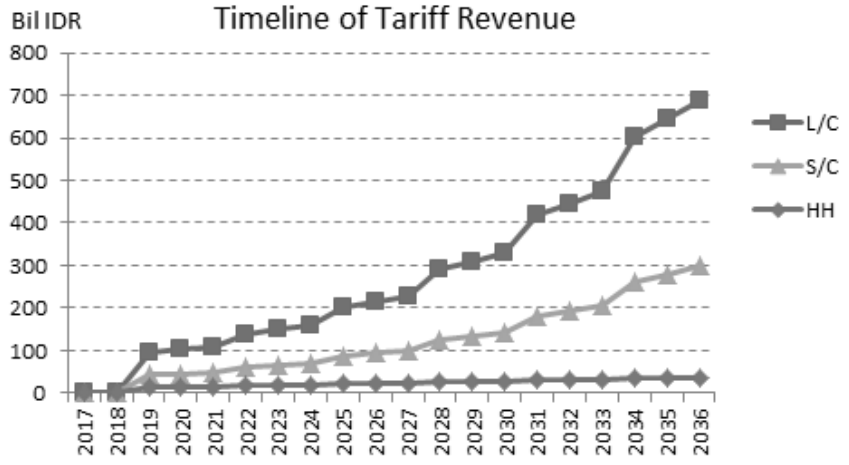
Table 5-28 is the summary of assumptions for calculation of tariff revenue.

Table 5-28 Assumptions for Calculation of Tariff Revenue

Category	Initial Unit Tariff	Number of Households /Buildings	Average Floor Area	Floor Area Increase*	Tariff Collection Rate	Tariff Revised Factor (Unit Tariff Increase Factor)
Household	Current level (131IDR/m^2)	200,000 households*	63 m^2 /household	NA	75%	Accumulated Average real GDP growth rate every 3 years (about 19%)
Large Commercial	2 times of current level (604IDR/m^2 ×2)	200 buildings	20,000m^2 /building	6.6% /year	100%	Accumulated Average real GDP growth rate every 3 years (about 19%)
Small Commercial	Current level (525IDR/m^2)	1,000 buildings	4,000m^2 / building	6.6% /year	100%	Accumulated Average real GDP growth rate every 3 years (about 19%)

* Floor area increase is not a unit tariff incease factor. On the other hand, GDP escarlation is a unit tariff increase factor.
* The Study Team does not assume that the number of household increases.
Source：JICA PPP Study Team

Figure 5-33 shows prediction of tariff revenue based on the above assumptions.



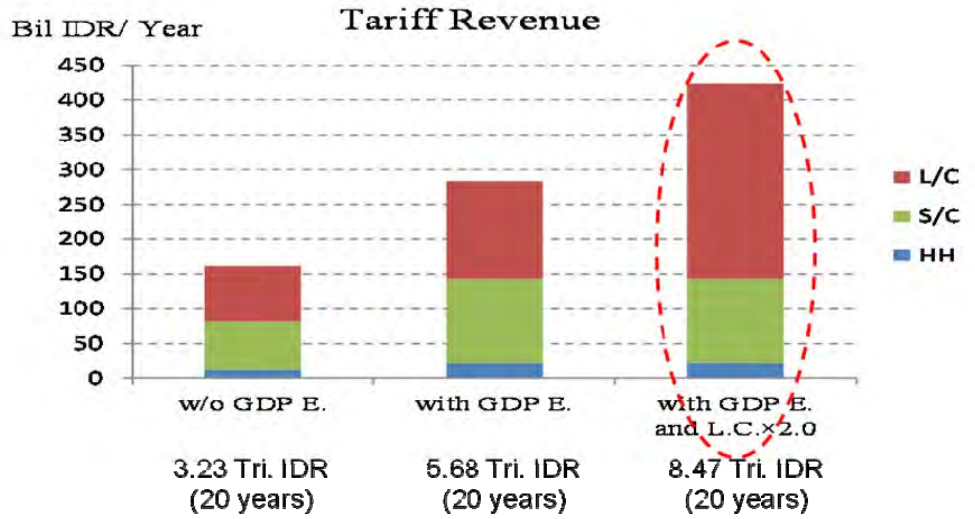
* The team assumes that construction of main sewers will not have been finished until the second year in the O&M period. Therefore the team does not estimate any tariff revenue for the first 2 years.
Source: JICA PPP Study Team

Figure 5-33 Prediction of Tariff Revenue

Total tariff revenue during O&M period (20 years) from both household and non-household will be 8.47 trillion IDR. (Unit tariff of Large Commercial is initially raised by 2 times and GDP escarlation for all categories is also considered.)

On the other hand, if unit tariff and GDP escarlation for all categories are not changed throughout the O&M period, the total tariff revenue for 20 years will be 3.23 trillion IDR. If unit tariff remains unchanged but only GDP escarlation for all categories is considered, the total tariff revenue will be 5.68 trillion IDR for 20 years.

Figure 5-34 shows that cross subsidy is functioned in the case of 8.47trillion IDR compared with other two cases (3.23 trillion IDR and 5.68 trillion IDR).



Source: JICA PPP Study Team

Figure 5-34 Comparison of Tariff Revenue

5.4.2 Income and Expenses for DKI Jakarta

DKI Jakarta gets its income from the sewerage project beneficiaries in Zone 1 (household and non-household) by collecting tariff during the O&M period. On the other hand, DKI Jakarta pays service fees to SPC periodically during the same period.

It is ideal that the service fee can be supplemented only by the sewerage tariff, but this is actually difficult. A financial gap between the tariff revenue and the service fee amount normally occurs. (Finance gap = Shortfall = tariff revenue - service fee amount)

The Study Team already explained that GOI's provision of a subsidy for the initial CAPEX in the STP construction period enables DKI Jakarta to reduce the service fee payment level in the O&M period and that VGF as a form of subsidy to the initial CAPEX is effective to eliminate the financial gap from the standpoint of the entire O&M period. It shall be pointed out that even if VGF is

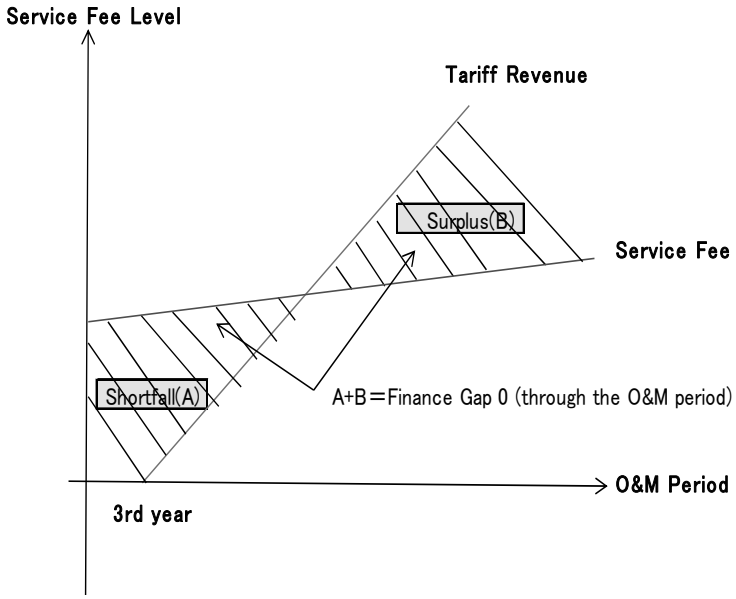
allocated to the initial CAPEX in the construction period, finance gaps every year in the O&M period are not always eliminated.

If DKI Jakarta introduced the proposed new tariff system described in 5.4.1, (1) and VGF, it would be possible for DKI Jakarta to find a balance point of finance gap 0 (zero) from the standpoint of the entire O&M period. By allocating VGF to the initial CAPEX, DKI Jakarta will actually be able to find a service fee level at a balance point where A + B = 0 as in Figure 5-29 below.

On the contrary, financial gaps of shortfall A in this figure will remain every year until the tariff revenue exceeds the service fee level.

Even if the tariff revenue exceeds the service fee level after the breakeven point of tariff and fees, DKI Jakarta does not need to pay surplus B to SPC. If DKI Jakarta keeps paying the service fee agreed between SPC and DKI Jakarta, SPC considers that DKI Jakarta‘s obligation is fulfilled. An agreement in which financial gaps in past years should be compensated by surplus in later years will not be adopted.

It is very important for DKI Jakarta to recognize from which point of view, the whole O&M period or respective years, the financial gap should be discussed. If the finance gap is argued from the standpoint of respective yearly base, shortfalls in respective years should be supplemented by other financial resources such as general account expenditure.



Remarks: Tariff revenue is estimated from the 3rd year of the O&M period. As main sewers will not have been completed until the 2nd year of O&M period, the Study Team considers that tariff collection from beneficiaries is difficult.

Source: JICA PPP Study Team

Figure 5-35 Shortfall and Surplus between Tariff Revenue and Service Fee in the O&M Period

(1) Consideration of Private Investment Options

Private funds will invest in STP's initial CAPEX where subsidy such as VGF is deducted. The private funding portion consists of SPC's debt (about 70% of SPC's funding) and equity (about 30% of SPC's funding).

One of the measures to reduce service fees in the O&M period (other than giving subsidy to the initial CAPEX) is to consider lowering the debt (loan) interest rate. Specifically, the Study Team assumes utilization of JICA's PSIF loan for SPC to reduce the loan interest rate.

However, JICA's PSIF loan is on a yen basis. If service fees, which SPC receives from DKI Jakarta, are on an Indonesian rupiah basis, a currency mismatch between service fees (revenue for SPC) and the loan (expenditure for SPC) will occur. Considering that long-term forward foreign exchange transaction (Yen and Indonesian rupiah) is difficult in the Indonesian capital market, SPC should not fully rely on JICA' s PSIF for debt financing in terms of currency risk control. On an Indonesian rupiah basis, SPC has to explore other funding sources such as PIP and PT SMI.

On the contrary, payment of expenditures in the construction and O&M periods is not always on an Indonesian rupiah basis. Especially in the case of machinery procurement through import from other countries, there is a possibility of payment with foreign currency such as the US dollar. It is necessary for SPC to consider funding sources mainly with two currencies (Indonesian rupiah and US dollar).

Table 5-29 Fundraising Options for SPC

<Debt>	
• On rupiah basis	Loan on rupiah basis from local public institutions such as PIP, PT SMI (Utilizing public fund in Indonesia) Currency exchange of JICA's PSIF on a yen basis (Utilizing public fund in Japan) Loan on a rupiah basis from local commercial banks
• On dollar basis	Currency exchange of JICA's PSIF on a yen basis (Utilizing public fund in Japan) Loan on a dollar basis from local commercial banks
<Equity>	
• On rupiah basis	Private equity investment (i.e., ORIX)

Source JICA PPP-FS

(2) Fiscal Revenue and Expenditure in the Central STP Project

In this section, the Study Team will more concretely explain that GOI's providing subsidy to the initial CAPEX enables DKI Jakarta to reduce service fee and shortfall (finance gap) levels in the O&M period. Assumptions in this section are as described in 4.3.8 (3) and 5.4.1(1) - (3).

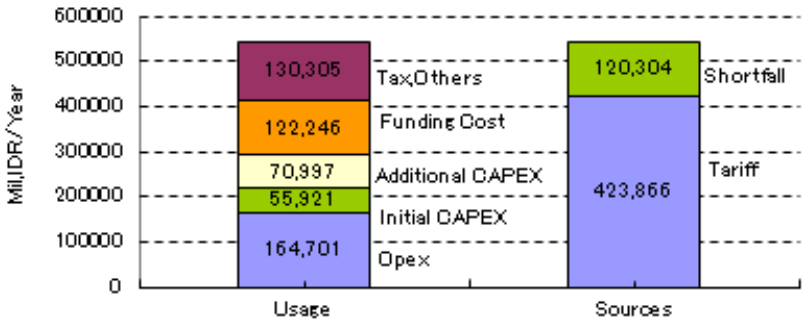
If the subsidy is 30% of the initial CAPEX, the service fee level is initially 480,000 Mil IDR per year (after that 1.3% increase every year) and the average shortfall per year is 120,304 Mil IDR.

On the other hand, if the subsidy is 60% of the initial CAPEX, the service fee level is initially 385,000Mil IDR per year (after that 1.3% increase every year) and the average shortfall per year is 12,604 Mil IDR. The Study Team regards this subsidy as VGF because the average shortfall will vanish through international bidding of the Project.

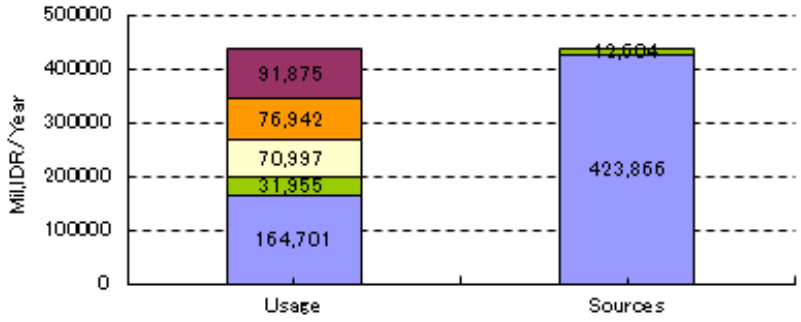
If the service fee is not increased by 1.3% every year, income and expence in SPC would not balance.

The Study Team also considers that this increasing rate will be admitted by DKI Jakarta because this is lower than GDP growth rate in DKI Jakarta. Service fee is backfinanced by tariff revenue, which is affected by GDP growth rate in DKI Jakarta.

<In the case of subsidy portion of 30% against the initial CAPEX>



<In the case of subsidy portion of 60% against the initial CAPEX (VGF)>



In the case of subsidy portion of 60% against initial CAPEX, the average shortfall becomes almost 0(zero); that is to say, the total tariff revenue and the total service fee are balanced from the standpoint of the entire O&M period. Subsidy to vanish shortfall from the standpoint of the entire O&M period is regarded as VGF.

Chapter 6 Project Evaluation

6.1 Financial and Economical Analysis

The Study Team showed the results of Case 1 and Case 2 in the past Joint Coordination Meetings; however, it has not yet been decided which case should be adopted. Therefore, only the result of Case 1 is described hereinbelow in this chapter.

6.1.1 Result of Financial Analysis

Based on assumptions described in 4.1.5 and 5.4.1 (1) - (2), the simulation for Case 1 to obtain subsidy injection proportion against the initial CAPEX, shortfall and service fee was undertaken. The results are as described below.

Table 6-1 Results of Simulation

Subsidy for		Short Fall (Mil.IDR/y)	Service Fee (Mil.IDR/y)
Initial CAPEX (%)	Total CAPEX (%)		
30	15.9	120,304	480,000
45	23.8	74,957	440,000
55	29.1	29,609	400,000
60	31.8	12,604	385,000
65	34.4	-4,401	370,000

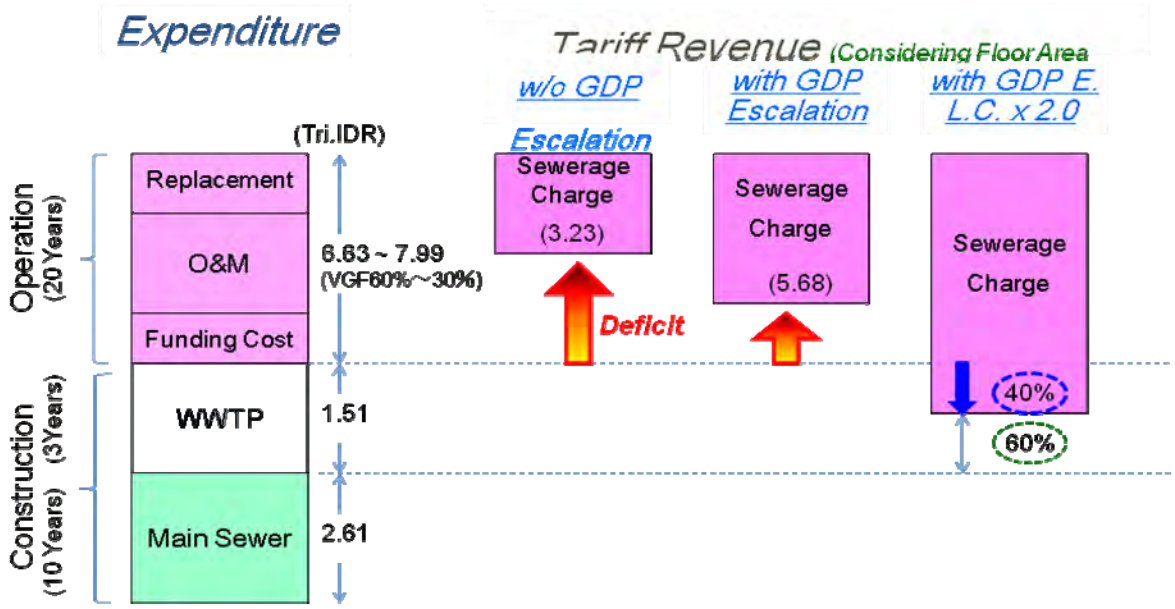
Note) The above service fee is the first one. After that it will be increased by 1.3% every year.
Note) Total CAPEX is a sum of initial CAPEX and additional CAPEX.
Source: JICA PPP Study Team

The results show that the larger the subsidy injection proportion against the initial CAPEX becomes, the lower the service fee and shortfall level in the O&M period become.

As well as the injection of subsidy to the initial CAPEX, the subsidy to additional CAPEX is also effective to reduce shortfall. In the above table, subsidy injection proportions against the total CAPEX (initial CAPEX + additional CAPEX) are calculated on the condition that subsidy injection amounts remain unchanged in respective cases.

As a result, even if respective subsidy amounts remain unchanged, subsidy injection proportions against the total CAPEX including the additional CAPEX are lower than one against the initial CAPEX. In addition, the result of Table 6-1 will fluctuate through the actual international bidding procedure.

Figure 6-1 shows the relation between project expenditure and tariff revenue.



*Considering tender and detail design process, the total construction period will be about 4 years.

*Expenditure does not consider inflation.

Source: JICA PPP Study Team

Figure 6-1 Relation between Project Expenditure and Tariff Revenue

As is shown in above figure, if VGF is injected into the STP's initial CAPEX by 60% and new tariff system proposed in 5.4.1, (2) (total tariff revenue during O&M period; 8.47 trillion IDR) is also adopted, full cost recovery for the STP project throughout O&M period would be almost achieved. (Table 6-1 shows that yearly average shortfall amount throughout O&M period is 12,604 Mil IDR, and thus the difference between the total service fee and tariff revenue throughout O&M period becomes almost 0 (zero).)

Results of the economic and financial analyses are as shown in Table 6-2. '1 Time' means Case 1. Economic analysis is based on assumptions described in 4.3.9 (2) and 5.4.1 (1) - (2).

Table 6-2 Result of Economic and Financial Analysis

Construction Stage	Subsidy for Initial CAPEX	FIRR ① (Project IRR)	EIRR ②	B/C ③
1 Time	0%	5.73%	304.9%	3.29
	30%	8.35%		
	60%	12.79%		

Source: JICA PPP Study Team

In calculating the FIRR in the Table 6-2, the pipe network construction cost is not considered because the purpose of FIRR calculation is to evaluate STP Project (DKI Jakarta's project) feasibility. (In the calculation, the Study Team regards tariff revenue as cash inflow for DKI Jakarta and also regards initial CAPEX, additional CAPEX and O&M costs as cash outflow for DKI Jakarta.)

It is often said that FIRR in sewerage development projects is low in general. But the above results show that this Project is feasible for DKI Jakarta.

It also shows that as the subsidy injection to the initial CAPEX increases, FIRR also increases. The reason is that tariff revenue as an income in calculation of FIRR remains unchanged, but the initial CAPEX excluding subsidy amount, as a part of expenditures in calculation FIRR, decreases in accordance with the subsidy injection.

6.1.2 Result of Economic Analysis

The pipe network cost and its O&M cost are considered in the calculations of EIRR and B/C. Additional CAPEX of the pipe network is excluded as already explained. The calculation results show that EIRR exceeds 12% and B/C exceeds 1.0. Accordingly, this Project is evaluated as economically feasible. The larger EIRR and B/C are attributed to the effect of rise in land value. (Effect of rise in land value contributes to 70% of the present value of economic effects.)

By adopting the interceptor method in this Project, effects of prevention against inundation and increase in the land value are expected regardless of not changing the existing drainage in Zone 1. The MP Review also assumes an increase in the land value by 5% in the economic analysis.

By implementing this Project, not only sewerage tariff revenue (direct revenue) but also the following social benefit-related revenues (indirect revenue) are expected for DKI Jakarta.

a. Willingness to Pay (WTP) to improve environment
b. Land and property tax (PBB) increase
c. Revenue by sales of reclaimed water
d. VAT increase by increased tourist expenditure by decreasing rate of water borne disease

WTP to improve the environment is calculated by (household WTP) - (household sewerage tariff). This indicates the additional amount of money payable for sewerage service according to the households' willingness to pay.

PBB will increase if the value of real estate as assessed for local government tax increases in accordance with sewerage development.

Sales revenue of reclaimed water will be expected for DKI Jakarta. Treated water (reclaimed water) at STP can be used for industrial water such as water sprinkling at golf courses. DKI Jakarta will get a new revenue source.

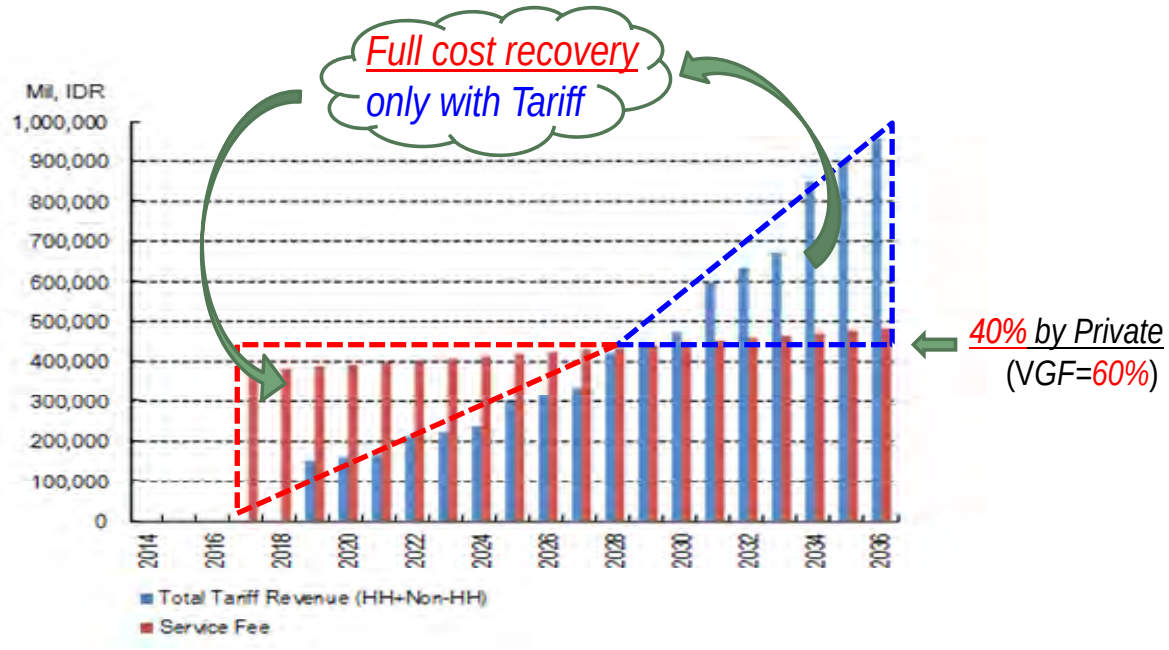
VAT increase is expected in accordance with the increase of tourists' expenditure due to the decreasing rate of water borne diseases.

Respective calculation results are as follows.

Table 6-3 Social Benefit-Related Revenue for DKI Jakarta by Sewerage Development in Zone 1 (expected indirect revenue, Mil IDR)

Item / Year	2017	2020	2023	2034	2036
Main					
WTP for Environmental Improvement (WTP-Tariff)	0	80,910	96,366	180,915	193,907
Increase of **Land Tax**	30,042	35,780	42,615	80,895	90,894
Others					
Revenue from selling Treated Water	0	3,842	4,511	7,977	8,794
Increasing of VAT from increased Tourist Expenditure by decreasing Rate of Water-Borne Disease	0	36	67	155	171
Total Indirect Revenue⇒	30,042	120,568	143,558	269,942	293,765

Source: JICA PPP Study Team



Source: JICA PPP Study Team

Figure 6-2 Service Fee and Tariff Revenue throughout BOT Period

Figure 6-2 indicates that it will be difficult for DKI Jakarta to offset the service fee only through tariff revenue for respective O&M years during the first half of O&M period. Supports* such as an issuance of municipal bond and general accounting expenditure by DKI Jakarta will be needed.

On the other hand, the total sewerage tariff revenue is almost equivalent to the total amount of service fee through the entire O&M period. These figures imply that VGF should be discussed for DKI Jakarta to reduce the financial gap through the entire O&M period to almost 0 (zero).

*Yearly finance gap will become maximum in 2018 (390 billion IDR which accounts for 1.39% of total expenditure of DKI Jakarta in 2011 (27.9 trillion IDR)). But after that this proportion will be decreased gradually. Tariff revenue will exceed service fee from 2029 (the thirteenth year from the commencement of O&M period). Fiscal burden of DKI Jakarta throughout the O&M period will not so large and therefore the Study Team does not consider DKI Jakarta's fundraising from donor agencies such as World Bank, ADB and GPOBA.

