PART-E ECONOMIC AND FINANCIAL EVALUATION

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E1 Methodological Background

The project is evaluated by two methods of analysis: economic and financial analysis.

Economic analysis determines if the decision to invest in a project is appropriate from the standpoint of economic benefit. In other words, it balances the effect of investment in a project as benefit not only for the entity managing the project, but also for the entire community.

Financial analysis, on the other hand, analyzes profitability of project investment from the perspective of those involved in the project from the standpoint of whether or not it is financially feasible, and regards direct income of the management entity from the project as benefit.

Both analyses are currency based, but they differ in the way cost and benefit are calculated. The differences are shown in the Table E1-1:

Table E1-1 Differences between Methods of Economic and Financial Analysis

Item	Economic analysis	Financial analysis
Objective of analysis	Economic profitability	Project sustainability
Cost	Economic value	Market value
Benefit	Reduction of cost/time, increase in productivity, etc.	Increase in income
Discount rate	Opportunity cost of capital	Long-term prime rate
Evaluation index	*Net Present Value (NPV) *Benefit/Cost Ratio (B/C Ratio) *Economic Internal Rate of Return (EIRR)	*Net Present Value (NPV) *Benefit/Cost Ratio (B/C Ratio) *Financial Internal Return Rate (FIRR)

Source: JICA Expert Team

This New M/P aims to improve sewage management of entire DKI Jakarta by proceeding with both development projects simultaneously which are sewerage system (off-site) development projects and on-site development projects. Therefore, achievement of targets for pollutant reduction in rivers etc., effect of improvement of public sanitation such as economical benefit due to reduction of medical treatment cost, and effect on reducing cost of water purification are gained not only by developing sewerage systems (off-site) but also by proper development of on-site systems such as renewal, expansion, and installation of sludge treatment plants, regular desludging from septic tanks, and replacing conventional septic tanks (CST) to modified septic tanks (MST).

From this standpoint, to evaluate the projects economically and financially, it is necessary to calculate required cost for both off-site system and on-site system.

Based on these, economic analysis is conducted for short and medium term development plans of the Master Plan (M/P) from the standpoint of being able to quantitatively evaluate the economic effect on the community where off-site and on-site projects are implemented.

Financial analysis is conducted for the M/P and priority projects (short-term plans) from the standpoint of evaluating the sustainability of a more specific project.

On-site priority projects implemented during the short-term plans (development of new STP and improvement of existing STPs) are excluded from financial analysis because the revenue earning cannot be expected due to characteristics of the facilities.

E2 Economic Evaluation

Whether the projects of the M/P have optimal distribution of resources from the standpoint of the national economy or not is verified by calculation of Net Present Value (NPV), Benefit/Cost Ratio (B/C Ratio) and Economic Internal Rate of Return (EIRR).

E2.1 Targets of Economic Analysis

Sewerage (off-site) plans and on-site plans are targets of economic analysis.

Sewerage plans and on-site plans are divided into short term (2012 - 2020), medium term (2021 - 2030) and long term (2031 - 2050). Because the projects of long-term plans are scheduled to start 20 years in the future, it is difficult to predict what the economic situation will be at that time. Therefore, the targets of economic analysis in this report is short and medium term plans (until 2030).

E2.2 Indices of Economic Analysis

The following 3 indices are used for economic analysis of off-site and on-site plans.

- Net Present Value (NPV)
- Benefit/Cost Ratio (B/C Ratio)
- Economic Internal Rate of Return (EIRR)

E2.3 Prerequisites of Economic Analysis

Prerequisites of economic analysis are as follows:

E2.3.1 Project Targets

Targeted projects of economical analysis are development plans of sewerage (off-site) and on-site implemented by 2030, the target year of medium term development plans.

Concretely, as for off-site, projects of zones No.1, No.6, No.4, No.5, No.8 and No.10 are set as target of the analysis. As for on-site, development of new on-site sludge treatment plant in Southern Jakarta, rehabilitation and expansion of existing STP, and integration with newly constructed WWTPs, and co-treatment for on-site sludge at off-site WWTPs are set as the targets. The overview of the projects is provided in the Table E2-1.

Table E2-1 Overview of the Priority Project for which Economic Analysis is Conducted

<Off-site development plan>

Term	Zone No.	Area (ha)	Population for Sewerage	Wastewater Flow (m^3/day)	Capacity of WWTP (m^3/day)	Length of Pipes (m)
Short-term (2013-2020)	No.1	4,901	989,389	198,000	264,000	758,000
	No.6	5,874	1,172,574	235,000	313,000	1,008,000
Medium-term (2021-2030)	No.4	935	232,637	(47,000)	(flow into Zone No.10)	165,000
	No.5	3,375	636,087	127,000	170,000	557,000
	No.8	4,702	880,110	176,000	235,000	744,000
	No.10	6,289	1,239,402	295,000	393,000	1,085,000
Total		26,076	5,150,199	1,031,000	1,375,000	4,317,000

Source: JICA expert team

<On-site sludge treatment plant development plan>

Plan	Development term	Development type	Facilities name	STP's capacity (maximum) (m^3/day)
On-site STP development plan	Short term: 2013-2014	New construction	New STP in south area	600
Integration plan for off-site WWTP and on-site STP	Short term:2013	Abolition of existing facilities and integrated	Duri Kosanbi WWTP (Zone 6)	930
		Renewal and expansion of existing facilities	Pulo Gebang STP (existing) (Zone 10)	450
	Medium term: 2021-2024	Abolition of existing facilities and integrated	Pulo Gebang WWTP (Zone 10)	940
Co-treatment plan of on-site sludge at off-site WWTPs	Short term:2014(start acceptance)	Co-treatment	Pejagalan WWTP (Zone 1)	790
	Medium term:2024 (start acceptance)	Co-treatment	Sunter Pond WWTP (Zone 5)	410
	Medium term:2025 (start acceptance)	Co-treatment	Marunda WWTP (Zone 8)	570

Source: JICA expert team

E2.3.2 Project Life (Analysis Term)

The term during which project analysis is conducted (project life) is from 2013 when construction is to start for a short-term project, and by 2050, which is the operation term of 2021 where sewerage system of a medium-term project is to start being used plus 30 years.

- Project life: 38 years
- Term: 2013 - 2050

E2.3.3 Discount Rate of Project

Discount rate used in economic analysis is established at 12% as the "opportunity cost of capital."

E2.3.4 Shadow Exchange Rate (SER)

With economic value used for economic analysis, value level of tradable commodities (foreign currency) and non-tradable commodities (domestic currency) must be made consistent with each other. Here, in order to offset the difference between official exchange rate (OER) and actual rate, commonly used Shadow Exchange Rate (SER) is employed to make value level of tradable commodities (foreign currency) consistent with the domestic (Indonesian) value level. Tradable commodities (foreign currency) are converted to domestic value level by the following formula:

(Value made consistent with domestic value level) = (cost posted as tradable commodities [foreign currency]) x (SER)

Here, SER is established as "1.1."

E2.4 Calculation of Cost

Cost items for economic analysis are given in Table E2-2.

Cost for off-site is the one related to sewerage development plans.

Cost for on-site, on the other hand, consists not only construction cost of on-site sludge treatment plant but also additional cost borne by the entire society such as desludging cost from septic tanks according to regular desludging system, and replacement cost from CST to MST according to improved structure of septic tanks. Although this cost is regarded not as project cost borne by public sectors but as cost generated or increased as a result that public sector introduces new system and borne by private sectors, it will be posted as cost for economical analysis because of its necessity as social cost.

Table E2-2 Cost Items for Economic Analysis

Cost items	Cost bearer	
	Public	Private
1. Off-site		
(1)Sewerage development plan		
1) Construction and renewal cost of sewerage facilities (WWTP and sewers)	✔	
2) O&M cost of sewerage facilities	✔	
2. On-site		
(1) On-site sludge treatment plant development plan		
1) Cost of improvement, expansion, and newly construction and cost of renewal of sludge treatment plants	✔	
2) O&M cost of sludge treatment plants	✔	
(2) Introduction of regular desludging system		
Cost of regular desludging from septic tanks		✔
(3) Improvement in structure of septic tanks		
Cost of replacement from CST to MST		✔

Source: JICA expert team

Construction cost and annual maintenance cost are given in Table E2-3 as cost of off-site and on-site development plan used for economic analysis. Construction cost among tradable commodities is made consistent with the domestic value level by multiplying by SER (= 1.1).

Specifically, construction cost of sewerage facilities developed according to short-term and medium-term development plans, and renewal cost and O&M cost occurred by 2050 are included in the cost of off-site development plan. However, sewerage coverage rate and connection rate after 2031 are kept as the level of 2030 because long-term development plan is excluded on this economic analysis.

As for on-site, construction cost of new STPs developed in southern Jakarta area according to short-term and medium-term plans are cost of improvement and expansion of existing STPs and integration with WWTPs, and construction cost of on-site sludge treatment facilities added to new WWTPs are included in the cost of on-site STP development plan. Renewal cost and O&M cost related to these facilities and transportation cost of on-site sludge to off-site WWTPs and co-treatment cost at off-site facilities occurred by 2050 are also included. However, treated volume of on-site sludge after 2031 is kept as the level of 2030 because long-term development plan is excluded from this economical analysis.

For details of economic analysis, see the attached S/R Part-E: E2.

Table E2-3 Estimated Cost for Economic Analysis

<Off-site development plans>

(Market price-based) Unit : Million IDR

Items			Short-term		Medium-term				Total
Construction Cost for Sewerage Development Plan			Zone No.1	Zone No.6	Zone No.4	Zone No.5	Zone No.8	Zone No.10	
	A. Construction Cost		5,127,423	6,923,407	520,238	3,398,813	4,620,518	7,327,577	27,917,976
		a. Direct Construction Cost	4,537,543	6,126,909	460,388	3,007,799	4,088,954	6,484,581	24,706,173
		(1)House Conection	361,275	464,054	75,824	252,490	332,536	497,467	1,983,646
		(2)Collection Sewer Line	1,893,787	2,791,067	384,564	1,359,651	1,812,432	2,751,112	10,992,613
		(3)Lift Pump Station	0	107,094	0	19,690	34,220	41,595	202,599
		(4)Wastewater Treatment Plant	1,501,632	1,782,240	0	963,168	1,334,784	2,237,280	7,819,104
		(5)Facilities Replacement(2013-2050)	780,849	982,454	0	412,800	574,982	957,127	3,708,211
		b. Indirect Construction Cost	589,881	796,498	59,850	391,014	531,564	842,996	3,211,803
	B. Engineering Cost		317,628	428,884	32,227	210,546	286,227	453,921	1,729,432
	C. Physical Contingency		256,371	346,170	26,012	169,941	231,026	366,379	1,395,899
	D. Land Use Cost		0	0	0	0	0	0	0
	Total (excluding Value Added Tax)		5,701,422	7,698,461	578,478	3,779,300	5,137,770	8,147,876	**31,043,307**
			13,399,883		17,643,424				
O&M Cost for Sewerage Development Plan (Annual)			113,587	139,578	26,498	74,104	102,484	144,808	**15,513,998**
Costs for Sewerage Development Plan									**46,557,304**

Source: JICA expert team

<On-site STP development plans>

(Market price-based) Unit : Million IDR

Items			1. On-site STP Development Plan	2. Integration Plan for Off-site WWTP and On-site STP		3. Co-treatment Plan of On-site sludge at Off-site WWTPs	Total
Construction Cost for On-site STPs Development Plan			Construction of a new STP in South area	(1) Duri Kosambi	(2) Pulo Gebang	Zone1 / Zone 5 / Zone 8	
	A. Construction Cost		50,996	192,966	202,149	353,880	799,991
		a. Direct Construction Cost	45,129	170,766	178,893	313,168	707,957
		(1) STPs	30,460	112,346	131,200	213,820	487,827
		(2)Facilities Replacement (from 2013 to 2050)	14,669	58,420	47,693	99,348	220,130
		b. Indirect Construction Cost	5,867	22,200	23,256	40,712	92,034
	B. Engineering Cost		3,159	11,954	12,523	21,922	49,557
	C. Physical Contingency		2,550	9,648	10,107	17,694	40,000
	D. Land Use Cost		0	0	0	0	0
	Total (excluding Value Added Tax)		56,705	214,568	224,779	393,496	**889,548**
O&M Cost for On-site STPs Development Plan (Annual)			11,758	6,197	6,263	11,793	**1,107,451**
Costs for On-site STPs Development Plan							**1,996,998**

Source: JICA expert team

E2.5 Calculation of Benefit

E2.5.1 Pro Forma Calculation Items for Benefit

The economic effects of off-site and on-site development plans include effect on reduction of

discharge/treatment cost of residential wastewater, effect on improvement of public sanitation, effect on enhancement of the living environment, effect on improvement of public waters, and effect on land utilization in applicable zones of the plan. Thus, development plans are expected to provide enormous benefits from the socioeconomic standpoint.

Table E2-4 shows foreseen benefits of implementing the off-site and on-site development plans.

Table E2-4 Benefit Items for Economical Analysis

Benefit items	Contribution to benefit	
	Off-site	On-site
1. Effect of reduction in wastewater treatment cost		
(1) Reduced cost of regular desludging from septic tanks	✔	
(2) Reduced cost of upgrading to modified septic tank	✔	
(3) Reduced O&M cost of ITP	✔	
(4) Reduced construction cost and O&M cost of sludge treatment plants	✔	
2. Effect of improvement in public sanitation		
(1) Reduced medical treatment cost by reducing the number of patients suffering from waterborne disease	✔	✔
(2) Increased benefit by reduction of absence from work due to waterborne disease	✔	✔
(3) Increased economic value by saving deaths from waterborne disease	✔	✔
3. Effect of improvement of the living environment		
(1) Reduced cost of covering small and medium-sized open channels	✔	✔
(2) Reduced cost of dredging open channels	✔	✔
4. Effect of improvement in quality of public waters		
- Reduced cost of purifying water at waterworks facilities	✔	✔
5. Effect of rise in land value		
- Increased value of land	✔	✔
6. Effect of tourism recuperation		
(1) Increased tourism income by improving hotel occupancy	✔	✔
(2) Increased tourist expenditure by decreasing rate of water borne disease	✔	✔

Source: JICA expert team

As for other benefits, increase in tax income due to rising value of land and reduction of unsanitary areas is expected. Quantitative evaluation of other benefits is also difficult, but benefits such as reduction of unpleasant aspects of the living environment, elimination of foul odors from open channels and rivers, and abatement of underground water pollution can be expected.

E2.5.2 Assumed Conditions for Pro Forma Calculation of Benefits

This section will detail and list the assumption used for calculation of each benefit item stated in the above table E2-4.

(1) Effect of Reduction of Wastewater Treatment Cost

The cost of wastewater treatment is posted as benefit if the current state of on-site treatment continues to be utilized without changing to the sewerage system which can be considered as mitigated cost, if the sewerage system is to be developed.

The cost of treatment required if the sewerage system is not developed includes the cost of regular desludging from septic tanks, the cost of switching from the existing type of septic tanks to an improved form, O&M cost of individual wastewater treatment plants (ITP) maintained by private contractors, and construction cost and O&M cost of the sludge treatment plants.

1) Cost of Regular Desludging from Septic Tanks

The following conditions have been established for pro forma calculation of cost of regular desludging if the sewerage system is not developed:

- No. of tanks applicable for desludging: (sewerage service population if sewerage system were developed) / (household population) x (introduction rate of regular desludging) / (frequency of regular desludging [times/year])

- Introduction rate of regular desludging: 50% for 2020, 75% for 2030
- Frequency of regular desludging: once in 3 years
- Household population: 5 people per household
- No. of septic tanks per household: 1 tank per household
- Cost of sludge removal: 350,000 IDR per tank

2) Cost of Upgrading to Modified Septic Tanks

The following conditions have been established for pro forma calculation of cost of switching to a more modern septic tank if the sewerage system is not developed. In this case, existing tanks are to be left as they are, and cost for desludging and cleaning of the tank and clogged pipes are included to the switch cost:

- No. of tanks applicable for switch: (sewerage service population if sewerage system is developed) / (household population) x (increase in switch rate)
- Switch rate: 25% for 2020, 50% for 2030
- Unit cost of switch: 4,500,000 IDR / tank
  (Including 500,000 IDR / tank as abolishment cost of existing tanks.)

3) O&M Cost of ITP

The following conditions have been established for pro forma calculation of O&M cost of ITP if the sewerage system is not developed: A survey of O&M for ITPs was taken as part of a socioeconomic study of 51 ITPs, and O&M unit cost was established from the results of the study.

- O&M cost calculation targets: No. of people switching from ITP to sewerage system if sewerage system were developed.
- ITP sewage basic unit: 150 LCD
- ITP O&M unit cost : 1,647 IDR/m^3 (average; from results of socioeconomic study)

4) Sludge Treatment Plants Construction Cost and O&M Cost

If the sewerage system is not developed, sludge removed from septic tanks or ITPs must be disposed of after processing such as concentration, dehydration, etc. Here, pro forma calculation of construction and O&M cost of sludge treatment plants if the sewerage system is not developed is conducted with the following assumptions:

- Targets of sludge treatment: Amount of sludge that would be produced from sewerage service population if the sewerage system were developed (calculated as [sewerage service population] x 200 LCD, on the basis of sewage volume).
- Sludge treatment plants upgrade plan:
- Phase 1: Sludge treatment plants required for 2020 are constructed in 2013
- Phase 2: Sludge treatment plants required for 2030 are constructed in 2020
- Facilities renewal: Assuming almost all equipment to be machinery, renewed each 15 years and same amount as construction cost is posted.
- Construction unit cost of sludge treatment plants: 677,000 IDR / m^3 (sewage volume base)
- O&M unit cost of sludge treatment plants: 0.028 USD / m^3 (sewage volume base) =240 IDR / m^3
  Based on empirical value in Japanese night-soil treatment plant (500 JPY / m^3: sludge of 1.5% conc.), the unit cost is assumed to one-third of the empirical value in Japan converted to sewage volume base value (SS=200). (500JPY/m^3/(1.5%/0.02%)/(79.87 JPY/USD)=0.028 USD/m^3)

(2) Effect of Improvement of Public Sanitation

Development of sewerage system and modified septic tanks can restrain contamination of ground water. Quality of well water, which is used for domestic water and drinking water, is expected to have some improvement accordingly. Pro forma calculation of decrease in medical care cost due to reduction in number of patients suffering from waterborne diseases and increase of added value due to

the reduction of absence due to illness as effects of enhancing public sanitation is conducted and posted as benefit.

1) Effect of Reduction of Medical Treatment Cost by Reducing the Number of Patients Suffering from Waterborne Disease

Assuming the following, pro forma calculation of medical care cost in the case where the sewerage system were developed and the case where it is not conducted, and the difference is regarded as the effect on reduction of medical care cost.

- No. of patients suffering from waterborne diseases (avg. results of 2007 - 2010): 219,030 people/year
  Source: Surveillance of Health Agency, Integrated Surveillance System (STP) based on Puskesmas (Public Health Center) Data Record
- Population of DKI Jakarta (2010 results): 9,718,196 people
- Current incidence of waterborne diseases: 219,030 / 9,738,880 = 2.25%
- Decrease rate of incidence of waterborne diseases due to increased access to sewerage system: 25% (avg. of 24.5% by old MP 1991)
- Medical care cost of waterborne diseases: 3,000,000 IDR / patient (assumed as 2 days admission to hospital)
- (Reduction of medical care cost by reduction of waterborne diseases) = (waterborne disease medical care cost without development) - (waterborne disease medical care cost with development)
- (Waterborne diseases medical care cost) = (population) x (incidence) x (medical care cost)

2) Effect of Increasing added Value by Reduction of Absence from Work due to Waterborne Disease

Assuming the following, pro forma calculation of the effect of avoiding absence from work due to waterborne diseases as a benefit of sewerage system development and on-site system improvement is conducted.

- Nominal GDP of Indonesia: 706,558,240,892 USD (2010)
  (From World Bank website; http://data.worldbank.org/country/indonesia)
- Total population of Indonesia: 237,641,326 people (2010 preliminary report value)
  (From Badan Pusat Statistik [Statistics Indonesia] website)
- Per day added value per person: 706,558,240,892 USD / 365 days / 237,641,326 people
  = 8.146 USD / day / person
  = 69,809 IDR / day / person
- Employed population rate: Because the employed population rate of DKI Jakarta is unknown, pro forma calculation of employed population rate of the entire country of Indonesia is conducted and that value is used.
  (employed population rate) = (employed population of Indonesia) / (total population of Indonesia)
  = 107,410,000 people / 237,641,326 people
  = 45.2%
  (The population given above is the figure for 2010. Taken from Badan Pusat Statistik [Statistics Indonesia] website)
- Assumed days absence due to waterborne diseases: 7 days
- (amount of increase in added value due to decrease in absence) = (decrease in No. of people suffering from waterborne diseases due to increased access to sewerage system) x (employed population rate) x (No. of days of absence) x (1 person per day added value)

3) Increased Economic Value by Saving Deaths from Waterborne Disease

Pro forma calculation of the effect of saving deaths due to waterborne diseases as a benefit of

sewerage system development and on-site system improvement is conducted. According to a report of The World Bank (Economic Impact of Sanitation in Southeast Asia, A four-country study conducted in Cambodia, Indonesia, the Philippines and Vietnam under the Economics of Sanitation Initiative (ESI), Research Report February 2008, herein after called World Bank Report), more than 90 % of the deaths due to poor sanitation in Indonesia are under five-year children. Economical losses of the premature deaths attributed to poor sanitation are calculated by multiplying the number of premature deaths by life time income.

Referring the World Bank Report and assuming the following, pro forma calculation of the number of premature deaths in the case where the sewerage system were developed and the case where it is not is calculated, and the difference is regarded as the effect on saving the number of under five-year deaths by improving public sanitation. The lifetime income multiplied by the estimated saved number of the premature deaths is calculated and posted as a benefit.