Chapter 7 Capacity Building of Operation of Jakarta Sewerage PPP Project

7.1 Needs of Capacity Building of PPP Project Operation

Sewerage contributes to the public sanitation and disaster mitigation of the urban waster environment through draining storm water and treating wastewater. However, levying service cost on beneficiaries is difficult. Accordingly, a financial system that offsets the costs of construction and O&M shall be sustainable through allocating user charges, taxes, subsidies, etc. comprehensively.

The PPP Project of Jakarta sewerage consists of the construction and operation of a sewer system by the municipality and sewerage treatment by a private company (SPC). This Project provides wastewater management service to the public. Interceptor sewers collect wastewater from the existing drainage that is operated by Dinas PU. Accordingly, collaboration between sewerage users (wastewater discharge), Dina PU (drainage management) and PD Pal Jaya (interceptor sewer management) is required to regulate illicit wastewater and solid waste disposal.

Private companies have know-how on construction and operation of sewerage. Since this is the first case for DKI Jakarta to operate the modern and largest sewerage system, the following knowhow and institutional design are indispensable for construction and operation.

- Sewerage ordinance: Tariff levy and collection, business wastewater monitoring, compulsory public sewer connection and directions on urban development projects
- Sewerage tariff collection: Wastewater quality regulation on building and tariff levy
- Sewer management: Facility information, wastewater quality monitoring and approvals for occupation and construction
- Sewer construction: Pipe jacking technology and supervision of construction
- Urban project on water environment improvement: Project features of water environment improvement and public relations
- Treated wastewater reclamation and rain water use: Sewerage ordinance, design manual and directions on building construction

7.2 Institutions on Sewerage Project Operation

7.2.1 Sewerage Ordinance

Sewerage in Setia Budi is a separate sewerage system and provides sewerage service through contracts with individual houses and buildings for sewerage connection. Wastewater quality and sewerage charge are parts of the contract conditions.

Since the central sewerage system applies interceptor sewers that collect wastewater from the existing drainage, wastewater service for private property will not be improved even after the public sewerage construction. However, a sewerage ordinance, which should regulate tariff levy and collection, business wastewater monitoring, compulsory connection to the public sewer and directions on urban development projects, is indispensable in order to operate the sewerage system properly.

Administrative procedures of the sewerage ordinance include notification ofn the sewerage service area for sewerage tariff levy and collection. For large buildings, the ordinance directs methods of public sewer connection, connection charges and pretreatment installation. Wastewater management is important to regulate wastewater quality from industry, restaurants and hotels, hospitals, gas stations, etc. since illicit wastewater discharge of hazardous waste and grease will adversely affect sewers and wastewater treatment.

Urban development projects can be relieved from nissues caused by the management and cost of on-site treatment plants if they connect to the public sewer. Sewerage administrators can construct sewers and expand the sewerage service by collecting connection charges in collaboration with the urban development projects.

Articles of sewerage ordinance to be described are as follows:

Article 1:	The jurisdiction matter of the sewerage ordinance
Article 2:	The definition of the words and terms
Article 3:	Notice of sewerage service area and directions of public sewer connection
Article 4:	Application of house connection, and application and design guideline of pretreatment facility installation
Article 5:	Design guideline of private sewer
Article 6:	Application of the succession of pretreatment facility
Article 7:	Plumber certification and registration
Article 8:	Human waste treatment
Article 9:	Discharge standards to public sewer system
Article 10:	Direction on pretreatment facility improvement
Article 11:	Application of the user change on tariff levy
Article 12:	Sewerage tariff system, tariff calculation and collection
Article 13:	Calculation of sewage discharge based on water supply and well use
Article 14:	Tariff collection method and tariff exemption
Article 15:	Levy of sewer construction cost and connection charge “Collaboration with building construction permission”
Article 16:	Permission for occupation of sewerage facility
Article 17:	Fees for application
Article 18:	Penal regulations

7.2.2 Directions on Building Wastewater and Tariff Levy

Interceptor sewer contributes to the water environment improvement and urban aesthetics; however, it is not a service recognized visually like services such as wastewater drainage on private property or human waste disposal. Accordingly, social disturbance may arise due to the implementation of sewerage tariff levies.

The following activities in collaboration with BPLHD (Regional Environment Management Board) are indispensable for the establishment of a sustainable financial system.

Strategy on the public sewer connection and tariff levy shall be developed. Transitional measures such as intensified septage cleansing and providing septage treatment service will be useful.

Table 7-1 Directions on Building Wastewater and Tariff Levy

Category	Tariff Levy	Issues & Measures of Interceptor Sewer
Present tariff system	Sewer connection approval	1) Benefit of interceptor sewer is not always recognized by sewerage users. 2) Complaints on tariff levy rises (Political issue). 3) Receiving & relay facilities of septage to be provided.
Amended Tariff System		
Residence	Tariff levy on all residents in sewerage area	1) Tariff levy in exchange for septage treatment, cost of which is equivalent to sewer tariff. (Septic tank cleansing & septage treatment are expended by property owner.) 2) Public sewer connection to trunk sewer to be approved.
Office & Commercial	Tariff levy on all residents in sewerage area	1) Inventory of building & on-site treatment facility (ownership, building floor area, facility information, treatment performance). 2) Intensified monitoring wastewater management (septage cleansing). 3) Mutual understanding on cost and performance of on-site treatment between sewerage administration and building owners. 4) Tariff levy in exchange for septage treatment, cost of which is equivalent to sewer tariff (septic tank cleansing & septage treatment are paid for by property owner). 5) Promoting public sewer connection through intensified monitoring of wastewater.

Source: JICA PPP Study Team

7.2.3 Sewer Management

Since sewers are installed in road areas, sewer management requires various tasks such as:

- Facility information on location, structural features and house connection
- O&M information of cleansing and repairs
- Illicit discharge monitoring
- Failures, traffic accidents, etc.
- Information on road construction

The asset management system of sewers provides basic data for sewer management such as inspection, maintenance, etc. by comprehensively grasping the location and structural information, O&M records, occupation approval, house connections and pretreatment information.

Tasks and the organization of sewer management office are described as shown in the following table.

Table 7-2 Tasks and Organization of Sewer Management Office

Section	Tasks
Administration	General affairs and administration Accounting and procurement Public relation
Business	Sewerage connection approval, Inspection of building sewer Levying sewerage tariff Monitoring on business wastewater, Detecting illict discharge and Order for improvement
Sewer facility	Inspection, Cleansing and maintenance Sewer management(Sewer ledger, Coordination on road occupation & construction) Sewer rehabilitation & reconstruction
Pump station	Pump operation, Inspection & maintenance
Construction	Sewer construction
Wastewater treatment plant	Wastewater treatment, Inspection & maintenace, Rehabilitation, Effluent water reclamation Sludge treatment, Inspection & maintenace, Rehabilitation, Sludge reclamation & reuse Water quality examination, Effluent quality monitoring Public relation

7.2.4 Sewer Construction

The central sewerage area is almost 4,900 ha and is necessary to install a total of about 140 km of sewer consisting of 90 km (Phase-1 40 km) of trunk and sub-trunk sewers and 50 km of secondary and tertiary sewers.

Among such sewers, the trunk & sub-trunk sewers are to be constructed in 5 to 10 years. Sewer construction in roads with more than two lanes must apply trenchless construction methods to mitigate traffic congestion. Pipe jacking, which is a principal sewer construction method, can be applied for sewers 150 to 3,000 mm in diameter. Curve and long distance pipe jacking is developed in Japan and is a competent construction method.

It is considered that sewer construction in this Project requires the following design manuals and requirements;

- Planning and design manual of pipe jacking
- Cost estimation system of pipe jacking
- Quality requirement of construction supervision of pipe jacking
- Quality requirement of sewer materials

7.2.5 Public Relations on Urban Water Environment

Public relations (PR) are effective for promoting public awareness on water environment improvement derived from sewerage projects. PR provides visible information on the improved situation before and after the projects.

Promotion of public awareness and proposals of water environment projects are practicable through site visits and/or small seminars in collaboration with PR professionals and community leaders.

Water environment restoration projects such as river front amenities and leisure boats can make the public aware of sewerage role. Such projects can save costs by collaborating with flood control and park development projects. Professionals should continuously present comprehensive information and technical advice on urban water environments.

7.2.6 Treated Wastewater Reclamation and Rainwater Reuse

Enhancing treated wastewater reclamation and rain water reuse is significantly accepted by the public, and requires an administrative approach in collaboration with “Building Construction Permission.” An administrative office shall provide the supply system of reclaimed wastewater and shall announce it to the service area.

As for rainwater reuse, directing various reuse methods to urban development projects is practicable since centralized business districts are appropriate for rainwater reuse and groundwater recharge. Collaboration with BPLHD is also indispensable.

7.3 Capacity Building on PPP Project

7.3.1 Performance Indicator of Sewerage Operation

Capacity of financial operation can be developed in accordance with projected specific indicators. Accordingly it requires monitoring of individual indicators and continuous improvement utilizing the PDCA cycle.

Performance indicators (PIs) can be considered as a management tool to evaluate the degree of the undertaking’s efficiency and effectiveness. Efficiency is the extent to which the resources of an undertaking are utilized to provide the services, e.g., maximizing services delivery with the

minimum use of available resources. Effectiveness is the extent to which declared or imposed objectives, such as levels of services, are achieved. PIs can also be used for quantitative comparative assessment of performance. This quantitative comparison can be conducted comparing the actual performance with the past undertaking records and the projected targets by an entity concerned and other similar entities.

The International Water Association (IWA) developed PIs for water supply services and wastewater services and published "Performance Indicator for Water Supply Services" in 2000 and "Performance Indicator for Wastewater Services" in 2003. The International Organization for Standardization (ISO) developed international standards regarding activities related to drinking water and wastewater services and published "Guidelines for the Assessment and for the Improvement of the Service to Users: ISO 24510," "Guidelines for the Management of Wastewater Utilities and for the Assessment of Wastewater Services: ISO 24511" and "Guidelines for the Management of Drinking Water Utilities and for the Assessment of Drinking Water Services: ISO 24512" in 2007. ISO 24500s are guidelines for evaluation of entire wastewater services, and their aim is to enhance the efficiency of undertakings and services. PIs used for evaluation are key factors.

Performance of an undertaking can be evaluated from various aspects and wastewater services are composed of numerous complicated activities. Therefore, a number of PIs have been developed and made available. Wastewater services in different countries have different histories, and they have different roles. Therefore, selection of proper PIs for each undertaking is the most desirable.

In Japanese national guidelines namely, "Guideline for Improving O&M of Wastewater Systems," 2007 Japan Sewage Works Association, PIs are composed of Context Information (CI) for business entities, systems and districts, PIs for operation, users, services, management and environment and References. CIs and PIs in the Japanese guideline are shown in Table 7-3.

Table 7-3 Context Information and Performance Information (Example in Japan)

CIs and PIs of Japanese Guideline

Context Information (CI) Context information means background information of a district about legal framework, geological conditions, population, and capacity of facilities, conditions for operation and maintenance, and environment. CIs are composed of 25 items and categorized as follows. (i) Characteristics of an undertaking 9 items (name of undertaking, application of local public entity law, name of project, scale of project, number of employees, etc.) (ii) Characteristics of a project 12 items (population in administrative district, served population, population density, service ratio, etc.) (iii) Characteristics of a district 4 items (annual rainfall, average temperature, future population (100 in 2000), classification of receiving water body, etc.)
Performance Indicators (PI) Performance indicator means indicator to evaluate quantitatively results and levels of operation and maintenance service. PIs are composed of 56 items, and categorized as follows.

Category	Performance Indictor (PI)	Calculation Formula	Improvement
1. Operation (sewers) (7 items)			
Op10	Ratio of age of facility (sewer)	Total length of sewers exceeding life time / Total length of sewers maintained x 100	↓
Op20	Ratio of inspected sewers	Total length of inspected sewers / Total length of sewers maintained x 100	↑
Op30	Ratio of repaired sewers	Total length of repaired sewers / Total length of sewers maintained x 100	↑
Op40	Ratio of inspected house connections	Number of inspected house connection / Total number of house connection x 100	↑
Op50	Number of repaired house connections (per 100,000)	Number of repaired house connection / Total number of house connection x 100,000	↑
Op60	Number of collapses per 1 km of sewer	Number of collapse / Total length of sewers maintained	↓
Op70	Maintenance cost per 1 m of sewer	Maintenance cost for sewers / Total length of sewers	↓
2. Operation (wastewater treatment) (12 items)			
Ot10	Ratio of age of main equipment	Total age of main equipment / Total average life time of main equipment x 100	↓
Ot20	Ratio of marginal wastewater treatment capacity	(1- Daily maximum DWF / Design capacity for DWF) x 100	↑
Ot30	Ratio of emergency power source security	Number of STPs with emergency power source / Total number of STPs x 100	↑
Ot40	Ratio of earthquake resistant facilities	Number of earthquake-resistant buildings /Number of buildings to be earthquake-resistant x 100	↑
Ot50	Compliance with discharge standard (BOD)	Number of tests complied with standard (BOD) /Total number of tests (BOD) x100	↑
Ot60	Compliance with standard (COD)	Number of tests complied with standard (COD) /Total number of tests (COD) x100	↑
Ot70	Compliance with standard (SS)	Number of tests complied with standard (SS) /Total number of tests (SS) x100	↑
Ot80	Compliance with standard (T-N)	Number of tests complied with standard (T-N) /Total number of tests (T-N) x100	↑
Ot90	Compliance with standard (T-P)	Number of tests complied with standard (T-P) /Total number of tests (T-P) x100	↑
Ot100	Compliance with standard of odor	Number of tests complied with standard of odor /Total number of tests of odor x100	↑
Ot110	Unit power consumption (wastewater treatment)	Power consumed (wastewater treatment) / Total wastewater treated	↓
Ot120	Unit disinfection chemical usage	Annual consumption of chemical / Total wastewater treated	↓
3. User Service (17 items)			
U10	Provision of storm water drainage	Area with storm water drainage / Total planning area x 100	↑
U20	Compliance with legal water quality standard for water body (BOD)	Number of samples complied with legal standard (BOD) / Total number of legal tests (BOD) x 100	↑
U30	Compliance with legal water quality standard for water body (COD)	Number of samples complied with legal standard (COD) / Total number of legal tests (COD) x 100	↑

Category	Performance Indictor (PI)	Calculation Formula	Improvement
U40	Compliance with legal water quality standard for water body (SS)	Number of samples complied with legal standard (SS) / Total number of legal tests (SS) x 100	↑
U50	Compliance with legal water quality standard for water body (T-N)	Number of samples complied with legal standard(T-N) / Total number of legal tests (T-N) x 100	↑
U60	Compliance with legal water quality standard for water body (T-P)	Number of samples complied with legal standard (T-P) / Total number of legal tests (T-P) x 100	↑
U70	Compliance with legal water quality standard for water body (E-coli)	Number of samples complied with legal standard (E-coli) / Total number of legal tests (E-coli) x 100	↑
U80	Sewer Blockages (per 100,000 persons)	Number of sewer blockages / Served population x 100,000	↓
U90	Third party accidents (per 100,000 persons)	Number of third party accidents / Served population x 100,000	↓
U100	Complaints (per 100,000 persons)	Number of complaints / Served population x 100,000	↓
U110	Response to complaints	Number of complaints responded within one week / Total number of complaints x 100	↑
U120	Service charge (residential)	According to local government	-
U130	Unit operating cost per person (O&M)	Operating cost (O&M) / Served population	↓
U140	Unit capital cost (capital)	Capital cost (wastewater) / Served population	↓
U150	Unit cost (O&M + capital)	Cost (wastewater) / Served population	↓
U160	Unit revenue per staff	Revenue / Number of staff	↑
U170	Unit revenue water per staff	Annual volume of revenue water / Number of staff	↑
4. Management (13 items)			
M10	Unit revenue water per person per day	(Annual revenue water / number of days) / Served population	↑
M20	Accounted-for water	Annual accounted-for water / Total treated wastewater x100	↑
M30	Current balance	Gross earning / Total cost x 100	↑
M40	Transfer ratio (profitable earning)	Transfer / Profitable earning x 100	↓
M50	Transfer ratio (capital earning)	Transfer / Capital earning x 100	↓
M60	Unit revenue	Total revenue / Total accounted-for water	↑
M70	Unit wastewater treatment cost	Wastewater treatment cost / Total accounted-for water	↓
M80	Unit wastewater treatment cost (O&M)	Wastewater treatment cost (O&M) / Total accounted-for water	↓
M90	Unit wastewater treatment cost (capital)	Wastewater treatment cost (capital) / Total accounted-for water	↓
M100	Cost covering ratio	Service charge revenue / Wastewater treatment cost x 100	↑
M110	Cost covering ratio (O&M)	Service charge revenue / Wastewater treatment cost (O&M) x 100	↑
M120	Cost covering ratio (capital cost)	Service charge revenue / Wastewater treatment cost (capital) x 100	↑

Category	Performance Indictor (PI)	Calculation Formula	Improvement
M130	Working accidents (per 1million m^3 treated wastewater)	Number of accidents which caused 4 days of absence or more / Total wastewater treated x 1,000,000	↓
5. Environment (7 items)			
E10	Pollutant reduction ration in dry weather (BOD)	(1 - Effluent BOD / Inflow BOD) x 100	↑
E20	Wastewater reuse	Wastewater reused / Total wastewater treated by advanced treatment x 100	↑
E30	Sludge recycle ratio	Sludge recycled / Total sludge generated x 100	↑
E40	GHG emission per person	GHG emission by sewerage service in terms of CO2 / Served population	↓
E50	Compliance with standard for discharge to sewerage	Number of compliance with standard / Total number of samples x 100	↑
E60	Service ratio of advanced treatment for environmental standard	Population served by advanced treatment / Served population x 100	↑
E70	Improvement of combined system	Area for which combined system was improved (ha) / Total area of combined system (ha) x 100	↑

"References"

References mean indicators that are utilized for determination of higher policy or measure such as fulfillment of environmental policy, and enhancement of accountability and understanding of customers. References are composed with 34 items and categorized as follows.

(i) Indicators for management analysis

8 items (Annual facility improvement ratio, total cost coverage ratio, average depreciation ratio, etc. indicators required when local public entity act is applied)

(ii) Indicators for high degree analysis

12 items (Rehabilitation of aged sewers, ratio of earthquake resistant sewers, cost for countermeasures against flooding, etc. indicators for enhancement of various users understanding)

(iii) Other indicators

14 items (energy cost, qualification holding ratio, repair cost for wastewater treatment plant, etc. indicators for more detailed management analysis)

Source: Guideline for improving O&M of wastewater systems, 2007, Japan Sewage Works Association

7.3.2 Capacity Development of Sewerage Operation

(1) Capacity Development Program

Capacity development program of sewerage operation is shown in Table 7-4.

Individual sub-programs carefully require institutional design in accordance with the role of each capacity development. These sub-programs shall be followed up during Project stages from detail design and construction through O&M. For example, direction of public sewer connection (guidance on urban development project) brings a win-win solution to both building owners and sewerage administration if sewerage operation starts prior to building construction because Building Construction Permission relieves the building owners from their obligation of on-site treatment installation.

Issues remain on public awareness of tariff levy and collection. The tariff system shall collaborate with the existing building wastewater discharge regulations and public relations. In other words,

regulations shall be carefully enforced through professional advice in order to enhance public awareness on sewerage service.

Table 7-4 Capacity Development Program of Sewerage Operation

Sub-program	Lecturer	DD Stage	Construction Stage	OM Stage
Sewerage ordinance	Large city	Enacting sewerage ordinance	Individual regulation Direction of public sewer connection Occupation and construction approval	Implementation & follow up
Sewerage tariff	Large city BPLHD	Institution design Tariff system & collection	Guiding building wastewater discharge & PR	Implementation & follow up
Sewer management				
Asset management system	Large city, Consultant	Sewer information system (Platform)	Facility constructed data inputted	Implementation & follow-up
Monitoring building wastewater	Large city	Guideline of pretreatment facility installation	Customer data provided	Implementation & follow-up
Sewer construction (Pipe jacking technology)	Public institution & Construction company	Planning & design manual Requirements of construction & materials	OJT	-
Water front improvement & Public Relation	Large city & NGO	Case study and proposals on administration	Case study Advice on waterfront improvement project	Follow-up
Treated wastewater reclamation & rain water use	Large city BPLHD	Manual of treated wastewater reclamation and rain water use Case study	Guidance on building construction	Sewerage service area notification & follow-up

(2) Sewerage Training Center

Training on practical basis is indispensable for construction projects and capacity development of sewerage service.

Since training needs are limited in the beginning stage of sewerage construction, temporary training courses are sufficient. Pejagaran STP can be used as a training facility because its use will ensure practical training and cost saving for a training center. Since Pejagaran STP is the largest organization related to activated sludge process, it is the most appropriate for acquiring wastewater management principles.

Training programs require TOT (training of trainer). Japanese experts will train engineers of PD Pal Jaya who could then be Indonesian trainers. The TOT program shall nominate trainees among staff who are engaged in daily sewerage services and shall help them acquire expertise of the training program and practical manual development. The training program is composed of lectures in the classroom and OJT for sewerage service operation.

(3) Individual Training Program

Manager class and O&M staff are developed in accordance with the human resource development program proposed in the MP Review. Human resource development shall be derived from needs of DKI Jakarta and PD Pal Jaya appropriately. Accordingly, trainers shall acquire skills and know-how useful for the Jakarta sewerage. The recommended training program is shown in Tables 7-5, 7-6 and 7-7.

Table 7-5 Training Subjects for Mangers & Engineers

Training class	Subjects	Venue
Manager and O&M staff	Role of sewerage, Planning and design of sewerage system	OJT plus training in Japan
Manager	Finance and tariff system Public relation	OJT plus training in Japan
O&M staff	Sewerage treatment process	Pejagaran STP
	Sewer management	OJT in Zones 0 & 1

Source: JICA PPP Study Team

Table 7-6 Subjects of Sewerage O&M and Finance

Training Subjects
Sewerage policy and public sanitation (history and regulations)
Design, construction and maintenance of sewer
Information system of sewer
Wastewater treatment
Sewage sludge treatment and management
Water quality management and water quality analysis
Operation & maintenance of machinery
Building sewer and business wastewater monitoring
Sewerage administration (urban development project and business wastewater)
Water supply and wastewater business operation (financing and management)

Source: JICA PPP Study Team

Table 7-7 OJT Training Subjects

OJT of sewer maintenance in a pilot area
OJT providing sewer management plan
OJT of GIS data in a pilot area
Operation and maintenance in STP
Water quality management and water quality analysis in STP
Preparation of O&M plan (SOP：Standard Operation Procedures)

Source: JICA PPP Study Team

7.4 Human Resources Development Plan

7.4.1 Concept Based on Division of Roles between Public and Private Sectors

As described in 4.2.1, the implementation structure of PPP projects can be roughly divided into the construction and maintenance/administration of the pipe network by the responsible public sector, and the construction and maintenance/administration of the sewage treatment plant (STP) with the private sector's involvement (O&M company, SPC) (Figures 4-6, 4-7, 4-8). Human resource (HR) development must be considered within this framework, but raising skills is essential for the performance of operations and monitoring when managing and running STP. Moreover, experience must be accumulated within the organization considering the operating system after 20 years from the start of operations when the asset is transferred. The issues and countermeasures for each operational item are outlined in the section below.

7.4.2 Roles of Public Sector and Required Capability

(1) Construction of Sewage Pipes

Since the sewer design is expected to be carried out by the public sector using ODA from FY 2014, training of HR in this field has the highest priority. In FY 2013, support for staff training and manual preparation will be essential on the premise that manuals and standards will be prepared for the sewer construction as described in 7.2.4. The training will cover the following subjects:

- Wastewater collection and treatment plan
- Storm water management plan
- Sewer plan
- Off-site storage plan
- Sewer construction

(2) Sewer Management

Training on a wide range of management tasks described in 7.2.3, such as the location and structure of sewers, information on users, maintenance and management such as inspections and cleaning, monitoring of influent water, prevention of accidents leading to damage, and sharing of information on road construction, must be completed by FY 2017 when STP starts operation. The following manuals and standards must also be formulated by FY 2016 at the latest.

- Pipe jacking technology plan and design manual
- Pipe jacking work estimates
- Pipe jacking work supervisory standards
- Sewer materials quality management standards

In addition, the training must also deepen understanding of the following issues:

- Shift to maintenance and management on the premise that management based on prevention is preferable to management based on responding to events after they have occurred
- Renovations to sewers

(3) Tariff Levy

Sewage tariff rates are unlike water service in that it is difficult to directly instill awareness that paying an equivalent value enables users to enjoy a service. In particular, as in countries with advanced underground sewage systems, city center sewage in the target region will be incorporated using an interceptor, so when considering the imposition of tariffs, ensuring residents' understanding is the most important issue. Japan has an extremely low arrears rate on water and sewage rates, which can be attributed to government administrators' sincere and persistent responses to residents, and unremitting improvements in customer awareness. It is important that these experiences and know-how be shared.

A levy system will have to be imposed in fiscal 2017, when the sewage system begins operating, and given that it must be approved in the regional congress, the approach to the levy must be understood among the participants in 2013, the year that the Project starts.

The key training components would be as follows:

- Concept of setting sewage tariffs
- Collection system
- Addressing those in arrears
- Improving residents' understanding

(4) Sewage Treatment Plant Operation and Management

Currently, Japan is using designated specification contracts for inclusive outsourcing of operation and management of its sewage treatment plants to the private sector. Although conditions are different, many issues are similar in this Project since the private sector will provide O&M services. Accordingly, the "Manual on Introducing Inclusive Private-Sector Outsourcing (Draft)" (hereafter, "Manual"), published by the Japan Sewage Works Association, has been used as a reference.

In Japan's concept of inclusive outsourcing, the scope of responsibilities is ranked from level 1 to 3, with the assumption being that this scope will gradually be expanded. However, since the sewage treatment plant being built in this project will be managed by the private sector, isseus that would occur up to the level 3 stipulated in the Manual—in other words, operations and maintenance, utility management and repairs—will be examined.

When outsourcing to the private sector, the public sector can expect to have the following key responsibilities.

- Legally-mandated managerial responsibilities

- Setting demand standards
- Examination of business plans prepared by contractor
- Selection of appropriate contractor
- Supervision of operations carried out by contractor
- Checking reporting items from contractor
- Developing a mechanism for identifying and assessing water quality and water volume
- Regularly confirming plant functions
- Repairing and renovating plant
- Response when requirement levels are not met or emergencies occur, establishing a system
- Supervision of influent from factories, etc.
- Payment of consignment costs
- Cost analysis to reflect in next contracts, identifying operational results and performance capacity

The following qualities and knowledge are essential in accomplish these operations.

- Legal code governing sewage system
- Knowledge about sewage systems overall
- Understanding functions of sewage treatment plant and operating the plant
- Ability to make decisions on fundamental aspects of O&M for sewage treatment plant
- Water quality management
- Sludge management
- Concepts on costs
- Renovations to plant

(5) Training Implementation Method

In the near term, the best approach would be to invite the staff members s to Japan, elicit the cooperation of experienced sewage operators, form teams for each operation, and then learn on-the-spot about sewer construction and O&M, sewage treatment plan operation and management, instructions on connections and tariff collection. After returning to Indonesia, the employees who received this training should take the central role in providing in-house training so that their knowledge can be shared within the organization. Training that can be reliably implemented in-house after the manual and standards are established is essential.

By repeatedly carrying out this kind of in-house training and revising it as necessary, a standard menu for training utilizing the Pejagalan STP as the sewage training center, as described in 7.3.2, can be developed.

(6) Timing of Training Implementation

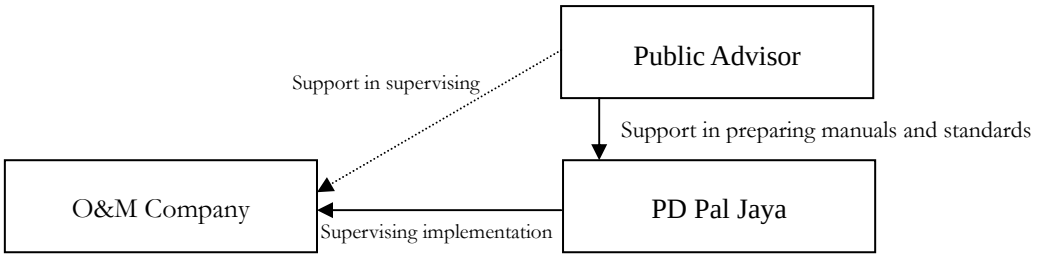
Given that the BOT bidding will take place in FY 2014, during FY 2013 systems for both the outsourcer and contractor must be developed in FY 2013 after companies are selected through an equitable process. Given the time required for the new introduction of selection procedures, negotiations with contractors, and the decision-making process within the organization, training to quickly acquire the above skills or technology transfer via ODA consultant services is essential.

(7) Support from Advisor

When outsourcing operations and management on an inclusive basis, the public sector's responsibilities are streamlines, but there is the risk of business collapse, deteriorating water quality, and damage to the facility. Accordingly, it is important to build an efficient and dependable oversight system. Even if PD Pal Jaya employees are given training in the areas noted above to improve their skills, they have almost no experience, so there is reason to doubt their ability to develop an oversight system.

Currently in Japan, methods involving collaboration between the private and public sectors in reconstructing, maintaining and managing and running local governments' sewage systems, which were damaged in the Great East Japan Earthquake, are being considered. Not only is this intended to alleviate the responsibilities of local government employees affected by the earthquake, but also to incorporate the usefulness of the support provided by public organizations' "public advisors" in order to provide advice, techniques and support with clerical work based on a wealth of experience. Support from a public advisor could stabilize project operations and reinforce crisis management, and would thus be effective in pursuing this project.

Moreover, support from a public advisor could also be extremely useful not only when it comes to outsourcing sewage treatment plant operations, but also in preparing manuals and standards for sewage plant construction and management, and implementing in-house training.



Source: JICA PPP Study Team

Figure 7-1 Scheme of Support by Public Advisors

7.4.3 HR Development Schedule

Assumed Schedule

		'13	'14	'15	'16	'17	'18	'19	'20
Assumed project schedule (reprint)	Sewer pipe and drain design, procurement and construction by public sector		→		→	→	→	→	→
	Operation, maintenance and management of sewer pipe and drains by public sector					→	→	→	→
	Sewage treatment plant design, procurement and construction by private sector		→	→	→				
	Operation, maintenance and management of sewage treatment plant by private sector					→	→	→	→
Public sector's assumes responsibilities	System design (legal code, rate system, connection requirements, etc.)		→	→	→				
	Preparation of sewer construction manual	→	→						
	Establishment of sewer management system (establishment of management and administrative office, manuals, etc.)			→	→				
	Formulation of rules for outsourcing of sewage treatment plant operation and management (scope of operations, demand standards, division of risk, etc.)	→	→						
	Selection of contractors	→	→						
	Implementation oversight		→	→	→	→	→	→	→
Training	Sewers (plan, construction, management)	→	⇢	⇢	⇢	⇢	⇢	⇢	⇢
	Sewage treatment plant (plan, operation and management)		→	⇢	⇢	⇢	⇢	⇢	⇢
	Tariff levies	→	⇢	⇢	⇢	⇢	⇢	⇢	⇢
Support	Sewer support	→	→						
	Support with contracts for outsourced operations			→	→	→			
	Support for implementation oversight					→	→	→	→
	In-house training			→	→	→	→	→	→

Solid lines indicate training conducted by invitation in Japan; broken lines indicate in-house training.

7.4.4 Training by Invitation in Japan

(1) Purpose of Training by Invitation

- Employees of central governments, local governments and sewage companies related to this project will be invited to Japan to deepen their understanding of sewage treatment and sludge management technology, including advanced treatment, and will gain the ability to determine the technology that should be adopted at the Pejagalan STP.
- By gaining an understanding of the role played by sewage systems in urban environmental management and a history of countermeasures, a sense of determination to pursue the sewage project will be cultivated.
- Trainees will gain an understanding of more feasible sewage construction methods as well as future accommodations so that the investment effects can be realized as quickly as possible.

(2) Components of Training Plan

- Effect that construction of a sewage system has on a city
- Construction of a sewage system tailored to city's conditions
- Measures to enhance residents' awareness of the importance of maintaining the aquatic environment
- Cutting-edge sewage treatment technology and examples of its application
- Concept of sewage tariff levy and status of implementation
- Sludge treatment
- Reuse of reclaimed wastewater
- Use of empty upper area at sewage treatment plant
- Sewer construction

(3) Training Implementation

In the initial plans, training was to have been held for about ten days for the management staff and engineers, respectively, twice in March and July 2012. However, due to the circumstances, only one training session was held at the end of September, and due to requests that the trip be condensed into six days from arrival in Japan to arrival in the home country, some topics had to be omitted from the training.

In these conditions, in order to get the most effect from the training, priority was given to observation rather than classroom lecture so that the trainees could see how the plants actually worked and experience actual operations. After a lecture, trainees were given a tour of the storm overflow chamber and discharge point located in a park in Kitikyushu so that they could observe a facility that would be difficult to understand from a textbook alone.

Training dates: Arrival in Japan on September 30 (Sunday) to arrival home on October 4 (Thursday), 2012

Trainees visiting Japan: Total of 14 (from MOF, BAPPENAS, PU, IIGF, DKI, PD Pal Jaya)

(4) Objectives

a) To understand the history of sewage systems in cities and the effect of their installation
b) To learn about cutting-edge technology used with sewage treatment
c) To understand the importance of improving residents' awareness

(5) Details of Training

Subject	Type	Lecturer request	Overview	Objective
History of improvements to aquatic environment in Kitakyushu	Lecture	Kitakyushu	The lecture discussed the severe water and air pollution that Kitakyushu previously suffered from due to wastewater and smoke from factories, and how the initiatives it took led to its declaration as a "model environmental city," as well as how its sewer construction takes advantage of its rolling geography. The lecture also discussed how a combined sewer system was used initially, and was quickly brought into service.	a)
Environmental Museum of Water	Visit	Kitakyushu	Training participants toured a museum built to raise citizens' awareness about the importance of the environment with a greater understanding of the clean-up of Kitakyushu's well-known Murasaki River and the inititatives taken to purify it.	a), c)
Hiagari Purification Center	Visit	Kitakyushu	Training participants toured the center to see how energy is efficiently used in a sewage treatment plant.	b), c)
Kitakyushu Water Plaza	Visit	Global Water Recycling and Reuse Solution Technology Research Association	Training participants observed a plant testing the membrane treatment to reuse treated wastewater and learned about types of membrane treatment technology and applications.	b)
Sanbo Sewage Treatment Plant	Visit	Sakai-shi	Training participants toured a sewage treatment plan applying the membrane treatment on the largest scale in Japan, and learned about the difference with standard treatment methods and plant conditions during operations.	b)
Lake Biwa Museum	Visit	Lake Biwa Museum in Shiga Prefecture	A Museum's Research Scientist explained the natural functions of Lake Biwa, which is one of the world's oldest lakes and the source for 13 million people in the Osaka metropolitan district, as well as its history and people's lifestyle. Training participants were given a tour of the museum, which raises residents' awareness about environmental conservation at the lake.	c)

(6) Opinions from Training Participants (summary from evaluation meeting held at JICA Kansai in Kobe on the final day of the training)

1) Combined sewer system and separate sewer system

While some trainees felt that being able to see the structure of a facility with a storm overflowchamber with their own eyes gave them a good understanding of the advantages of a combined sewer system, some trainees felt that they did not gain an adequate understanding of the combined sewer system. This may have been because time constraints meant that there was no time to thoroughly explain the issues and steps for improvements in the combined sewer system.

2) Cost burden of national government and local governments

The trainees understood the role of the national government and local governments in constructing and maintaining sewage systems in Japan, but employees from the central government (particularly MoF and IIGF) made cautious statements on the cost burden, while expressing their understanding of the long-term effect of construction.

3) Technology adopted in sewage treatment plants

Given the difficulty in acquiring a site for a sewage treatment plant in Jakarta, the trainees gained a general understanding of the introduction of MBR at the Pejagalan sewage treatment plan. However, some trainees felt that MBR operations were better suited to Jakarta in terms of energy consumption, and that this technology was too advanced for Pejagalan. Several trainees asked for technical training so that it could be properly maintained after introduction.

4) Raising citizens' awareness

Participants felt that they understood the importance of environmental education, given the burden of sewage charges.

5) Training schedule

Many participants felt that the schedule was extremely tight and that they were pressed for time.

(7) Future Training

Due to time constraints and the wide range of fields in which the participating trainees worked, the training conducted October 2012 was narrowly focused on basic topics necessary to make decisions in the near term, such as the need for a sewage system, the effect of its construction, and drainage and treatment technologies, rather than delving deeper into specific fields. In this sense, trainees developed a common perception on sewage construction, and also formed the base for receiving

training on more advanced subjects in the next stage. Considering this fact, subsequent training must be elaborately planned as described in this section.

A list of the trainees visiting Japan, the training schedule, training texts and pictures are included in Chapter 7 of “Volume 2: Supporting Report”.

Chapter 8 Environmental and Social Considerations

8.1 Baseline Information of the Natural and Social Environments

The Project for the sewage treatment plant (STP) and sewer network may cause potential environmental impacts. This section presents baseline information on the natural and social environments that may be affected by the Project activities, either directly or indirectly.

8.1.1 Natural Environment

(1) Temperature and Humidity

Temperature and humidity data were obtained from Halim Perdana Kusuma Jakarta Climatological Station Jakarta for the ten (10) years of 1998–2007. Temperature and humidity data are presented in Table 8-1.

Table 8-1 Temperature and Humidity

Month	Temperature			Humidity (%)
	Average (^{o}C)	Max (^{o}C)	Min (^{o}C)	
January	27.5	32.6	22.4	79
February	26.9	32.4	23.1	82
March	27.6	32.2	24.3	78
April	28.2	33.7	14.6	78
May	28.4	33.4	23.5	76
June	27.5	32.4	22.9	75
July	27.5	33.0	21.5	72
August	27.9	32.8	21.9	68
September	28.3	34.2	14.0	69
October	28.8	33.8	23.8	69
November	28.7	36.4	24.0	71
December	28.2	34.0	24.2	76

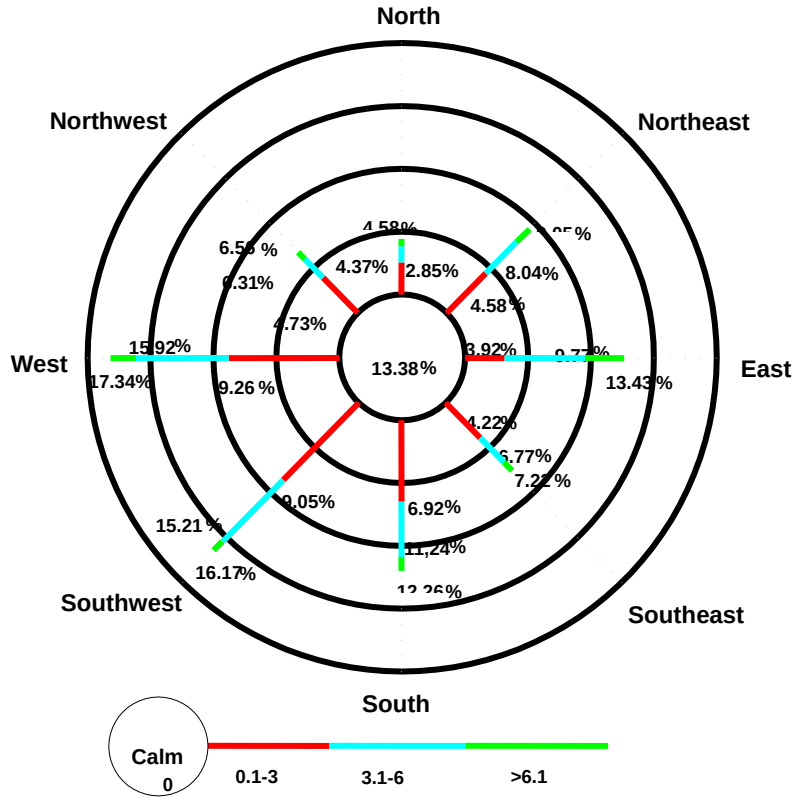
Source: BMKG Jakarta, 2008

According to Table 8-1, the average air temperature ranged from 26.9°C–28.8°C. The lowest minimum temperature of 14°C was recorded in September. The highest maximum temperature of 36.4°C was recorded in November.

As for the area around the Project site, the highest average humidity is 82%, which occurred in February, and the lowest average humidity is 68%, which occurred in August.

(2) Wind Speed and Direction

Based on the data from wind speed and direction observation, the most frequent wind speed is between 0.1 knots and 3 knots at 9.26%. The predominant wind direction is the wind blowing from the west. More details can be seen in Figure 8-1.



Remark: wind speed in knots

Source: JICA PPP Study Team

Figure 8-1 Wind Rose

(3) Topography and Geology

Administratively, the Project site for the STP belongs to the area of Penjaringan-North Jakarta, which is between the Banjir Kanal Barat River and Pluit–Tomang Toll Road.

The site is in the northern coastal area of Jakarta that extends from east to west. The relief of the surface area of the coastal plain north of Jakarta is generally fine to almost flat.

The STP Project site is affected by the tide of seawater coming through the Banjir Kanal Barat River. Currently, it is protected by the embankments of the Banjir Kanal so the water does not overflow and reach the Project site. But prior to the embankments, the Project site was a potential flooding area, which is evident by the presence of the marsh that is still flooded and currently partly used as a fishpond.

Inundation area on the site used for fishpond

Inundation area in the proposed site

Source: JICA PPP Study Team

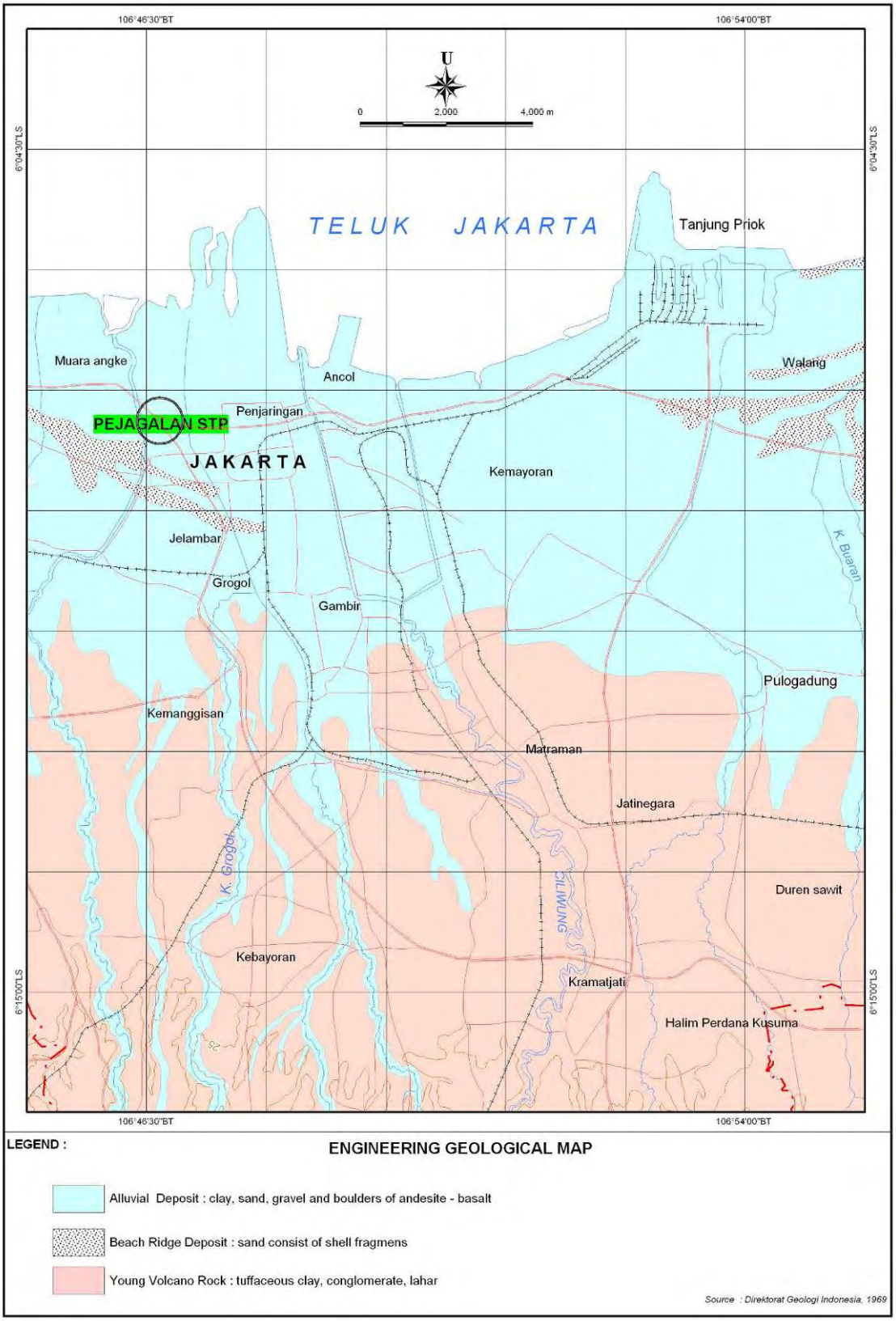
Figure 8-2 Marshy Area in the Project Site

Based on the engineering characteristics seen in the Engineering Geology Map (Figure 8-3) prepared by the Directorate of Indonesian Geology, Murdohardono et al. 1969 and 1993, the proposed Project soil is composed of a unit of sandy silt-organic clay. This alluvium deposit is a marshy deposit with an inset of sandy clay. The sandy silt and organic clay is blackish-gray and gray; the consistency is very soft to soft, it has medium to high plasticity, high compressibility, low permeability, water content and high organic material, with the remains of plants having been found. The thickness of this alluvium deposit varies from 2 up to 25 meters.

The STP site is a marshy area where backfill soil has been dumped, which is now the Penjaringan City Park.

The loose backfill soil in this uppermost surface of the Project site shall be removed before the STP is constructed and the additional filling height of the embankment will be less than 1.0 m. Thus, consolidation settlement of the alluvium deposit in the Project site is not expected.

According to an existing soil boring log near the Project site, soil liquefaction risks are negligible in the Project site because there are no fine sand layers up to 20 meters below the surface.



Source: Directorate of Indonesian Geology, Murdohardono et al. 1969 and 1993

Figure 8-3 Engineering Geological Map

(4) Air Quality

To find the existing air quality at the Project site and in the surroundings, ambient air quality sampling was done for the parameters CO, SO_2, NOx, Pb and dust. The air quality measurements were conducted at two locations, namely:

AQ1: At the front yard area of Penjaringan City Park

AQ2: At the backyard area of Penjaringan City Park

The exact measurement points are exhibited in Figure 8-4 and measurement results of ambient air quality are presented in Table 8-2.

Table 8-2 Results of Ambient Air Quality near Project Site

No	Parameter	Unit	Measurement Result		Air quality standard*
			AQ1	AQ2	
1	NO_2	$\mu g/m^3$	41.24	42.62	400
2	SO_2	$\mu g/m^3$	29.99	31.85	900
3	CO	$\mu g/m^3$	4,101	4,204	26,000
4	Dust	$\mu g/m^3$	258	172	230
5	Pb	$\mu g/m^3$	0.15	0.11	2

Source: JICA PPP Study Team

* Decree of the Governor of Jakarta 551 of 2001.

In general, the air quality condition at the STP Project site is good, since all parameters of air quality comply with the ambient air quality standards (Decree of the Governor of Jakarta 551 of 2001). This is due to the absence of significant sources of air pollution around the study area, such as the emission gas of passing vehicles.

(5) Noise

Noise intensity measurements were carried out in the Project site and surrounding area. The results of measurements of noise intensity are presented in Table 8-3 and the sampling locations are shown in Figure 8-4. The noise intensity measurements obtained at the STP Project site and the surrounding area comply with the standard, due to the absence of specific activities that generate noise.

Table 8-3 Results of Noise Measurement

No.	Location	Noise Intensity dB (A)	Noise Standard dB (A) *
1.	Front yard of Penjaringan City Park	65.6	70
2.	Backyard of Penjaringan City Park	65.7	70

Source: JICA PPP Study Team

* Decree of the Governor of Jakarta 551 of 2001 Appendix II.

(6) Vibration

Vibration levels in the STP Project site and the surrounding areas were measured at two locations. The results of mechanical vibration measurement are presented in Table 8-4 and the sampling locations are shown in Figure 8-4.

Table 8-4 Results of Vibration Measurement

No.	Location	Vibration level (mm/second)	Vibration Standard *
1.	Front yard of Penjaringan City Park	0.1	2
2.	Backyard of Penjaringan City Park	0.1	2

Source: JICA PPP Study Team

* Decree of the Minister of Environment KEP-49/MENLH/11/1996 Appendix IV.

Based on Table 8-4, it is found that the vibration levels in the middle of the Project site (frontyard area) and in the illegal settlement to the north (backyard) comply with the quality standard.

(7) Odor

To determine the current level of odor at the STP Project site, samplings of ammonia (NH_3) and sulfide (H_2S) were taken. Odor measurements were taken at the front yard and backyard areas of Penjaringan City Park. The results of the analysis of odor level can be seen in Table 8-5.

Table 8-5 Results of Odor Level

No	Parameter	Unit	Analysis Results		Standard Quality *
			AQ1	AQ2	
1	NH_3	ppm	0,0985	0,0795	2
2	H_2S	ppm	0,005	0,005	0.02

Source: JICA PPP Study Team

* Decree of the Minister of Environment KEP-50/MENLH/11/1996.

Based on Table 8-5, it is found that the odor levels in the study area comply with the applicable quality standards.

Figure 8-4 Sampling Points

Source: JICA PPP Study Team

(8) Surface Water Quality

In order to obtain surface water quality data, water sampling at the Banjir Kanal Barat River and a pond in Penjanringan City Park was conducted. The results of the laboratorial analysis can be seen in Table 8-6, whereas the sampling locations are shown in Figure 8-4.

Generally, the quality parameters of river and pond water are in accordance with the quality standards, but some parameters do not comply with the quality standards, such as conductivity, dissolved solids, Mn, sulfur, organic matter and COD. This shows that the river and pond water has already been contaminated by domestic waste.

The sampling location for S_3 is a fishpond, which is a land-locked pond; there is no water flow in and out (stagnant waterbody). The entry of impurities into the system will likely continue to accumulate resulting in elevated levels of contaminants. The fishpond is currently used as a fishing spot. Impurities coming from fishmeal, fish waste and other domestic wastes will increase the levels of organic matter and water COD. The high total dissolved solids (TDS), chloride and sulfate ions, indicate the fish pond suffers from intrusion of seawater or brackish water resulting in increased salt, sulfate salt and chloride, which are also total dissolved solids (TDS).