- Population under 5 years old of DKI Jakarta: 769,280 people (From "Jakarta in Figures 2009")
- Population of DKI Jakarta: 9,146,181 people (the same as above)
- Population ratio of under 5 years old: 769,280 / 9,146,181 = 8.41%
- Mortality of under 5 years old: 3.6% (From "Indonesia Health Profile 2008", year 2007 in DKI Jakarta)
- Mortality of under 5 years old due to poor sanitation: 32% (From World Bank Report)
- (No. of deaths under 5 years old due to poor sanitation) = (On-site population) x (population ration of under 5 years old) x (mortality of 5 years old) x (mortality of under 5 years old due to poor sanitation)
- (On-site population of the case with the project) = (On-site population of the case without the project) x (1- sewerage coverage rate)
- (Reduced No. of deaths under 5 years old due to poor sanitation) = (No. of deaths of without case) – (No. of deaths of with case)
- Life time income of under 5 years old: 97,760 USD / person (From World Bank Report)
- (Increased economic value by saving deaths from waterborne disease) = (Reduced No. of deaths under 5 years old due to poor sanitation) x (Life time income of under 5 years old)

(3) Effect of Improvement of the Living Environment

Development of the sewerage system and improvement of on-site system is expected to improve the living environment of local people by enabling them to get rid of wastewater from homes and businesses and have it treated right away. Improvements to the living environment would include alleviation of problems concerning poor quality open channels and better landscape. In the case where the sewerage system were not developed, it would probably be necessary to cover small and medium-sized open channels and to periodically clean open channels and remove sludge to prevent foul odors as an alternative project for preservation of the living environment. Therefore, the cost of covering small to medium-sized open channels and dredging open channels to improve the living environment is considered as a benefit here.

1) Cost of Covering Small and Medium-sized Open Channels

Pro forma calculation of cost is conducted assuming the following:

- Assumed length of small and medium-sized open channels per unit area: 100 m/ha
  The total length of Mikro Drain in DKI Jakarta is 6,622,102 m (2008) (source: Jakarta Dalam Angka 2009, Badan Pusat Statistik Provinsi DKI Jakarta); the total length of Mikro Drain per hectare is calculated as 6,622,102 m = 102 m/ha from the total area of DKI Jakarta (64,705 ha).
- Assumed unit cost of covering: 1,000,000 IDR / m
- (covering provided area) = (total are of DKI Jakarta [69,769 ha](2030)) x (covering provided rate)
- Covering provided rate: Same value as sewerage coverage rate
- (cost of covering small to medium-sized open channels) = (covering upgrade area) x

(length of small to medium-sized open channels per unit area) x (covering unit value)

2) Cost of Dredging Open Channels

Pro forma calculation of cost is conducted assuming the following:

- Assumed length of small and medium-sized open channels per unit area to be cleaned: 100 m/ha
- Assumed unit value of cleaning: 50,000 IDR / m
- Assumed cleaning frequency: once a year
- (cleaning area) = (total are of DKI Jakarta [69,769 ha](2030)) x (cleaning rate)
- Cleaning rate: Same value as sewerage coverage rate
- (cost of open channels dredging) = (dredging are) x (length of small and medium-sized open channels per unit area to be dredged) x (unit value of dredging)

(4) Effect of Improving Quality of Public Waters (Effect on Reducing Cost of Purifying Water at Waterworks Facilities)

Improving quality of river water by increasing access to the sewerage system would probably reduce the cost of water purification at waterworks facilities that get water from rivers. Thus, as the result of improving quality of public waters, in the case where water for the water supply is taken from rivers, the effect of reducing cost of water purification at waterworks facilities is calculated pro forma as a benefit. The following are assumed for pro forma calculation:

- The zone where reduction of cost of water purification is forecasted is limited to area where the water supply system is served.
- Waterworks access rate: The waterworks access rate is currently about 60%. The reason for the waterworks access rate being low is said to be because the water that supplies the water supply system is of poor quality. If quality of water that supplies the water supply system can be improved, the waterworks access rate will probably also improve. The waterworks access rate for pro forma calculation of benefit is therefore established as 100%.
- Water usage volume: 200 LCD
- Purification cost unit value: All water tariff revenues are assumed to be applied to the cost of water purification. The average water tariff is therefore supposed to be purification cost unit value.
- Average water tariff: Assumed to be 5,500 IDR / m^3
- Effect on reducing water purification cost: Improvement rate of river BOD is assumed to be equal to reduction rate of water purification cost.
- Estimated river BOD and BOD improvement rate

Year	2011	2020	2030
Estimated river BOD (mg/L)	61	33	24
River BOD improvement rate (in comparison with 2011)	-	46%	61%

Source: JICA expert team

- (Reduction of water purification cost) =(Cost of purification if the sewerage system is not developed) x (River BOD improvement rate)

(5) Land Utilization Effect (Rise of Land Price)

Improving sanitation by developing the sewerage system should contribute to a higher value of land to a certain degree. While it is difficult to quantify degree of this contribution, pro forma calculation of the rise in land value as benefit is conducted here assuming the following:

- Zones where the value of land is expected to rise: Zones where the sewerage system is developed
- Assumed average price of land in DKI Jakarta: 1,300,000 IDR/ m^2
- Assumed rate of land value rise due to development of sewerage system: 5%

(6) Effect of Tourism Recuperation

Recuperation of tourist income is expected as an effect of sewerage system development and on-site system improvement. Here, increased tourist income by improving hotel occupancy and increased tourist expenditure by decreasing rate of water borne disease are calculated and posted as a benefit.

1) Increased Tourist income by Improving Hotel Occupancy

Pro forma calculation of the increased tourist income due to improved hotel occupancy as a result of improved sanitation as benefit is conducted here assuming the following:

- Hotel occupancy :
  - Current :45% (From World Bank Report)
  - Final target when the sanitary condition is completely improved: 90% (The same as above)
- (Hotel occupancy after sanitary improvement (With case)) = 45% + (90%-45%) x (sewerage coverage rate)
- Tourist income of entire Indonesia: 4,520 Million USD / year (2005, from World Bank Report)
- (Tourist income of DKI Jakarta) =(Tourist income of entire Indonesia) x (Population of DKI Jakarta) / (Population of entire Indonesia)
  =4,520 Million USD / year x 9,718,196 people(2010) / 237,641,326 people (2010)
  =185 Million USD / year
- (Improvement rate of hotel occupancy) =(Hotel occupancy after sanitary improvement (with case)) / (Current hotel occupancy (without case))
- (Tourist income after hotel occupancy improved (with case)) = (Tourist income of DKI Jakarta) x (Improvement rate of hotel occupancy)
- Attribution of sanitary improvement to raise hotel occupancy: 5% (From World Bank Report)
- (Increased tourist income after hotel occupancy improved)= (Tourist income (with case)) – (Tourist income (without case)) x (Attribution of sanitary improvement to raise hotel occupancy)

2) Increased Tourist Expenditure by Decreasing Rate of Waterborne Disease

Sickness of foreign tourists due to water borne diseases is decreased and their expenditure is increased during the stay by improving sanitary condition. The increased expenditure of foreign tourists is calculated as a benefit.

- No. of annual foreign tourists to DKI Jakarta :1,534,785 people (From "Jakarta in Figures 2008", 2009)
- 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%) x (Improvement rate of incidence of diseases)
  Improvement rate of incidence of diseases is assumed to be equal to sewerage coverage rate.
- (No. of annual foreign tourists to become sick with waterborne diseases)= (No. of annual foreign tourists) x (Incidence of diseases)
- (Daily expenditure of a foreign tourist) = 100 USD / day/person =857,000 IDR/day/person
- Average length of episode: 3days
- (Loss of tourist expenditure due to waterborne diseases of foreign tourists) =(No. of annual foreign tourists to become sick with waterborne diseases) x (Daily expenditure of a foreign tourist) x (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)) x (Attribution of sanitary improvement to decrease the waterborne diseases)

E2.6 Economic Evaluation

E2.6.1 Cost and Benefit Calculation Results

Pro forma calculation of cost and benefit for 38 years from 2013 to 2050 for off-site and on-site development projects in which relevant facilities are scheduled to be developed by 2030, which is the medium term plan target year, has been conducted. The results are provided in Table E2-5.

As a result of pro forma calculation, cost converted to Net Present Value (NPV) was 18,984 billion IDR, benefit was 20,219 billion IDR, with benefit outweighing cost.

Table E2-5 Calculation Results of Costs and Benefits (2013-2050)

Unit : Million IDR

	Items	Future Value	Present Value
Cost	**1. Off-site**		
	(1) Sewerage Development Plan		
	Construction Cost for Sewerage Development Plan	32,029,287	12,379,150
	O&M Cost for Sewerage Development Plan	15,513,998	1,809,361
	Sub-total	47,543,285	14,188,511
	2. On-site		
	(1) On-site Sludge Treatment Plants(STPs) Development Plans		
	Construction Cost for On-site STPs Development Plans	932,447	454,237
	O&M Cost for On-site STPs Development Plans	1,107,451	195,977
	Sub-total	2,039,898	650,214
	(2) Intoroduction of regular de-sludging system		
	Cost of regular de-sludging from septic tanks	10,840,733	1,842,135
	(3) Intoroduction of appropriate O&M for ITP		
	Cost of regular de-sludging from ITP	1,790,272	267,602
	(4) Improvement of the structure of septic tank		
	Cost of upgrading CST to MST	3,503,800	2,035,886
	Cost (total)	**65,717,987**	**18,984,347**
Benefit	**1. Effect of reduction in wastewater treatment cost**		
	(1) Reduced cost of regular de-sludging from septic tanks	2,473,234	245,586
	(2) Reduced cost of upgrading to modified septic tank	2,862,290	376,940
	(3) Reduced O&M cost of ITP	3,843,878	484,291
	(4) Reduced construction cost and O&M cost of sludge treatment	4,056,640	772,892
	Sub-total	13,236,042	1,879,711
	2. Effect of improvement in public sanitation		
	(1) Reduced medical treatment cost by reducing the number of patients suffering from waterborne disease	1,126,077	144,632
	(2) Increased benefit by reduction of absence from work due to waterborne disease	331,619	42,593
	(3) Increasd economic value by saving deaths from waterborne	54,078,945	6,945,846
	Sub-total	55,536,642	7,133,071
	3. Effect on improvement of the living environment		
	(1) Reduced cost of covering small and medium-sized open channels	2,256,131	923,223
	(2) Reduced cost of dredging open channels	3,442,805	462,628
	Sub-total	5,698,935	1,385,851
	4. Effect on improvement in quality of public waters		
	Reduced cost of purifying water at waterworks facilities	28,046,538	3,053,862
	5. Effect of rise in land value		
	Increased value of land	15,393,191	6,651,256
	6. Effect of tourism recuperation		
	(1) Increased tourism income by improving hotel occupancy	814,175	109,405
	(2) Increased tourist expenditure by decreasing rate of water borne disease	46,676	5,995
	Sub-total	860,851	115,400
	Benefit (total)	**118,772,199**	**20,219,151**

Source: JICA expert team

E2.6.2 NPV, B/C Ratio and EIRR

As a result of economic analysis, NPV, B/C and EIRR were as given in Table E2-6.

Table E2-6 Results of Economic Analysis

Benefit/cost ratio (B/C ratio)	1.07
*Net Present Value (NPV)	1,234,803 million IDR
Economic Internal Rate of Return (EIRR)	13.9 %

*Discount rate of project = 12%
Source: JICA expert team

From the preceding table, B/C ratio exceeds "1" and NPV exceeds zero. Also, because EIRR was 13.9%, which excess 12% established as opportunity cost of capital that indicates limited profitability related to capital for public construction, the project is determined to be economically feasible.

For details of economic analysis, see the attached S/R Part-E: E2

E3 Financial Evaluation

Financial analysis is conducted to evaluate whether or not the project established by the Master Plan (M/P) is financially feasible. The results of financial analysis are evaluated by calculating Net Present Value (NPV), Benefit/Cost Ratio (B/C Ratio) and Financial Internal Rate of Return (FIRR).

E3.1 Targets of Financial Analysis

Sewerage projects (off-site) are targets of financial analysis.

Zones No.1 and No.6, which are priority projects of the M/P, are targets of financial analysis; analysis is conducted for the two zones respectively.

On-site priority projects implemented during the short-term plans (development of new STP and improvement of existing STP) are excluded from financial analysis because they can not expect revenue earning due to characteristics of the facilities.

E3.2 Index of Financial Analysis

The following 3 indices are used for financial analysis of sewerage projects.

- NPV : Net Present Value
- B/C Ratio : Benefit Cost Ratio
- FIRR : Financial Internal Rate of Return

E3.3 Prerequisites of Financial Analysis

Prerequisites of financial analysis are as follows:

E3.3.1 Project Targets

Priority projects of zones No.1 and No.6 where facilities are scheduled for development by 2020, the target year for short-term projects, are targets of financial analysis. The overview of the projects is provided in Table E3-1.

Table E3-1 Overview of the Priority Project for which Conducting Financial Analysis

Term	Zone No.	Area (ha)	Population for Sewerage	Wastewater Flow (m^3/day)	Capacity of WWTP (m^3/day)	Length of Pipes (m)
Short-term (2013-2020)	No.1	4,901	989,389	198,000	264,000	758,000
	No.6	5,874	1,172,574	235,000	313,000	1,008,000
Total		10,775	2,161,963	433,000	577,000	1,766,000

Source: JICA expert team

E3.3.2 Project Life (Analysis Term)

The term during which project analysis is conducted (project life) is 33 years: sum of 3 years of construction period from 2013 when construction is to start, to 2015 when the sewerage system is to begin being used, and 30 years of operation period.

- Project life: 33 years
- Term: 2013 - 2045

E3.3.3 Discount Rate of Project

Discount rate used for financial analysis is set as the same as assumed interest on foreign currency loan.

According to Indonesia Finance Ministry Directive No. 259 / KMK.0.17. / 1993, if the central government subleases a foreign currency loan to an institution of a local government, etc., the interest on the foreign currency loan is compounded at the rate of 0.50% (Regulation of Minister Finance of Republic of Indonesia Number 259 / KMK.017. / 1993, Article 3).

In keeping with this, the discount rate of the project would be (JICA yen loan interest (preferential terms) of 0.65%) + (central government-compounded interest of 0.50%) = 1.15%.

E3.3.4 Inflation Rate

It is difficult to predict the inflation rate during a project which is to run for 30 years or more, and even if predicted, it may not be consistent with the actual situation. Inflation rate is therefore not taken into account here and the constant 2012 price is used.

E3.4 Financing

E3.4.1 Financing of the Construction Cost

Sewerage projects are projects for the purpose of enhancing public benefit in the form of improving public sanitation and the environment that require financial assistance from the central government because they naturally tend to have low income in the form of sewerage tariff whereas upkeep requires an enormous investment. Financing for construction, in particular, are required at the stage where the projects have little or no income. Therefore, the implementation of the sewerage project requires the financial assistance from the central government or the long-term, low-interest loan from the financial institutions including international financial institutions.

Taking into consideration the above, the financial analysis is conducted assuming that the loan from the international financial institution is mobilized for financing the construction cost.

As an example of financing by an international financial institution, with yen loans from JICA, "Fixed-Percentage Financing Criteria" is adopted, and a credit ceiling is established for loans by multiplying the total cost of the project by a fixed percentage. The upper limit of Japan’s ODA loan financing is 85% for Indonesia. In keeping with this, the upper limit of the coverage of the loan from international financial institutions is set to 85% for the financial analysis described herein as well.

In Indonesia, foreign currency loans are borrowed by the central government and on-lent to the implementing institutions such as local governments.

On the other hand, in the case of sanitation project where the central government provides a local government with financial assistance, it is the principle that the percentage of the total cost of the project borne by the central government and the local government is based on the basic concept of "matching grants," which is 1-to-1 for the central government and the local government.

Invoking the above principle, 50% of the cost of construction is assumed to be provided by the central government to the DKI Jakarta as a grant.

This means that it is assumed that once the central government receives financing of 85% of the cost

of construction from international financial institutions, 50% of the construction cost must be paid back to the international financial institution by the central government, and the central government on-lends the remaining 35% to the DKI Jakarta, which the DKI Jakarta in turn is obligated to pay back.

It is assumed that the remaining 15% of the cost of construction is self-financed by the DKI Jakarta.

Table E3-2 gives percentages of financing assumed for financial analysis.

Table E3-2 Percentages of Financing for Construction Cost

No	Financing for construction cost		Funding allocation ratio	Debtor
1	Foreign currency loan	Grant from Central Gov. funded by foreign currency loan	50%	Central Gov.
2		On-lending of Foreign currency loan from Central Gov. to DKI Jakarta	35%	DKI Jakarta
3	Own funds	Budget of DKI Jakarta (APBD)	15%	-
4		Own funds of PD PAL JAYA	0%	-

Source: JICA expert team

Concerning the method of PD PAL JAYA's involvement in financing of construction cost, since whenever PD PAL JAYA invests in a project, the necessary fund is provided by DKI Jakarta as the increase of the equity, the source of the financial contribution of PD PAL JAYA to the project, if any, is the budget of DKI Jakarta. Consequently, the amount of funding borne by PD PAL JAYA here is 0%.

E3.4.2 Financing O&M Cost

As a rule, the cost of operation and maintenance (O&M) should be borne by the beneficiary. Therefore, the financial analysis is conducted assuming that all the cost of O&M is financed by the income from sewerage tariff.

E3.5 Calculation of Cost

Table E3-3 gives the cost of construction for priority projects which are targets of financial analysis, annual O&M cost and the rate of allocation for these costs.

Concerning the cost of construction, 50% of the total cost of construction indicated in Table E3-3 is subsidized by the central government; the DKI Jakarta therefore does not bear the cost of construction.

This means the percentage of the cost of construction that is to be borne by the DKI Jakarta is 50%. Of the 50%, 15% is provided impromptu by from the DKI Jakarta from its own budget (APBD, etc.), and the remaining 35% is financed in the form of foreign currency loan from the central government, and is repaid by income from operation of the sewerage system (sewerage tariff revenue).

This means the cost to be borne financially through sewerage project operation (cost posted by financial analysis) is "35% of the total cost of construction" and "cost of O&M."

Table E3-4 and Table E3-5 give project cost and financing percentages for Zone No.1 and No.6 respectively.

Table E3-3 Construction Cost of Priority Project, O&M Cost and Financing Percentages

Unit: Million IDR

Items	Short-term		Total	Rate of Allocation for Construction Cost		
Construction Cost	Zone No.1	Zone No.6		Central Gov.	DKI Jakarta	
					Loan	Budget
A. Construction Cost	5,127,423	6,709,912	11,837,335	**50%** As Subsidy	**35%** As Foreign currency loan lending from Central Gov.	**15%** As Budget (APBD)
a. Direct Construction Cost	4,537,543	5,937,975	10,475,518			
(1)House Connection	361,275	464,054	825,329			
(2)Collection Sewer Line	1,893,787	2,791,067	4,684,854			
(3)Lift Pump Station	0	107,094	107,094			
(4)Wastewater Treatment Plant	1,501,632	1,782,240	3,283,872			
(5)Facilities Replacement (2013-2045)	780,849	793,520	1,574,369			
b. Indirect Construction Cost	589,881	771,937	1,361,817			
B. Engineering Cost	317,628	415,658	733,286			
C. Physical Contingency	256,371	335,496	591,867			
D. Land Use Cost	0	0	0			
E. Value Added Tax	570,142	746,107	1,316,249			
Construction Cost Total (including VAT)	**6,271,565**	**8,207,172**	**14,478,737**	**7,239,368**	**5,067,558**	**2,171,811**
O&M Cost (2014-2045)	3,123,629	3,838,282	6,962,011	Allocated by sewerage fee income		
Value Added Tax	313,363	383,838	696,201			
O&M Cost (including VAT)	**3,435,992**	**4,222,220**	**7,658,213**			

Remarks ; Costs to be incurred by Sewerage service income (quoted in Financial Analysis costs)

Source: JICA expert team

Table E3-4 Zone No.1 Project Cost of (Construction and O&M) and Financing Percentages

Unit : Million IDR

Items	Total	Central Gov.	DKI Jakarta	
	Zone No.1	(1) Subsidy from Central Gov.	(2) Foreign currency loan	(3) Budget of DKI Jakarta (APBD)
Construction Cost	100%	50%	35%	15%
A. Construction Cost	5,127,423	2,563,712	1,794,598	769,113
a. Direct Construction Cost	4,537,543	2,268,771	1,588,140	680,631
(1)House Connection	361,275	180,638	126,446	54,191
(2)Collection Sewer Line	1,893,787	946,894	662,825	284,068
(3)Lift Pump Station	0	0	0	0
(4)Wastewater Treatment Plant	1,501,632	750,816	525,571	225,245
(5)Facilities Replacement(2013-2045)	780,849	390,424	273,297	117,127
b. Indirect Construction Cost	589,881	294,940	206,458	88,482
B. Engineering Cost	317,628	158,814	111,170	47,644
C. Physical Contingency	256,371	128,186	89,730	38,456
D. Land Use Cost	0	0	0	0
E. Value Added Tax	570,142	285,071	199,550	85,521
Construction Cost Total (including VAT)	**6,271,565**	**3,135,782**	**2,195,048**	**940,735**
O&M Cost (2014-2045)	3,123,629	Allocated by sewerage fee income		
Value Added Tax	312,363			
O&M Cost (Annual) (including VAT)	**3,435,992**			
Cost (Grand total)	**9,707,557**			

Remarks; : Costs to be incurred by Sewerage service income (quoted in Financial Analysis costs)

Source: JICA expert team

Table E3-5 Zone No.6 Project Cost of (Construction and O&M) and Financing Percentages

Unit : Million IDR

Items	Total	Central Gov.	DKI Jakarta	
	Zone No.6	(1) Subsidy from Central Gov.	(2) Foreign currency loan	(3) Budget of DKI Jakarta (APBD)
Construction Cost	100%	50%	35%	15%
A. Construction Cost	6,709,912	3,354,956	2,348,469	1,006,487
a. Direct Construction Cost	5,937,975	2,968,988	2,078,291	890,696
(1)House Connection	464,054	232,027	162,419	69,608
(2)Collection Sewer Line	2,791,067	1,395,534	976,873	418,660
(3)Lift Pump Station	107,094	53,547	37,483	16,064
(4)Wastewater Treatment Plant	1,782,240	891,120	623,784	267,336
(5)Facilities Replacement(2013-2045)	793,520	396,760	277,732	119,028
b. Indirect Construction Cost	771,937	385,968	270,178	115,791
B. Engineering Cost	415,658	207,829	145,480	62,349
C. Physical Contingency	335,496	167,748	117,423	50,324
D. Land Use Cost	0	0	0	0
E. Value Added Tax	746,107	373,053	261,137	111,916
Construction Cost Total (including VAT)	**8,207,172**	**4,103,586**	**2,872,510**	**1,231,076**
O&M Cost (2014-2045)	3,838,382	Allocated by sewerage fee income		
Value Added Tax	383,838			
O&M Cost (Annual) (including VAT)	**4,222,220**			
Cost (Grand total)	**12,429,393**			

Remarks; : Costs to be incurred by Sewerage service income (quoted in Financial Analysis costs)

Source: JICA expert team

E3.6 Calculation of Benefit

The benefit posted by financial analysis is sewerage tariff revenue.