Table 8-6 Analysis Results of Surface Water Quality

NO	PARAMETER	UNIT	RESULT				QUALITY STANDARD *
			S_1	S_2	S_3	S_4	
A.	**PHYSICAL**						
1	Electrical Conductivity	µmhos/cm	303	297	6,200	706	500
2	Dissolved Solids	mg/L	162	158	3,670	383	500
3	Turbidity	NTU	15	5	29	44	100
4	Temperature	°C	29.0	31.0	32.1	31.5	Normal
5	Color	Pt-Co	12	13	21	11	100
6	Suspended Solids	mg/L	45	26	61	59	100
B.	**CHEMICAL**						
1	Mercury (Hg)	mg/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.001
2	Free Ammonia (NH_3-N)	mg/L	0.04	0.04	0.30	< 0.01	1.0
3	Arsenic (As)	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	0.05
4	Barium (Ba)	mg/L	< 0.1	< 0.1	< 0.1	< 0.1	1.0
5	Iron (Fe)	mg/L	< 0.06	0.35	0.22	0.35	2.0
6	Fluoride (F)	mg/L	0.09	< 0.01	0.12	< 0.01	1.50
7	Cadmium (Cd)	mg/L	< 0.003	< 0.003	< 0.003	< 0.003	0.010
8	Chloride (Cl)	mg/L	25.5	24.1	2,024.7	53.3	250
9	Chromium VI (Cr^{6+})	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.050
10	Manganese (Mn)	mg/L	< 0.02	0.40	1.12	< 0.02	0.50
11	Nitrate (NO_3-N)	mg/L	0.2	0.1	< 0.1	0.6	10.0
12	Nitrite (NO_2-N)	mg/L	0.023	< 0.002	< 0.002	0.091	1.0
13	Dissolved Oxygen (DO)	mg/L	3.0	2.0	3.0	3.0	3
14	pH	mg/L	6.88	6.88	7.88	7.50	6.0-8.5
15	Selenium (Se)	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	0.010
16	Zinc (Zn)	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	1.0
17	Cyanide (CN)	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	0.050
18	Sulphate (SO_4)	mg/L	29.2	23.6	408.2	56.9	100
19	Sulfide (H_2S)	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	0.10

NO	PARAMETER	UNIT	RESULT				QUALITY STANDARD *
			S_1	S_2	S_3	S_4	
20	Copper (Cu)	mg/L	< 0.02	< 0.02	< 0.02	< 0.02	0.10
21	Lead (Pb)	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.10
22	Phenol	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	0.050
23	Oils and grease	mg/L	< 0.2	< 0.2	< 0.2	< 0.2	Nihil
24	Detergent (MBAS)	mg/L	0.03	0.26	0.05	0.01	1.0
25	Phosphate (PO_4-P)	mg/L	0.26	0.28	0.22	0.08	0.50
26	Nickel (Ni)	mg/L	< 0.02	< 0.02	< 0.02	< 0.02	0.10
27	Permanganate Value ($KMnO_4$)	mg/L	15.2	14.0	25.1	16.1	15.0
28	BOD_5	mg/L	6	3	9	6	10
29	COD	mg/L	44	20	67	47	20
C.	**MICROBIOLOGY**						
1.	Fecal Coliform	MPN/100 ml	430	90	90	30	2,000
2.	Total Coliform	MPN/100 ml	930	150	230	70	10,000

Source: JICA PPP Study Team

* Decree of Governor of DKI Jakarta No. 582/1995 Quality Standard Category B

= Does not comply with the quality standard

(9) Groundwater Quality

Observation of groundwater at the Project site includes observation of existing wells at the Project site and those in public housing. To determine the quality of groundwater, water sampling was conducted for: deep well water of Parks Guard Post of Penjaringan (SU_1), residential well water of Pak Kasir RT. 06/16 Pejagalan (SU_2), well water under the flyover at the former MCK (SU_3) and well water under the flyover near the MCK (SU_4).

The well water was analyzed and the results can be seen in Table 8-7, while the sampling locations are shown in Figure 8-4.

Table 8-7 Analysis Results of Ground Water Quality

NO	PARAMETER	UNIT	RESULT				QUALITY STANDARD *
			SU_1	SU_2	SU_3	SU_4	
A.	**PHYSICAL**						
1	Odor (in situ)	-	Odorless	Odorless	Odorless	Odorless	Odorless
2	Total Dissolved Solids (TDS)	mg/L	1,384	2,200	1,808	1,603	1,500
3	Turbidity	NTU	18	9	23	11	25
4	Taste	-	Tasteless	Tasteless	Tasteless	Tasteless	Tasteless
5	Temperature	℃	30.4	30.6	29.3	30.5	Ambient ±3℃
6	Color	Pt-Co	5	5	8	4	50
B.	**CHEMICAL**						
1	pH	-	7.02	6.35	7.03	6.74	6.5 – 9.0

NO	PARAMETER	UNIT	RESULT				QUALITY STANDARD *
			SU_1	SU_2	SU_3	SU_4	
2	Mercury (Hg)	mg/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.001
3	Arsenic (As)	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	0.05
4	Iron (Fe)	mg/L	< 0.06	< 0.06	0.10	< 0.06	1.0
5	Fluoride (F)	mg/L	0.39	0.24	0.65	0.52	1.5
6	Cadmium (Cd)	mg/L	< 0.003	< 0.003	< 0.003	< 0.003	0.005
7	Total hardness ($CaCO_3$)	mg/L	498.7	734.3	659.8	782.5	500
8	Chloride (Cl)	mg/L	337.5	1,079.8	723.7	539.9	600
9	Chromium VI (Cr^{6+})	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.05
10	Manganese (Mn)	mg/L	0.48	< 0.02	2.87	1.30	0.5
11	Nitrate (NO_3-N)	mg/L	2.4	3.3	1.6	3.2	10
12	Nitrite (NO_2-N)	mg/L	< 0.002	0.014	1.733	< 0.002	1.0
13	Selenium (Se)	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	0.01
14	Zinc (Zn)	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	15
15	Cyanide (CN)	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	0.1
16	Sulfate (SO_4)	mg/L	359.7	274.4	410.6	965.9	400
17	Surfactant (MBAS)	mg/L	0.05	0.04	0.05	0.03	0.5
18	Timbal (Pb)	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.05
19	Permanganate Value ($KMnO_4$)	mg/L	9.2	7.7	10.0	7.3	10
C.	**MICROBIOLOGY**						
1	Total Coliform	MPN/ 100 ml	0	20	64	0	50

Source: JICA PPP Study Team

* Regulation of the Minister of Health No. 416/MENKES/PER/IX/1990

= Does not comply with the quality standard

According to laboratorial analysis, there are some parameters that do not comply with the quality standards, namely: pH, Total Hardness and Chloride (SU_2); Total Hardness, Chloride, Manganese, Nitrite Sulfate, and Total Coliform (SU_3); Total Hardness, Manganese and Sulfate (SU_4). The high content of Nitrite, Sulfate, and Coliform within wells comes from domestic waste, whereas the high content of manganese comes from the layers of rocks/aquifers as the groundwater forms.

8.1.2 Social Environment

(1) Municipality and Demography

1) Pejagalan village

The Project site for the Sewage Treatment Plant at Penjaringan City Park is located in the village of Pejagalan, Sub-district of Penjaringan, North Jakarta. It is located to the north of Cengkareng Toll Road, Pluit Grogol. The Pejagalan village area is bordered by the Muara

Karang River and Jembatan Tiga Street on the east, the Tubagus Angke railroad tracks on the south and Tubagus Angke / Cisadane Rivers on the west. Pejagalan village is located at a height of 0.40 meters above sea level, so the area is often flooded.

According to the Central Statistics Agency (*Indonesian: BPS*) in 2011, the population of Pejagalan village is 56,594 people with 14,689 households consisting of 226 RT and 18 RW. With an area of 323 hectares or 3.23 km^2, the population density is 17,521 people per km^2. Referring to the population density category according to the standard of the Central Statistics Agency (in 2010), which establishes a population density of over 2,000 people per km^2 as a dense region, the population density of Pejagalan village is very dense at far above the standard. The population density in Pejagalan village is much higher than the average population density of Penjaringan Sub-district, which is 4,977 people per km^2. Among the five villages in the Sub-district of Penjaringan, the population density of Penjaringan village is the highest (see Table 8-8).

Table 8-8 Total Area and Population Density of Penjaringan Sub-District

No.	Name of Village	Total Area (km^2)	Total Population (People)	Population Density (People/km^2)
1.	Pejagalan	3.23	56,594	17,521
2.	Penjaringan	3.95	55,897	14,151
3.	Pluit	7.71	43,439	5,634
4.	Kamal Muara	10.53	5,979	568
5.	Kapuk Muara	10.05	14,760	1,469
	Total Population for Penjaringan Sub-district	35.47	176,669	4,981

Source: JICA PPP Study Team

Regarding education levels of the Pejagalan village residents, 9,500 people graduated from elementary school, 8,500 people graduated from junior high school, and 7,000 people graduated from high school. College graduates account for 1,000 people; those with Bachelor's degree number 2,500; 500 people have Master's degrees and 10 people have Doctoral degrees. Pejagalan village residents' livelihood comprises laborers: 7,872 people, traders: 12,809 people, private employees: 12,258 people, civil servants: 98 people, retirees: 544 people, other private sectors: 9,304 people, and others: 9,192 people.

2) Regional profile along the proposed sewer network

The sewer networks pass through the administrative area of 9 (nine) sub-districts and 26 (twenty six) urban villages, each of which belong to the three Administrative Cities, namely, Central Jakarta, North Jakarta and West Jakarta (see Table 8-9). The sewer installation will be mainly in the ground that crosses street borders and roads.

The 26 villages have a population of 72,516 people and cover an area of 49.75 km^2. With that total area and the amount of population, the average population density is 14,585 people per km^2. Compared to the average population density of Jakarta at 14,776 people per km^2, the population density in the study area is average.

The highest population density is found in the urban villages that belong to Tambora Sub-district, West Jakarta. The highest population density is in the Village of Jembatan Besi, amounting to 63,994 people per km^2, then the Village of Krendang at 57,306 people per km^2, and the Village of Tanah Sereal at 43,164 people per km^2. In general, the Sub-district of Tambora seems to have an above-average population density compared to other villages throughout the study area.

Table 8-9 Names of Village and Street along Sewer Network

Sub-District	Village	Street	Total Area (km^2)	Population	Population Density (person/km^2)
Administrative City of Central Jakarta					
1. Gambir	Petojo Utara	Suryo Pranoto	1.12	15,615	13,942
	Gambir	Veteran, Gajahmada, Abdul Muis	2.58	2,750	1,066
	Kebon Kelapa	Ir. H Juanda	0.78	9,690	12,423
	Petojo Selatan	Abdul Muis	1.14	12,459	10,929
2. Menteng	Menteng	Agus Salim, Purworejo, Sumenep, Moh Yamin	2.44	24,342	9,976
3. Sawah Besar	Gunung Sahari Utara	Gunung Sahari	1.90	16,792	8,838
	Manggadua Selatan	Pangeran Jayakarta	1.29	23,689	18,364
	Pasar Baru	Dr. Sutomo	1.89	12,345	6,532
4. Tanah Abang	Kebon Kacang	KH. Mas Mansyur, Kebonkacang Raya	0.71	20,661	29,100
5. Kemayoran	Gunung Sahari Selatan	Gunung Sahari	1.53	20,336	13,292
Administrative City of North Jakarta					
1. Penjaringan	Kel. Pejagalan	Bandengan Utara	3.23	74,561	23,084
	Kel. Pluit	Pluit Karang Raya, Muara Karang, Muara Angke, Pantai Mutiara	7.71	52,886	6,859
	Kel. Penjaringan	Muara Baru	3.95	113,554	28,748
	Kapuk Muara	Permai Raya	10.05	50,576	5,032
2. Pademangan	Pademangan Barat	Lodan Raya,	3.53	77,331	21,907
Administrative City of West Jakarta :					
1. Tambora	Krendang	Krendang Raya, Krendang Barat, Angke Jaya	0.32	18,338	57,306

Sub-District	Village	Street	Total Area (km^2)	Population	Population Density (person/km^2)
	Angke	Latumeten, Pangeran Tubagus Angke	0.80	29,857	37,321
	Tambora	Tambora	0.28	9,646	34,450
	Tanah Sereal	Tanah Sereal, Hanura 1	0.61	26,330	43,164
	Roa Malaka	Pakin, Gedongpanjang	0.53	2,858	5,392
	Pekojan	Jembatan Tiga, Bandengan Utara	0.78	26,273	33,683
	Jembatan Besi	Jembatan Besi	0.55	35,169	63,944
	Jembatan Lima	Jembatan Lima	0.46	19,593	42,593
Tamansari	Tamansari	Tamansari	0.68	15,161	22,296
	Mangga Besar	Mangga Besar, Mangga Besar V	0.51	7,341	14,394
	Glodok	Toko Tiga Seberang	0.38	7,466	19,647
			49.75	725,619	14,585

Source: BPS Province of Jakarta, 2012

Another relatively dense village is in Penjaringan village, North Jakarta. The highest population density is in Penjaringan urban village with 28,748 people per km^2, followed by Pejagalan village at 23,084 people per km^2.

The lowest population density is in the Village of Gambir, Sub-district of Gambir, Central Jakarta, which is 1,066 people per km^2. If compared with the population density categories based on BPS standards (2010), which establish a population density of 2,000 people per km^2 as the limit for a dense category, then the population density in the Village of Gambir is below the average density. This condition results from the wide-open land in the region, which houses the National Monument Park, the central national government (including the Presidential palace) and the railway station.

(2) Involuntary Resettlement

1) Illegal occupants in Penjaringan City Park

Socio-economic profile

The city park was built by the Government of Jakarta in 2010, with the aim to increase green open space and recreational needs of the local community. Penjaringan City Park doesn't belong to any administrative area, including the village of Penjaringan. The area is popularly known as RT 0 and RW 0.

In the early stages of the establishment of the park, the government cleared the land. However, the existence of cleared land resulted in outsiders occupying the site. The

backgrounds of the residents who occupy the land have the same characteristics as those who settle under the toll road (which borders Penjaringan City Park). They are people who work in informal sectors, such as garbage collectors (i.e., scavengers), retailers, and handymen. The existing condition of land use by the residents in Penjaringan City Park comprises houses, places of business, fishponds and practices of alternative healthcare. From a survey, 57 families or about 230 persons are known to occupy the city park.

Scavengers have average monthly income of Rp. 526,000, while fishing spot businessmen earn Rp. 2,800,000. The average of monthly income per household of the illegal settlers in Penjanringan City Park is estimated at Rp. 1,076,000.

The Jakarta Provincial Government, through the North Jakarta Mayor HM Effendi Anas, as of August 16, 2007 issued a warrant for eviction No. 3777/-1.711 regarding evicting the residents living under Penjaringan–Tanjung Priok Toll Road, Tanjung Priok Sub-district, Pademangan Sub-district and Penjaringan Sub-district, North Jakarta Municipality. The Jakarta Provincial Government offered to provide flats for about 25% of the evictees who have ID cards. For the rest who did not have ID cards, they were only offered compensation cost (*Indonesian: Uang Kerohiman*) and were asked to leave Jakarta.

The residents under the toll road, most of who have no ID cards, did not approve the order and chose to survive by arguing that the provincial government could not forcibly evict either those who have ID cards or those who do not have ID cards. Supported by several non-governmental organizations (NGOs) that are concerned about them, their leaders have argued that the eviction should refer to one of the international rules on human rights on the prohibition of forced eviction. Strong arguments that were put forward by the residents occupying the area under the toll road and the city park have enabled them to survive until today.

It is alleged that some of the residents, who now live and reside in the city park, are residents who could not acquire the land under the toll road or residents who required more space for their business.

Community perception

Regarding community perception of the Project in the city park, the data presented in Table 8-10 shows that 40.91% of the population have agreed with the STP Project, 27.27% have agreed conditionally and 31.82% do not agree.

As much as 18.1% of the population who agree do so because their compensation would be in the form of money. According to them, the compensation is necessary because they would have to live side by side with activities causing odor and noise. Although they would receive compensation, they would not necessarily give up their right to live in the city park. According

to this group, they would remain in the area as long as the government does not provide shelter for them.

13.64% stated their approval of the STP Project activities because the time ranging from construction to the operational phase will provide employment opportunities for residents living in the city park. Employment opportunities that can be achieved by people according to their skill capacity are primarily jobs as unskilled workers. Job opportunities are expected by the residents, as is payment obtained routinely. These needs are considered quite large and can help the financial situations of the households.

As another reason for those residents to agree, they expect the Project site will be in their residential (9.09%) area so they expect that the government will help them obtain adequate housing elsewhere.

Table 8-10 Community Perception of the STP Project in Penjaringan City Park

No.	Type of Opinion	Amount	%
	Residents agree on:		
1	Obtaining replacement land	2	9.09
2	Providing employment opportunities	3	13.64
3	Getting compensation	4	18.18
	Sub-Total	**9**	**40.91**
	Residents agree with conditions of:		
1	No eviction	2	9.09
2	Compensating	2	9.09
3	Providing employment opportunities	1	4.55
4	Project site is outside settlement area	1	4.55
	Sub-Total	**6**	**27.27**
	Residents disagree on:		
1	Adding a reason for government eviction	4	18.18
2	Eliminating business opportunities	2	9.09
3	Comfort disturbances	1	4.55
	Sub-Total	**7**	**31.82**
	Grand Total	**22**	**100.00**

Source: JICA PPP Study Team

For those residents who agree conditionally, as much as 9.09% agreed with the construction of STP if there is no eviction of people living in the city park. As many as 9.09% of others stated their consent to be compensated for the disruption to their comfort as long as they do not have to move from that place.

Similarly, 4.55% of the residents stated that the proponent should provide employment opportunities for local residents. Employment opportunities are required by the population because the wages earned would meet the needs of households, compared to those from the business of waste collection. The last group is the one who agree to the condition that the Project site will not be within their settlement. Thus, they will be able to keep living and surviving, and carrying out other social activities.

From the group of residents who say they do not agree to the construction of STP, as many as 18.18% state that STP construction will only add to the reasons for the government to carry out evictions. As discussed in the previous sub-chapter, the residents do not want to move because they will not receive adequate housing from the government. The rest of the residents disagree because the presence of the STP would interfere with the businesses already established (9.09%). Some groups also claim to have investments like constructing fishing locations, stalls, traditional healing practices, and others. The presence of the STP is considered to interfere with investment and business activities they have carried out.

2) Illegal use of sidewalks and roads along sewer networks

The existing sidewalk and roads, which should have been functioning as road infrastructure, have been largely changed by local people. The sidewalks and roads have been used for business activities such as kiosks and stalls, parking lots, and areas for piling odds and ends. The illegal use of sidewalks and roads by local people was found in the three municipal areas during the time this survey was being performed (July 2012). Table 8-11 shows observation data on the use of sidewalks by local people. In 19 of 26 areas of the village, it was found that local people were using the sidewalks for functions ranging from stalls, kiosks, public motorcycle (Indonesian: ojeg) bases, and guard posts, to RW Secretariat posts, etc.

Table 8-11 Land Use Conditions on Sidewalks and Roads along Sewer Network

No.	Village	Street	Types of Businesses on Sidewalks used by local people along Sewer Network
Central Jakarta			
Gambir Sub-district			
1	Gambir	Pecenongan	Parking lot using sidewalks
2	Pasar Baru	Pos	Postal equipment sellers
Menteng Sub-district			
1	Menteng	Sumenep	Ornamental fish sellers
Sawah Besar Sub-district			
1	Manggadua Selatan	Pangeran Jayakarta	Kiosks and stalls and also RW 02 Post (on sidewalk, Telkom and Flexi STO (on sidewalk), shop houses
Tanah Abang Sub-district			
1	Kebon Kacang	KH. Mas Mansyur	Kiosks (on sidewalks)
2		Kebon Kacang Raya	Kiosks (on sidewalks)
North Jakarta			
Penjaringan Sub-district			
1	Pluit	Pluit Karang Barat	Kiosk and stall, church, bank and police office
2		Muara Karang Utara Raya	Kiosk and stall, siskamling/guard post
3	Penjaringan	Muara Baru	Kiosks and stalls on sidewalks
Pademangan Barat Sub-district			
1	Pademangan Barat	Lodan Raya	The under-toll road occupants, warehouse, stalls
West Jakarta			
Tambora Sub-district			
1	Tambora	Tambora	Kiosks and stalls, piles of odds and ends, electricity and telephone poles, (along Tambora Street on the sidewalks)
2		KH. Moch.Mansyur	Motorcycle sales place and parking lot, stamp maker, Telkom and Flexi STO (on sidewalks), telephone poles
3	Krendang	Krendang Raya	Kiosks (on sidewalks), Telkom and Flexi STO (on sidewalks)
4		Krendang Barat	Stall (on sidewalks), Linmas Office, Flexi STO
5	Tanah Sereal	Tanah Sereal	Stall (on sidewalks), ojeg base
6		Hanura 1	Kiosk, stall (on sidewalks), police office, ornamental plants sellers, RW office and Posyandu, waste carriers post
7	Roa Malaka	Gedong Panjang	Street vendors, tire service, truck parking lot, parking lot for automobile spare parts shops (on sidewalks)
8	Pekojan	Raya Jembatan Tiga	Street vendors
9	Jembatan Besi	Jembatan Besi	Workshop, stall and shop (on sidewalks), telephone poles

Source: JICA PPP Study Team

(3) Traffic Condition

1) Teluk Gong Raya Street

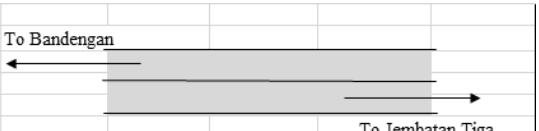
Teluk Gong Raya Street provides access to Penjaringan City Park. It is a two-way road with two lanes in each direction and is classified as a secondary collector road. The average

carriageway width is 14 m excluding a road shoulder approximately 1.5 m wide on both sides. To determine the current traffic condition, a traffic survey was performed during peak hours on both holidays and workdays.

The results of the traffic survey are exhibited in Tables 8-12 and 8-13.

Table 8-12 Traffic Volume of Teluk Gong Raya Street on Holidays

Provice	DKI Jakarta
District/City	Jakarta Utara
Segment	Teluk Gong Raya
Pos Number	1
Surveyor	Randi Suhendi
Supervisor	AgS
Date	1 Juli 2012

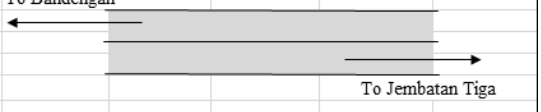


Peak Hour Period	Time	Light vehicle		Heavy vehicle		Motorcycle		TOTAL	
		Vehicle/Hour	pcu/Hour	Vehicle/Hour	pcu/Hour	Vehicle/Hour	pcu/Hour	Vehicle/Hour	pcu/Hour
MORNING	06.00 - 07.00	825	825	93	130.2	1538	769	2456	1724
	07.00 - 08.00	672	672	49	68.6	1427	713.5	2148	1454
	08.00 - 09.00	598	598	50	70	1531	765.5	2179	1434
	Total	2095	2095	192	268.8	4496	2248	6783	4612
AFTERNOON	11.00 - 12.00	938	938	215	301	1596	798	2749	2037
	12.00 - 13.00	942	942	243	340.2	1636	818	2821	2100
	13.00 - 14.00	926	926	202	282.8	1494	747	2622	1956
	Total	2806	2806	660	924	4726	2363	8192	6093
EVENING	15.00 - 16.00	983	983	292	408.8	1,505	752.5	2780	2144
	16.00 - 17.00	1128	1128	321	449.4	1,505	752.5	2954	2330
	17.00 - 18.00	750	750	303	424.2	1,486	743	2539	1917
	Total	2861	2861	916	1282.4	4496	2248	8273	6391

Source : JICA PPP Study Team

Table 8-13 Traffic Volume of Teluk Gong Raya Street on Workdays

Provice	DKI Jakarta
District/City	Jakarta Utara
Segment	Teluk Gong Raya
Pos Number	1
Surveyor	Randi Suhendi
Supervisor	AgS
Date	2 Juli 2012



Peak Hour Period	Time	Light vehicle		Heavy vehicle		Motorcycle		TOTAL	
		Vehicle/Hour	pcu/Hour	Vehicle/Hour	pcu/Hour	Vehicle/Hour	pcu/Hour	Vehicle/Hour	pcu/Hour
MORNING	06.00 - 07.00	852	852	92	128.8	1,615	807.5	2559	1788
	07.00 - 08.00	694	694	61	85.4	1,542	771	2297	1550
	08.00 - 09.00	625	625	79	110.6	1,469	734.5	2173	1470
	Jumlah	2171	2171	232	324.8	4626	2313	7029	4809
AFTERNOON	11.00 - 12.00	1028	1028	100	140	1,641	820.5	2769	1989
	12.00 - 13.00	1135	1135	95	133	1,721	860.5	2951	2129
	13.00 - 14.00	984	984	74	103.6	1,542	771	2600	1859
	Jumlah	3147	3147	269	377	4,904	2,452	8320	5976
EVENING	15.00 - 16.00	1019	1019	105	147	1,642	821	2766	1987
	16.00 - 17.00	1251	1251	100	140	1,752	876	3103	2267
	17.00 - 18.00	897	897	88	123.2	1,502	751	2487	1771
	Jumlah	3167	3167	293	410.2	4896	2448	8356	6025

Source : JICA PPP Study Team

It was found that the road performance on holidays and workdays is still quite good, i.e., the capacity of Teluk Gong Raya Street is sufficient to accommodate traffic at peak hours. This is indicated by the value of DS (Degree of Saturation) ranging from 0.4 to 0.6, which is below the standard value of traffic disturbances (<0.75).

2) Road conditions along the proposed sewer network

The roads, to be excavated for the sewer network installation, are spread in STP service areas, which cover areas of West Jakarta, Central Jakarta and North Jakarta. The roads generally have the status of city/urban streets with functions of primary collector roads, secondary collector roads and primary local roads connecting to main residences.

Geometric conditions of these roads include an ROW from 15 to 30 meters, consisting of 2 to 4 lanes with an average lane width of approximately 3.5 meters. Some roads are equipped with road medians (traffic way separators) with widths from 0.6 to 2 meters, and on some roads, traffic way separators consist only of road markings. In general, these roads are operated one way, but some are operated with a 2-way system. Other road sections, such as drainage channels, have an average width from 0.8 to 1 meters and have road shoulders at an average of 1 to 2 meters. However, some other roads do not have road shoulders due to road widening. Subsequently, the roads and buildings are separated only by walking tracks with relatively minimal widths.

The city/urban roads are in relatively good condition and are well maintained; they have hot mix asphalt pavement, with traffic signs, driving directions, street names, street lighting and obvious road markings.

Observation results of traffic conditions on roads across the area of West Jakarta, Central Jakarta and North Jakarta, show that traffic flows are relatively high on workdays, and on holidays, they are relatively "low," except near retail places and shops.

Generally, the roads are bypassed by various public transportation routes, but a few are not.

The present road conditions along the proposed sewer network are detailed in Appendices of “Volume 2: Supporting Report.”

8.2 Legal Framework on Environmental and Social Considerations and its Organization

8.2.1 Laws and Regulations Related to the Project

Laws and regulations related to the construction activities of the Pejagalan STP and the sewer network are listed in Table 8-14.

Table 8-14 Laws and Regulations Related to the STP and Sewer Network Project

No	Regulation	Relevance	Institution Involved
1	Legislation 32/2009 on Environment Protection and Management	– Article 22 clause (1) states that every business and/or activity that has significant impacts on the environment requires an EIA. – The Project on STP construction and sewer network might cause impacts on the environment. It therefore requires an EIA.	BPLHD of DKI Jakarta Province, as the issuing agency of EIA environmental feasibility
2	Legislation 2/2012 on Land Acquisition for Public Purposes Development	The legislation regulates land acquisition for STP.	• BPN Jakarta Regional Office • Sub-district • Village
3	Government Regulation 41/1999 on Air Pollution Control	The regulation regulates air pollution and ambient air quality standard management.	BPLHD of DKI Jakarta Province as the superintendent of air quality management
4	Government Regulation 82/2001 on Air Quality Management and Water Pollution Control	The regulation regulates river water quality standards.	BPLHD of DKI Jakarta Province as the superintendent of river water quality management
5	Government Regulation 27/2012 on Environmental Permit	The regulation regulates composing EIA and environmental permits.	BPLHD of DKI Jakarta Province as the issuing agency of EIA environmental feasibility
6	Presidential Regulation 71/2012 on Land Acquisition for Public Purposes Development	The regulation regulates land acquisition for public purposes.	• BPN Jakarta Regional Office • Sub-District • Village
7	Minister of Environment Regulation 5/2012 on types of business and/or activity that require EIA	The regulation regulates determination on types of environmental document that the Project requires.	BPLHD of DKI Jakarta Province
8	Minister of Environment Regulation 16/2012 on Guidelines of Environmental Document Composition/Preparation	The regulation regulates EIA document preparation/composition.	BPLHD of DKI Jakarta Province
9	Minister of Environment Regulation 17/2012 on Guidelines of Community Involvement in the Process of EIA and Environmental Permit	The regulation regulates community involvement in the EIA preparation and environmental permits.	• Government of DKI Jakarta Province • Sub-District • Village
10	Decree of the Minister of Environment Kep-48/Men LH/11/1996 on Noise Level Standards	The decree regulates noise level standards.	BPLHD of DKI Jakarta Province as superintendent of noise management
11	Decree of the Minister of Environment 49/1996 on Vibration Level Standards	The decree regulates vibration level standards.	BPLHD of DKI Jakarta Province as the superintendent of vibration management
12	Decree of the Minister of Environment 50/1996 on Odor Level Standards	The decree regulates odor level standards.	BPLHD of DKI Jakarta Province as the superintendent of odor management

No	Regulation	Relevance	Institution Involved
13	Decree of the Minister of Environment 112/2003 on Domestic Wastewater Quality Standards	The decree regulates domestic wastewater quality standards.	BPLHD of DKI Jakarta Province as the superintendent of domestic wastewater management BPLHD as the issuing department of liquid waste discharge permits

Source: JICA PPP Study Team

8.2.2 Institutional Framework of Environmental Impact Assessment (EIA) in Indonesia

(1) Overview

In 2012, the "Government Regulation 27/2012 on Environmental Permit" as the basic regulation of EIA in the Republic of Indonesia was enacted, is under Legislation 32/2009 on Environment Protection and Management and obligates implementation of an EIA (AMDAL) according to the type and scale of projects. An EIA committee is established in the central government, provincial government and local governments in order to examine EIA documents.

An AMDAL is composed of a TOR of EIA (KA-ANDAL), an EIA report (ANDAL), an environmental management plan (RKL) and an environmental monitoring plan (RPL).

(2) Necessity of EIA (AMDAL)

Types of businesses and/or activities that require an EIA (AMDAL) are stipulated in Ministerial Environment Regulation 5/2012.

A determination on the types of environmental studies required for the STP and Sewer Network Project is presented in Table 8-15.

Table 8-15 Types of Environmental Study Required

Project Description	EIA Criteria Based On MoE Regulation 5/2012
Sewage Treatment Plant Organic loading 24 ton/day Area 7.3 Ha	Construction of Waste Water Treatment Plant (WWTP) for domestic waste and its support facilities, with an area of ≥ 3 Ha or organic loading ≥ 2.4 ton/day, requires AMDAL documents.
Sewer Network Plan Population 725,619 Debit 200,000 m^3/day Service area 4.975 Ha	1. Installation of sewer network, with a service area of ≥ 500 Ha or wastewater flow rate ≥ 16,000 m^3/day 2. Service area available for 100,000 people 3. 20,000 units of wastewater connectors

Source: JICA PPP Study Team

According to the criteria in the above table, both the Penjaringan STP and the sewer network construction Project for Zone-1 require an EIA.

(3) AMDAL Process

The AMDAL process is described as follows:

1) Composing an EIA TOR (KA-ANDAL) document begins by making an announcement in the newspaper about the plan of the activity and it is limited to a 10-day period. In addition, public consultation with the concerned community is carried out to accommodate any ideas, opinions, or responses from the community.

2) The results of the consultation with the community or other inputs are to be part of the items on composing KA-ANDAL. Composing KA-ANDAL is expected to take a period of 30 days. The document draft of KA-ANDAL shall be submitted to the AMDAL assessment committee for assessment. The assessment process takes a period of 30 days, excluding correction and improvement of the document. The assessment process of KA-ANDAL is done only by the Technical Team of the AMDAL Committee, and does not involve the concerned community.

3) The EIA report (ANDAL) is composed after the assessment of KA-ANDAL is completed. The composing of the document begins from both primary and secondary environmental data collection. The document can be composed simultaneously with the environmental management plan and environmental monitoring plan (RKL-RPL). The composing of both documents of ANDAL and RKL-RPL takes approximately 6 months.

4) The document drafts of ANDAL and RKL-RPL are submitted simultaneously to the AMDAL Assessment Committee for assessment. The time needed for the assessment is not to be more than 75 workdays, excluding correction and improvement of the document. The assessment process of both documents involves the concerned community in order to get advice, opinions, and responses.

5) After the correction and improvement of ANDAL and RKL-RPL documents, an Environmental Feasibility Decree about the proposed project is issued. The issuing process of the Decree can be done at the same time as the issuing of Environmental Permits.

An indicative time schedule of the AMDAL process is shown in the following flowchart:

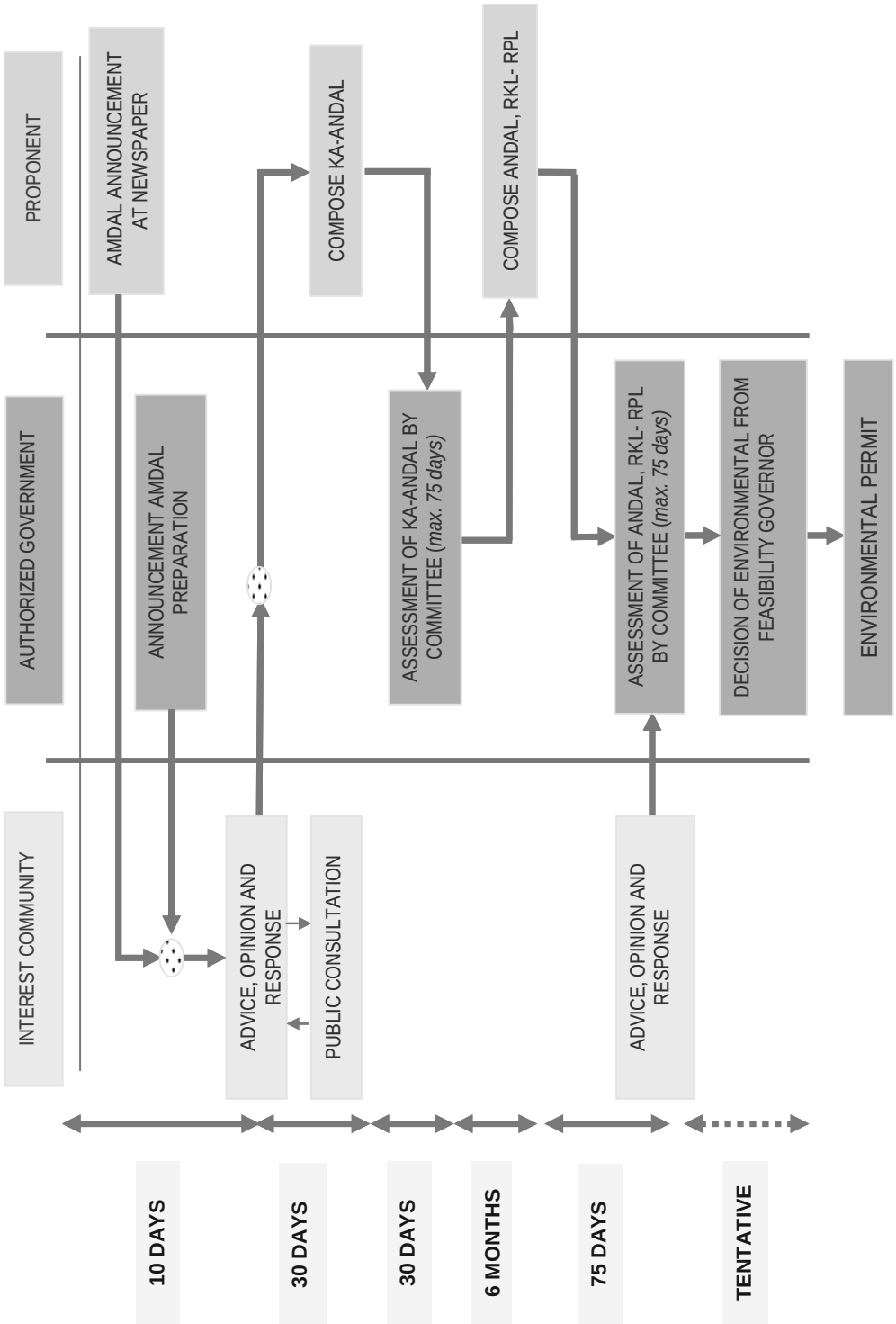


Figure 8-5 AMDAL Process

Source: JICA PPP Study Team

8.3 Study of Alternatives

In DKI Jakarta, it is quite difficult to secure the land for STPs because available large open spaces are very little. In the M/P study which precedes this Survey, therefore, it was decided to select candidate sites for STPs from the public lands, and also to avoid private land because acquisition cost for private land is very high and there is a possibility that other facilities and/or buildings are developed until the commencement of STP construction. Furthermore, in the course of selection process, some designated green spaces and parks which belong to the provincial government of DKI Jakarta are judged to be suitable for STP sites.

As a result of study on technical viability as well as environmental and social considerations for potential sites, Penjaringan City Park was selected as the only candidate site for the STP for Zone-1 and recognized by Indonesian side.

As mentioned above, since Penjaringan City Park was designated by Indonesian side as the only candidate site for the STP for Zone-1, study of candidate sites for the STP was not performed in this Survey.

8.4 Impact Prediction

Results of the impact prediction are shown in Table 8-16.

Because there are about 230 illegal settlers (57 families) in the proposed STP site (i.e., Penjanringan City Park), this Project is categorized as “A.” Accordingly, an EIA and RAP shall be undertaken after the Project site and the Project proponent(s) are officially determined.

Table 8-16 Impact Predictions

Category	Impact Items		STP Development				Sewer Network Installation			
			Evaluation			Reason for Evaluation	Evaluation			Reason for Evaluation
			PC	C	O		PC	UC	OP	
Pollution control	1	Air quality	D	B(-)	D	Construction: Air quality will decrease due to soil preparation and heavy equipment mobilization. Operation: Air pollution will not increase because pumps, blowers, and motors are operated by electric power.	D	B(-)	D	During construction, air quality may decrease due to excavation and soil transportation.
	2	Water quality	D	B(-)	A(+)	Construction: Water pollution may be caused by discharged water derived from construction site, construction machines and vehicles and workers' camp. Operation: Because the water quality of effluent from the STP shall meet applicable quality standards for effluent discharged from water treatment plants (Governor Decree No. 122/2005), the water environment of rivers will be significantly improved.	D	B(-)	D	Surface water quality may be affected at the time of piping construction due to excavations during rainfall.
	3	Wastes	D	B(-)	B(-)	Construction: Solid waste from excavation activity and liquid waste have impacts on the surrounding environment. Operation: STP operation produces sludge that may reduce the quality of the surrounding environment. If the sludge is not re-used, it will be dumped at a sanitary landfill designated by DKI Jakarta.	D	B(-)	D	Pipeline construction will produce solid construction waste.
	4	Soil contamination	D	B(-)	D	Construction: The soil may be contaminated by solid waste, oil leakage and other domestic waste. Operation: There are no significant impacts expected.	D	B(-)	D	The soil may be contaminated by oil leakage and other construction waste.

Category		Impact Items	STP Development					Sewer Network Installation				
			Evaluation			Reason for Evaluation		Evaluation			Reason for Evaluation	
			PC	C	O			PC	UC	OP		
	5	Noise and vibration	D	B(-)	D	Construction: Noise and vibration will arise due to heavy equipment operation. Operation: Noise and vibration generated from blowers, pumps, etc. shall be controlled with appropriate control methods (silencers, enclosures, etc.) to meet applicable noise and vibration standards. Thus, adverse impact on the environment is not expected.		D	B(-)	D	During construction, noise and vibration will increase due to heavy equipment operation and transportation activities.
	6	Subsidence	D	D	D	No potential activities can cause subsidence.		D	D	D	No potential activities can cause subsidence.	
	7	Odor	D	D	D	Operation: Although operation of STP causes NH_3 and H_2S emissions, because the sludge treatment system is designed as a completely closed system with deodorizing equipment, adverse impact on the environment is not expected.		D	D	D	No potential impact.	
	8	Bottom sediment	D	B(-)	D	Construction: Piles of excavation soil, which are exposed to the rain, may flow into the nearest waterbody and cause sedimentation.		D	B(-)	D	Piles of excavation soil, which are exposed to rain, may flow into the nearest waterbody and cause sedimentation.	
Natural environment	9	Protected areas	D	D	D	No protected areas in the Project site.		D	D	D	No protected areas in the Project site.	
	10	Ecosystem	D	B(-)	D	STP construction has direct impact on partial loss of vegetation. Loss of vegetation means loss of bird habitats.		D	D	D	The Project is in a metropolitan city, so flora and fauna are already strictly limited. Thus, sewer network installation does not have significant impacts on the ecosystem.	
	11	Hydrology	D	D	D	No potential impact.		D	A(-)	D	Surface water is affected by construction and sewer network installation, especially in the event that drainage lines are blocked during installation activity.	
	12	Topography and geology	D	D	D	Large-scale cut-and-fill earthwork is not planned. Thus, there is no significant impact expected.		D	D	D	Large-scale cut-and-fill earthwork is not planned. Thus, there is no significant impact expected.	

Category		Impact Items	STP Development					Sewer Network Installation				
			Evaluation			Reason for Evaluation		Evaluation			Reason for Evaluation	
			PC	C	O			PC	UC	OP		
Social environment	13	Resettlement	A(-)	D	D	Currently, there are 230 illegal settlers in the STP site. Thus, involuntary resettlement will arise.		D	B(-)	D	The sidewalks and roads have been used for business activities such as kiosks and stalls, parking lots, etc. These business activities will be interrupted by construction works.	
	14	Poor	A(-)	B(-)	B(-)	The people occupying Penjaringan City Park are those who belong to the informal sector.		D	B(-)	D	Poor people living along the sewer network are affected during construction, especially in terms of access to their livelihood.	
	15	Ethnic minorities and indigenous peoples	D	D	D	No ethnic minorities in the Project area.		D	D	D	No ethnic minorities in the Project area.	
	16	Local economics, such as employment, livelihood, etc.	A(-)	B(+)	D	Pre-construction: Illegal settlers in Penjanringan City Park will lose their jobs and livelihoods. Construction: Local economy increases due to employment and business opportunities. Operation: The Project will not affect living conditions or livelihoods of residents.		D	B(+/-)	D	- During the preconstruction phase, the local economy may worsen due to the loss of job opportunities. - Sewer network installation activity has positive impacts on employment and business opportunities.	
	17	Land use and utilization of local resources	A(-)	A(-)	B(-)	Pre-construction: Impact on land use is caused by land conversion activity from existing land use to the STP land use, including its support facilities. Operation: The plantation and pathways at the city park will be blocked by STP construction, notably in the form of loss of green area.		D	B(-)	D	Shade trees on the roadsides and in open green spaces will probably be disturbed during the sewer network installation activity.	
	18	Water usage	D	D	D	STP construction activity does not disturb water resources used by the public.		D	D	D	Sewer network installation activity does not disturb water resources used by the public.	
	19	Existing social infrastructures and services	D	A(-)	B(+)	Construction: Construction activity disturbs social infrastructure, e.g., children's playground. STP construction also causes traffic jams. Operation: The water environment will be		D	A(-)	D	Construction activity disturbs the access road to public facilities and settlements. Excavation and sewer network installation activities potentially cause traffic jams.	

Category		Impact Items	STP Development					Sewer Network Installation				
			Evaluation				Reason for Evaluation	Evaluation				Reason for Evaluation
			PC	C	O			PC	UC	OP		
							improved and good sanitary conditions will be provided for residents. Thus, it will result in the upgrading of social services					
	20	Social institutions such as social infrastructure and local decision-making institutions	D	D	D		There are no social institutions in STP area.	D	A(-)	D		Schools, agency offices, etc., are disturbed by sewer network installation. RW offices built on sidewalks (such as on Tambora Street and Hanura 1 Street, Sub-district Tambora West Jakarta) are absolutely illegal. These buildings would be disturbed by sewer network installation activity.
	21	Misdistribution of benefits and damages	D	B(-)	B(-)		Construction: During the construction phase, job and business opportunities would only be enjoyed by a few people, so that could cause social jealousy. Additionally, a difference in compensation values among houses and other assets damage due to construction activity could cause social jealousy. Operation: Social tension and jealousy will continue if the misdistribution of benefits and damages is not properly managed during pre-construction and construction phases.	D	B(-)	D		During the construction phase, job and business opportunities would only be enjoyed by a few people, so that could cause social jealousy. Additionally, a difference in compensation values among houses and other assets damage due to construction activity could cause social jealousy.
	22	Local conflicts of interest	A(-)	D	D		Construction: Conflict would arise while the Project involves political issues. The political issues are, among others, efforts of the illegal occupants of Penjaringan City Park who seek protection from urban-poverty-caring NGOs, in effort to protect them from eviction.	A(-)	D	D		Land clearing, for the purpose of sewer network installation activity, could result in objections from the land users because land clearing would disturb their activities, especially the people whose lives depend on businesses run on the sidewalks and on some parts of the roads.
	23	Heritage	D	D	D		There are no cultural heritage sites in the Project area.	D	D	D		There are no cultural heritage sites in the site area.
	24	Landscape	D	B(-)	B(-)		Construction: The landscape would be affected, especially by STP construction	D	A(-)	D		During construction, the landscape would be affected, especially by excavation

Category	Impact Items		STP Development				Sewer Network Installation			
			Evaluation			Reason for Evaluation	Evaluation			Reason for Evaluation
			PC	C	O		PC	UC	OP	
						activity. Operation: Landscape and visual impacts are expected due to the loss of landscape resources and the Project's compatibility with the surrounding landscape.				activity.
	25	Gender	D	D	D	No gender issues.	D	D	D	No gender issues.
	26	Children's rights	D	A(-)	D	Children's access to schools and playground at Penjaringan City Park would be disturbed by the Project, especially by excavation and STP construction activities.	D	D	D	No children's rights impact.
	27	Infectious diseases such as HIV/AIDS	D	D	D	No potential infectious diseases.	D	D	D	No potential infectious diseases.
	28	Working conditions (including occupational safety)	D	B(-)	B(-)	Working condition should be prepared according to adequate regulations.	D	B(-)	D	Working condition should be prepared according to adequate regulations.
Other	29	Accident prevention measures	D	B(-)	D	Safety regulations should be applied during construction activity, such as the use of guardrails, safety tools, etc.	D	B(-)	D	Safety regulations should be applied during construction activity such as the use of guardrails, safety tools, etc.
	30	Trans-boundary impacts and climate change	D	D	D	No impact is expected, as long as the appropriate construction process complies with the standard regulations.	D	D	D	No global impacts (e.g., climate change).

A+/-: Significant positive/negative impact is expected.
B+/-: Positive/negative impact is expected to some extent.
C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses.)
D: No impact is expected.
Evaluation: PC (Pre-Construction), C (Construction), O (Operation)
Source: JICA PPP Study Team

8.5 Environmental Management and Monitoring Plans

The Environmental Management Plan (including mitigation measures) and Environmental Monitoring Plan for both the STP Development Project and Sewer Network Development Project are presented in Tables 8-18 and 8-19.

Land acquisition cost and compensation cost at the pre-construction phase are assumed to be incurred by DKI Jakarta, who will be the contracting agency for the STP Development Project and the implementation agency for the Sewer Network Development Project for Zone-1. In terms of the estimated capital costs to be incurred for undertaking pollution prevention measures at the plant, the budgetary requirement during the construction phase will be within the EPC cost, and the requirement during the operation phase will be included in ordinary operation and maintenance costs.