E3.6.1 Sewerage Tariff Revenue Unit Value per Wastewater Volume

Sewerage tariff is based on the sewerage tariff stipulated in the order of the governor of DKI Jakarta in 2011, and is the pro forma calculation of sewerage tariff unit value per floor area and per volume of wastewater from the 2009 results of the sewerage works currently carried out by PD PAL JAYA. The pro forma calculation results are given in Table E3-6. For the detail calculation is given in S/R Part-E: E3.

Table E3-6 Sewerage Tariff Unit Value per Floor Space Unit Area and per Wastewater Volume (from FY 2009 Results)

Category of customer	Unit tariff per floor area (IDR/m^2/month)	Unit tariff per wastewater flow (IDR/m^3)
Household	97	471
Non-household	529	4,557
Average unit tariff	517	4,357

Source: JICA expert team

Pro forma calculation of project income is conducted with the sewerage tariff revenue unit price as shown in the above Table E3-6 as the sewerage tariff revenue unit price at the time the project starts.

E3.6.2 The Increase of the Sewerage Tariff

(1) Sewerage Tariff Revenueunit Price Estimate

As for PD PAL JAYA customer makeup, as of 2009, 99.5% are "non-household" (commercial buildings, etc.) at the tariff revenue base. Sewerage tariff revenue unit price per wastewater volume unit is the unit value near "non-household" with high tariff revenue unit value (4,357 IDR / m^3); the

revenue unit value can be regarded as extremely high. On the other hand, after increasing use of the sewerage system in the future, it is clear that the number of "household" customers would increase relatively in comparison to "non-household" customers. Table E3-7 gives the results of pro forma calculation of sewerage tariff revenue unit price per wastewater volume unit up to 2030 at the existing tariff levels.

Table E3-7 Sewerage Tariff Revenue Unit Price per Wastewater Volume Unit Estimate (at Existing Tariff Levels)

Items		Unit	2,010 (Actual)	2,020	2,030
Sewerage Tariff Collection Rate	Household	%	63%	66%	75%
	Non-household	%	99%	90%	90%
Rate of Tariff revenue per customer type	Household	%	0.5%	12%	17%
	Non-household	%	99.5%	98%	83%
Unit Tariff revenue per m^3(wastewater volume)	Household	IDR/m^3	471	309	353
	Non-household	IDR/m^3	4,557	4,101	4,101
	Total	IDR/m^3	4,357	1,649	1,457

Source: JICA expert team

As indicated by Table E3-7, sewerage tariff revenue unit price per unit wastewater volume is expected to decrease one-third from 4,357 IDR / m^3 in 2010 to 1,457 IDR / m^3 in 2030. Consequently, in order to make sewerage projects sustainable by compensating the decrease in sewerage tariff revenue unit price, raising sewerage tariff should probably not be avoided.

(2) Setting of the Case for the Seewerage Tariff Increase

As aforementioned, current level of sewerage tariff is supposed to fail to keep sustainability of sewerage works in future and gradual increase of the tariff should be considered.

Accordingly, with financial analysis, pro forma calculation of case 1, where you want to maintain the existing sewerage tariff level, and case 2, where you want to gradually increase sewerage tariff in stages, is conducted.

Increase of sewerage tariff is considered based on frequency and increment rate of ones implemented by DKI Jakarta in the past.

Changes in sewerage tariff by DKI Jakarta since PD PAL JAYA's foundation and changes in water tariff by PAM JAYA are indicated in Table E3-8 and Table E3-10 respectively. Details are attached in Part-E:E3 of S/R.

Table E3-8 Frequency and Increment Rate of Sewerage Tariff Increase by DKI Jakarta

Type of customers (Excerpt)	1994	2003		2006	
	Tariff	Tariff IDR/m^2/month	Increment rate %	Tariff IDR/m^2/month	Increment rate %
Household					
Household Type A	28	72	157%	90	25%
Household Type B	40	90	125%	113	26%
Household Type C	76	108	42%	135	25%
Household Type D	114	126	11%	158	25%
Non-household (extract)					
Office(Up to three stories building)	78	108	38%	135	25%
High Rise Building Office	224	360	61%	450	25%
V Stars Hotel	330	576	75%	720	25%
Government Institution	76	144	89%	180	25%
Big Industry	-	468	-	585	25%

Source: JICA expert team based on data from PD PAL JAYA

Table E3-9 Frequency and Increment Rate of Water Tariff Increase by PAM JAYA

Items	1998	2001	2003	2004	2005 Semester Ⅰ	2005 Semester Ⅱ	2006 Semester Ⅰ	2007-
Household IDR/m^3	1,188	1,582	2,446	3,346	3,692	4,213	4,585	5,002
Increment rate %	-	33%	33%	37%	10%	14%	9%	0%
Average IDR/m^3	1,964	2,562	3,396	4,781	5,343	5,889	6,384	7,025
Increment rate %	-	30%	33%	41%	12%	10%	8%	10%

Source: JICA expert team based on data from PAM JAYA

According to Table E3-8, the latest tariff increase was implemented in 2006, and its increment rate is around 25% of ones revised in 2003. In addition, Table E3-9 tells that water tariff had been raised almost every year till 2007 with increment rate of 8 to 41% per year.

Based on this figures, about 30% increase in every three years are set as condition of tariff increase.

Table E3-10 indicates the concept of financial analysis case setting concerning sewerage charge increase. Table E3-10 gives the rate at which sewerage tariff fee is raised in case 2 and the sewerage tariff revenue unit price.

Table E3-10 Financial Analysis Case Setting Concerning Sewerage Tariff Increase

Case	Concept
Case 1	Sewerage tariff is not raised; the current level is maintained.
Case 2	Sewerage tariff is raised by 30% every 3 years from 2016, and eventually to be raised up to 3 times level of the current level in stages through the 4 times revisions by 2025. * Household: - Sewerage tariff revenue unit price per wastewater unit volume; 471 → 1,345 IDR/m^3 (approx. 3 times level) (Sewerage tariff revenue unit price per floor unit area; 97 → 277 IDR/m^2/month) * Non-household: - Sewerage tariff revenue unit price per wastewater unit volume; 4,557 → 13,015 IDR/m^3 (approx. 3 times level) (Sewerage tariff revenue unit price per floor unit area; 529 → 1,511 IDR/m^2/month)

Source: JICA expert team

Table E3-11 Case 2 Rate of Sewerage Tariff Increase and Sewerage Tariff Revenue Unit Price per Wastewater Unit Volume

Unit : IDR/m^3

Year		2011	2016	2019	2022	2025	2028
Increase rate	Household	0%	30%	30%	30%	30%	0%
	Non-household	0%	30%	30%	30%	30%	0%
Tariff	Household	471	612	796	1,035	1,345	1,345
	Non-household	4,557	5,924	7,701	10,012	13,015	13,015

Year		2031	2034	2037	2040	2043	2045
Increase rate	Household	0%	0%	0%	0%	0%	0%
	Non-household	0%	0%	0%	0%	0%	0%
Tariff	Household	1,345	1,345	1,345	1,345	1,345	1,345
	Non-household	13,015	13,015	13,015	13,015	13,015	13,015

Source: JICA expert team

(3) Validation on Setting of the Sewerage Tariff Increase

To validate sewerage tariff for household set as a result of financial analysis, sewerage tariff, desludging cost from septic tanks, and water tariff per household are calculated and compared with the average income.

The calculated result was indicated in Table E3-12. Sewerage tariff before and after rise accounts for 0.26% and 0.74% of average household income in DKI Jakarta (50,028,699 IDR/year/household), respectively. On the other hand, desludging cost from septic tanks accounts for only 0.23% of the

income, which is about a third of raised sewerage tariff. As for water tariff, it accounts for 2.81%, which is about 4 times of the raised sewerage tariff.

Considering that the setting of raised sewerage tariff is 26% level of water tariff, it is validated as appropriate level although it is higher than the cost for desludging from septic tanks, that is because sewerage system can have benefit on improving sanitary conditions.

Table E3-12 Calculation of Sewerage Tariff and Desludging Cost from Septic Tanks

Compared items	Calculation of cost per year	Ratio to average income*
Sewerage tariff (Household)	[Calculation conditions] ・Household population：5 peoples / household ・Average wastewater volume : 150LCD×5peoples=0.75m^3/day ・Unit of sewerage tariff： (1) Before raise：471 IDR/m^3 (2) After raise：1,345 IDR/m^3 [Calculation result] ・Annual sewerage tariff per household (1) Before raise： 0.75 m^3/day×365day×471 IDR/m^3 = 128,936 IDR/year (2) After raise： 0.75 m^3/day×365day×1,345 IDR/m^3 = 368,194 IDR/year	(1) Before raise：0.26 % (2) After raise：0.74%
Desludging cost from septic tanks	[Calculation conditions] ・Frequency of desludging：Once in 3 years ・Cost of desludging：350,000 IDR / unit [Calculation result] ・Annual desludging cost per household 350,000 IDR / 3 years/time ＝ 116,667 IDR/year	0.23%
Water tariff (Household)	[Calculation conditions] ・Household population：5 peoples / household ・Average water supply volume : 154LCD×5peoples =0.77m^3/day ・Unit of water tariff：5,002 IDR/m^3 [Calculation result] ・Annual water tariff per household 0.77m^3/day×365day×5,002 IDR/m^3 = 1,405,812 IDR/year	2.81%

* Monthly Average of Wage/Salary/Income of Employee in DKI Jakarta, February 2010: 1,925,662 IDR/month
Population 15 Years of Age and Over Who are in Working in DKI Jakarta, February 2010: 4,208,905 peoples
(Perkembangan Beberapa Indikator Utama Sosial Ekonomi Indonesia, Augustus 2010)

[Average household income in DKI Jakarta]=[Average of income of employee in DKI Jakarta 1,925,662IDR/month]×12 months × [Employment rate in DKI Jakarta 43.3%]×[A household population 5 peoples]=50,028,699IDR/year/household

Herein, [Employment rate in DKI Jakarta]=[Population 15 years of age and over who are in working in DKI Jakarta 4,208,905 peoples]/[Population of DKI Jakarta (2010 results) 9,718,196 peoples =43.3%]

Source: JICA expert team

E3.6.3 Tariff Collection Ratio

Tariff collection ratio is set based on willingness to pay according to the results of the social survey and current tariff collection ratio results.

The sewerage tariff collection ratio for 2010 for sewerage works currently being implemented by PD PAL JAYA is as given in Table E3-13.

Table E3-13 Sewerage Tariff Collection Ratio (2010 Results)

Items	Fee collection Ratio (%)	The number of customers	Tariff revenue	Remarks
		Collected/ Contracted	Collected/ Contracted	
Entire customers	99%	-	32,063 Mill. IDR/ 32,472 Mill. IDR	Based on tariff revenue
Household	63%	741 / 1,181	-	Based on the number of customers (March, 2011)
collection by directly visiting	57%	446 / 789	-	
Collection by representative of community	75%	295 / 392	-	
Non-household	99%	-	-	Estimated from the above data

Source : JICA expert team based on data from PD PAL JAYA

Willingness to pay for residents (household) in the case of 1% of income as sewerage tariff according to the results of a social survey is as given in Table E3-14.

Table E3-14 Willingness to pay (WTP) for Sewerage Tariff of Residents (Household)

Items	WTP (%)		Remarks
	Yes	No	
Total	43%	58%	WTP (ATP = 1% of Estimated Average Income)
Low income level	43%	57%	
Middle income level	39%	61%	* WTP: Willingness to Pay
High income level	33%	67%	* ATP: Affordability to Pay
Leaders	55%	45%	

Source: JICA expert team

According to Table E3-13, the actual sewerage tariff collection ratio for "household" are 63%. In the case of batch collection by representative of community, the results are 75%. WTP for all households is 43% and is 55% for leaders.

This tells us that sewerage tariff collection ratio can be set in the range of 43% at worst and 75% at best. Here, the initial value of sewerage tariff collection ratio (year of service start: 2014) is taken as the intermediate value, and household sewerage tariff collection ratio is set as 60%. The target fee collection ratio for 2030 is set to 75% considering increase in user awareness and improvement in tariff collection ratio in conjunction with more widespread utilization of the sewerage system.

As for the non-household customers, a high tariff collection ratio of 99% is currently achieved based on the current method of directly depositing payment into a bank account. This is probably due to the fact that there are a comparatively large number of major businesses in the existing sewerage system service area. Because in the future, not only major businesses, but smaller shops and so forth will relatively increase, here, thinking somewhat pessimistically, the future non-household sewerage tariff collection ratio is set as 90% which is lower compared to the actual current collection ratio.

Sewerage tariff collection ratio is as given in Table E3-15.

Table E3-15 Setting of Sewerage Tariff Collection Ratio

Category of customer	2016	2020	2025	2030 - 2045
Household	60%	64%	70%	75%
Non-household	90%	90%	90%	90%

Source: JICA expert team

E3.6.4 Calculation of Benefit (Sewerage Tariff Revenue)

Sewerage tariff revenue in the case of case 1 and case 2 for zone No.1 and zone No.6 based on the previously mentioned sewerage tariff increase and the tariff collection ratio is given in Table E3-16 /

Table E3-17, and Table E3-18 / Table E3-19.

(1) Sewerage Tariff Revenuefor Zone No.1

Table E3-16 Calculation of Sewerage Tariff Revenue for Zone No.1 (Case 1: Case where Existing Sewerage Tariff Level is Maintained)

Items		Year	2020	2030	2045
Unit Sewerage Tariff per Wastewater flow(IDR/m^3)	Household	-	471	471	471
	Non-household	-	4,557	4,557	4,557
Revenue from Sewerage Service (Million IDR)		Total	2014-2020	2021-2030	2031-2045
	Household	354,273	31,758	122,361	200,154
	Non-household	3,885,639	395,629	1,370,571	2,119,440
Benefit (total)		**4,239,912**	**427,387**	**1,492,932**	**2,319,594**

Source: JICA expert team

Table E3-17 Calculation of Sewerage Tariff Revenue for Zone No.1 (Case 2: Case where Sewerage Tariff Level is Gradually Increased in Stages)

Items		Year	2020	2030	2045
Unit Sewerage Tariff per Wastewater flow(IDR/m^3)	Household	-	796	1,345	1,345
	Non-household	-	7,701	13,015	13,015
Revenue from Sewerage Service (Million IDR)		Total	2014-2020	2021-2030	2031-2045
	Household	932,999	46,195	315,143	571,661
	Non-household	10,139,173	573,238	3,512,604	6,053,331
Benefit (total)		**11,072,172**	**619,433**	**3,827,747**	**6,624,992**

Source: JICA expert team

(2) Sewerage Tariff Revenue for Zone No.6

Table E3-18 Calculation of Sewerage Tariff Revenue for Zone No.6 (Case 1: Case where Existing Sewerage Tariff Level is Maintained)

Items		Year	2020	2030	2045
Unit Sewerage Tariff per Wastewater flow(IDR/m^3)	Household	-	471	471	471
	Non-household	-	4,557	4,557	4,557
Revenue from Sewerage Service (Million IDR)		Total	2014-2020	2021-2030	2031-2045
	Household	602,906	54,046	208,235	340,625
	Non-household	2,403,902	244,761	847,922	1,311,220
Benefit (total)		**3,006,809**	**298,807**	**1,056,157**	**1,651,845**

Source: JICA expert team

Table E3-19 Calculation of Sewerage Tariff Revenue for Zone No.6 (Case 2: Case where Sewerage Tariff Level is Gradually Increased in Stages)

Items		Year	2020	2030	2045
Unit Sewerage Tariff per Wastewater flow(IDR/m^3)	Household	-	796	1,345	1,345
	Non-household	-	7,701	13,015	13,015
Revenue from Sewerage Service (Million IDR)		Total	2014-2020	2021-2030	2031-2045
	Household	1,587,790	78,615	536,315	972,859
	Non-household	6,272,734	354,641	2,173,119	3,744,974
Benefit (total)		**7,860,524**	**433,256**	**2,709,434**	**4,717,833**

Source: JICA expert team

E3.7 Financial Analysis Results

Cost and benefit (sewerage tariff revenue) converted to current value for the 33 years from 2013 to 2045 concerning the following 2 cases where projects of zone No.1 and No.6 respectively where wastewater treatment plants development is to be conducted by 2020, which is the target year for short-term projects.

- Case 1: Case where sewerage tariff is unchanged
- Case 2: Case where sewerage tariff is revised in stages

E3.7.1 Zone No.1

(1) Case 1: Case where Sewerage Tariff is Unchanged

1) Income and Expenditure (Zone No.1 / Case 1)

The income and expenditure in the case where sewerage tariff remains unchanged are given in Table E3-20.

As a result of pro forma calculation, cost converted to Net Present Value (NPV) was 4,839 billion IDR, benefit was 3,441 billion IDR, with benefit being 71% of cost. Benefit (tariff revenue) relative to O&M cost was 123% by NPV conversion; sewe0rage tariff revenue income can not cover up to construction cost, though it can cover O&M cost.

Consequently, although the cost of O&M can be covered by the tariff revenue, it is impossible to cover the amount of construction cost (35%) of the project of zone No.1 that must be repaid by DKI Jakarta, if sewerage tariff fee is left unchanged.

Table E3-20 Calculation Results of Costs and Benefits (2013-2045) (Zone No.1 / Case 1)

Unit : Million IDR

	Items	Future Value	Present Value
Cost	**1. Construction Cost to be repaid by DKI Jakarta (35% of the overall construction cost)**	2,195,048	2,048,775
	2. O&M Cost (Total from 2014 to 2045)	3,435,992	2,789,938
	Cost (total)	**5,631,040**	**4,838,713**
Benefit	**Revenue from Sewerage Service (Total from 2014 to 2045)**	4,239,912	3,441,433
	Benefit (total)	**4,239,912**	**3,441,433**

Source: JICA expert team

2) NPV, B/C Ratio and FIRR (Zone No.1 / Case 1)

As a result of financial analysis, NPV, B/C and FIRR were as given in Table E3-21.

Table E3-21 Results of Financial Analysis (Zone No.1 / Case 1)

B/C Ratio	0.71
Net Present Value (NPV)	- 1,397,280 million IDR
Financial Internal Rate of Return (FIRR)	No solution

*Discount rate of project = 1.15%

Source: JICA expert team

3) Financial Evaluation (Zone No.1 / Case 1)

From these results, if sewerage tariff is maintained at the current level, the benefit/cost (B/C) ratio will fall below "1," Net Present Value (NPV) will be negative and the project will not appear financially feasible.

(2) Case 2: Case where Ssewerage Tariff is Increased in Stages

1) Income and Expenditure Forecast (Zone No.1 / Case 2)

Pro forma calculation results of case 1 indicate that the project cannot be profitable at the current sewerage tariff level, so here, financial analysis assuming sewerage tariff were gradually raised in stages is conducted.

The Income and Expenditure of case 2 is given in Table E3-22.

As a result of pro forma calculation, cost converted to Net Present Value (NPV) was 4,838 billion IDR, benefit was 8,867 billion IDR, with benefit outweighing cost, thereby maintaining profitability.

Table E3-22 Calculation Results of Costs and Benefits (2013-2045) (Zone No.1 / Case 2)

Unit : Million IDR

Items		Future Value	Present Value
Cost	**1. Construction Cost to be repaid by DKI Jakarta (35% of the overall construction cost)**	2,195,048	2,048,775
	2. O&M Cost (Total from 2014 to 2045)	3,435,992	2,789,938
	Cost (total)	**5,631,040**	**4,838,713**
Benefit	**Revenue from Sewerage Service (Total from 2014 to 2045)**	11,072,172	8,867,445
	Benefit (total)	**11,072,172**	**8,867,445**

Source: JICA expert team

2) NPV, B/C Ratio and FIRR (Zone No.1 / Case 2)

As a result of financial analysis, NPV, B/C and FIRR were as given in Table E3-23.