Table 8-17 Environmental Management Plan and Environmental Monitoring Plan for STP Development

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation measures)	Environmental Monitoring
Pre-Construction Phase				
Social Environment	1. Resettlement	Economically, resettlement is highly affected. The activity of STP pre-construction will cause resettlement of the existing occupants at Penjaringan City Park. Due to the STP construction plan, the site must be vacated, so the illegal occupants living at the site must move out.	Objective To prevent social unrest Impact management • Community socialization • Discussions to determine forms of compensation • Preparation and implementation of resettlement shall be carried out	Monitoring items and methods • Community perception of resettlement process • Number of community complaints Method: interview Monitoring point and frequencies Illegal settlement at Penjaringan City Park, twice during pre-construction phase. Evaluation criteria • No community complaints • No unrest in spite of land acquisition
	2. Local economy	Local domestic income decreases due to loss of job opportunities. The land is used for illegal settlement and illegal business activities. The land is also used to build garbage stalls for storing economic-value waste (recyclable waste).	Objective To prevent social unrest and reduction in the livelihoods of 57 households who live in Penjaringan City Park Impact management • Social mapping • Determining concept and strategy of compensation method. • Conduct socialization and communication with the community living in Penjaringan City Park. • Discussions performance to achieve agreements on the forms of compensation. • Facilitate the enforcement of rights and property assets owned by the community, in order to meet the needs of the community	Monitoring items and methods • Perceptions of people who acquire financial compensation about satisfaction level of facility • Number of community complaints toward the proponent Method: interview Monitoring point and frequencies Illegal settlement at Penjaringan City Park, Pejagalan Village, Penjaringan Sub-district, twice during pre-construction phase. Evaluation criteria • No community complaints • No unrest in spite of land acquisition.
	3. Land use and utilization of local resources	• Impact on land use/land function originated from land conversion activity of site existing land use to the STP function includes its support facilities.	Objective To prevent social unrest and to comply with urban regulations, particularly with regard to the function of the city park	Monitoring items and methods • Community perception toward disturbance to greenery plants • Number of community complaints toward the

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation measures)	Environmental Monitoring
		• Land use change of Penjaringan City Park into STP and its support facilities will result in loss of the city park covering an area of ± 7.3 ha including the existing plants.	Impact management • To conduct land use permitting process to relevant agencies, particularly on function conversion of the city park to other activities. • To conduct community socialization and communication with the community living in Penjaringan City Park. • During construction, permit must be granted from Mayor of North Jakarta c.q., Head of park institution • Informing the community that impaired or dead plants will be replaced by new ones.	proponent Method: interview Monitoring point and frequencies Pejagalan Village, Penjaringan Sub-district, administrative city of North Jakarta, twice during pre-construction phase. Evaluation criteria • No community complaints • No unrest in spite of land acquisition
	4. Local Conflicts of Interest	• The Jakarta STP development predicted to cause direct impact to the social component in pre-construction phase is the cause of social unrest. • Conflict will arise while the Project involves political issues. The political issues are, among others, effort of the illegal occupants of Penjaringan City Park who seek protection by urban-poverty-caring NGOs, in an effort to protect them from expulsion (see 8.1.2).	Objective To prevent conflict of interest and build a positive opinion about the Project Impact management Organize meetings with the community group who live at Penjaringan City Park, such as: • Community displacement, if the land required for the STP construction Project is located on the illegal settlement location. • Facilitate the people who are interested in working on the construction Project site and (if possible) on STP operation.	Monitoring items and method Community perception toward the institution that supports the community in terms of STP construction plan, and the expected compensation. Method: interview Monitoring points and time frequency Penjaringan City Park and location / address of institution supporting the illegal settlement's interests, twice during pre-construction phase. Evaluation criterion No conflicts in community
Construction Phase				
Anti-Pollution Measures	1. Air Quality	• The decrease of air quality during the construction phase as a result of activities such as Project vehicles transporting construction material and heavy equipment, land clearing/land preparation, and STP construction. • The increase of pollution load, which is caused by the intensive dust concentration	Objective Reduce the effects of air pollution Impact management • The backyard of the Project site that borders community housing will be surrounded by 2-m high zinc fence in order to isolate the site.	Monitoring items and method Dust content Method: gravimetric Monitoring point and time frequency • In STP area, once every 3 months during construction phase. • On the street, once every 3 months during

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation measures)	Environmental Monitoring
		and gas emission from heavy equipment and vehicles, would cause some decrease in air quality. • The parameters of air quality that may increase are vehicle gas emissions including SO_2, NO_2 and CO. • The decrease in air quality would have a direct effect on construction workers and people living nearby the Project site, mainly the area to the north, would be impacted as long as the construction activity is performed.	• Trucks transporting dugouts will be covered with tarpaulins. • Transportation of heavy equipment and materials done in stages to reduce the intensity of the vehicles that go in and out of the Project site. • Conduct watering at STP site area, especially in the dry season, to reduce high dust concentration.	construction phase. Evaluation criteria Ambient air quality standards based on Decree of the Governor of Jakarta 551/2001
	2. Waste	STP construction would produce solid waste from land preparation and construction material. The waste would cause a decrease in environmental sanitation. STP construction activity needs a base camp that would produce domestic waste, both solid and liquid.	Objective To manage soil piles resulting from excavation and domestic waste, so they will not disturb environment esthetics. Impact management Immediately picking up and transporting the piles of excavation and solid waste. Solid waste will be placed into waste bins, whereas domestic liquid waste is processed in a septic tank.	Monitoring items and methods Soil spills and waste stacks Method: observation Monitoring point and frequencies STP area, once every 3 months during construction phase. Evaluation criteria No soil spilled and waste stacks
	3. Soil Contamination	The soil will be contaminated by solid waste, oil leakage, and other domestic waste. Soil contamination may be caused by: • Mudding on the surface soil • Solid and liquid domestic waste are not managed properly • Oil spills from construction equipment on the surface soil	Objective Avoiding soil contamination Impact management • Providing garbage cans at the base camp to place domestic waste. • Preventing oil spills from construction equipment by means of operation and maintenance that comply with the SOP.	Monitoring items and methods Waste stacks and oil spills: observation Method: observation Monitoring point and frequencies • STP Project area • Once every 3 months during construction phase. Evaluation criteria The condition of environmental sanitation
	4. Noise and Vibration	• During construction, noise and vibration will arise due to heavy equipment operation.	Objective Reduce noise and vibration impacts	Monitoring items and method Noise and vibration levels Method: sound level meter and vibration meter

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation measures)	Environmental Monitoring
		• The targets for the noise in the proposed STP area shall be the construction workers and the community undertaking activities in the STP area.	Impact management Limiting construction activity (at a location borders to population) to only during the day so it does not interfere with the surrounding community.	Monitoring point and frequencies • STP Project area, once every 3 months during construction phase. • Neighborhood near STP, once every 3 months during construction phase. Evaluation criteria • Quality standards of noise based on Decree of the Governor of Jakarta 551/2001 Appendix II • Quality standards of vibration levels based on Decree of the Minister of Environment KEP-49/MENLH/11/1996 Appendix IV
	5. Bottom Sediment	Piles of excavation soil, which are exposed to the rain, will flow into the nearest waterbody and cause sedimentation.	Objective Preventing the occurrence of bottom sediment in the river Impact management • To build a sediment trap to block run-off water that flows from land preparation activity, so that it will not cause river water turbidity to increase. • Immediately picking up and transporting the piles of excavated soil.	Monitoring item and method Turbidity Method: turbid metric Monitoring point and time frequency Banjir Kanal Barat River, once every 3 months during construction. Evaluation criteria Quality standards of surface water based on Decree of Governor of DKI Jakarta 582/1995
Natural Environment	1. Ecosystem	The Project is in a metropolitan city, so flora and fauna numbers are limited. STP construction causes a direct impact on the partial loss of vegetation. The loss of vegetation means loss of bird habitat.	Objective Reduce the impacts on terrestrial flora and fauna Impact management • For the land preparation, all vegetation should not be removed. • Provide green open space ≥ 40 % of total STP area • Re-plantation with a density of 10 m.	Monitoring items and methods • Greenery total area • Plant density in greenery area Methods: observation Monitoring point and frequencies • STP area, once every 3 months during construction phase. Evaluation criteria • Greenery total area ≥ 40% The plants are in good condition.

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation measures)	Environmental Monitoring
Social Environment	1. Local Economics	• During the construction phase, the local economy would increase due to job and business opportunities. • In the STP Project area and surroundings, the manpower to be absorbed during construction activities is not only the educated manpower and skillful manpower, but also unskilled manpower. The people in the nearest settlement could have a higher chance to be employed. • Regarding labor wage, the unskilled labor wage is Rp. 35,000/day, and bricklayer is Rp. 50,000/day, so we can make a calculation that in a week, each laborer can earn from Rp. 210,000 to Rp. 300,000. If calculated over a year, then the income will be from Rp. 10,080,000 to Rp. 14,400,000 per year.	Objective To minimize negative impacts and to maximize positive impacts towards livelihoods. Impact management • Social mapping of the people can potentially be employed in construction phase. • Conducting socialization and community consultancy regarding the Project plan. • Identify the needs of the manpower needed and the potential local manpower that can be recruited. • Identify local contractors who can be partners/sub-contractors in Project activity. • Manage the manpower recruitment with intention that the local manpower of every RT / RW (including residents from illegal settlements) may be employed. • Giving wages in accordance with UMP of DKI Jakarta. • Hold communication forums between the proponent with the community represented by the administrators of RT / RW, Karang Taruna (youth organization) and women's organizations	Monitoring items and methods • Community perception toward employment and business opportunities during construction phase. • Community income comparison of before and during construction phase. • Number of community complaints toward proponent Method: interview Monitoring point and frequencies Neighborhoods near STP, once every 3 months during construction phase. Evaluation criteria • No complaints from community • No unrest in spite of construction activity • Increase in domestic income
	2. Land Use	The plantation and pathways at Penjaringan City Park would be blocked by STP construction resulting in a loss of green area for construction activity.	Objective Impact reducing from land use changing Impact management • Informing the community that the impaired or dead plants will be replaced by new ones. • 40% of the STP area will be provided as green open space; therefore, it can still be used as a playground.	Monitoring items and methods • Community perception of the disturbance toward plants in the city park • Number of community complaints toward proponent Method: interview Monitoring point and frequencies Pejagalan Village, Sub-district Penjaringan, once every 3 months during construction phase.

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation measures)	Environmental Monitoring
				Evaluation criteria • No complaints from community • No unrest in spite of construction
	3. Existing Social Infrastructure	• Construction activity will disturb social infrastructure, e.g., playground. • Mobilization of heavy vehicles and materials shall disturb traffic flow and congestion, particularly at the entrance point between Jalan Teluk Gong Raya and STP location entrance. • The Project will also trigger inconveniences for road users and pedestrians.	Objective • Preventing the existing social infrastructure from interfering with construction activity • To prevent traffic congestion at the entrance to the STP located on road segment of Teluk Gong Raya Impact management • Scheduling heavy equipment mobilization that will not disturb local people's activities. • Establishing traffic signs, boards and warning lights at the STP entrance point and at STP construction points. • Assigning traffic control officers at the entrance point, especially when vehicles enter and leave the STP area. • To conduct coordination and good communication with the related agency (transportation, police, etc.)	Monitoring items and methods Traffic volume and congestion Method: observation Monitoring point and frequencies The point of entrance to the STP area that passes Teluk Gong Raya Street, every 3 months during construction phase. Evaluation criteria Increase of traffic volume and congestion
	4. Misdistribution of Benefits and Damages	• Job and business opportunities would only be enjoyed by a few people, so that could cause social jealousy. • During the construction activity, some of resident's assets and properties might be damaged due to land clearing or construction activities. In regard to the damage, there will be some compensation given by the proponent based on calculation and analysis of damage extent on every asset and property of the residents. Difference in the value of compensation might create social jealousy among the residents.	Objective Minimizing the possibility of social unrest because of misdistribution of benefits and damages Impact management • Recruitment with the priority of local people. • Conducting discussion on determining building damage compensation as the result of construction activity.	Monitoring items and methods Community perception Method: interview Monitoring point and time frequency Local population near STP site, once every 3 months during construction phase. Evaluation criteria No complaints from community

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation measures)	Environmental Monitoring
	5. Landscape	The land clearing activity consists of digging, hilling, leveling, and compacting. This activity would affect the city park, which is currently well organized. Among others, there would be some logging for the purpose of making a traffic way for the vehicles to transport hilling materials to bury the water-stagnant land.	Objective Reduce landscape impacts Impact management 1. Logging is only done on land that will be used for STP construction. 2. Dugouts piling can be minimized by hastening transport for hilling to inundation area that will be used for building construction.	Monitoring items and methods Whether there are soil dough out piles or not Method: observation Monitoring point and frequencies STP plan site at Penjaringan City Park, every 3 months during construction phase. Evaluation criteria Soil dough out piles that could harm the surrounding plants.
	6. Children's Rights	Children's rights to play at Penjaringan City Park would be disturbed because of the STP construction activity.	Objective Re-establishing the children's rights to play in the city park Impact management Substituting and upgrading the playground with some play equipment that is more interesting for children at the city park.	Monitoring items and methods • Community perception toward disturbance to children playground use at Penjaringan City Park • Number of complaints conveyed to government or initiator: collected data tabulated into a presentation, then a descriptive analysis is done Methods: observation and interview Monitoring point and frequencies People in Pejagalan Village, Sub-district Penjagalan, once every 3 months during construction phase. Evaluation criteria • Number of community complaints toward disturbance to the use of children's playground of the city park • Number of complaints conveyed to developer office
	7. Working Condition	Working condition should be prepared according to adequate regulations.	Objective Maintaining the environment to comply with the regulations	Monitoring items and methods Work condition Method: observation

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation measures)	Environmental Monitoring
			Impact management Complying with the regulations of Health and Safety Environment (Indonesian: K3) during construction activity.	Monitoring point and frequencies STP site, every 3 months during construction phase. Evaluation criteria The environment of working condition does not comply with the regulations of Health and Safety Environment
Other	1. Accident Prevention Measures	Safety regulations should be applied during construction such as guardrails, safety equipment, etc.	Objective Avoiding work accidents Impact management Providing safety equipment for the construction workers.	Monitoring items and methods The use of safety equipment at work Method: observation Monitoring point and frequencies Project locations, every 3 months during construction phase. Evaluation criteria Safety regulation is not applied at work
OPERATION PHASE				
Anti-pollution Measures	1. Water Quality	• Liquid waste effluent of STP would affect surface water quality. • STP operation has an impact on the reduction in water quality. Secondary impact is disturbance of aquatic biota due to change in river water quality. • Modification of river water quality would affect aquatic biota such as plankton, benthos, and nekton (fish, shrimp, etc.). Other potential impacts include residual content and sludge intensity as a result of the STP operation.	Objective To avoid surface water pollution Impact management • To select appropriate equipment specifications to meet applicable environmental standards. • To perform sewage treatment in accordance with standard operational procedures (SOP) so that effluent discharged to surface water complies with effluent standards. • STP equipments maintenance • To routinely monitor STP effluent before it is discarded into the Banjir Kanal Barat River	Monitoring items and methods BOD, COD, pH, H_2S, TSS Method: sampling / laboratorial analysis Monitoring point and frequencies • STP effluent, once every 3 months during operational phase. • Banjir Kanal Barat River (before and after STP effluent discharge). Once every 3 months during operational phase. Evaluation criteria • Domestic wastewater quality standard is based on Decree of the Minister of Environment 112 /2003 • River water quality standard is based on Decree of Governor of DKI Jakarta 582/1995

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation measures)	Environmental Monitoring
	2. Noise and Vibration	Noise and vibration are generated from blowers, pumps, etc.	Objective To avoid adverse effects on the surrounding environment and occupational accidents caused by noise and vibration Impact management • To select appropriate equipment specifications to meet applicable environmental standards. • STP equipment maintenance • To routinely monitor noise and vibration levels • To continuously check for the presence or absence of complaints from local residents	Monitoring item and method Noise and vibration Monitoring point and time frequency Vicinity of noise generating equipment (blowers, pumps, etc.) Evaluation criteria • Applicable occupational hygiene standards in Indonesia • Presence or absence of complaints from local residents
	3. Wastes	STP operation will produce sludge, which could potentially decrease the quality of surrounding environment.	Objective The usage of sludge due to the STP operational activity Impact management The use of sludge from STP to fertilize STP garden	Monitoring item and method Sludge use Method: observation Monitoring point and time frequency STP area, once every 3 months during operational phase. Evaluation criteria Sludge used
	4. Odor	The STP operation will produce odor coming from the waste gases NH_3 and H_2S. This will interfere with the comfort level and may result in the reduction of workers and the surrounding community's health when constantly inhaling the odor.	Objective Reduce adverse effects on surrounding environment caused by bad odor Impact management • To select appropriate equipment specifications to meet applicable environmental standards. • The creation of a buffer zone by planting plants that can reduce air pollution such as Japanese bamboo, Angsana (Pterocarpus indicus), Flamboyant (Delonix regia ketepeng) and Juvenile (Duranta erecta)	Monitoring items and methods H_2S and NH_3 Method: sampling / laboratorial analysis Monitoring point and time frequency • STP area • Nearby neighborhoods Once every 3 months during operational phase. Evaluation criteria Odor quality standard is based on Decree of the Minister of Environment KEP-50/MENLH/11/1996

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation measures)	Environmental Monitoring
Social Environment	Working Conditions	STP operation will cause workers' health problems by odor generated from waste gases H_2S and NH_3 and possibly itching disease.	Objective To avoid the emergence of diseases on workers due to STP operation Impact management • The use of masks, boots and gloves for workers • Routine medical checkup for workers	Monitoring items and methods Work condition, the use of safety tools Method: observation Monitoring point and frequencies STP site, every 3 months during operational phase. Evaluation criteria The environment of working condition does not comply with the regulations of Health and Safety Environment

Source: JICA PPP Study Team

Table 8-18 Management and Monitoring Plan for Sewer Network Installation

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation Measures)	Environmental Monitoring
Pre-Construction Phase				
Social Environment	1. Resettlement	Sewer network installation activity on road shoulders could have negative impacts in the form of temporary discontinuation of economic activity, such as kiosks, shops, etc.	Objective To prevent social unrest Impact management • Public socialization • Discussions to determine forms of compensation. • Preparation and implementation of resettlement shall be carried out.	Monitoring items and method • Community perception toward resettlement process • Number of community complaints Method: interview Monitoring point and time frequency Illegal road-shoulder users along sewer network, twice during pre-construction phase. Evaluation criteria • No complaints from community • No unrest in spite of pre-construction phase activity
	2. Local economy	There will be an impact on the local economy, such as income reduction of people who work on the land to be used for sewer installation, notably those who have businesses on road shoulders that will be passed by the sewer network installation.	Objective To prevent social unrest and decrease in livelihood of illegal road shoulder users Impact management • Social mapping • Determining the concept and strategy of compensation method. • Conduct socialization and communication with the community who illegally use road-shoulders. • Discussions performance to achieve agreements on the forms of compensation.	Monitoring items and method • Perceptions of people who acquire compensation cost • Number of community complaints toward the proponent Method: interview Monitoring point and time frequency Road shoulder users along sewer network, twice during pre-construction phase. Evaluation criteria • No complaints from community • No unrest in spite of pre-construction phase activity
	3. Local Conflicts of Interest	• The Jakarta sewer network development predicted to cause direct impact on the social component in the pre-construction phase is the	Objective To prevent conflict of interest and build a positive opinion about the Project	Monitoring items and methods Personal interview from institutions supporting the local people regarding the plan of sewer network construction and the expected

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation Measures)	Environmental Monitoring
		occurrence of social unrest. • The sewer network installation activity would cause disturbance to daily activities of the people near the roads, including discomfort. It is presumed that some of the population from various groups in the 26 villages would suffer discomfort due to this activity. • Land clearing, for the purpose of sewer network installation work, surely could cause objections from the land users, because land clearing would disrupt their activities, especially the people depending on the business run on the sidewalks and on some part of the roads for their livelihoods.	Impact management • Performing socialization related to the sewer installation plan located on land of the related agency's ownership, with the aim that the community will notice the risk rate of the sewer installation activity. • Holding PR activity in order to absorb community aspirations / expectations about the possible potency from the activity.	compensation method. Method: interview Monitoring point and frequencies 26 villages that are passed by the activity of sewer network installation, twice during pre-construction phase. Evaluation criteria No conflict from community
Construction Phase				
Anti-Pollution Measures	1. Air Quality	• The decrease of air quality during construction phase as a result of activities of Project vehicles transporting construction material and heavy equipment, land clearing/land preparation, and sewer network installation. • The increase of pollution load, which is caused by the intensive dust concentration and gas emission from heavy equipment and vehicles, would cause some decrease of air quality. • The parameters of air quality that may increase are vehicle gas emissions including SO_2, NO_2 and CO. • The decrease in air quality would have a direct influence on construction workers and people living near the	Objective Reduce the effects of air pollution Impact management • Trucks transporting excavation soil are covered with tarpaulins. • Transportation of heavy equipment and materials is conducted in stages to reduce the intensity of the vehicles that go in and out of the Project site. • Conduct watering at sewer network area, especially in the dry season, to reduce dust concentration.	Monitoring items and methods Air content Method: gravimetric Monitoring point and time frequency • In neighborhoods along sewer network installation, every 3 months during construction phase. • On the street, every 3 months during construction phase. Evaluation criteria Ambient air quality standard is based on Decree of the Governor of Jakarta 551/2001

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation Measures)	Environmental Monitoring
		Project site. Mainly, the area to the north would be impacted as long as the construction activity is performed.		
	2. Water Quality	Surface water quality degradation is a result of increasing erosion/silting and sedimentation from land clearing. River diversion activity will alter the river's physical condition and result in water quality degradation due to silting. Surface water quality would decline due to the sewer network installation activity when the excavation takes place. As a result, the excavation soil was piled on the side of the road, so when it rains, the piles would flow and cause turbidity in surface water.	Objective Reduce surface water quality impacts Impact management • To build a sediment trap to block run-off water that flows from land preparation activity, so that it will not cause an increase in river water turbidity. • Immediately picking up and transporting the piles of excavation along the sewers.	Monitoring items and methods Total suspended solids and turbidity Method: gravimetric and turbid metric Monitoring point and frequencies At rivers affected by sewer network installation activity, once every 3 months during construction phase. Evaluation criteria River water quality standard is based on Decree of Governor of DKI Jakarta 582/1995
	3. Waste	The excavation activity for the sewer network will be carried out on the part of road shoulders. Solid waste from excavation and liquid waste will impact the surrounding environment. This situation can cause a muddy and dirty environment.	Objective Handling the piles of excavation and solid waste, so they will not interfere environment esthetics. Impact management Immediately picking up and transporting the piles of excavation and solid waste.	Monitoring items and methods Soil spills and waste stacks Method: observation Monitoring point and frequencies Sewer network installation area, once every 3 months during construction phase. Evaluation criteria No soil spills and waste stacks
	4. Soil Contamination	• Sewer network installation activity has impacts on soil contamination. The soil will be contaminated by oil leakage and other construction waste.	Objective Avoiding soil contamination Impact management • Providing waste bins at the base camp to place domestic waste. • Preventing oil spills from construction equipment by means of operation and maintenance that comply with the SOP.	Monitoring items and methods Waste stacks and oil spills Method: observation Monitoring point and frequencies Sewer network installation area, once every 3 months during construction phase. Evaluation criteria Condition of environmental sanitation

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation Measures)	Environmental Monitoring
	5. Noise and Vibration	• Noise and vibration will arise due to heavy equipment operation. • The targets for the noise shall be the construction workers and the community undertaking activities in the area.	Objective Reduce noise and vibration impacts Impact management • Scheduling heavy equipment and materials mobilizations and managing construction activity that does not disturb people activities. • Excavation locations are separated by guardrails.	Monitoring items and methods Noise and vibration levels Method: sound level meter and vibration level meter Monitoring point and frequencies • Sewer network installation area, once every 3 months during construction phase. • Settlements adjacent to sewer network installation area, once every 3 months during construction phase. Evaluation criteria Noise quality standard is based on Decree of the Governor of Jakarta. 551/2001 Appendix II Vibration quality standard is based on Decree of the Minister of Environment KEP-49/MENLH/11/1996 Appendix IV
	6. Bottom Sediment	Piles of excavation soil, which are exposed to the rain, will flow into the nearest waterbody and cause sedimentation.	Objective Preventing the occurrence of bottom sediment in the river. Impact management • To build a sediment trap to block run-off water that flows from land preparation activity, so that it will not cause an increase in river water turbidity. • Immediately picking up and transporting the piles of excavation along the sewers.	Monitoring items and methods Turbidity Method: turbid metric Monitoring point and frequencies Banjir Kanal Barat waterway, once every 3 months during construction phase. Evaluation criteria Quality standard of river water is based on Decree of Governor of DKI Jakarta 582/1995
Natural Environment	1. Hydrology	Surface water is affected by construction and sewer installation. In the event of drainage, lines will be blocked during construction.	Objective To prevent soils from excavation activity (dugouts) from covering drainage inlets Impact management • To clear drainage systems of waste. • To prevent dugout spills from entering river and drainage systems.	Monitoring items and methods Condition of drainage channel Method: Visual Monitoring point and time frequency Passed by sewer network installation, every 3 months during construction phase.

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation Measures)	Environmental Monitoring
				Evaluation criteria No floods or puddles
	2. Topography and Geology	There is a topographical impact during construction. In particular, piles of excavated soil could block a part of the roads and sidewalks.	Objective To reduce interference of roads and pedestrians Impact management Immediately picking up and relocating the piles of excavation along the sewers.	Monitoring items and methods Soil piles condition Method: Visual Monitoring point and time frequency Passed by sewer network installation. Every 3 months during construction phase. Evaluation criteria There are no soil piles that could disturb road users and pedestrians.
Social Environment	1. Poor	Poor people will be affected during construction, especially regarding access to their livelihoods. The loss of income of people who make a living on sidewalks during sewer installation activity.	Objective Reduce impacts on the poor due to construction activity Impact management • Social mapping of people who are as the subject of compensation. • Determining the concept and strategy of compensation method. • Socialization and communication to the community. • Discussions to achieve agreements of the forms of compensation. • After agreement is achieved, compensation deliverance is conducted directly to the entitled people.	Monitoring items and methods • Community perception of the disturbance towards the business due to the sewer installation activity. • Domestic income comparison of the community whose business activities are disturbed before and during sewer network installation. • Number of community complaints to government. Method: interview Monitoring point and time frequency The location of sewer network installation in 26 villages in the Administrative City of Central Jakarta, North Jakarta, and West Jakarta. Every 3 months during construction phase. Evaluation criteria • No complaints from community • Interpretation toward present tendency and relation to analogy of social events in other places.