Table E3-23 Results of Financial Analysis (Zone No.1 / Case 2)

B/C Ratio	1.83
Net Present Value (NPV)	4,028,732 Mill. IDR
Financial Internal Rate of Return (FIRR)	9.66 %

*Discount rate of project = 1.15%

Source: JICA expert team

3) Financial Evaluation (Zone No.1 / Case 2)

These results indicate that if sewerage tariff is raised 3 times the current level, B/C ratio will exceed "1," and NPV will also exceed zero. At 9.66%, FIRR would furthermore exceed project discount rate of 1.15%, so profitability can be expected for zone No.1 projects.

E3.7.2 Zone No.6

(1) Case 1: Case where Tariff is Unchanged

1) Project Cost Balance (Zone No. 6 / Case 1)

The Income and Expenditure in the case where sewerage system usage fee remains unchanged are given in Table E3-24.

As a result of pro forma calculation, cost converted to Net Present Value (NPV) was 6,117 billion IDR, benefit was 2,439 billion IDR, with benefit being 40% of cost. Benefit (tariff revenue) relative to O&M cost was 71% by NPV conversion; O&M cost therefore could not be covered with sewerage tariff revenue.

Consequently, it is impossible to cover neither the amount of construction cost (35%) of the project of zone No.6 that must be repaid by DKI Jakarta nor the cost of O&M with tariff revenue if sewerage tariff fee is left unchanged.

Table E3-24 Calculation Results of Costs and Benefits (2013-2045) (Zone No.6 /Case 1)

Unit : Million IDR

Items		Future Value	Present Value
Cost	**1. Construction Cost to be repaid by DKI Jakarta (35% of the overall construction cost)**	2,872,510	2,688,803
	2. O&M Cost (Total from 2014 to 2045)	4,222,220	3,428,335
	Cost (total)	**7,094,730**	**6,117,138**
Benefit	**Revenue from Sewerage Service (Total from 2014 to 2045)**	3,006,809	2,439,294
	Benefit (total)	**3,006,809**	**2,439,294**

Source: JICA expert team

2) NPV, B/C ratio and FIRR (Zone No.6 / Case 1)

As a result of financial analysis, NPV, B/C and FIRR were as given in Table E3-25.

Table E3-25 Results of Financial Analysis (Zone No.6 / Case 1)

B/C Ratio	0.40
Net Present Value (NPV)	- 3,677,844 Mill. IDR
Financial Internal Rate of Return (FIRR)	No solution

*Discount rate of project = 1.15%

Source: JICA expert team

3) Financial Evaluation (Zone No. 6 / Case 1)

From these results, if sewerage tariff is maintained at the current level, the benefit/cost (B/C) ratio will fall below "1," Net Present Value (NPV) will be negative and the project will not appear financially feasible.

(2) Case 2: Case where Sewerage Tariff is Revised in Stages

1) Income and Expenditure (Zone No.6 / Case 2)

Pro forma calculation results of case 1 indicate that the project cannot be profitable at the current sewerage tariff level, so here, financial analysis assuming sewerage tariff were gradually raised in stages is conducted.

The Income and Expenditure of case 2 is given in Table E3-26.

As a result of pro forma calculation, cost converted to Net Present Value (NPV) was 6,117 billion IDR, benefit was 6,293 billion IDR, with benefit outweighing cost, thereby maintaining profitability.

Table E3-26 Calculation Results of Costs and Benefits (2013-2045) (Zone No.6 / Case 2)

Unit : Million IDR

Items		Future Value	Present Value
Cost	**1. Construction Cost to be repaid by DKI Jakarta (35% of the overall construction cost)**	2,872,510	2,688,803
	2. O&M Cost (Total from 2014 to 2045)	4,222,220	3,428,335
	Cost (total)	**7,094,730**	**6,117,138**
Benefit	**Revenue from Sewerage Service (Total from 2014 to 2045)**	7,860,524	6,292,879
	Benefit (total)	**7,860,524**	**6,292,879**

Source: JICA expert team

2) NPV, B/C ratio and FIRR (Zone No.6 / Case 2)

As a result of financial analysis, NPV, B/C and FIRR were as given in Table E3-27.

Table E3-27 Results of Financial Analysis (Zone No.6 / Case 2)

B/C Ratio	1.03
Net Present Value (NPV)	175,741 Mill. IDR
Financial Internal Rate of Return (FIRR)	1.57 %

*Discount rate of project = 1.15%
Source: JICA expert team

3) Financial Evaluation (Zone No.6 / Case 2)

These results indicate that if sewerage tariff is increased approximately 3 times the current level, B/C ratio will exceed "1," and NPV will also exceed zero. At 1.57%, FIRR would furthermore exceed project discount rate of 1.15%, so profitability can be expected for zone No.6 projects.

E3.7.3 Financial Evaluation (Summary)

Table E3-28 gives results of financial analysis for zones No.1 and No.6, which are priority projects, in the case of "Case 1: Case where existing sewerage tariff level is maintained," and "Case 2: Case where sewerage tariff is raised by 30% every 3 years from 2016, and eventually to be raised up to 3 times level of the current level in stages through the 4 times revisions by 2025".

For details of financial analysis, see the attached S/R Part-E: E3.

Table E3-28 Results of Financial Analysis (Summary)

Evaluation Items	Unit	Zone No.1		Zone No.6		Zone No.1 and Zone No.6		Evaluation Criteria
		Case1	Case2	Case1	Case2	Case1	Case2	
B/C Ratio	-	0.71	1.83	0.40	1.03	0.54	1.38	B/C Ratio>1
	Evaluation	N.F.F.	F.F.	N.F.F.	F.F.	N.F.F.	F.F.	
NPV	Mill. IDR	-1,397,280	4,028,732	-3,677,844	175,741	-5,075,124	4,204,473	NPV>0
	Evaluation	N.F.F.	F.F.	N.F.F.	F.F.	N.F.F.	F.F.	
FIRR	%	No solution	9.66%	No solution	1.57%	No solution	5.79%	FIRR>r
	Evaluation	N.F.F.	F.F.	N.F.F.	F.F.	N.F.F.	F.F.	r=1.15%
Financial Evaluation		**N.F.F.**	**F.F.**	**N.F.F.**	**F.F.**	**N.F.F.**	**F.F.**	

Note: F.F. = Financially Feasible, N.F.F. = Not Financially Feasible
Source: JICA expert team

The results of financial analysis show that all projects of zone No.1 and zone No.6 require gradual increase of sewerage tariff, and that sewerage system project profitability can be secured by raising the tariff by 30% every 3 years from 2016, and eventually raising up approximately to 3 times level of the current level in stages through the 4 times revisions by 2025 (case 2).

In addition, the results, which were analyzed together Zone No.1 and Zone No.6 as a single business, were as given in Table E3-28. The results show that FIRR can be secured 5.79% if sewerage tariff is increased.

E3.8 Funding Source

E3.8.1 Target of Funding

Sort-term projects requiring government investment are shown in Table E3-29.

Table E3-29 Short-term Projects Requiring Government Investment and the Initial Construction Costs

Category	District	Outline of Project	Initial Construction Cost of Project (Million IDR)
Off-site priority project	Zone No.1 (Penjagalan)	• Design population: 989,389 people • Design flow: (daily average) 198,000 m^3/day (daily maximum) 264,000 m^3/day • Start of construction / service：2013/2014	5,192,315
	Zone No.6 (Duri Kosambi)	• Design population: 1,172,574people • Design flow: (daily average) 235,000 m^3/day (daily maximum) 313,000 m^3/day • Start of construction / service: 2013/2014	7,110,408
		Off-site priority project Sub-total	12,302,723
On-site priority project	Construction of a newly STP in South area	• Capacity：600m^3/day • Treatment method: Solid-liquid separation-Activated sludge process • Construction term: 2013-2014（2years）	42,100
	Rehabilitation and Extension of eastern existing STP (Pulo Gebang)	• Automation: Improve the poor sanitary condition and overwork for labors by introducing automated removal mechanism of grid and sludge. Increased capacity due to automation: 300m^3/day → 450m^3/day • Construction term: 2013（1 year）	24,390
	Integration On-site sludge treatment plant(Duri Kosambi) with WWTP of Zone No.6	• Abolish existing STP(Duri Kosambi) ,and then integrate the function of STP with newly constructed WWTP of Zone No.6. • Capacity: 930m^3/day (maximum) • Construction term：2013	155,279
	Co-treatment of on-site sludge at WWTP of Zone No.1 (Penjagalan)	• Add on-site sludge treatment facilities to newly constructed WWTP of Zone No.1(Penjagalan) • Capacity: 790m^3/day (maximum) • Construction term：2013	131,904
		On-site priority project Sub-total	353,673
		Total	12,656,396

Source: JICA expert team

E3.8.2 Possible Funding Source

The financial evaluation of the priority sewerage projects (Zone-1 and Zone-6) in E3 was conducted assuming that the main funding source is JICA's ODA loan which covers 85% of the total construction cost of the project based on the "Fixed-Percentage Financing Criteria", and is borrowed by the central government and the portion equivalent to 50% of the total construction cost of the project is provided to DKI Jakarta as a grant from the central government and the portion equivalent to 35% of the total construction cost of the project is on-lent to DKI Jakarta and the remaining portion equivalent to 15% of the total construction cost of the project is self-financed by DKI Jakarta according to the basic concept of 'Matching Grant' set forth by BAPPENAS.

The funding sources, however, may not be limited to JICA ODA's loan. Other possible funding sources would be as follows.

(1) APBN(National Income and Expenditure Budget)
(2) APBD(Regional Income and Expenditure Budget)
(3) Loan
(4) Grant
(5) Private funding (PPP)

E3.8.3 Sharing of Funding between Central Government and DKI Jakarta

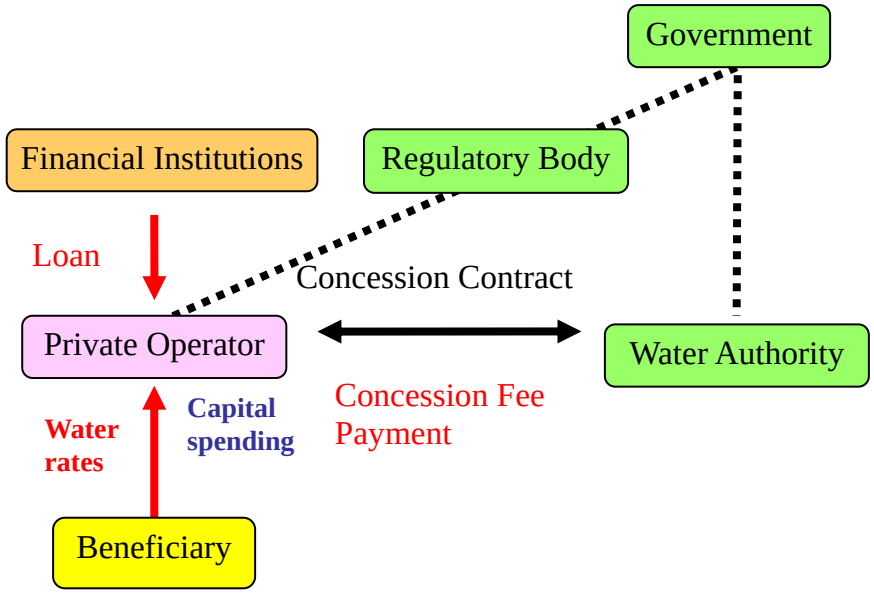
According to DKI Jakarta, the amount of sharing proportion depends on the agreement between Central Government and Regional Government DKI Jakarta and could vary for each project. DKI Jakarta points out that the Law No. 29 year 2007 about DKI Jakarta Province as the capital of the State of Republic Indonesia stipulates that the funding in implementation the governmental special matters will be budgeted on APBN (National Income and Expenditure Budget).

E3.8.4 PPP for Water and Sewerage Projects in Developing Countries

Utilization of the Private Sector in infrastructure development in developing countries is established as a means of infrastructure sector reform and infrastructure development in areas connected with economic infrastructure, such as electric power and transport. Section G7.2.2 of the previous chapter presented specific project schemes in these areas that are thought not to present a problem. However, water and sewage remains an area where the effectiveness of Private Sector utilization continues to be debated, as examples of both success and marked failure have been reported.

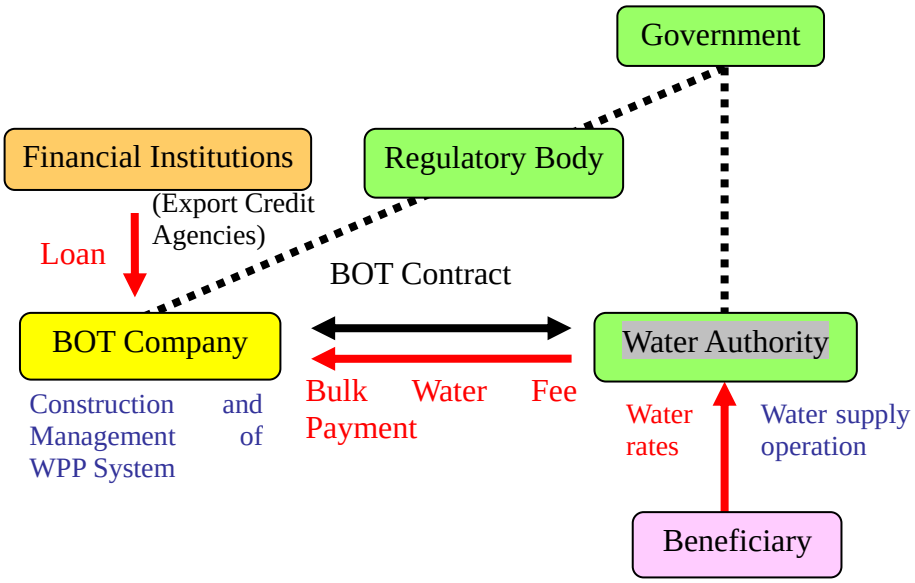
Accordingly, when studying project schemes for Private Sector utilization in the area of water and sewage, it is thought important to pursue such study from standpoints other than those used in ordinary infrastructure projects. A report that serves as a reference in providing such standpoints was issued by Philippe Marin, a water and sanitation specialist of the World Bank, during the 2009 World Water Week. This report, titled “Public-Private Partnerships for Urban Water Utilities A Review of Experiences in Developing Countries,” points out that “PPP approaches that were successful in other sectors do not necessarily translate directly into success in the water and sewerage sector,” “the direct investment approach is not the correct approach,” and “combining private management efficiency and public capital (including hybrids of private capital and public capital) is succeeding.” Moreover, it lists management contract-type and affermage-type (lease-type) approaches as “Private-Public capital hybrid” variations that have achieved considerable success. (PPT presentation “Public-Private Partnerships for Urban Water Utilities A Review of Experiences in Developing Countries” at the World Bank Water Week 2009 by Philippe Marin, Senior Water & Sanitation Specialist, Water Anchor [ETWWA], World Bank)

A PowerPoint presentation “Kaihatsu-Tojokoku no Suido Jigyo” (water-supply projects in developing countries) that was presented to the Japan Water Works Association in June 2010 by Kazushi Hashimoto (Deputy Manager, International Division, Yachiyo Engineering Co., Ltd.) serves as a reference for presenting actual PPP forms in developing countries’ water and sewage sectors based on the aforementioned World Bank report. The following uses this material to present an overview of specific PPP schemes namely, concession, BOT, management contract, and lease (affermage) that have performed well in developing countries’ water sectors. These schemes are presented in Figure E3-1, Figure E3-2, Figure E3-3, and Figure E3-4, respectively. Moreover, Table E3-30presents a comparison of responsible areas of private operators, ownership and management of capital, bodies in charge of fee collection, and other items for each scheme.



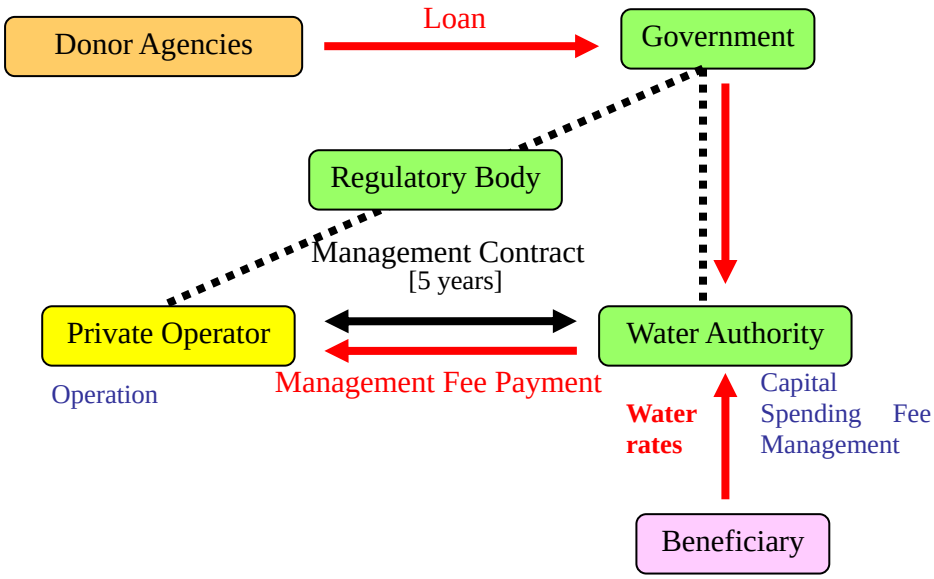
Source: JICA expert team

Figure E3-1 Concession Scheme



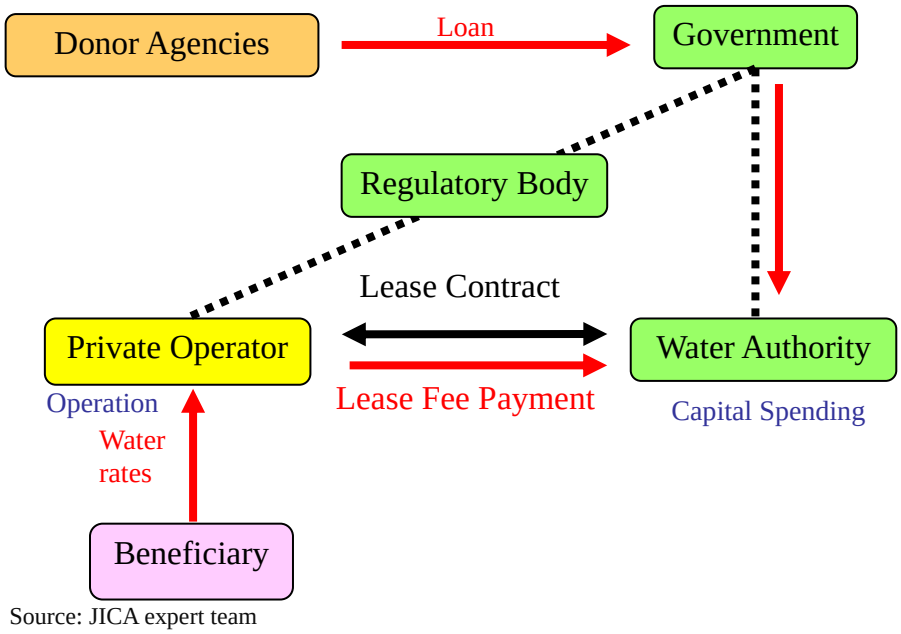
Source: JICA expert team

Figure E3-2 BOT Scheme



Source: JICA expert team

Figure E3-3 Management Contract Scheme



Source: JICA expert team

Figure E3-4 Lease (Affermage) Scheme

Table E3-30 Comparison of PPP Schemes

	Items	Concession	BOT	Management Contract	Lease (Affermage)
1	Responsible Area of Private Operator	Entire water supply from Water Purification plant to Distribution Network	Construction and Management of Water intake and WPP (Only Bulk water supply without Individual supply network)	Entire water supply from Water Purification Plant to Distribution Network	Entire water supply from Water Purification Plant to Distribution Network
2	Principal Responsibility of Capital spending (Including Funding)	Private Operator	Private Operator	Government (Water Utility)	Government (Water Utility)
3	Attribution of Water rates	Private Operator (Private Operator pays the Concession Fee to Government (Water Utility) from the water tariff it collects from the end-users.)	Government (Water Utility) (Government (Water Utility) pays the Bulk Water Fee to Private Operator from the water tariff it collects from the end-users.)	Government (Water Utility (Government (Water Utility) pays Management Fee to Private Operator from its own budget or using the donor finance.)	Private Operator (Private Operator pays Lease Fee to Government (Water Utility) from water tariff it collects from end-users.)
4	Period of Contract (typical)	25 years	25 Years	5 years	10 years
5	Others	Private Operator assumes all the risks on capital spending, operation, finance and water tariff. Role of Regulatory Body is extremely important.	Private Operator assumes the risks on capital spending, operation and finance of the Bulk water supply. Private Operator is unable to control the risk of the water tariff. Private Operator may demand the Government guarantee on the payment of the bulk water fee. Role of Regulatory Body is important.	Private Operator does not assume the risks on capital spending or its finance. Private Operator does not assume the risk on water tariff. It is necessary to link the payment of the Management Fee to the performance of Private Operator by incentive payment and penalty. Role of Regulatory Body is important.	Private Operator does not assume the risks on capital spending or its finance. Private Operator assumes the risk on water tariff. Role of Regulatory Body is important.

Source: JICA expert team

The concession scheme and BOT scheme have significant advantages in developing countries (and particularly their financial authorities) that face difficult fiscal situations, because the responsibility for capital investment and procuring the funds for such investment lies with private-sector enterprises, and not with the Public side (government, public corporation). However, long contract periods of 25 years must be set so that the private enterprises can recover their invested funds. Thus, it is necessary to set detailed rules for conflict resolution (including the roles of regulatory institutions) at the time of the initial contract signing. This is to ensure that conflicts that arise between private enterprises and the Public side (government, public corporation) during this time do not become drawn out and remain unresolved until the end of the contract.