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation Measures)	Environmental Monitoring
	2. Local Economics	• During the construction phase, the local economy would improve due to job and business opportunities. • The manpower to be absorbed during construction activities is not only the educated manpower and skillful manpower, but also unskilled manpower. The people living in the nearest settlement could have a higher chance to be employed. • Regarding labor wages, the unskilled labor wage is Rp. 35,000/day, and bricklayer is Rp. 50,000/day, so we can make a calculation that in a week, laborers can earn from Rp. 210,000 to Rp. 300,000.	Objective To minimize negative impacts and maximize positive impacts towards livelihood. Impact management • Conducting socialization and community consultancy regarding the Project plan. • Identify the needs of the manpower needed and the potential local manpower that can be recruited. • Identify local contractors who can be partners/sub-contractors in Project activity. • Manage the manpower recruitment with intention that the local manpower of every RT / RW (including residents from illegal settlements) may be employed. • Giving wages in accordance with UMP of DKI Jakarta. • Hold communication forums between the proponent with the community represented by the administrators of RT / RW, Karang Taruna (youths organization) and women's organizations.	Monitoring items and methods • Community perception toward employment and business opportunities during construction phase. • Amount of domestic income for comparison of the community whose business activities are disturbed before and during sewer network installation. • Number of community complaints toward government. Methods: interview Monitoring point and time frequency The location of sewer network installation in 26 villages in the Administrative City of Central Jakarta, North Jakarta, and West Jakarta. Every 3 months during construction phase. Evaluation criteria • No complaints from community • No unrest in spite of land acquisition • Increased population income
	3. Land Use	The land area to be used for sewer installation is a part of the street network of the government, and the impacts that would arise are the disturbances to the activity of street users, including pedestrians, cyclists, and motorized vehicle users.	Objective Impact reducing from land use changing Impact management • Informing the community that the impaired or dead plants will be replaced by new ones. • Discussion to achieve agreement about actions needed to decrease the discomfort and disturbance towards community facilities.	Monitoring items and methods • Community perception of the disturbance towards pedestrians. • Number of complaints from community to government. Methods: interview Monitoring point and frequencies 26 villages that are passed by the sewer installation activity. Every 3 months during construction phase. Evaluation criteria No complaints from community

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation Measures)	Environmental Monitoring
	4. Existing Social Infrastructure	• Construction activity will disturb social infrastructure. • Existing social infrastructure such as schools, offices, mosques, would be interfered with during the sewer installation activity. Construction activity would disturb the access points to public facilities and houses. • Activities of excavation and sewer installation would potentially cause traffic jams. • This Project could also trigger inconveniences for road users and pedestrians.	Objective • To prevent interference from construction activity. • To prevent traffic congestion along the corridor of sewer networking road, as well as inconvenience of road users. Impact management • Transportation of construction materials is not conducted at peak hours. • To install traffic signs, boards and warning lights at the entrance point and at points of implementation of sewer network constructions. • To conduct coordination and good communication with the related agency (transportation, police, etc.)	Monitoring items and methods Community perception toward neighborhood access and business location in terms of excavation activity. Method: interview Monitoring point and frequencies 26 Villages location of sewer network installation in the Administrative City of West Jakarta, Central Jakarta, and North Jakarta. Once every 3 months during construction phase. Evaluation criteria • No complaints from community. • No unrest in spite of sewer network installation activity.
	5. Social Institutions	Social institutions such as schools, agency offices, etc., would be disturbed by sewer installation activity.	Objective Minimizing the expected impacts due to construction activity Impact management • Informing the community that the interference would only be temporary. • Establishing signs or directions so the community would be more aware of the sewer installation activity.	Monitoring items and methods Observation towards community perception of the disturbance towards social-institution-owned facilities due to sewer network installation activity. Method: interview Monitoring point and frequencies 26 Villages of the sewer installation area in the Administrative City of West Jakarta, Central Jakarta, and North Jakarta. Once every 3 months during construction phase. Evaluation criteria • No complaints from community • No unrest in spite of sewer network installation
	6. Misdistribution of Benefits and Damages	• Job and business opportunities would only be enjoyed by a few people, so that could cause social jealousy. • During construction activity, some	Objective Minimizing the possibility of social unrest because of misdistribution of benefits and damages	Monitoring items and methods Community perception Method: interview

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation Measures)	Environmental Monitoring
		public assets and properties might be damaged. In regard to the damages, there will be some compensation provided by the proponent based on calculation and analysis of damage extent. Difference in compensation value might cause social jealousy among the residents.	Impact management • Recruiting manpower with the priority of local people. • Conducting discussion on determining building damage compensation as the result on construction activity.	Monitoring point and frequencies Local people near area sewer installation, every 3 months during construction phase. Evaluation criteria No complaints from community
	7. Landscape	The soil excavation activity for sewer network will be carried out on a part of the road shoulders. The existence of soil dugout piles could cause a higher dust concentration in the dry season and mudding in the rainy season. The roads would consequently become dirty and muddy.	Objective Reduce landscape impacts Impact management Immediate soil piles relocation along sewer network to avoid traffic jams and the possibility of siltation in the surrounding drainage.	Monitoring items and methods Whether there are soil dugout piles or not Method: observation Monitoring point and frequencies 26 Villages of the sewer installation area in the Administrative City of West Jakarta, Central Jakarta, and North Jakarta. Every 3 months during construction phase. Evaluation criteria There are no soil piles that could disturb the surrounding area.
	8. Working Condition	Working condition should be prepared according to adequate regulations	Objective Maintaining the environment to comply with the regulations Impact management Complying with the regulation of Health and Safety Environment (Indonesian: K3) during construction activity.	Monitoring items and methods Work condition Method: observation Monitoring point and frequencies Sewer network installation locations, once every 3 months during construction phase. Evaluation criteria The environment of working condition does not comply with the regulations of Health and Safety Environment.
Other	1. Accident Prevention Measures	Safety regulations should be applied during construction such as guardrails, safety equipment, etc.	Objective Avoiding work accidents	Monitoring items and methods Applying safety regulations for work Method: observation

Category	Potential Impact	Impact Prediction	Environmental Management (including Mitigation Measures)	Environmental Monitoring
			Impact management Providing safety equipment for the construction workers.	Monitoring point and frequencies Sewer network installation locations once every 3 months during construction phase. Evaluation criteria Safety regulations are applied for work.

Source: JICA PPP Study Team

8.6 Land Acquisition and Compensation

8.6.1 Institutional Framework of Land Acquisition and Compensation

In 2012, Presidential Regulation on Land Procurement No. 71/2012 came into effect to support the process of land acquisition for public purposes. According to Presidential Regulation 71/2012, land acquisition is an activity for providing land by way of giving proper and fair compensation to an "entitled party." Presidential Regulation 71/2012 does not address issues related to illegal settlers because illegal settlers are not recognized as an "entitled party" on the land. However, if a project is financed by international donor agencies (JICA, World Bank, ADB, etc.), a Resettlement Action Plan (RAP) should be prepared by the borrowers, then reviewed by the donor agency and finally implemented by the borrower.

(1) Land Acquisition Process

Land acquisition is not necessary for this Project because the proposed sites for STP and the sewer network for Zone-1 are within public lands owned and managed by DKI Jakarta. If additional land becomes necessary in the future, however, land acquisition shall proceed in accordance with Presidential Regulation 71/2012. The land acquisition comprises of the following five steps.

1) Planning stage of land acquisition

The basic plan of an agency that needs an area of land for development is done by reviewing the Spatial Plan and development priorities set out in various national development plans.

The Land Acquisition Plan can be prepared by the agency itself or can be assisted by a professional institution. A Land Acquisition Plan document must contain at least:

a. Purposes and objectives of the development plan
b. Compliance with the Spatial Plan and development priorities
c. Location and total area of land required
d. Overview of the status of the land
e. Estimated period of land acquisition implementation
f. Estimated period of development implementation
g. Estimated value of the land and budgeting plan

In addition to the document, a feasibility study is required, which consists of socio-economic surveys, analysis of costs and benefits of the development, and environmental and social impacts. The Land Acquisition Plan document is then submitted by the land-requiring institution to the governor.

2) Preparation stage of land acquisition

In the case land acquisition is to be performed by the land-requiring agency itself, the preparation stage of land acquisition is processed by the governor after receiving the land preparation document. Afterwards, the governor forms a Preparation Team in not more than ten workdays. Preparation Team members consist of regent/mayor, provincial work unit, the land-requiring agency and other related bodies.

The tasks of the Preparation Team are:

a. Publishing notification of the development plan
b. Collecting initial data on the development plan site
c. Performing public consultancy of development plan
d. Preparing determination of the development site
e. Announcing determination of the development site for public interests
f. Performing other tasks related to land acquisition preparation assigned by the governor

3) Implementation stage of land acquisition

The Implementation of Land Acquisition is conducted by the Head of the National Land Agency (Indonesian: BPN), c.q. and the Head of Regional BPN as the Executive Chief of Land Acquisition. The other members of Land Acquisition Implementation are:

a. Officials in charge of the affairs of land acquisition at BPN
b. Head of regional BPN where the proposed land acquisition is located.
c. Official of Work Unit in charge of land affairs
d. Head of local sub-district where the proposed land acquisition is located
e. Chief or others of local village where the proposed land acquisition is located

In performing the composing of the implementation of land acquisition, some activities shall be conducted at least as follows:

a. Setting an implementation meeting agenda
b. Creating a work plan and schedule of activities
c. Preparing the establishment of Task Force and the division of its tasks
d. Estimating technical obstacles that may occur in the implementation
e. Formulating strategies and solutions towards the obstacles in the implementation
f. Preparing administrative matters required

g. Applying operational budget for the implementation of land acquisition

h. Assigning appraisers

i. Creating the document of meeting results

The Executive Chief of Land Acquisition may establish a Task Force in charge of inventory and identification of physical data of control, ownership, use and utilization, and the data of entitled party and the object of land acquisition.

The results of data inventory and identification of the entitled party and the object of land acquisition are in the form of a land map and nominative list. For this purpose, the Task Force shall complete their tasks in a maximum of 30 working days.

The land map and nominative list are then announced at the village office, sub-district office and at the construction site, in order to get responses from the entitled party. If there is an objection about the land data, then the objecting party can file an objection to the Executive Chief of Land Acquisition (in 14 days) for corrections/improvements based on the results of discussions and verification.

Land use data can be a reference for determining how an entitled party can perform compensation referral. The compensation value determination is done by the Executive Chief of Land Acquisition based on the appraisal results from an appraiser service or public appraiser. Appraiser charges in assessing the value of land compensation include land, space on ground and underground, buildings, plants, objects related to the land or other forms of countable loss.

Once the results of compensation appraising are mailed to the village office, sub-district office, and construction site representatives, the compensation value becomes a discussion issue to determine the form of compensation. Discussion is held between the Executive of Land Acquisition and the entitled party. In the process of such discussion, if no agreement is achieved, the entitled party can file an objection with the local district court.

4) Submission of land acquisition results

The results of land acquisition are then submitted by the Executive Chief of Land Acquisition to the land-requiring agency. The Minutes of Handover shall be followed up by the land-requiring agency for registration and issuing of land certification. The land-requiring agency can begin performing construction, following the submission of land acquisition from the Executive Chief of Land Acquisition.

5) Monitoring and evaluation stage

The National Land Agency (BPN) will conduct monitoring and evaluation of control, ownership, use, and exploitation following the execution of land acquisition.

(2) Grievance Mechanisms

Presidential Regulation 71/2012 on grievance mechanisms is provided for some stages in the process of land acquisition activities.

In the preparation stage, grievance mechanisms are presented through public consultation. In the case that some or all of the residents object to the land acquisition plan, the public consultation must be repeated.

If there is an objection from people on the public consultation repetition, the land-requiring agency reports it to the governor through the Preparation Team. Then, the governor establishes a team to conduct a study on the objections of the development plan. Upon the recommendation of the Study Team, the governor can deliver a letter that states whether to accept or refuse the objection.

In the implementation stage of land acquisition, grievance mechanisms that can be delivered are people's objection over the inventory and identification of the entitled party to the land to be used for development. The entitled party can file an objection to the Executive Chief of the Land Acquisition within 14 days after the issuance of the results of land inventory and identification. Furthermore, the Land Acquisition Executive will verify and calculate the money needed to refine the data.

In the stage of compensation deliverance, if there is no agreement on the form and value of compensation, the entitled party can file an objection to the District Court up to the Supreme Court.

According to the Presidential Regulation No. 71 of 2012, maximum time for the land acquisition process in theory is 359 days from the date the Governor (of the area) receives the land acquisition plan document from the land-requiring agency to the date of land registration or certificate process. If there are no objections or appeals from the parties, time period for the land acquisition process can be shortened to 264 workdays.

8.6.2 Necessity of Land Acquisition and Compensation

As explained in the preceding sections, there are about 230 illegal settlers in the proposed STP site (i.e., Penjanringan City Park). Furthermore, road property areas, (Indonesian: Rumija) where sewer network installation is planned, are illegally used for business activities such as kiosks and stalls, parking lots, etc. Accordingly, both the STP Development Project and Sewer Network Development Project will cause involuntary resettlement (including temporary relocations).

According to environmental guidelines of donor agencies such as JICA, World Bank, ADB, etc., both illegal settlers and illegal occupants of road property areas are regarded as Project-Affected Persons (PAPs), and a Resettlement Action Plan (RAP) should be performed. According to JICA Guidelines, *where displacement of household is unavoidable, all Project-Affected Persons (PAPs)*

as well as communities losing assets, livelihoods or resources will be fully compensated and assisted so that they can improve, or at least restore, their former economic and social conditions.

As described in Section 8.1.2, illegal occupants in Penjanringan City Park (i.e., potential PAPs) have rejected eviction by the provincial government of DKI and 31.82% of them do not agree to the Project. Accordingly, special attention should be paid to involuntary settlement for implementation of the Project.

Compensation procedures are not specifically regulated. The record of awarding compensation fund activities by various agencies, companies or land-requiring party, shows that the activities tend to depend on the policy of each party. However, as the approach to perform compensation referral, focus needs to be placed on the principle of right on target, social hospitality, and accountability and intertwining coordination with the regional government. To implement those principles, there are some steps to be taken as follows:

a. Social mapping of citizens as the subject of compensation, which includes aspects of socio-economic capacity of every citizen, income level and household income, pattern of leadership and social organization and social conflict events.

b. Defining the concept and strategy of compensation method to be awarded, that is the value of compensation to be offered to residents in accordance with loss potential that will be experienced by every person.

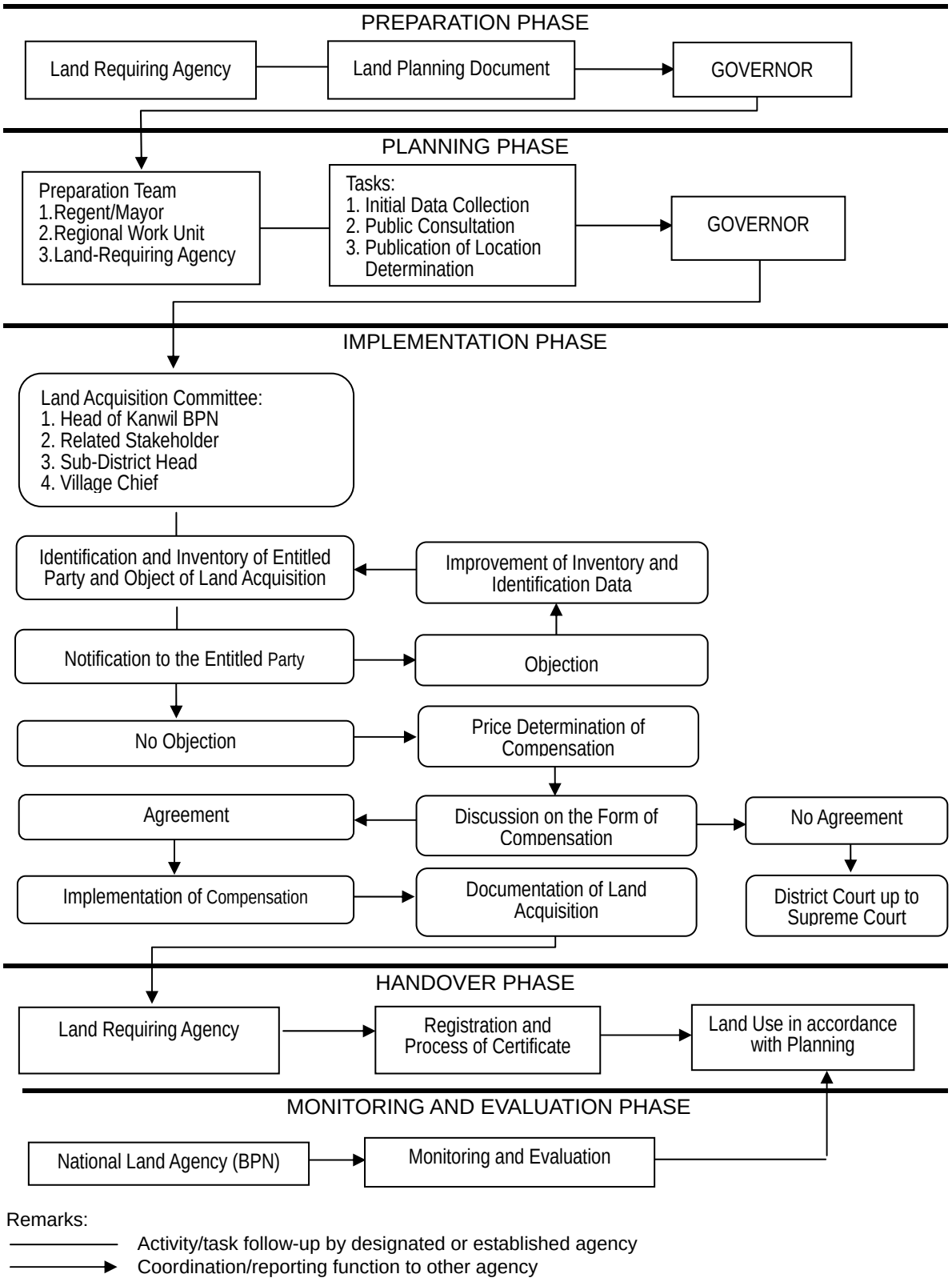
c. Conducting socialization and public consultancy about activity plan.

d. Performing discussions to achieve agreements of the forms of compensation granted.

e. After achieving agreement, compensation referral is carried out directly to the entitled people.

g. Performing monitoring to get data on compensation referral activity towards the smooth running of project activity, especially in the aspect of social interaction with local people.

Government organizations that will become partners in the activity of this compensation referral are at least sub-district head, village chief, village committee, Chief of RW and Chief of RT.



Source: JICA PPP Study Team

Figure 8-6 Flowchart of Land Acquisition in Accordance with Presidential Regulation 71, 2012

8.6.3 Examples of Criteria of Compensation for Similar Projects

Examples of compensation for the people using land illegally in some areas are presented below:

1) In March 2010, a land inheritor sold his land located in Duri Kepa Village, Sub-district of Kebon Jeruk, West Jakarta. The land was previously inhabited by some people illegally. He determined compensation cost (*Indonesian: uang kerohiman*) as follows:

   - Compensation for the land 400,000 IDR/m^2
   - Compensation for the removal process with 3 classifications, i.e., provisional buildings 2.5 million IDR, semi-permanent houses 5 million IDR, and permanent houses 10 million IDR.

   The compensation process, which eventually resulted in eviction of the dwellers, went smoothly.

2) A group in Gunung village, Sub-district of Kebayoran Baru rejected a compensation cost of 50 million IDR from a Ministry that wanted to evict them from land under Ministry jurisdiction because they thought that the compensation cost was too cheap and the determination of the compensation cost was not done through discussions. From this case, it can be assumed that discussion to achieve agreement is an important factor in the case of compensation cost for people inhabiting land illegally.

3) There is a successful example of compensation cost for people who ran business on sidewalks from a project of underground cable installation in the area between Main Electrical Substation Duren Tiga and Main Electrical Substation Pangeran Antasari in South Jakarta. For the compensation activity, PLN referred to the standards of land acquisition from Asian Development Bank (ADB), which includes people under those criteria in the regulation. The compensation cost is based on the lost income during a certain period of time, due to land clearing for the cable installation. The steps in the issue of compensation cost are: social mapping of the potency and characteristic of socio-economy culture of the impacted people, determination of the value of compensation, discussion to achieve agreement over the value of compensation, and finally the issue of compensation. One of the sellers agreed and accepted compensation cost for 2,875,000 IDR with the details in the following table.

Table 8-19 Example of Compensation Criteria for Temporary PAPs

Type of business	Young coconut drink seller
Location	Duren Tiga Street, Jakarta Selatan
Asset value	11–15 million IDR
Weekly turnover value	2,200,000 IDR
Daily net income	121,000 IDR
Calculation of compensation cost	
Temporary stall displacement	1,500,000 IDR
Compensation for the lost income during 7 days	875,000 IDR
Cost for income recovery program	500,000 IDR
Total amount of compensation cost	**2,875,000 IDR**

Source: Implementation Report of RKL RPL PLN Distribution in DKI Jakarta – Banten, 2011

8.7 Stakeholder Consultation

In the EIA process, stakeholder meetings shall be held in accordance with Indonesian environmental laws to provide adequate explanation and to receive opinions from local stakeholders. The Project proponent or implementation agency has not been determined yet. Thus, it is presently not at a stage to hold stakeholder meetings.

8.8 JICA's Environmental Checklist

As shown in Table 8-20, JICA's Environmental Checklist was followed for assessment of the various aspects of the environmental and social considerations of the Project.

Table 8-20 Environmental Checklist

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) - (c) -	(a) For the STP development Project, EIA reports should be prepared by SPC after the signing of PPP contract; the EIA reports are not necessary at this moment. The contracting agency (DKI Jakarta) needs to prepare a KA-ANDAL (a draft TOR for the EIA) and submit the KA-ANDAL to BPLHD (Jakarta Environment Management Board) before the signing of the PPP contract. For the sewer network development Project, DKI Jakarta is solely responsible for preparation of EIA reports. (b) Not applicable due to the above reason. (c) Ditto
	(2) Explanation to the Local Stakeholders	(a) Have contents of the Project and the potential impacts been adequately explained to the local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the local stakeholders? (b) Have the comments from the stakeholders (such as local residents) been reflected in the Project design?	(a) N (b) -	(a) In the EIA process, stakeholder meetings shall be held in accordance with Indonesian environmental laws to conduct adequate explanation and to receive opinions from local stakeholders. The Project proponent or implementation agency is not determined yet. Thus, it is presently not at a stage to hold stakeholder meetings. (b) Not applicable due to the above reasons.
	(3) Examination of Alternatives	(a) Have alternative plans of the Project been examined considering social and environmental considerations?	(a) -	(a) As a result of the M/P review, Penjanringan City Park was identified as the only possible site for STP for Zone-1. Thus, no alternative sites for the STP were studied in this Survey.
2 Pollution Control	(1) Water Quality	(a) Do pollutants, such as SS, BOD, COD, pH contained in treated effluent from a sewage treatment plant comply with the country's effluent standards? (b) Does untreated water contain heavy metals?	(a) Y (b) N	(a) Since the treatment method of the proposed STP is determined based on quality standards for effluent discharged from treatment plants to receiving waters (Governor Decree No. 122/2005), pollutants contained in treated effluent from STP meet the said effluent standards. (b) Sewage to be treated in the proposed STP, which originates from commercial and residential areas and enters interceptors, is not expected to contain heavy metals. If heavy metals are found in untreated water at the detailed design stage, DKI Jakarta shall identify polluter(s) and oblige them to take preventive action to ensure that their effluent meets the quality standards in accordance with relevant laws and regulations.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
2 Pollution Control	(2) Wastes	(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed of in accordance with the country's standards?	(a) Y	(a) The proposed STP receives only sewage from commercial and residential areas. Sludge is treated and disposed of according to relevant Indonesian regulations and standards.
	(3) Soil Contamination	(a) If wastes, such as sludge, are suspected to contain heavy metals, are adequate measures taken to prevent contamination of soil and groundwater by leachates from the wastes?	(a) -	(a) Sewage to be treated at the proposed STP originates from commercial and residential areas. Thus, it does not include heavy metals. Sludge is dumped at sanitary landfills that are authorized by DKI Jakarta. Thus, leachate of seepage water from sludge in landfill does not cause soil contamination and groundwater pollution.
	(4) Noise and Vibration	(a) Do noise and vibrations generated from the facilities, such as pumping stations, comply with the country's standards?	(a) Y	(a) Noise and vibration generated from the facilities for proposed STP (e.g., blowers, pumps, etc.) shall be controlled with appropriate control methods, including application of silencers, use of barriers and enclosures around noise/vibration sources to meet applicable environmental standards.
	(5) Odor	(a) Are adequate control measures taken for odor sources, such as sludge treatment facilities?	(a) Y	(a) The sludge treatment system is designed as a completely closed system, and deodorizing equipment is installed to remove bad odors.
3 Natural Environment	(1) Protected Areas	(a) Is the Project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the Project will affect the protected areas?	(a) N	(a) There are no protected areas designated by Indonesian laws and international convention in and around the Project site for STP and the sewer network for Zone-1. Thus, the Project does not affect the protected areas.
	(2) Ecosystem	(a) Does the Project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the Project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that the Project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) N (c) - (d) -	(a) The Project site and discharge area of effluent from STP do not include primeval forests, tropical rain forests, ecological valuable habitats such as coral reefs, mangroves, or tidal flats. (b) The Project site does not include the protected habitats of endangered species of which protection and conservation are need by Indonesian laws and international treaties. (c) Based on the above, significant ecological impacts are not anticipated. (d) Pollution load of river water downstream of interceptors is reduced to the same level as that upstream of interceptors. Thus, the water environment of rivers in Zone-1 will be significantly improved.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by Project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensation going to be paid prior to the resettlement? (e) Are the compensation policies prepared in document form? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are there any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(a) Y (b) - (c) - (d) - (e) - (f) - (g) - (h) - (i) - (j) -	(a) Currently, there are about 230 illegal settlers in the proposed STP site (i.e., Penjanringan City Park). The Resettlement Action Plan (RAP) shall be developed to minimize the impacts and to compensate for losses and shall be properly implemented. (b) To be done in accordance with JICA Guidelines and the World Bank's OP4.12. (c) Ditto (d) Ditto (e) Ditto (f) Ditto (g) Ditto (h) Ditto (i) To be developed in RAP. (j) Ditto
	(2) Living and Livelihood	(a) Is there a possibility that changes in land uses and water uses due to the Project will adversely affect the living conditions of inhabitants? (b) Is there a possibility that the Project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?	(a) N (b) Y	(a) The proposed STP site is currently used as a city park. Thus, large-scale cut-and-fill earthwork is not involved for construction of STP. Since STP discharges relatively clean treated water to West Banjir Canal, it will not affect the living conditions of inhabitants by change of land use and of utilization of water bodies. (b) STP construction causes a partial loss of recreational area for local residents. In order to compensate for this, more trees and play equipment shall be provided.
	(3) Heritage	(a) Is there a possibility that the Project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) -	(a) There are no local archeological, historical, cultural, or religious heritage sites in or around the Project site.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(4) Landscape	(a) Is there a possibility that the Project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) Since the proposed STP site and its surrounding do not contain aesthetically significant features, the Project will not affect the local landscape.
	(5) Ethnic Minorities and Indigenous People	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to lands and resources respected?	(a) - (b) -	(a) There are no ethnic minorities or indigenous people in or around the Project site. (b) Not applicable due to the above reason.
	(6) Working Conditions	(a) Is the Project proponent not violating any laws and ordinances associated with the working conditions of the country that the Project proponent should observe in the Project? (b) Are tangible safety considerations in place for individuals involved in the Project, such as the installation of safety equipment that prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the Project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers, etc.? (d) Are appropriate measures taken to ensure that security guards involved in the Project do not violate the safety of other individuals involved, or local residents?	(a) Y (b) Y (c) Y (d) Y	(a) The Project will be implemented in compliance with relevant Indonesian laws, regulations and standards on occupational safety and health. (b) The Project will be planned with due consideration of safety countermeasures, such as installation of safety equipment to protect labor accidents, the management of toxic substances, etc. (c) During the construction period, continuous safety and health programs and safety training for workers will be conducted. (d) The Project will provide appropriate education to security guards so as not to violate safety of other individuals and/or local residents.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts? (d) If the construction activities might cause traffic congestion, are adequate measures considered to reduce such impacts?	(a) Y (b) N (c) N (d) Y	(a) Appropriate mitigation measures against environmental pollution (noise, vibration, turbid water, and waste, etc.) will be prepared. Mitigation measures are described in Tables 8-17 and 8-18. (b) There are no significant impacts on the natural environment. (c) There are no significant impacts on the social environment. (d) Installation of sewage pipes may cause traffic congestion, since a part of the proposed pipe network is routed along heavily-trafficked roads. Mitigation measures are described in Tables 8-17 and 8-18.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
5 Others	(2) Monitoring	(a) Does the proponent develop and implement a monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) Y (c) Y (d) N	(a) For the STP development Project, the monitoring plan should be prepared and implemented by SPC. For the sewer network development Project for Zone-1, DKI Jakarta is solely responsible for monitoring works. (b) The monitoring plan for the STP development Project should be established by SPC in the EIA process. For the sewer network development Project, DKI Jakarta is responsible for preparation of the monitoring plan. (c) The existing STP is properly managed by PD Pal Jaya. It is anticipated that PD Pal Jaya will participate in O&M of the proposed STP and therefore, an adequate monitoring framework will be established. (d) The reporting method and its frequencies from the proponent to BPLHD are not clearly mentioned in the relevant laws and regulations, but they are generally prescribed as conditions for EIA approval by BPLHD.

Source: JICA PPP Study Team

Chapter 9 Risk Analysis

9.1 Risk Allocation Principle in the Context of PPP Project Implementation

It is important to establish an optimal risk allocation scheme in the context of PPP implementation. Based on the risk allocation principle, definition and formulation of GCA's and SPC's obligation should be included in the PPP contract.

The common principle for risk allocation is that, "a risk should be allocated to party which is relatively able to manage the risk, or having the least cost of absorbing such risk. If this principle is implemented properly, it is expected that the risk premium and the project cost would be lower leading to positive impact to the project stakeholders."

9.2 Typical Risk Allocation between Public and Private

The typical allocation of risks between public and private is as described below:

- SPC normally bears the risk related to financing, design, construction, procurement, operation and maintenance (then transfer some of the risk to other party, either consultant, designer, contractor, supplier, operator, based on future discussions).
- GCA representing the government typically handles political risk, including change of law which the trigger is (relatively or better) controlled by the government or public sector.
- Basically GCA bears Force Majeure events, and SPC should be exempted from it.

9.3 Process of Risk Analysis

Risk analysis for the project has been done through the following process.

1) ***Risk identification*** for the PPP project has been done through the method of risk identification, observation, brainstorming or discussion.

2) ***Risk assessment***, including estimation of the risk exposures and its associated likelihood, has been done using the method of data evaluation, field observation, brainstorming and discussion.

3) ***Risk evaluation***, including determination of risk priority or risks being most concerned (i.e. critical risks which would be major issues at negotiation of the PPP Service agreement), has been done. In this stage, the requirement for government guarantee and insurance has been identified.

4) ***Risk treatment*** has been outlined.

Throughout the above process, risk matrix is applied for the risk allocation between GCA and SPC, and it will be used for drafting the PPP service agreement.

9.4 Identification of Major Risks in the Project Execution and Risk Allocation between Public and Private

The identification of risks is the first step in risk management for project execution, and involves the identification of all major risks that the project will face. If any major risks are not identified at this stage, the opportunity to appropriate risk management will be lost, and this may have a significant impact on the management.

Identified risks and risk allocation are listed in Table 9-2 “Risk Matrix.”

Risk assessment shown in Table 9-2 has been made in order to analyze risk significance (frequency of occurrence and damage size) following the table below.

Table 9-1 Risk Significance

Frequency	Damageability
Small (S)	Small (S)
Medium (M)	Medium (M)
High (H)	High (H)

Source: JICA PPP Study Team

[Frequency]

- High (H) means that the risk is expected to occur one or more times in one to several years.
- Medium (M) means that the risk is expected to occur one or more times in several years to more than 10 years
- Low (L) means that the risk is expected to occur one or more times in more than 10 years to several decades.

[Damageability]

- Small (S) means anticipated loss of no more than approximately USD 1 million
- Medium (M) means anticipated loss of approximately USD 1 million to about USD 10 million
- Large (L) means anticipated loss of approximately USD 10 million or more

.

Table 9-2 Risk Matrix

Risk Matrix (BOT Project)

The party marked "○" should bear the risks and the cost in each Type of Risk and Risk Evens

Private includes SPC, JC, Sponsor, Contractor (EPC and O&M) and Lender. If the risks or the incidents as mentioned below occur due to grounds attributable to SPC, SPC is to bear the risks and the cost.

Risk Matrix rank ; Frequency (**L**ow, **M**edium, **H**igh) Damageability (**S**mall, **M**edium, **L**arge)

Phase	Classification	Type of Risk and Risk Events	Description/Impact to the project	Note	Pubic	Private	Risk Matrix rank		Insurance
							Frequency	Damageability	
Common	Site Risks	Delay of decision to select a project site	Delay of an entire project schedule Costs increase in Public	Currently "Pejagalan" is nominated, but final decision on GOI has not been made. The decision on GOI must be made before, at least, a preparation of bidding for PPP project	○		L	S	
		Delay of handover of land to a project company after signing of PPP Service Agreement	Delay of commencement of the project Costs increase	Compensation to the project company should be stipulated in PPP Service Agreement	○		L	S	
		Complex resettlement process (especially, squatter on the site)	Costs overrun and delay due to a complicated resettlement process	All resettlment must be completed by GOI before the bidding for PPP project.	○		L	S	
		Unforeseen difficulties of site conditions (due to uncertainty of ground conditions and ground facilities)	Cost increase Project delay/halt	PPP Service Agreement should stipulate Public's responsibility	○		L	S	
		Damaged of artifacts and antiquites in the site	Cost increase Project delay/halt	It depends on the bidding condition		○	L	M	
		Demolition	Cost increase Project delay/halt	In case the demolition is included in the project scope		○	L	S	
		Fail in keeping site safety	Cost increase in a project company Project delay/halt			○	L	M	
		Unusual weather claim (other than "Force Majeure")	Cost increase Project delay/halt	The definition of "force majeure" need to be discussed and determined		○	M	M	EAR/DSU: during construction Property/BI: during operation
		Contamination / pollution to the site environment caused by Private	Cost increase Project delay/halt			○	L	M	
		Society distress due to potential discomfort from the process / final efluent quality, caused by Private	Cost increase Project delay/halt	In case of failure to comply with specification in the contract		○	L	M	
		Failure to comply with EIA (Environment Impact Assessment) /AMDAL	Cost increase Project delay/halt Project termination			○	L	M	
	Licenses and charters	The delay on procedures to gain licenses and/or charters which Private should proceed	Cost increase Project delay/halt	Lisenses include in the establishment of SPC/JC, registration of foreign investment, clear of negative list and so on		○	L	M	
		The delay on procedures to gain licenses and/or charters which Public should proceed	Cost increase Project delay/halt	PPP Service Agreement will be effective as licenses. Lisenses include in the establishment of JC	○		L	M	
		Incapable of gaining licenses caused by Private	Project termination/(re-tender)	License includs the establishment of SPC/JC		○	L	M	
		Incapable of gaining licenses caused by Public (e.g. authorization at assembly)	including the establishment of JC Project termination		○		L	M	

Common	Sponsor Risks	Poor performance of subcontractors (design-build contractor, O&M contractor)	Cost increase Project delay/halt		○	L	M		
		Subcontractors' (design-build contractor, O&M contractor) default	Cost increase Project delay/halt		○	L	M		
		SPC's default	SPC's default leading to termination and / or step-in by financiers	PPP Service Agreement should stipulate SPC's default	○	L	L		
		Project sponsor's default	Sponsor (or a member of consortium) 's default Cost increase Project delay/halt	PPP Service Agreement should stipulate Project Sponsor's default	○	L	M		
	Political Risks	Currency Inconvertibility	Inavailability and / or incovertibility of local currency to the investor's home currency Cost increase	It should be guaranteed by IIGF	○	L	S		
		Currency non-transfer	Inability to transfer funds in foreign currency to the investor's home country Cost increase	It should be guaranteed by IIGF	○	L	S		
		Expropriation risk	Cost increase Project delay/halt Project termination	It should be guaranteed by IIGF	○	L	L		
		General change in law (including tax such as income tax, VAT)	Cost increase		○	M	M		
		Discriminatory or project specific change in law (including effluent standard/environmental standard)	Cost increase (e.g. nessecity of modification of facilities, increase matrials cost) Project delay/halt	Responsibility on Public should be stipulated in PPP Service Agreement. Also it should be guaranteed by IIGF	○	L	M		
		Delay in achieving planning approval	Only if it caused by the public sector's unilateral / Improper decision Cost increase Project delay/halt		○	L	M		
		Fail or delay in obtaining necessary consents (excl. Planning)	Only if it caused by the public sector's unilateral / Improper decision Cost increase Project delay/halt		○	L	M		
		Delay in gaining access to the site	Only if caused by the public sector's unilateral / Improper decision Cost increase Project delay/halt		○	L	M		
		Termination due to Authority default	Project termination	It should be guaranteed by IIGF	○	L	L		
	Third party liability	The damage to the third party caused by the conduct attributable to Public	Cost increase		○	L	L	Third party liability insurance	
		The damage to the third party caused by the conduct attributable to Private	Cost increase		○	L	L	Third party liability insurance	
	Force Majeure Risks	Natural disasters	Catastrophic god's act events Cost increase Project delay/halt Project termination	The definition of "force majeure" needs to be clarified. Basically Private should be exempted but in case the loss or damage is covered by insurance Private should claim the insurance first and the remaining amount will be claimed to Public. In case of construction phase, period should be extended. In O&M phase, services fees (coresponded part of debt and interest) should be paid to SPC. It should be guaranteed by IIGF	○	L	L	EAR/DSU: during construction Property/BI: during operation	

Common	Force Majeure Risks	Political force majeure	Events of war, riots, civil disturbance, sabotage, pressure by industrial group Cost increase Project delay/halt Project termination	Ditto	○		L	L	Terrorism insurance
		Extreme weather	Cost increase Project delay/halt Project termination	Ditto	○		L	M	EAR/DSU: during construction Property/BI: during operation
		Prolonged force majeure	If above 6 to 12 months, it could cause economic problems on the affected party (esp. if insurance is no longer available) Cost increase Project delay/halt Project termination	Ditto	○		L	L	DSU(cover for fixed cost/debt service in case the property insured suffers the damage caused by insurable peril) during construction BI(cover for fixed cost/debt service in case the property insured suffers the damage caused by insurable peril)
	Financial Risks	Fail to achieve financial close	Inability to achieve financial close due to market uncertainty Cost increase Project delay/halt			○	L	M	
		Financial structure risk	Inmefficiency due to inoptimal project's capital structure Cost increase			○	L	M	
		Foreign exchange rate risk	(non extreme) fluctuation of foreign exchange rate Cost increase	The definition of "non extreme" and "extreme" needs to be clarified		○	M	S	
			(extreme) fluctuation of foreign exchange rate Cost increase	The definition of "non extreme" and "extreme" needs to be clarified	○		L	L	
		Inflation rate risk	(non extreme) Increase of inflation rate used for estimating life-cycle costs Cost increase	The definition of "non extreme" and "extreme" needs to be clarified		○	M	S	
			(extreme) Increase of inflation rate used for estimating life-cycle costs Cost increase	The definition of "non extreme" and "extreme" needs to be discussed Fructuation of O&M costs due to extreme fructuation shall be subject to re-evaluation of services fees based on official price index.	○		L	L	
		Interest rate risk	(non extreme) fluctuation of loan interest rate Cost increase	The definition of "non extreme" and "extreme" needs to be discussed.		○	M	S	
			(extreme) fluctuation of loan interest rate Cost increase	The definition of "non extreme" and "extreme" needs to be discussed. Extreame fructuation of interest shall be subject to re-evaluation of services fees based on official interest rate.	○		L	L	
		Insurance risk	Insurance cover for a certain risk is no longer available from reputable insurers in the market Cost increase	PPP Service Agreement should stipulate only the standard insurances in the insurance market		○	L	S	
			Substantial increases in rates at which insurance premiums are calculated Cost increase			○	M	S	

Common	Public Revenue Risks	End (retail) user fail to pay	Cost (Budget support) increase		○		M	M	
		Periodical tariff adjustment is delayed (i.e. on tariff Indexation to inflation rate)	Cost (Budget support) increase	(e.g. Authorization at assembly)	○		M	M	
		Level of the adjusted tariff is lower from initially projected	Especially after tariff indexation Cost (Budget support) increase		○		L	M	
	Private Revenue Risks	Non-payment of VGF to SPC	Project termination	The payment should be made on appropriate time stipulated in PPP Service agreement.	○		L	L	
		Delay of payment of service fee from Public to SPC	Difficulty in operation of the project Cost increase	PPP Service agreement should stipulate that public should pay the compensation correspond to the interest during the period of delay.	○		L	M	
		Non-payment caused by Public	Difficulty in operation of the project. Project termination	It should be guaranteed by IIGF	○		L	L	
		Miscalculation of the service fee estimates, by Private	Cost increase			○	L	M	
Construction Phase	Design, Construction and commissioning risks	Design brief risk for bidding	Time and cost overruns due to unclear / incomplete design brief	e.g mistake in the bidding document	○		L	S	
		Additional design works required by public	Cost increase		○		L	S	
		Design faults	Technical commissioning leads to discovery of design faults Cost increase Commencement of Project delay/halt			○	L	M	
		Delay in completing construction works	Cost increase (no service fee payment but repayment on SPC) Commencement of the project delay/halt			○	L	M	DSU (cover for fixed cost/debt service in case the property insured suffers the damage caused by insurable peril)
		Construction mistake	including the failure on supervsion of the construction process or damage to the facility caused by Private Cost increase Commencement of Project delay/halt			○	M	S	
		Commissioning mistake	Incorrect time / cost estimates of technical commissioning Cost increase Commencement of the project delay			○	L	M	
		Contamination / pollution outside of the site during construction caused by Private conducts	Cost increase Project delay/halt	(e.g. Soil pollution, noise, air pollution)		○	M	M	
		Contamination / pollution outside of the site during construction caused by OTHER THAN Private conducts	Cost increase Project delay/halt		○		L	M	

Operation Phase	Operating Risks	Non-performance of services caused by Private	Cost increase Project delay/halt	Penalty by private should be made, if performance doesn't meet required standard of PPP Service Agreement. Project termination:if the problem can't be solved during the certain period.		○	L		L	BI (cover for fixed cost/debt service in case the property insured suffers the damage caused by insurable peril)
		Poor performance of services	including defect of the facility, the manpower shortage and the lack of the staff skills Cost increase Project delay/halt	Penalty by private should be made, if performance doesn't meet required standard of PPP Service Agreement. Project termination:if the problem can't be solved during the certain period.		○	L		M	BI (cover for fixed cost/debt service in case the property insured suffers the damage caused by insurable peril)
		Improper compliance by Private	including the negative reputation accompanied with the employee scandal, corruption, Cost increase			○	L		M	
		Industrial action	Industrial actions (strike, lockout, go slow, etc) by operation staff Cost increase Project delay/halt			○	L		M	Property(cover the damage on the property insured casued by the actions)
			Industrial actions (strike, lockout, go slow, etc) by subcontractor or supplier Cost increase Project delay/halt			○	L		M	Property(cover the damage on the property insured casued by the actions)
		O&M/replacement cost overrun risk	Mis-estimation of O&M/replacement costs Cost increase			○	L		S	
		Increase in energy costs - due to inefficient plant	Cost increase excluding electric rate hike			○	L		S	
		Irregular availability of required utilities	Cost increase Project delay/halt			○	L		M	
		Shortfall of influent rate against contracted influent rate	Cost per m3 increase Final effluent quality doesn't meet contracted final effluent quality.	Service fee should be composed of fixed cost and variable one. Even if actual influent volume is lower than contractual one, total fixed cost and variable cost reflecting the operating condition should be calculated(added up) as service fee ,based on service fee calculation method stipilated on the PPP contract.	○		L		S	
		Excessive influent rate against contracted influent rate	Cost increase Final effluent quality doesn't meet contracted final effluent quality.		○		L		S	
		Unsatisfied(Low/High) influent quality (BOD, COD, SS and N) against contracted influent quality	Cost increase Final effluent quality doesn't meet contracted final effluent quality.		○		L		M	
		Shortfall of final effluent rate against contracted final effluent rate caused by Private (e.g. Leakage from the site due to improper process)	It may cause environmental problems at receving water body.			○	L		M	
		Unsatisfied final effluent quality caused by inappropriate operation	Final effluent quality doesn't meet contracted final effluent quality. It may cause environmental problems at receving water body.			○	L		M	

Operation Phase									
	Operating Risks	Default of Sludge cake disposal	Cost increase Deterioration of final effluent quality It may cause environmental problems	Sludge cake disposal should be Public's responsibility	○		L	M	
		Contamination / pollution (other than above) outside of the site during operation caused by Private conducts	Cost increase Project delay/halt	(e.g. Bad smell, noise, air pollution)		○	L	M	
		Contamination / pollutionk (other than above) outside of the site during operation caused by OTHER THAN Private conducts	Cost increase Project delay/halt		○		L	M	
	Network Connectivity Risks	Illicite of discharge (e.g. garbage and toxic substance discharge) to waste water collection network before input to the site	Cost increase Deterioration of final effluent quality Malfunction of facility It may cause environmental problems	There is a probability of it will take any time and cost to cope with gabage caught by screens in WWTP.Public is responsible for O&M activities for pipe network.Public should bear removal costs when necessary.	○		M	L	
		Breach of authority's obligation to maintain required waste water collection network	Cost increase Project delay/halt	Influent water quality-and quantity change due to damaged sewer pipe	○		M	M	
		Breach of authority's obligation to develop required facilities	Cost increase Project delay/halt		○		L	M	
	Asset ownership risks	Asset loss event risk (other than Force Majeure)	Fire, explosion, etc			○	L	M	Property/B1: during operation
Termination	Contract termination (during the contract period and at the expiry of the contract)	Incapable of terminating the contract and operation	Cost increase	Termination event need to be discussed		○	L	M	
		The increase of the cost at the termination of the contract, caused by Public	Cost increase	Transfer/termination condition need to be discussed. It should be guaranteed by IIGF (e.g. breach of contract)	○		L	M	
		The increase of the cost at the termination of the contract, caused by Private	Cost increase	Transfer/termination condition need to be discussed		○	L	M	
		The increase of the cost at the termination of the contract, due to the force majeure	Cost increase	The definition of "force majeure" needs to be discussed. It should be guaranteed by IIGF.	○		L	L	
	Asset transfer	Not to meet the condition stipulated at the date of the asset transfer	Cost increase Project delay (turnover by Public)	Transfer condition need to be discussed		○	L	M	

9.5 Insurance

Types of insurance that the SPC (or its contractors, such as EPC contractors and O&M contractors) needs to obtain for the Project are summarized in Table 9-3.

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Table 9-3 Types of Insurance

[Construction phase]

Policy	Policy Holder	Outline of Policy	Insured	Policy Period	Sum Insured /Loss Limit
EAR/CAR (Erection / Construction All Risks)	SPC/EPC Contractor	Physical loss of or damage to the permanent and temporary works, materials, buildings, structures, machinery, plant and equipment supplies and all other property for incorporation into the construction of Project.	-SPC -EPC Contractor and sub-contractors of every tier -Finance Parties	Construction period including test and commissioning period plus warranty period	EPC contract value
DSU (Delay in Start Up)	SPC	Loss of or damage to the project during the construction period may result in a delay to the Project and consequently anticipated revenue will not be realized. Delay in Start up insurance will indemnify the project for insured contingencies that are incurred as a result of a delay in commercial operation date (COD) due to loss or damage covered under EAR policy.	-SPC -Finance Parties	Construction period including test and commissioning period (until scheduled COD)	To be determined (i) loss of gross profit or (ii) debt service (interest and capital) and fixed costs or (iii) debt service only.
TPL/CGL (Third Party Liability/ Comprehensive General Liability)	SPC	Third Party Liability insurance will indemnify the insured parties for accidental damage, bodily injury, property damage including coverage for contractors extended maintenance obligations arising out of the design supply, fabrication, construction, testing, commissioning and supply of products of the Plant.	same as EAR	same as EAR	Limit To be determined
Marine cargo	SPC/EPC Contractor	Loss, destruction or damage to all materials, equipment, machinery (excluding contractors plant), spares and other items for incorporation within the project whilst in transit by sea, land or air from the time that the insured items leave the warehouse or factory in the country of origin anywhere in the world until delivery at the project site. Coverage excludes inland transit for locally procured materials which are covered under the EAR policy.	same as EAR	from commencement of the shipment to completion of project	Limit To be determined

Policy	Policy Holder	Outline of Policy	Insured	Policy Period	Sum Insured /Loss Limit
Marine DSU (Marine Delay in Start Up)	SPC	Loss or damage to critical plant, equipment or machinery during transit can result in a delay to COD. Marine DSU insurance will indemnify the project for insured contingencies that are incurred as a result of a delay in commercial operation date (COD) due to loss or damage covered under Marine cargo policy.	-SPC -Finance Parties	Same as Marine cargo	To be determined (i) loss of gross profit or (ii) debt Service (interest and capital) and fixed costs or (iii) debt service only.
Terrorism	SPC	For the purposes of insurance, an act of terrorism means an act including the use of force or violence of any person or group(s) of persons, whether acting alone or on behalf of or in connection with any organization(s), committed for political, religious or ideological purposes including the intention to influence any government and / or to put the public in fear for such purposes. This insurance will cover loss of or damage to the assets of the Project caused by an act of Terrorism as defined in the policy.	same as EAR	Construction period including test and commissioning period (until scheduled COD)	To be determined
Workers compensation	EPC Contractor	Provides benefits which may become payable to an employee following a work related accident.	-EPC Contractor/ sub-contractors	Construction period	depend on the contractor
Automobile liability	EPC Contractor	Third party legal liability and owned vehicle damage cover.	-EPC Contractor/ Owner of auto	Construction period	depend on the contractor

[Operation phase]

Policy	Policy Holder	Outline of Policy	Insured	Period	Sum Insured/Loss Limit
Property All Risks	SPC	This insurance will cover the insureds for “All Risks” of loss or damage to the Property Insured including machinery breakdown occurring during the period of insurance by any cause not otherwise excluded.	-SPC -Finance Parties	1 year	To be determined

Policy	Policy Holder	Outline of Policy	Insured	Period	Sum Insured/Loss Limit
BI (Business Interruption)	SPC	Business Interruption Insurance will cover the reduction in gross profit actually sustained or as otherwise agreed, including continuing contractual obligations and the increased cost of working if at any time during the period of insurance any Property Insured suffers insured damage, covered under Property All risks above.	-SPC -Finance Parties	1 year	To be determined (i) loss of gross profit or (ii) debt Service (interest and capital) and fixed costs or (iii) debt service only.
TPL/CGL (Third Party Liability/ Comprehensive General Liability)	SPC/O&M Contractor	Third Party Liability Insurance will cover the insured against legal liability to pay compensation (including claimants' costs, fees and expenses) consequent upon: a) bodily injury, death, illness or disease to any person; b) or loss or damage to any property in accordance with the law of any country,	-SPC -O&M Contractor -Finance Parties	1 year	To be determined
Terrorism	SPC	same as terrorism during construction period	-SPC -Finance Parties	1 year	To be determined
Workers Compensation	O&M Contractor / SPC	Provides benefits which may become payable to an employee following a work related accident.	O&M Contractor /SPC	1 year	depend on the contractor/SPC
Automobile liability	O&M Contractor /SPC	Third party legal liability and owned vehicle damage cover.	Owner of auto	1 year	depend on the contractor/SPC