On the other hand, under the management contract scheme and lease (affermage) scheme, the responsibility for capital investment and procuring the funds for such investment lies with Public side (government, public corporation) and not with private enterprises. Consequently, the advantage of greater efficiency that comes with private enterprise-led management is greater for the Public side (government, public corporation) than the financial advantage. However, this does not mean that there is no financial advantage whatsoever. If project profitability improves as a result of higher efficiency, this presents benefits for financial authorities as well. And because there is no need for private enterprises to recover the funds they applied to capital investment, contract periods are between five and ten years, which are shorter than those for the concession scheme and BOT scheme.

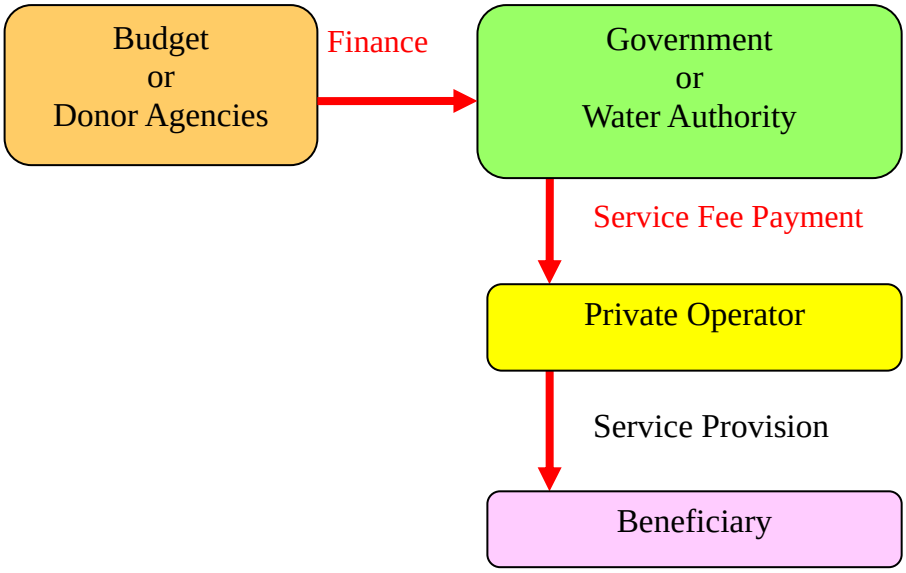
The concession scheme, BOT scheme, and lease (affermage) scheme are all schemes in which private

enterprises bear “tariff risk” for water tariff and sewage tariff. Under the concession scheme and lease (affermage) scheme, private enterprises pay concession fees or lease fees to the Public side (government, public corporation) using the tariff which they collect. Thus, tariffs and collection rates have a direct impact on the profits of private enterprises. Under the BOT scheme, private enterprises do not directly collect water and sewage tariffs. Rather, they receive payments of bulk water charge or bulk treatment charge from the Public side (government, public corporation). At first glance, this appears to mean that private enterprises do not bear the tariff risk. However, in actuality, because ordinarily only water tariff revenue or sewage tariff revenue is the only resources for the payment of bulk water charge and bulk treatment charge, there is a tariff risk as the entire scheme. Consequently, private enterprises will likely demand that the Public side (government, public corporation) provide government guarantee for payment of bulk water charge or bulk treatment charge. The Public side (government, public corporation) will also be required to take budgetary measures in advance in order to provide such government guarantee. Thus, for these three schemes, the setting of tariff is important and the role of regulatory institutions is large.

Under the management contract scheme, private enterprises manage water-supply and sewerage projects for a set period of time based on a commission from the Public side (government, public corporation). In return, the private enterprises receive set management fees. This means that private enterprises do not bear capital investment or financing risk, nor do they bear tariff risk. Consequently, there is rooms for introducing PPP even if project profitability is low. However, because risks to private enterprises under this scheme are low, there is also the risk that PPP will not lead to higher project performance. In order to prevent this, performance-based bonuses and the levying of penalties are incorporated into contracts in order to appropriately encourage private enterprises to improve performance. And here, regulatory institutions play a role in monitoring performance. Moreover, when the management contract scheme is employed for projects with low profitability, private enterprises face the risk that management fees will not be paid in accordance with the contract. This may cause them to be hesitant about joining PPP. Consequently, it is desirable to make financial assistance (loans, etc.) from donors applicable to management fees.

On the other hand, under the concession and BOT schemes, private enterprises must recover their invested funds. This makes overall project profitability including investment costs and maintenance and management expense (including financing expense) a very important condition. Under the lease (affermage) scheme, there is no need for private enterprises to recover invested funds. Therefore, this scheme can be applied even to low-profitability projects if lease fees are set appropriately in accordance with project profitability.

Furthermore, in addition to the four typical PPP schemes as described above which have evolved in the water supply and sewerage sector in the developing countries, there is a ‘services sold to the public sector’ type in which a part of the function of the public entity, not the whole management of the public entity, is outsourced to private enterprise. The ‘comprehensive private consignment’ scheme in Japan, in which the O&M of the water purification plant or the wastewater treatment plant is outsourced to the private sector, is a variety of the classification ‘services sold to the public sector’. In reality, in the developing countries, it is widely being tried to contract out the O&M of water purification plant or wastewater treatment plant to the private sector in the limited period, or to contract out such functions as billing and tariff collection to the private sector, which can be seen as PPP in a broader sense. Even though the ‘services sold to the public sector’ scheme does not have the advantage of reducing dependence on public funds, and its effect on efficiency improvement of the management of the public entity is limited, it is a good idea to start involving the private sector in the ‘services sold to the public sector’ scheme, a partial PPP, if full engagement of the private sector under typical PPP schemes is difficult for some reason, political or otherwise. When the public sector introduces the ‘services sold to the public sector’ type of PPP scheme, it is necessary to appropriate a budget for service fee payment. If this proves difficult, an arrangement in which a donor agency such as JICA finances service fee payment needs to be established.



Source: JICA expert team

Figure E3-5 Services Sold to the Public Sector

E3.8.5 Possible PPP Option for the Sewerage Projects in DKI Jakarta

(1) Appropriate PPP Option for Sewerage Works

The sewerage development in DKI Jakarta requires huge financial resources. The short term plan alone, which needs to be developed before 2020, will cost 11 trillion IDR (about 100 billion JPY), which is too big a sum to be covered entirely by public financial resources such as the budget of the central government, the DKI Jakarta budget, and ODA funding. Therefore, it is desirable to mobilize private funding even for a part of the investment cost.

On the other hand, as indicated by the result of the financial analysis on the priority projects in the short term plan, even in the case of sewerage development in the zone where a comparably higher level of tariff revenue is envisaged due to many commercial buildings located in the area covered by the short term plan, the sewerage investment will be marginally financially viable only if 65% of the project cost is funded by grant assistance and the sewage tariff is raised to 3 times of the current level in real terms. Therefore, the Concession model, in which the private operator assumes investment, financial, and tariff risks for the entire facility, from WWTPs 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 WWTPs 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.

(2) The Fiscal Support by the Public Sector for the PPP

If the BOT model for the WWTPs is applied, the public sector will pay the bulk sewage treatment fee to the private operator. Since the financial viability of the sewerage works is low, it is envisaged that the sewage tariff revenue from the users would not be enough to cover the bulk sewage treatment fee to be paid to the private operator. Therefore, it is necessary for DKI Jakarta to allocate a budget for payment of the bulk sewage treatment fee separately.

Furthermore, if the BOT model for the WWTPs is applied, since the progress of the connection to the households and commercial buildings and, consequently, the volume of the sewage inflow to the WWTPs is out of the private operator's control, the private operator would not assume the risk

associated to the volume of the sewage inflow in the BOT contract. Concretely, such contractual arrangement will be absolutely necessary as the private operator would be paid the certain amount of the sewage treatment fee, even in case that the operation ratio of the WWTP remains low due to the delay of the house connection.

Under the BOT model, however, the private sector can utilize the flexibility of private investment as much as possible and can maintain the operation rate of the WWTP at the appropriate level by staging the construction of WWTP.

In the case the BOT model is applied for the WWTPs as the PPP arrangement, although the financial cost will increase since the private financial resource replaces the central government subsidy which might have been applied, the increase will be in an allowable range, since the construction cost of the WWTPs consists of only about 1/3 of the total investment cost. It is necessary to allocate the subsidy originally intended for the WWTPs to the piping system and house connection so that the increase of the financial cost can be mitigated.

(3) PPP for the Capacity Development for the Management of the Sewerage Works

The BOT model can be applicable for WWTPs established in such zone where much commercial building and higher financial viability is envisaged. The public sector remains responsible for the WWTPs in the Zones with lower financial viability and for the entire piping system. It may be difficult at first for the public sector, which lacks the experience of managing a substantial sewerage system, to acquire the knowhow required for the efficient management of the sewerage works.

As the measure to improve the capacity of the public sector in managing the sewerage works, as the conventional measure, the technical cooperation project by JICA would be an option; on the other hand, the introduction of the Management Contract model as presented in the previous section, in which the management of the sewerage facilities developed by the public sector is entrusted to a private operator for a certain period, during which managerial knowhow is transferred, would also be one of the realistic option. The JICA Survey Team proposes considering the JICA technical cooperation project option, the management contract option or the other option in the forthcoming JICA Feasibility Study for the short term plan.

E4 Sewage Charges and Collection

E4.1 Prospect of Revising Sewage Tariff in DKI Jakarta

As of 2011, PD PAL JAYA is presenting a proposal for revised sewage charges to the Governor of DKI Jakarta. It is anticipated that the Governor's approval will be received and a gubernatorial ordinance concerning charge revision will be issued in 2012. The following presents an outline of the expected charge revision.

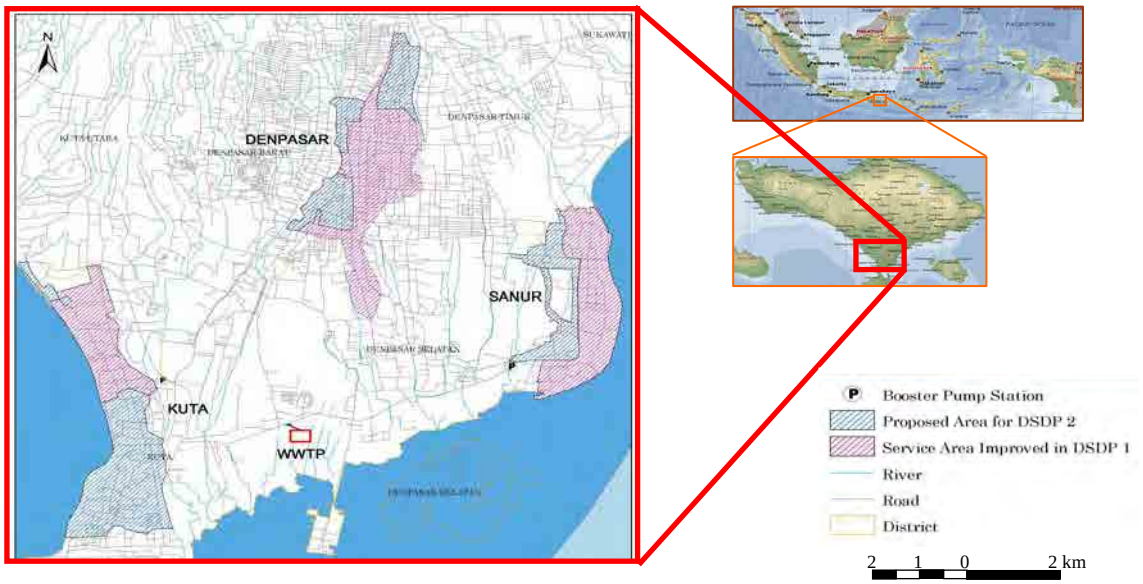
- Tariffs in all categories will be raised by an average of 15%.
- Category III-1 (high-rise office buildings) will be integrated with III-2 (office buildings of three stories or less).
- The charge of Category III-1 will be raised by 15% as the Basic Tariff (Average Tariff)
- The ratio of Category III-1/Category I (ordinary households) of 5 to 1 will be kept.

E4.2 Case of the Sewerage Charges and Collection in Bali (BLUPAL: Public Service Organization of Wastewater Management)

E4.2.1 Summary of Denpasar Sewerage Development Project

Denpasar Sewerage Development Project II (hereinafter referred to as DSDP-II) is the Japanese Yen Loan project. The contract period for ICB is from 22nd October 2009 to 8th April 2012 (900 days). The location of DSDP-II is shown in Figure E4-1 and the outline of facilities is explained in Table E4-1.

The progress of ICB is almost 90% of the whole construction. The construction period for LCB portion is from March 2011 to April 2014. The progress of LCB is about 10%.



Source: JICA expert team

Figure E4-1 Location of Denpasar Sewerage Development Project II (DSDP II)

Table E4-1 Outline of Facilities in DSDP-II

Package	Area (ha)	Contents of Main Facilities
ICB 1	**Denpasar** (250 ha)	- Main Sewer Construction : 25,500 m - Secondary Sewer Construction : 5,500 m - Other Auxiliary Facility : Manhole and Wet Pit
	Sanur (164 ha)	- Main Sewer Construction : 12,500 m - Secondary Sewer Construction : 3,150 m - Other Auxiliary Facility : Generator Set, Manhole and Wet Pit
ICB 2	**Kuta** (420 ha)	- Main Sewer Construction : 22,500m (2.282m Pipe Jacking) - Secondary Sewer Construction : 3,800 m - Other Auxiliary Facility : Manhole, Wet Pit, Generator Set, Aerator, Sludge Drying Bed and Maintenance Equipment for BLUPAL
LCB 1	**Denpasar** (250 ha)	- Tertiary Sewer Connection : 8,100 m - House Connection : 1,500 units - Other Auxiliary Facility : Manholes
LCB 2	**Sanur** (164 ha)	- Tertiary Sewer Connection : 1,850 m - House Connection : 3,000 units - Other Auxiliary Facility : Manholes
LCB 3	**Kuta** (420 ha)	- Tertiary Sewer Connection : 16,800 m - House Connection : 2,620 units - Other Auxiliary Facility : Manholes

Source: JICA expert team

E4.2.2 Sewerage Charges and Collection Method

(1) Sewerage Charges

1) Charging of Sewerage Charges and Collection Body

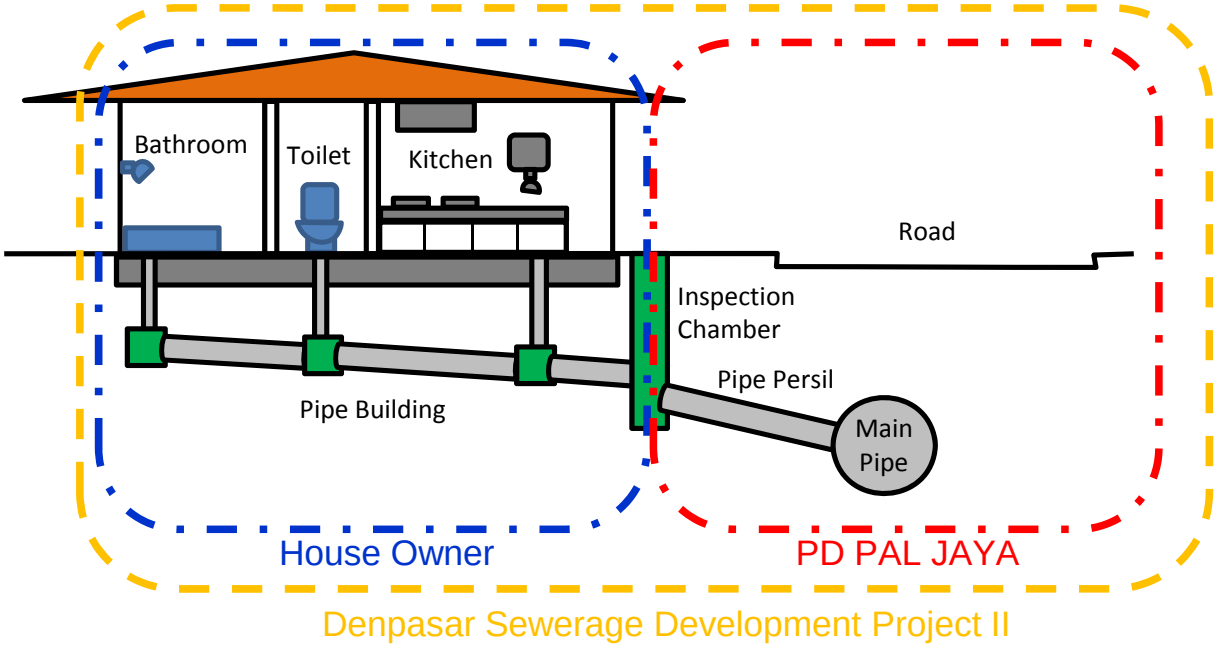
- As of August 2011, collection of sewerage charges has yet to start.
- A proposal for a sewerage charge system has already been prepared. It is expected that the system will be announced as an order of the Governor of Bali Province in September 2011. An effort is underway to begin charging and collection of sewerage charges on September 1.
- There is a plan to establish a sewerage project administrative department (UPT-PAL) within the government to serve as the charge collection body. According to the plan, UPT-PAL will begin collecting charges and will be raised in status to Regional Public Service Board (BLUD) after several months.

2) Collection Method

- The currently planned collection method involves independent payment by customers to the Local Development Bank once monthly.
- This collection method is the same as the charge payment method used by electricity projects (PLM) and water-supply projects (PDAM).
- Although BLUPAL (Public Service Board for Wastewater Management) believes that collecting charges on a community base would be effective as a means of collecting from residents, it has not formulated any concrete plans for such a collection method.

3) Charge System

- Charges are meter charges only; there are no initial connection charges. This is because the Bali provincial government is paying expenses up to construction of pipe building in case customers apply connection when sewerage system is constructed, and therefore there is no cost charged to customers at the time of sewerage connection.
  On the other hand, DKI Jakarta stipulates by Governmental Decree that PD PAL JAYA is paying up to construction of house connection and inspection chamber, and customers are obliged to have their own pipe buildings constructed. Therefore, there are initial connection charges.
  Differences in responsible area for sewerage connection between Bali province and DKI Jakarta are shown in Figure E4-2.



Source: JICA expert team

Figure E4-2 Differences in Responsible Area for Sewerage Connection between Bali Province and DKI Jakarta

(2) Comparison with Sewerage Charges in DKI Jakarta (Estimate)

Table E4-2 Comparison of Sewerage Charges in Bali Province and DKI Jakarta

Unit: IDR/month

Division	Bali Province	DKI Jakarta	Conditions of estimate
Resident	3 classes based on road width Fixed-rate system 10,000 to 25,000 (0.6 to 1.1 times)	4 classes based on power consumption Based on floor area 9,000 to 41,080 (1 times)	Floor area Type A: 100 m^2 Type B: 260 m^2 (Based on actual PD PAL customer data)
Hotel	Based on No. of room occupancies	Based on floor area 2,025,000	Set based on following assumption: No. of guest rooms: 100; occupancy

Table E4-2 Comparison of Sewerage Charges in Bali Province and DKI Jakarta

Unit: IDR/month

Division	Bali Province	DKI Jakarta	Conditions of estimate
	8,000,000 (4 times)	(1 times)	rate: 80%; 4-star hotel; floor area of 30 m^2 per room
Restaurant	3 classes based on No. of seats Fixed-rate system 40,000 to 150,000 (1.4 to 5.1 times)	Based on floor area 29,250 (1 times)	100 seats or more Restaurant floor space: 130 m^2 (Based on actual PD PAL customer data)
Office building	Fixed-rate system 45,000 (1 times)	Based on floor area 3 floors or less: 1,350,000 3 floors or more: 11,250,000 (30 to 250 times)	Office building floors space (average) 3 floors or less: 10,000m^2 3 floors or more: 25,000m^2 (Based on actual PD PAL customer data)

Source: JICA expert team

Results of sewerage charge estimation:

- Charges on residents in DKI Jakarta cover a larger spread but do not show significant differences
- Charges on hotels and restaurants are 2 to 5 times higher in Bali Province.
- Charges on office buildings are 30 to 250 times higher in DKI Jakarta.

Based on the above, it can be concluded that both DKI Jakarta and Bali Province have set charges in accordance with their own regional characteristics.

E4.2.3 Suggestions for Sewerage Charges and Collection

(1) Sewerage Charges

As is shown by the results of the financial analysis presented in PART-E, future declines in the sewerage unit charge against the number of customers are unavoidable. This is because the number of ordinary household customers, who pay low sewerage charges, will increase as the sewerage system diffusion rate rises.

This means that establishing sustainable sewerage projects will require more than just higher management efficiency through use of the Private Sector. It will also make future increases in sewerage charges inevitable. Indonesia is currently enjoying steady development with a real GDP growth rate of 6% or more per year. Thus, it will be necessary to study increasing sewage charges to keep pace with rising national income in the future.

(2) Sewerage Charge System

Under the current sewerage charge system, unit charges are set on the basis of established building areas for individual customer categories. Moreover, ordinary households are classified into four groups based on their contract power consumption even with the same building areas, with higher unit charges set for those households with higher contracted power consumption. In other words, the current charge system is comprised of three elements: customer category, building area, and contracted power consumption.

When viewed in terms of efficient sewerage facility management, it is desirable to set the total volume of wastewater requiring treatment based on actual measurement of generated wastewater volume, floor area, household population, etc. for each customer at the time of contract. However, given current circumstances in DKI Jakarta where the water supply diffusion rate is less than 60% and many households and commercial facilities use groundwater obtained from their own wells, water consumption data, which is ideal data for setting sewerage charge, is hard to be applied for DKI Jakarta effectively.

In view of the above, it can be said that the current building area-based sewerage charge system is

appropriate given current conditions in DKI Jakarta.

When, in the future, progress is made toward raising the water supply diffusion rate, and reducing dependency on use of private wells according to restriction on use of groundwater etc., switching from the current building area-based charge system to a water use volume-based charge system should be considered.

Moreover, in consideration of switching to volume-based charge system for sewerage charge, it will be required to grasp actual usage volume of groundwater from wells because well water are supposed to be kept being used to some extent even after water supply system spreads.

However, measuring actual volume of pumping water or actual electricity used for pumping is assumed difficult. Coping with this problem, it is recommendable to investigate actual usage of well including scale of pumping facilities and their operating hours for business customers that are typically charged high sewerage charge, as a first step, and to obligate business customers that use quite a lot of well water to install integrating flowmeters for their private well and to report their usage volume, which should be reflected to the sewerage charge.

(3) Sewerage Charge Collection Methods

The sewage charge collection methods that PD PAL JAYA currently applies to ordinary households and businesses are described below.

1) Ordinary Households

(a) Collection through individual visits: Two PD PAL JAYA employees visit each household once monthly to collect charges.
(b) Payment at payment office: Residents pay directly at the PD PAL JAYA payment office.
(c) Collection and payment by community representative: A local community representative collects charges and pays them as a lump sum to PD PAL JAYA.

In terms of percentage of the total amount of charges collected, the three methods described above approximately break down as follows: (a): 70%; (b): 10%; and (c): 20%.

2) Businesses

In general, businesses pay their charges using bank account transfers.

A challenge for the future will be how to secure and raise collection rates as the number of ordinary household customers rises.

If the current charge collection methods were to be continued, the “collection through individual visits” method would become unrealistic unless a large number of new charge collectors were hired. Moreover, given that “payment at a PD PAL JAYA payment office” currently accounts for a low share of collection (10%), it is unlikely to become the main collection method.

On the other hand, the “collection and payment by community representative” currently maintains a high collection rate of 75%. Thus, it is thought that using public campaigns at the community level would be effective as a means of raising the collection rate.

At the same time, it is worth considering the collection method being studied in Bali Province, whereby customers independently pay their charges to the Local Development Bank once a month. This method is similar to that employed for electricity projects (PLN) and water-supply projects (PDAM), and therefore it would likely have comparatively high receptivity among residents.

Furthermore, as progress is made toward raising the water supply diffusion rate, measuring water use volumes for each customer, and reducing dependency on use of private wells, it will become possible to switch from the current building area-based charge system to a water use volume-based charge system. When this condition is met, integrated collection of water charges and sewerage charges will be the method that best contributes to a higher charge collection rate.

PART-F EVALUATION BY ENVIRONMENTAL SOCIAL CONSIDERATION

PART-F EVALUATION BY ENVIRONMENTAL SOCIAL CONSIDERATION

F1 Environmental Impact Assessment in Indonesia (AMDAL)

"Government Regulation on Environmental Impact Assessment (hereinafter referred to as EIA) No. 27, 1999" regulates the procedure of Environmental Impact Assessment (hereinafter referred to as "AMDAL : *Analisis Mengenai Dampak Lingkungan*" which means EIA in Indonesian). The target activity is indicated in "Decree of State Ministry for the Environment on Types of Business and/or Activity Plans No. 17, 2001". Main laws and regulations of Indonesia and DKI Jakarta related to AMDAL are shown in Table F1-1 and Table F1-2 respectively.

Table F1-1 Major National Laws and Regulations related to AMDAL

Category	Name of Legislative
Governmental Decree	Government Decree No. 27 Year 1999 on Environmental Impact Assessment (AMDAL)
Ministerial Regulation	Regulation of Environmental Document for Business and/or Activity Whish has Business License and/or Which is Under Implementation without Environmental Document.
	Regulation of Types of Business Plan and/or Activity Which Obligate to be Completed With Environmental Impact Assessment (AMDAL) No. 11 / 2006
Ministerial Decree	Decree of State Minister for Environment No. 8 2006 on Guidelines for Preparation of Environmental Impact Assessment (AMDAL)
	Decree of State Minister for the Environment No. 17 Year 2002 on Types of Business and/or Activity Plans required to be Completed with AMDAL
	Decree of State Minister for the Environment No. 86 Year 2002 Guidelines of Environmental Management Program and Environmental Monitoring Program (UKL - UPL)
	Decree of State Minister for the Environment No. 42 Year 2000 on Form of Members of Assessment Committee and Technical Committee for AMDAL
	Decree of State Minister for Environment No. 41 Year 2000 on Guidelines for Local Assessment Committee for AMDAL
	Decree of State Minister for Environment No. 40 Year 2000 on Guidelines for System of Assessment Committees for AMDAL
	Decree of State Minister for Environment No. 8 Year 2000 on Public Involvement and Information Disclosure for AMDAL
	Decree of State Minister for Environment No. 2 Year 2000 on Guidelines for AMDAL

Source: Prepared by JICA Expert Team

Table F1-2 Major Laws and Regulations of DKI Jakarta related to AMDAL

Category	Name of Legislative
Governor Decision	Decision of Jakarta City Governor No 2333 Year 2002 On Types of Businesses and/or Activity Plans for Environmental Management Summary Plan (SPPL)
	Decision of Jakarta City Governor No. 189 Year 2002 on Provision of Types of Business and/or Activity Plans for Environmental Management Plan (UKL) and Environmental Monitoring Plan (UPL)
	Decision of Jakarta City Governor No. 99 Year 2002 on Execution Mechanism of Environmental Impact Assessment (AMDAL) and Environmental Management Plan (UKL) and Environmental Monitoring Plan (UPL)
	Decision of Jakarta City Governor No. 2863 Year 2001 on Types of Businesses and/or Activity Plans required to be Completed with Environmental Impact Assessment (AMDAL) in DKI Jakarta
	Decision of Jakarta City Governor No. 76 Year 2001 on Guidance of Public Involvement and Information Disclosure for Environmental Impact Assessment (AMDAL)
	Decision of Jakarta City Governor No. 57 Year 2001 on Form of Assessment Committee for Environmental Impact Assessment (AMDAL)

Source: Prepared by JICA Expert Team

Projects, which have substantial large impacts on the environment, are subject to AMDAL and to the approval by the relevant authorities with the following documents;

i) Executive Summary (which would be the terms of reference of ANDAL) (KA-ANDAL : *Kerangka Acuan Kerja Jasa Analisis Dampak Lingkungan Hidup*)

ii) Environmental Impact Analysis Report (ANDAL: Analisis Dampak Linkungan)

iii) Environmental Management Planning Document (RKL: Rencana Pengelolaan Lingkungan)

iv) Environmental Monitoring Planning Document (RPL: Rencana Pemantauan Lingkungan)

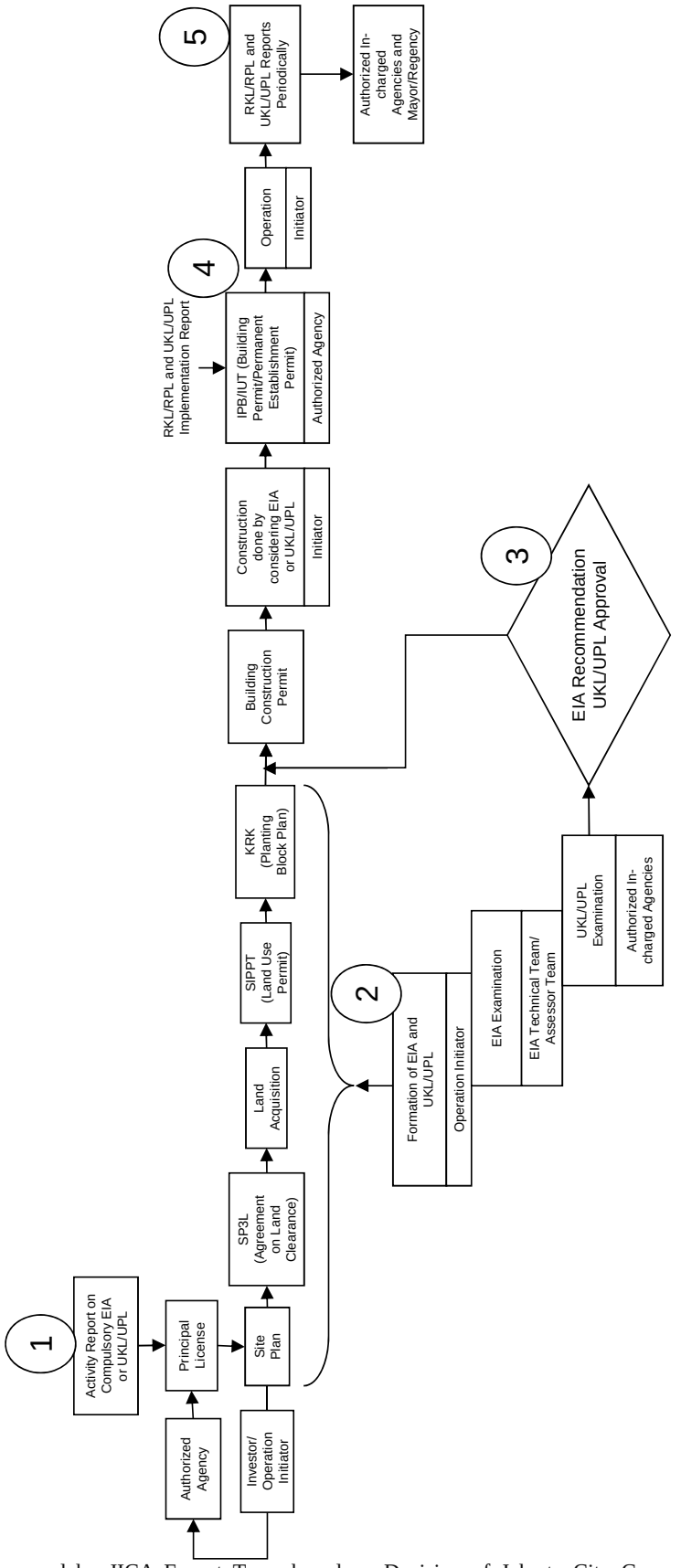
v) Executive summary

On the other hand, projects, which have substantial impacts on the environment to some extent, need to prepare Environmental Management Plan (UKL: Upaya Pengelolaan Lingkungan,) and Environmental Monitoring Plan (UPL: Upaya Pemantauan Lingkungan), or Statement Letter of Environmental Management (SPPL: Surat Pernyataan Pengelolaan Lingkungan) even though they are not subject to AMDAL.

Relevant authorities for AMDAL are basically local governments in cities and regencies, however, sometimes provincial or central governments are in charge of AMDAL depending on the types and/or places of projects, and the capacities of local governments.

The newly enforced environmental basic law, "Environmental Protection and Management Law No. 32, 2009", indicates the environmental permission system. According to the hearing to Ministry of Environment, it is under discussion whether the new system would be established or the existing AMDAL would be applied (as of March 2012). Also the new law indicates the target projects for EIA would be increased, however, the procedure of existing AMDAL is applied because the detail criteria are under discussion.

The procedure of AMDAL in DKI Jakarta is shown in Figure F1-1. This procedure would be commenced after the size and place of projects are decided because AMDAL is determined on the basis of the scale of projects. In order to apply AMDAL, it is necessary to submit the check list. This check list shows the progress of each procedure. The contents of check list are shown in Table F1-3.



Note:
1. The authorized agency shall inform type of environmental document to be formulated (EIA or UKL/UPL).
2. Formulation of EIA or UKL/UPL.
3. EIA or UKL/UPL is a requirement for Building Construction Permit
4. Development Construction done by considering EIA or UKL/UPL.
5. To report implementation of RKL/RPL and UKL/UPL
6. Periodic report for RKL/RPL and UKL/UPL implementation.

Source: Prepared by JICA Expert Team based on Decision of Jakarta City Governor No. 99 Year 2002 on Execution Mechanism of Environmental Impact Assessment (AMDAL) and Environmental Management Plan (UKL) and Environmental Monitoring Plan (UPL)

Figure F1-1 Procedure of AMDAL in DKI Jakarta

Table F1-3 Contents of Check List for AMDAL Application

No.	Description
Part 1 Outline	
1	ANDAL, RKL-RPL documents, executive summary based on Environment Ministry Regulation No. 8/2006
2	Cover letter of application discussion for Andal, RKL-RPL documents
3	Letter of statement of environmental management, signed by director/the same level with Head of BPLHD and stamped (Rp. 6.000)
4	Letter of statement (Ability to construct building) signed by director/ the same level with Head of BPLH and stamped (Rp. 6.000)
5	Approval letter of KA-ANDAL (term of reference-ANDAL) (KA-ANDAL documents is bring while discussion)
	Land use must be proper with activity plan that already be stamped. - Copy of land certification -area of land > 5.000 m^2, land use permit -advice planning (KRK) - Blok plan (RTLB)
6	Official document of Applicant (Company) / identity card
7	Related map (Google and Gutter equipped with Legend, direction, coordinate, scale, source, notation, and color)
8	Perspective drawing of building/ structural drawing of building from architect
9	MOU (if there is an agreement with third party)
10	Dewatering analysis related to the activities which have basement (BPLHD regulation
11	Photo of current condition (in the last 1 week/should contain time of taken)
12	Laboratory Analysis Result of Air and Water Condition - Legality/Accreditation from National accreditation committee and should show the original file - Layout of sampling equipped with the coordinate/Global Positioning System (GPS)
13	Level of floor/ level of flood from Public Works Agency
14	Runoff - Study of watersheds - Maximum rainfall - Drainage capacity - Micro and macro drainage layout - Permission to use the infrastructure – Public Works Agency
15	Responsibility to make traffic analysis – Travel Agency
16	Principal permit from Governor (for reclamation)
17	Permit related to the construction of harbor and the facility
18	Application of non-smoking area
19	Reforestation duty for 20% of area. Improvement of reforestation by potted plants and roof garden.
20	Obligation to make infiltration well: - Infiltration well (area of roof and pavement) - Infiltration pound (1% from the area > 5000 m^2) The location should be detailed in lay out
21	Obligation to make bio pore infiltration based on Governor Instruction No. 197/2008 and Environment Ministry Regulation No. 12/2009 (Layout of location)
22	Waste water treatment plant (Governor Regulation No.122/2005). Technical team will not allow WWTP to be placed > 1st basement (Layout of location)
23	Permit of waste water disposal (Governor decree No. 220/2010)
24	Quality standard of waste water (Governor decree No.122/2005 and/or No.582/1995)
25	Permit of solid waste disposal (Governor regulation No.76/2009) and separation of hazardous waste
26	Maximize the use of water from PAM (Drinking Water Company) in construction and operational phase. Should be attached with the application letter of PAM 's connection and receipt from PAM
27	Permits the utilization of ground water (Governor Regulation No.37/2009) (Layout of location)
28	Emission test of operational vehicle and also the use of sticker emission test (Governor decree No.1041/2000, Local Regulation of DKI Jakarta No.2/2005)
29	Emission test of generator (Industrial Agency) and feasibility study of generator (Local Regulation II), operational permit of generator based on Governor decree No. 107/2003
30	Noise and ambient air handling (Governor decree No.551/2001)
31	Solid waste management Law No. 18/2008 - Organic, Inorganic, and hazardous waste separation - 3R - Calculation of solid waste generation - Providing the TPS (temporary transfer station) (Layout)
32	Saving effort of water and energy (Governor Instruction No.73/2008)
33	Organizational structure of environmental manager, in the stage of: - Construction - Operational Should be stated that the position is the responsible person of environment management

Table F1-3 Contents of Check List for AMDAL Application

No.	Description
34	Team of documents organizer (consultant) Leaders, expert team include the number of competence registration. Address and phone number of consultant s
35	Copy of competence registration proof from consultant (AMDAL (environmental impact assessment) document organizer) provider agency
36	Document organizer - CV - Certificate of AMDAL organizer - Competence certificate of team leader - Competence certificate of team members - Letter of statement of involvement in organizing
37	Recommendation from the region regarding to the activities inside the area (Ex: KBN (Nusantara Bonded Zone), JIEP (Jakarta Indurtrial Estate Pulo Gedung), SCBD (Sudirman Central Business District), PELINDO (Indonesian harbor))
38	The origin of Concrete Batching Plan (CBP), if from the outside area, it require Environment Document and should have the permission
39	Handling of air circulation in basement, ventilation or blower
40	Water balance, between inlet and outlet should be balance (assume that there is no evaporation in anticipation of WWTP capacity) and GWT's capacity is made twice from water needs in a day.
41	Recycle obligation (a certain %), the result should meet the quality standard, unit of recycling and recycle tanks
42	Table of content, Table list, Figure list, and Appendices
43	Community questionnaire result
44	Socialization result (Governor decree No.76/2001) - Official report - Absent of socialization participant, which is known by Kelurahan - Photo of activities - Announcement photos in Kelurahan - Billboard photo in location - Announcement by mass media - Community recommendation related to the socialization result - Comment of applicant related to community recommendation
45	Investment capital - Foreign capital investment – attach the permit from BPM (board of investment) - Domestic direct investment
46	Placing of fire extinguishers
47	Attach the recommendation from Transportation agency/ The Indonesian National Military - air forces related to the Safety areas of flight operation zone
Part 2 ANDAL	
1	Introduction Description of activities background Purposes and benefit of activities Regulation and the relevancies
2	Plan of business and or activities Identity of applicant and editor a. Applicant b. Amdal organizer
	Description of business and or activities plan a. Determination of land boundaries b. Relation between the business and/or activities plans' location with the distance and availability of water and energy resource c. Lay out include the map d. Stage of activities - Pre-construction stage - Construction stage - Operational stage - Post-operational stage
	Alternative that will be discuss in Amdal - Alternative of location - Alternative of Design - Alternative of Process - Alternative of Layout building and supporting facilities
	Relationship between the business and/or activities plan with the other activities in the surrounding
3	Environmental condition -Environmental condition in the location of business and/or activities plan -Quantitative and qualitative condition - Data and information about environmental condition

Table F1-3 Contents of Check List for AMDAL Application

No.	Description
4	Scope of study - Significant impact that will be consider - Location and time of study
5	Estimation of significant impact The use of data that represent the changes in environmental quality
6	Evaluation of significant impact - Study of significant impact - Election of the best alternative - Study as based of management - Recommendation of environmental feasibility
7	Bibliography
8	Appendices
Part 3 RKL	
1	Introduction - Purposes and objectives of RKL-RPL implementation in general and clearly - Statement about the environmental policy, and description about the commitment - Description about the purposes of management plan
2	Approach in Environmental Management - Technology approach - Social economy approach - Institutional approach
3	Environment Management Plan - Significant impact and source of significant impact - Benchmark of impact - Purposes of environmental management plan - Environmental management - Location of environmental management - Period of environmental management - Institution of environmental management a. Implementation of environmental management b. Supervision of environmental management c. Reporting of environmental management result
4	Bibliography
5	Appendices Summary of RKL document in table with column order a. Type of impact b. Source of impact c. Benchmark of impact d. Purpose of environmental management e. Environmental management plan f. Period of environmental management g. Institution of environmental management
	Important data and information a. Map of activities location, environment management b. Engineering design c. Matrix and also related primary data
Part 4 RPL	
1	Introduction Statement about necessity background of monitoring Purposes description of monitoring in brief, clearly, and systematically Benefit description of monitoring
2	Environmental Monitoring Plan – Significant impact which is monitored – Source of impact – Parameter of environment which is monitored – Method of environmental monitoring a. Sampling and analysis method b. Location of environmental monitoring c. Period and frequency of monitoring – Institution of environmental monitoring a. Implementation of environmental monitoring b. Supervision of environmental monitoring c. Reporting of environmental monitoring result
3	Bibliography

Table F1-3 Contents of Check List for AMDAL Application

No.	Description
4	Appendices Summary of RPL document in table with column order a. Significant impact which is monitored b. Source of impact c. Purpose of environmental monitoring d. Environmental monitoring plan (method of sampling, location of environmental monitoring) e. Institution of environmental monitoring Important data and information

Source: Prepared by JICA Expert Team based on the data provided by DKI Jakarta

F2 Sector of AMDAL Related to the Project in the New M/P

Regarding to the sectors of AMDAL, the sectors of wastewater, drainage and underground network utilities shall be related to the Project in the New M/P. DKI regulations for sectors of AMDAL takes the higher priority than the national ones. Therefore, depending on each capacity of the Project, AMDAL, UKL/UPL or SPPL shall be necessary as the following Table F2-1.

Table F2-1 Sector of AMDAL Related to the Project in the New M/P

Sector	Type of Activity	Scale/Quantity			
		AMDAL		UKL/URL	SPPL
Wastewater	a. Development of Sludge Treatment Plant included the supporting facility - Land Area	more than 10,000 m^2 (1 ha)	<Remarks> • The impact of the disturbing odor and visual disturbances • Traffic disruption during construction • Limitation of land/space • Changes in the function of the area that caused to spatial and urban planning is quite significant • Changes in behavior	from 100 m^2 to 10,000 m^2	less than 100 m^2
	b. Development of Wastewater Treatment Plant included the supporting facility - Land Area	more than 10,000 m^2 (1 ha)		from 100 m^2 to 10,000 m^2	less than 100 m^2
	c. Development of sewer system - Service Area	more than 10 ha		from 2 ha to 10 ha	less than 2 ha
Drainage	a. Improvement of urban drainage by land acquisition - Length	more than 3 km	<Remarks> • Disturbance of traffic, noise, vibration, and changes in water management • Municipal utility network disruption • Population density	from 2 km to 3 km	less than 2 km
	b. Improvement of urban drainage by widening and land acquisition - Length	more than 5 km		from 3 km to 5 km	less than 3 km
	c. Improvement of urban drainage by widening - Length	more than 7 km		from 5 km to 7 km	less than 5 km
Underground network utilities	a. Open excavation - Length and/or	more than 1 km	<Remarks> • Disruption of traffic and municipal utility network • Disturbance of noise, vibration, dust and visual disturbances • Limitations of land / space • Population density	from 0.5 km to 1 km	less than 0.5 km
	- Depth	more than 3 m		from 1.1 m to 3 m	less than 1.1 m
	b. Horizontal drilling, with diameter	more than 100 cm (1 m)		from 20 cm to 100 cm	less than 20 cm
	c. Backfill soil, with volume	more than 25,000 m^3		from 5,000 m^3 to 25,000 m^3	less than 5,000 m^3

Source: Prepared by JICA Expert Team based on Decision of Jakarta City Governor No 2863 Year 2001, Decision of Jakarta City Governor No. 189 Year 2002 and Decision of Jakarta City Governor No 2333 Year 2002

F3 Natural and Social Environment to be Considered

Protection areas and facilities for the natural and social environment in DKI Jakarta are designated by the provincial spatial plan for 2011-2030. The list and position of these areas and facilities are shown in the following Table F3-1 and figure respectively.

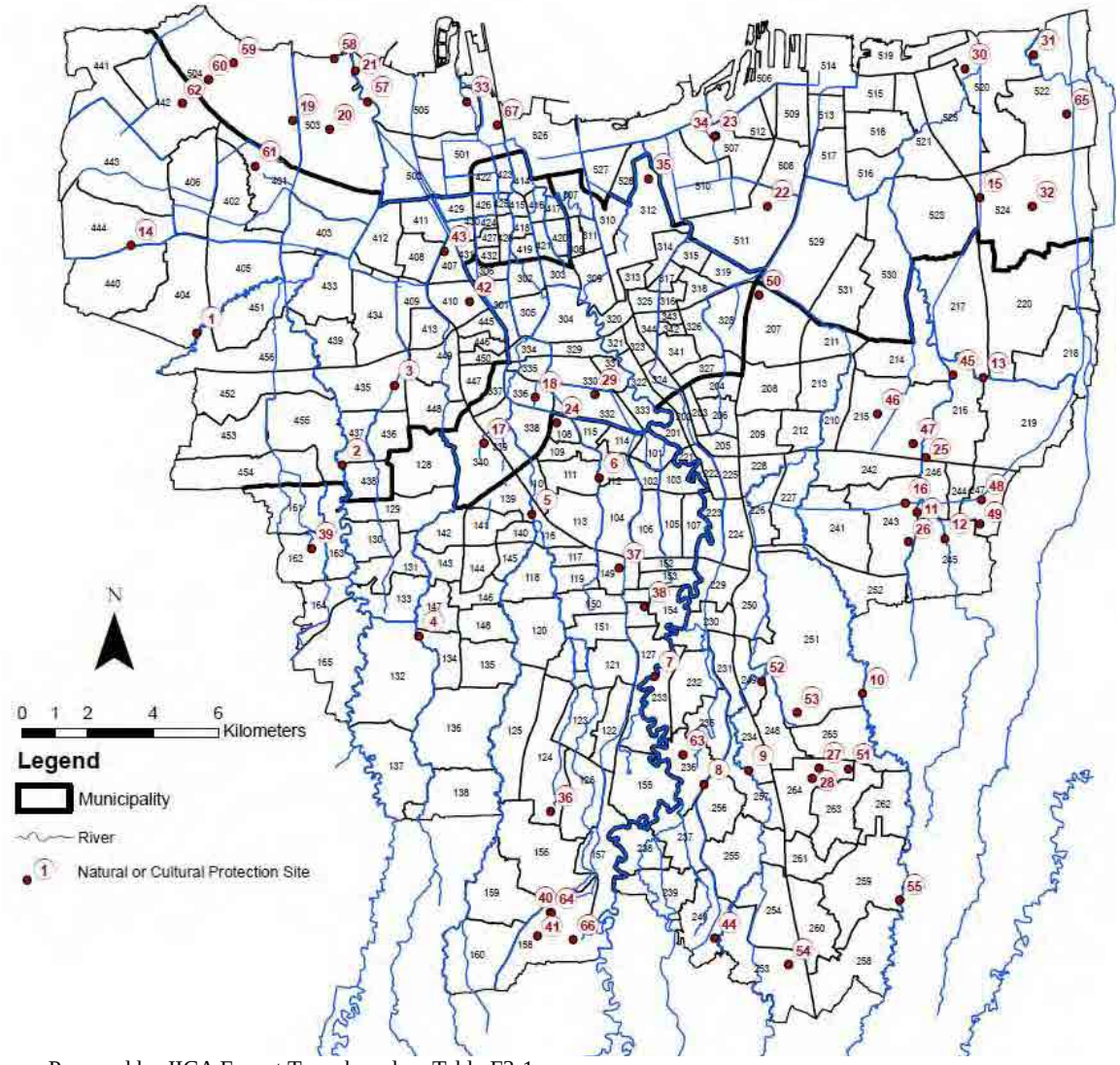
Table F3-1 List of Protection Areas and Facilities for Natural and Social Environment in DKI Jakarta

Category	Description
Coral reefs and sea grass bed areas	1. Sea of Seribu Island, around of Nyamuk Besar, Anyer Island, Bidadari Island, Onrut Island and Kelor Island
Shoreline	2. Along northern beach of Jakarta
	3. Around island in Seribu island
Riverbanks	Along those river:
	4. Angke River
	5. Pesanggrahan River
	6. Sekretaris River
	7. Grogol River
	8. Krukut River
	9. Cideng River
	10. Ciliwung River
	11. Kalibaru Timur River
	12. Cipinang River
	13. Sunter River
	14. Buaran River
	15. Jati Kramat River
	16. Cakung River
	17. Mookevart River
	18. Cengkareng Drain
	19. East Flood Canal
Reservoirs Area (Artificial Reservoirs)	20. Taman Ria Remaja Reservoir
	21. Kebon Melati Reservoir
	22. PIK I Reservoir
	23. PIK II Reservoir
	24. Muara Angke Reservoir
	25. Sunter I Reservoir
	26. Sunter III Reservoir
	27. Setiabudi Reservoir
	28. Elok Reservoir
	29. PDAM Reservoir
	30. TMII Indonesia Archipelago Reservoir
	31. TMII Reservoir
Nature reverse	32. Bokor Island in Thousand Island
Wild animal sanctuary	33. Rambut Island in Thousand Island
	34. Muara Angke
Protected Forest	35. North Jakarta
Marine National Park	36. Seribu Island district
Nature Tourism Park	37. Nature Tourism Park on Kamal in North Jakarta
Mangrove nursery	
Safety area of toll road and green belt	38. Along Sediyatmo toll road
Safety area of cengkareng drain	39. Cengkareng drain canal
Safety area of high voltage electrical transmission	40. Area of Tegal alur – Angke Kapuk
Heritage and historical	41. Condet Area
	42. Situ Babakan Area
	43. Si Pitung Region
	44. Srengseng sawah
	45. Luar Batang
Disaster prone-area	Mostly in north, west and east Jakarta
Reservoirs Area (Natural Reservoir)	46. Lembang Reservoir
	47. Marunda Pond
	48. Rawa Kendal Reservoir
	49. Rorotan Swamp
	50. Pluit Pond
	51. West Sunter Pond
	52. Pademangan Reservoir
	53. Cisarua Bon Bin Ragunan Reservoir
	54. MBAU Pancoran Pond
	55. Kalibata Pond

Table F3-1 List of Protection Areas and Facilities for Natural and Social Environment in DKI Jakarta

Category	Description
	56. Ulujami Swamp
	57. Babakan Reservoir
	58. Mangga Bolong Resevoir
	59. Rawa Kepa Reservoir
	60. Empang Bahagia Grogol Pond
	61. Arman Reservoir
	62. Penggilingan Swamp
	63. Rawabadung Reservoir
	64. Pedongkelan Swamp
	65. Bea Cukai Reservoir
	66. Wadas Swamp
	67. Ria Rio Reservoir
	68. Rawa Segaran Reservoir
	69. Dirgantara Reservoir
	70. Skuadron Reservoir
	71. Rawa Dongkal Reservoir
	72. Rawa Kelapa Dua Wetan Reservoir

Source: Prepared by JICA Expert Team based on the data provided by BAPPEDA



Source: Prepared by JICA Expert Team based on Table F3-1

Figure F3-1 Position of Protection Areas and Facilities for Natural and Social Environment in DKI Jakarta

At present, there are not any rules and regulations for development of these areas and facilities. However, it is necessary to exclude them as target sites for construction of facilities, or to take mitigation and/or minimization methods. Regarding to social environment, there are several slum areas in DKI Jakarta as mentioned in Part B. For selection of the target sites, it is necessary to mitigate and/or minimize a large scale resettlement and/or impacts.

F4 Evaluation of Alternative Plans based on Natural and Social Environmental Impacts

Main projects which are proposed in the New M/P are as follows;

- Off-site system: Construction of WWTP and sewers
- On-site system: Promotion to establish regulations related to on-site sanitation facilities (change from the soak type septic tanks to the modified type septic tanks, newly construction and/or addition of ITP for communities and business facilities, etc.), Construction of sludge treatment plants, Establishment of regular desludging system

The following table shows the main positive and negative environmental impacts by the suggested projects in the New M/P.

Table F4-1 Main Positive and Negative Environment Impacts by the Suggested Projects in the New M/P

Project		Positive	Negative
Off-site system	Construction of WWTP and sewers	Expansion of surface (river) water pollution will be protected.	It is difficult to spread rapidly because of the financial and geological reasons.
		Expansion of groundwater pollution will be protected because the soak type septic tanks will not be used.	People should pay the fee for sewerage use periodically.
		Sanitation situation will be improved because wastewater will not directly flow into the surface water, and generation of odor and insects will be prevented.	It is necessary to secure the land for WWTP.
		Groundwater cultivation will be promoted and advance of ground subsidence will be prevented because the surface water will be utilized as drinking water source in the future after WWTP improves the surface water quality.	Under the construction of sewers, traffic jam can be worse than the present situation.
		Treatment water will be returned to the surface water and utilized as water for living.	
		Maintenance of septic tanks will be unnecessary.	
On-site system	promotion to establish regulations related to on-site sanitation facilities	Expansion of groundwater pollution will be prevented.	Each household, community and business entity should maintain their septic tanks by themselves.
		Sanitation situation will be improved because wastewater will not directly flow into the surface water, and generation of odor and insects will be prevented.	
	Construction of sludge treatment plants and Establishment of regular desludging system	Function of septic tank can be shown properly and it can contribute to the prevention of sludge outflow, odor and groundwater pollution.	It is necessary to secure the land for the plants.
		It will be contributed to protection of functional problems such as blockage in tanks and difficulty of discharge at kitchen and bathroom.	People should pay the fee for regular desludging periodically.
		It will be contributed to environmental improvement because illegal dumping of sludge will be decreased.	Traffic jam can be worse than the present situation because of the increase of vacuum cars.

Source: JICA expert team

This M/P study follows "Japan International Cooperation Agency Guidelines for Environmental and Social Considerations (April 2004)" (hereinafter referred to as "2004 JICA Guideline for ES"). This guideline requires examining alternative options including "zero-option", which means not to implement the suggested Project, therefore, the zero-option and the necessity of the Project are examined here. Among the positive and negative environment impacts by the suggested Projects in the New M/P, the following impacts can be estimated in case of the zero-option.

- Expansion of sludge outflow, odor and groundwater pollution cannot be prevented because the soak type septic tanks will be used continuously.
- Surface (river) water pollution will go worse because business entities will continue to use ITPs, and the current inappropriate O&M will be continued.
- Sanitation situation cannot be improved because wastewater will directly flow into the surface water, and odor and insects will generate continuously.
- Groundwater cultivation cannot be promoted and advance of ground subsidence cannot be prevented because the surface water quality will be inappropriate for water use.
- Illegal dumping of sludge cannot be improved.

Consequently, pollution of surface water and groundwater is one of the quite urgent issues for the present DKI Jakarta, and the necessity of the Project in the New M/P is very high.

Considering the effectiveness, it is better to construct off-site system in all over DKI Jakarta. However, it is difficult to apply off-site system only because of the natural and social environmental restriction, such as dotting slum areas, lack of available land, etc. Therefore, it is preferable to apply both off-site and on-site systems based on the natural and social environmental evaluation. And there are not any significant differences among the alternatives shown in Chapter D from the viewpoint of natural and social environmental consideration. And involuntary resettlement and land acquisition are not necessary because all planned sites are public lands.

F5 Necessary Procedure for the Suggested Projects in the New M/P

Regarding to AMDAL procedure, main projects which are proposed in the New M/P are categorized as the sector of wastewater as shown in Table F2-1. However, the sectors of drainage and underground network utilities shall also be related to the projects. So it is necessary to confirm the sector at Feasibility Study (hereinafter referred to as "F/S"). At present, the necessary procedure of AMDAL for each project shall be considered as the following table. In the projects with high priority (Zone No. 1 and No. 6), the site and outline of the projects are mostly designated, and AMDAL is required for both projects. From F/S stage, each project should follow Japan International Cooperation Agency Guidelines for Environmental and Social Considerations (April 2010) (hereinafter referred to as "2010 JICA Guideline for ES"). Completion of AMDAL procedure takes about 1 year in general, therefore, it is necessary to prepare the application of AMDAL in the middle of F/S stage. And consultation with local stakeholders is required by AMDAL procedure and 2010 JICA Guideline for ES. For other projects, the following table should be revised and the necessary procedure should be started after the site and outline are mostly designated, the related projects are confirmed, and so on.

Table F5-1 Necessary AMDAL Procedure for the Suggested Projects in the New M/P

Facility		Necessary Area/ Service Area	Necessary Procedure	Remark
WWTP	Zone 1	6.9 ha	AMDAL	Owned by Park Agency of DKI DKI requests about 3.6 ha of the land would be green area.
	Zone 2	0.8 ha	UKL/UPL	Not yet decided
	Zone 3	4.0 ha	AMDAL	DKI requests to keep as a park.
	Zone 5	4.6 ha	AMDAL	
	Zone 6	8.2 ha	AMDAL	Owned by Cleansing Agency of DKI DKI has a plan to use 3 ha for recycling plant.
	Zone 7	3.9 ha	AMDAL	
	Zone 8	6.0 ha	AMDAL	Related to the planning for pond development

Table F5-1 Necessary AMDAL Procedure for the Suggested Projects in the New M/P

Facility		Necessary Area/ Service Area	Necessary Procedure	Remark
	Zone 9	2.9 ha	AMDAL	Related to the planning for pond development
	Zone 10	8.7 ha	AMDAL	
	Zone 11	3.0 ha 5.9 ha	AMDAL AMDAL	Related to the planning for pond development Not yet decided
	Zone 12	3.1 ha	AMDAL	Related to Ragunan Master Plan
	Zone 13	5.7 ha	AMDAL	Related to the planning for pond development
	Zone 14	3.6 ha	AMDAL	Related to the planning for pond development
Sewer network	All zones	Service area: more than 10 ha	AMDAL	
Sludge treatment plant	Expansion of existing plant	500 m2	UKL/UPL	
	Construction of new plant	1.5 ha	AMDAL	

Note: Each item should be confirmed at F/S stage
Source: JICA expert team

All proposed land for WWTPs belongs to the Provincial Government of DKI Jakarta. The Governor of the Provincial Government of DKI Jakarta authorizes the agency through issuing the decree to manage the land (ownership is not transferred to any agency). In the projects with high priority, the land for Zone No. 1 is managed by the park agency, and that of No. 6 is managed by DK as mentioned in Part-D. From now on, Implementation Committee (hereinafter referred to as "IC") should be established with these agencies, BAPPEDA, BPLHD and PD PAL JAYA. Based on the discussion in IC, BAPPEDA shall record the land in the Detailed Spatial Plan (RDTR) of DKI Jakarta for the wastewater Treatment plants. The detail schedule of this procedure should be confirmed at F/S stage. For other projects, the same procedure is necessary based on the decree of the Governor of DKI after the New M/P was submitted.
Also, development permitting procedure, mentioned in B2.1.1, is required as shown in Figure F1-1 at the same time of AMDAL procedure. For Zone No. 8, 9, 11, 12, 13 and 14, outline and progress of related projects should be monitored.

F6 Initial Environmental Evaluation (IEE)

Table F6-1 and Table F6-2 show the estimated environmental and social impacts in each stage of the suggested projects for off-site and on-site respectively in the New M/P.

Table F6-1 Scoping for Off-Site Project (Construction of WWTP and Sewer)

	Item	Rating (preparation and construction)	Rating (operation)	Reasons
Social Environment	Involuntary Resettlement	**D**	**D**	There is no possibility of impact because all sites are public lands.
	Local Economy such as Employment and Livelihood, etc.	**C**	**D**	There is a possibility of impact, depending on the route of sewage pipes because small shops are along the streets.
	Land Use and Utilization of Local Resources	**B**	**D**	There is a possibility to construct WWTP in the parks because of the lack of available land. It is possible that DKI requests to secure the green area according to the spatial plan.
	Social Institutions such as Social Infrastructure and Local Decision - making Institutions	**D**	**D**	There is no possibility of impact because there are not any social institutions in the sites.
	Existing Social Infrastructures and Services	**B**	**D**	It is necessary to consider the underground infrastructures for planning the route of sewage pipes. Under the construction of sewage pipes, temporal traffic regulation is necessary.
	The Poor, Indigenous and	**D**	**D**	There is no possibility of impact because all sites

Table F6-1 Scoping for Off-Site Project (Construction of WWTP and Sewer)

	Item	Rating (preparation and construction)	Rating (operation)	Reasons
	Ethnic people			are public lands.
	Misdistribution of Benefit and Damage	**D**	**D**	There is no possibility of impact because all sites are public lands.
	Cultural heritage	**D**	**D**	There is no cultural heritage in the sites.
	Local Conflicts of Interest	**D**	**D**	There is no possibility of impact because all sites are public lands.
	Water Usage or Water Rights and Communal Rights	**D**	**D**	There is no possibility of impact because all sites are public lands. After the operation of WWTP, it is expected to expansion of use of surface water as drinking water source.
	Sanitation	**D**	**D**	Although the number of worker for construction of WWTP increases, there is no possibility of impact by temporal toilets and appropriate waste management. After the construction of the plant, the situation of sanitation will be improved.
	Hazards (risk) Infectious Diseases such as HIV/AIDS	**D**	**D**	There is no possibility of impact because the construction and operation will not lead hazards infectious diseases. After the construction of the plant, the situation of infectious diseases will be improved.
Natural Environment	Topography and Geographical Features	**C**	**D**	It is necessary to confirm topography and geographical features by topographical and boring surveys, depending on the WWTP sites and sewer routes.
	Soil Erosion	**D**	**D**	There is no possibility of impact because the construction and operation will not lead soil erosion.
	Groundwater	**C**	**D**	It is necessary to confirm topography and geographical features by topographical and boring surveys, depending on the WWTP sites and sewer routes.
	Hydrological Situation	**C**	**C**	After the construction of the plant, the effluent of pollutants will be decreased. However, some treatment methods cannot remove nitrogen substances so much.
	Coastal zone	**D**	**D**	After the construction of the plant, the effluent of pollutants will be decreased.
	Flora, Fauna and Biodiversity	**D**	**D**	There is no possibility of impact because the construction and operation will not affect flora, fauna and biodiversity.
	Meteorology	**D**	**D**	There is no possibility of impact because the construction and operation will not affect meteorology.
	Landscape	**B**	**D**	Some WWTPs can be constructed near the center of DKI Jakarta.
	Global Warming	**D**	**D**	There is no possibility of impact because the scale of construction and operation is not so large to affect global warming. It is expected that the global warming gas, such as methane, from the surface water will be decreased by WWTP.
Pollution	Air Pollution	**B**	**D**	A small scale of air pollutants can be discharged by vehicles during construction.
	Water Pollution	**B**	**D**	There is a possibility of murky waters by the construction. After the construction of WWTP, the effluent of pollutants will be decreased.
	Soil Contamination	**D**	**D**	There is no possibility of impact because the construction and operation will not lead soil contamination.
	Waste	**B**	**B**	It is necessary to examine the appropriate treatment method and to investigate the present situation and related regulation for construction wastes under the construction and for sludge

Table F6-1 Scoping for Off-Site Project (Construction of WWTP and Sewer)

	Item	Rating (preparation and construction)	Rating (operation)	Reasons
				after the construction.
	Noise and Vibration	**B**	**B**	There is a possibility of noise and vibration during construction. During operation of WWTP, it is necessary to provide countermeasure against insulation of noise and vibration, to arrange the working hours and so on.
	Ground Subsidence	**D**	**D**	Although the temporal construction for WWTPs and construction of sewer network have a possibility of ground subsidence, and it has already occurred in all over DKI area, there is no possibility of impact by appropriate countermeasures.
	Offensive Odor	**D**	**B**	It is necessary to provide countermeasure against the impact.
	Bottom Sediment	**D**	**D**	There is no possibility of impact because the construction and operation will not affect/generate the bottom sediment.
	Accidents	**B**	**D**	There is a possibility of traffic jam and/or accidents by construction vehicles. Under the construction of sewers, there is a possibility of traffic accidents by open-cut excavation and jacking works.

Rating **A** : serious impact is expected**, B** : some impact is expected **, C** : extent of impact unknown. Examination is needed. Impact may become clear as the study progresses, **D** : minimum or hardly any impact is expected.

Source: JICA expert team

Table F6-2 Scoping for On-Site Project (Expansion of Existing Sludge Treatment Plant, Construction of Sludge Treatment Plant, and Periodical Desludging)

	Item	Rating (preparation and construction)	Rating (operation)	Reasons
Social Environment:	Involuntary Resettlement	**D**	**D**	There is no possibility of impact because all sites are public lands.
	Local Economy such as Employment and Livelihood, etc.	**D**	**D**	There is no possibility of impact because all sites are public lands.
	Land Use and Utilization of Local Resources	**D**	**D**	There is no possibility of impact because all sites are public lands.
	Social Institutions such as Social Infrastructure and Local Decision - making Institutions	**D**	**B**	There is a possibility that the traffic jam will be severe because of increase of vacuum cars. Each household, community and business entity should maintain their septic tanks by themselves.
	Existing Social Infrastructures and Services	**D**	**D**	There is no possibility of impact because the existing sludge treatment is in the site for the expansion, and any facility is not in the site for newly construction.
	The Poor, Indigenous and Ethnic people	**D**	**D**	There is no possibility of impact because all sites are public lands.
	Misdistribution of Benefit and Damage	**D**	**D**	There is no possibility of impact because all sites are public lands.
	Cultural heritage	**D**	**D**	There is no cultural heritage in all sites.
	Local Conflicts of Interest	**D**	**D**	There is no possibility of impact because all sites are public lands.
	Water Usage or Water Rights and Communal Rights	**D**	**D**	There is no possibility of impact because the construction and operation will not affect water usage and water rights.

Table F6-2 Scoping for On-Site Project (Expansion of Existing Sludge Treatment Plant, Construction of Sludge Treatment Plant, and Periodical Desludging)

	Item	Rating (preparation and construction)	Rating (operation)	Reasons
				After the implementation, it is expected to expansion of use of surface water as drinking water source.
	Sanitation	**D**	**D**	There is no possibility of impact because the construction and operation will not lead negative impact. After the implementation, sanitation condition will be improved.
	Hazards (risk) Infectious Diseases such as HIV/AIDS	**D**	**D**	There is no possibility of impact because the construction and operation will not lead hazards infectious diseases. After the construction of the plant, the situation of infectious diseases will be improved.
Naturall Environment	Topography and Geographical Features	**C**	**D**	It is necessary to confirm topography and geographical features by topographical and boring surveys, depending on the site for newly construction.
	Soil Erosion	**D**	**D**	There is no possibility of impact because the construction and operation will not lead soil erosion.
	Groundwater	**C**	**D**	It is necessary to confirm topography and geographical features by topographical and boring surveys, depending on the site for newly construction. After the construction, the penetration of pollutants will be decreased.
	Hydrological Situation	**D**	**D**	There is no possibility of impact because the construction and operation will not affect hydrological situation. After the construction, the penetration of pollutants will be decreased.
	Coastal zone	**D**	**D**	There is no possibility of impact because the construction and operation will not affect the coastal zone. After the construction, the penetration of pollutants will be decreased.
	Flora, Fauna and Biodiversity	**D**	**D**	There is no possibility of impact because the construction and operation will not affect flora, fauna and biodiversity.
	Meteorology	**D**	**D**	There is no possibility of impact because the construction and operation will not affect meteorology.
	Landscape	**D**	**D**	There is no possibility of impact because all sites are far from the center of DKI.
	Global Warming	**D**	**D**	There is no possibility of impact because the scale of construction and operation is not so large to affect global warming. It is expected that the global warming gas, such as methane, from the surface water will be decreased by WWTP.
Pollution	Air Pollution	**B**	**D**	A small scale of air pollutants can be discharged by vehicles during construction.
	Water Pollution	**B**	**D**	There is a possibility of murky waters by the construction. After the construction, the water pollution situation will be improved by appropriate sludge treatment.
	Soil Contamination	**D**	**D**	There is no possibility of impact because the construction and operation will not lead soil contamination.

Table F6-2 Scoping for On-Site Project (Expansion of Existing Sludge Treatment Plant, Construction of Sludge Treatment Plant, and Periodical Desludging)

	Item	Rating (preparation and construction)	Rating (operation)	Reasons
	Waste	**B**	**B**	It is necessary to examine the appropriate treatment method and to investigate the present situation and related regulation for construction wastes, and sludge after the implementation.
	Noise and Vibration	**B**	**B**	There is a possibility of noise and vibration during construction. During operation, it is necessary to provide countermeasure against insulation of noise and vibration, to arrange the working hours and so on.
	Ground Subsidence	**D**	**D**	Although the temporal construction has a possibility of ground subsidence, and it has already occurred in all over DKI area, there is no possibility of impact by appropriate countermeasures.
	Offensive Odor	**D**	**B**	It is necessary to provide countermeasure against the impact during the operation of sludge treatment and vacuum cars.
	Bottom Sediment	**D**	**D**	There is no possibility of impact because the construction and operation will not affect/generate the bottom sediment.
	Accidents	**B**	**B**	There is a possibility that the traffic accidents will be increased because of increase of vacuum cars.

Rating **A** : serious impact is expected、**B** : some impact is expected、**C** : extent of impact unknown. Examination is needed. Impact may become clear as the study progresses、**D** : minimum or hardly any impact is expected.

Source: JICA expert team

F7 Necessary Minimization and/or Mitigation Methods

For the items rated as “A” and “B” in the scoping tables, it is necessary to examine mitigation and/or minimization methods as follows Table F7-1.

Table F7-1 Environmental and Social Impact Mitigation Methods

Item	Methods
Off-site System	
Local Economy such as Employment and Livelihood	Basically sewers would be constructed along the existing roads, however, there are small shops along the roads in several areas. In order to avoid the temporal and permanent resettlement, it is necessary to examine the route of sewers carefully with the discussion of related agencies.
Land Use and Utilization of Local Resources	There is a possibility to construct WWTP in the parks because of the lack of available land. It is possible that DKI requests to secure the green area. So it is required to select the site where cutting trees and other impacts are minimized. And it is also required to select the site in the protection areas.
Existing Social Infrastructures and Service	It should be confirmed the existing public underground facility (electricity, gas, etc.) and private underground facility (cell phone line, etc.). In order to minimize the impacts, it is necessary to examine the route of sewers carefully with the discussion of DKI and related agencies.
Topography and Geographical Features	It is necessary to confirm topography and geographical features by topographical and boring surveys, depending on the WWTP sites and sewer routes. For some treatment methods, deep tanks will be installed. In this case, there is a possibility of larger impact on the surrounding foundation comparing to use of shallow tanks.
Groundwater	It is necessary to confirm topography and geographical features by topographical and boring surveys, depending on the WWTP sites and sewer routes. For some treatment methods, deep tanks will be installed. In this case, there is a possibility of larger impact on the groundwater comparing to use of shallow tanks. When it is to use green area for WWTP measure should be taken that the groundwater recharge is not reduced.
Hydrological Situation	It is necessary to take countermeasures because some treatment methods cannot remove nitrogen substances so much.
Landscape	It is necessary to make design of WWTP suitable with surrounding landscape because some WWTPs can be constructed near the center of DKI Jakarta.
Air Pollution	Appropriate construction and working plans should be prepared in order to minimize the exhaust

Table F7-1 Environmental and Social Impact Mitigation Methods

Item	Methods
	gas from the construction vehicles. Equipment including the construction vehicles should be maintained periodically. And instructions to follow appropriate construction and work plans should be necessary.
Water Pollution	There is a possibility of murky waters by the construction. Treatment facility for muddy water should be included in the construction plan. Also the existing situation of groundwater, surface water and wastewater should be confirmed for the selecting the treatment systems and evaluating the impact by these systems.
Waste	It is necessary to examine the appropriate treatment method and to investigate the present situation and related regulation for construction wastes under the construction and for sludge after the construction. And instructions for a contractor are necessary to prevent the scattering and falling of the waste during transportation.
Noise and Vibration	During construction, a construction plan should be prepared with consideration of mitigating noise and vibration. And equipment including the construction vehicles should be maintained periodically. During operation of WWTP, it is necessary to provide countermeasure for minimization of noise and vibration, such as to use equipment and vehicles with low noise and vibration and to install equipment on a rigid foundation in an enclosed room.
Offensive Odor	It is necessary to provide countermeasure against the offensive odor.
Accidents	Under the construction of sewers, there is a possibility of traffic accidents by open-cut excavation and jacking works. Traffic control and appropriate instructions are required. Regarding to construction vehicles, it is necessary to take an optimal route to prevent the accidents inside and outside the site, and to prepare an appropriate construction schedule to avoid peak traffic hours. And equipment including the construction vehicles should be maintained periodically.
On-site System	
Social Institutions such as Social Infrastructure and Local Decision - making Institutions	There is a possibility that the traffic jam will be severe because of increase of vacuum cars. It is necessary to take an optimal route and schedule to avoid peak traffic hours. And environmental education and public awareness activities should be examined because each household, community and business entity should maintain their septic tanks by themselves.
Topography and Geographical Features	It is necessary to confirm topography and geographical features by topographical and boring surveys, depending on the site for newly construction.
Groundwater	It is necessary to confirm topography and geographical features by topographical and boring surveys, depending on the site for newly construction.
Air Pollution	Appropriate construction and working plans should be prepared in order to minimize the exhaust gas from the construction vehicles. Equipment including the construction vehicles should be maintained periodically. And instructions to follow appropriate construction and work plans should be necessary.
Water Pollution	There is a possibility of murky waters by the construction. Treatment facility for muddy water should be included in the construction plan. Also the existing situation of groundwater, surface water and wastewater should be confirmed for the selecting the treatment systems and evaluating the impact by these systems.
Waste	It is necessary to examine the appropriate treatment method and to investigate the present situation and related regulation for sludge after the implementation. And instructions for a contractor are necessary to prevent scattering and falling during transportation
Noise and Vibration	During construction, a construction plan should be prepared with consideration of mitigating noise and vibration. And equipment including the construction vehicles should be maintained periodically. During operation of treatment plants, it is necessary to provide countermeasure for minimization of noise and vibration, such as to use equipment and vehicles with low noise and vibration and to install equipment on a rigid foundation in an enclosed room.
Offensive Odor	It is necessary to provide countermeasure against the offensive odor.
Accidents	Regarding to construction vehicles, it is necessary to take an optimal route to prevent the accidents inside and outside the site, and to prepare an appropriate construction schedule to avoid peak traffic hours. And equipment including the construction vehicles should be maintained periodically. And there is a possibility that the traffic accidents will be increased because of increase of vacuum cars. It is necessary to take an optimal route and schedule to avoid peak traffic hours.

Source: JICA expert team

PART-G INSTITUTIONAL CONSIDERATIONS

PART-G INSTITUTIONAL CONSIDERATIONS

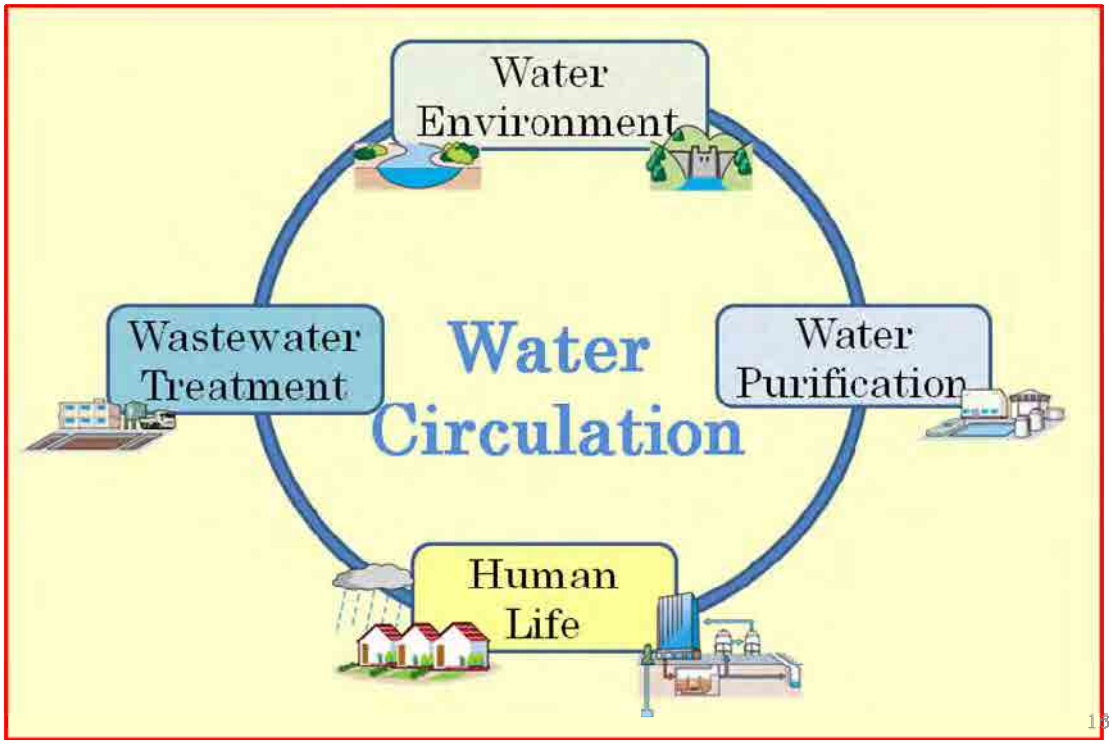
G1 Basic Philosophy

It is sometimes said that the 21st century will be known as the century of water. Water is a strategic resource considered equal to or more important than oil. The economies of such countries as China, India, and Indonesia are growing fast. Living standard improvement, population growth, and increased food production may result in struggles for water and scarce resources, in these areas and elsewhere. Climate change due to global warming may also accelerate confusion due to rapid changes in the water resource balance in many places in the world.

New M/P aims to improve the living environment in DKI Jakarta, and focuses on the development of treatment systems for wastewater generated by human activities. However, since water is primary to human life in each step s of the water cycle - water environment, water purification, human life, and wastewater treatment - this cycle should not be disrupted. Furthermore, considering the current global situation regarding water as a strategic resource, we should be reminded that a country that fails to develop appropriate water recycling systems may not survive.

Taking the above into consideration, any policy or administrative action concerning water must take into account this basic concept of Water Circulation. Understanding of this concept would lead to the further development and stability of Indonesia as a whole, not just DKI Jakarta.

Accordingly, the New M/P's philosophy is to share the basic concept of "water circulation" in the administrative development of all laws, policies, organizations, technologies, systems, and education concerning water environments, water, wastewater treatment, and social environments.



Source: JICA exert tam

Figure G1-1 Water Circulation

G2 Current Institutional Issues

G2.1 Subject of Wastewater Management

As was discussed in PART-B, on-site treatment using septic tanks is the most commonly used form of wastewater treatment in DKI Jakarta. Thus, even as construction of the off-site sewerage system under the New M/P progresses, it will be necessary to implement measures concerning awareness among Jakarta's residents and measures concerning wastewater management problems (see Table G2-1)

during the transitional period for the sewerage system in order to promote improvement in water environments. Specifically, these measures are: 1) regular desludging of septic tanks, 2) improvement of existing underground seepage-type septic tanks, and switching to septic tanks that also treat gray water, 3) appropriate operation of wastewater treatment of establishments such as office buildings and commercial buildings, and 4) capacity development in sewage treatment technology.

Table G2-1 Current Issues Identified in DKI Jakarta

Issues	Issues Identified
Regular desludging	People take on-call desludging for granted, with little interest in what happens to the sludge afterward. - Regular desludging has not yet been introduced for any wastewater treatment facilities including ST.
Reform from CST to Appropriate System	People desire elimination of noxious odors from directly discharged gray water. - CST is for only black water - Appropriate System for BW&GW is required.
Appropriate operation of ITP	Who is responsible for operating the ITPs constructed by DPU? People expect high-rise buildings to have good WWTP. - There are no standards for ITP design.
Sewerage	People have been considering Setiabudi Pond for WWTP use for over 20 years. - PD PAL lacks experience of operating the standard WWTP.

ST: Septic tank, CST: Conventional septic tank, BW: Black water, GW: Gray water
Source: JICA expert team

G2.2 Subject of Institution of Wastewater Management

Table G2-2 shows current wastewater management and implementation organizations in DKI Jakarta as well as their scopes of responsibility and implementation capabilities in dealing with wastewater management issues. The table classifies the main duties of supervising and implementing organizations in Jakarta's wastewater treatment administration according to the current wastewater treatment fields. It also summarizes the JICA Team's evaluations of how these duties are being implemented by these organizations and the results of their implementations according to the items in the regulations specifics.

As is seen in Table G2-2, overall authority for wastewater management lies with BPLHD. However, there are many areas in individual categories in which the scope of responsibilities is unclear.

Issues here can be condensed into three main points.

The first is the section indicated by the blue line. BPLHD is in charge of environmental management and, in essence, management and supervision of each field. However, under "policy & regulation," "standards," and "inspection," it lacks functions in many areas in terms of both on-site and off-site treatment. Accordingly, it will first be necessary to strengthen BPLHD's technical capacity for wastewater and sludge management and also to reinforce its capabilities concerning enforcement and supervision of related laws and regulations.

The second is the section indicated by the green line. Looking forward, it is unclear which departments will take the lead in implementing regular desludging of septic tanks and ITP.

The third is the section marked by the red line. It will be necessary to determine which departments will supervise and which will implement sewage treatment systems to be operated under the New M/P, wastewater treatment improvement, and sludge treatment facilities that will produce sludge as a result of such improvement, and then to effect efficient reorganization accordingly.

Table G2-2 Matrix of Responsibility for Wastewater Management

		Supervision			Implementation		
		Policy & Regulation	Standards	Water Quality Inspection	Planning, DED & Construction	O&M	
						Facility	Sludge removal
Water Environment Management		BPLHD					
On-site	Septic Tank	BPLHD	BPLHD insufficient	None	Private	Private	Regular, None
On-site	Sludge Treatment Plant	None	None	None	None	DK; Only 2 plants	
On-site	MCK for Slum Area	None	None	None	Dinas Permahan	Community	
Off-site	Sewerage	None	None	None	None Budget & Land acquisition	PD PAL	DPU, Setiabudi Ponds
Off-site	ITP	BPLHD	None	BPLHD; Insufficient	Private	Private; Weak	Regular, None

Source: JICA expert team

Table G2-3 provides a comparison of each organization involved with wastewater treatment management in DKI Jakarta with Tokyo. Wastewater management organizations in DKI Jakarta are BAPPEDA, Spatial Agency, DPU, BPLHD, DK, and PD PAL JAYA.

BAPPEDA and the Spatial Agency manage general spatial plans and detailed spatial plans, respectively. The general spatial plans establish spatial structure as well as land-use plans and their implementation strategies for administrative districts. The detailed spatial plans are designed for implementation of the general plans and are prepared as a standard for enforcing zoning regulations, etc. For wastewater treatment management, directions for the development of wastewater treatment facilities are indicated in zoning regulations of the detailed spatial plans.

These directions include 1) classifying wastewater treatment facilities separately from rainwater systems, 2) treatment of wastewater from commercial and industrial facilities prior to public waters release, and 3) giving priority in improving management of gray water in the central and middle zone. However, it can be said that plans at the concrete working level do not exist, as there is no organization that handles them.

Working-level plans must be implemented by the bureau in charge. DPU transferred responsibility for managing 35 IPALs to BPLHD. However, BPLHD is having difficulty handling this responsibility, as it does not have enough management capabilities and human resources for wastewater management, including the 35 IPALs. DK handles only desludging work during emergencies (on-call basis). PDPALJAYA does not have sufficient experience with sewerage systems. Moreover, although it receives contributions from DKI Jakarta within an increased capitalization framework, it does not have authority to directly access the government budget each fiscal year.

On the other hand, in Tokyo, the Bureau of Urban Development, which has the functions of both BAPPEDA and DTR, is in charge of urban planning. Furthermore, the Bureau of Sewerage, which does not have a counterpart in DKI Jakarta, has responsibility for sewerage plans and is in charge of budgets for construction and maintenance. Moreover, the Bureau of Environment has responsibility for supervising the environmental management field that corresponds to the responsibilities of both BPLHD and DK in DKI Jakarta.

Given the advent of sewage-centered wastewater treatment construction and management based on the new M/P, it will be important to establish a bureau like Tokyo's Bureau of Sewerage that supervises and manages wastewater comprehensively.

Table G2-3 Comparison of the Institutions between DKI Jakarta and Tokyo Metropolitan

DKI Jakarta			Tokyo Metropolitan Govt. , Japan	
Institution	Responsibility	Problem	Institution	Responsibility
BAPPEDA	* Planning and coordinate of Macro Spatial Plan	* There are orientations for development of wastewater management, but there are no specific plans.	Bureau of Urban Development	* City planning * Urban development * Regulate land use * Settlement planning * Coordinate for each sector plan
Spatial Agency (DTR)	* Planning & Implementation of Micro Spatial Plan			
DPU	* Construction and Maintenance of urban infrastructure (Flood, Road, Bridge)	Transfer to BPLHD responsibility for 35 IPALs	Bureau of Construction	* Construction and maintenance of urban infrastructure (River, road, bridge, park)
None	None	No Institution	Bureau of Sewerage	* Sewerage planning * Accessing budget * Construction & O&M management
BPLHD	* Water Environment Supervision	* does not have enough capability	Bureau of Environment	* Environmental conservation and improvement * Solid waste management * Night-soil sludge treatment
DK	* Solid Waste and Night-Soil Sludge Collection and Treatment	*Only On-Call based *O&M for 2 plants only		
PD PAL JAYA	* O&M for Sewerage	*No experience *No route for accessing budget	Sewerage Service Corporation	* O&M for sewerage (Government owned company)

* The Bureau of Sewerage is a professional institution that handles the sewerage system.
Source: JICA expert team

G3 Institutional Framework

G3.1 Background

Currently, the administration for the management of wastewater and sludge in DKI Jakarta is divided into BPLHD for the environment and wastewater management in general, DK for sludge treatment, PD PAL JAYA for sewerage, etc. On the other hand, there is no institution which manages both wastewater and sludge in an integrated manner. Because of this situation, DKI Jakarta is unable to cope with a deteriorating water environment accompanied by rapid economic growth, population growth, and social change, and there is unclearness of responsibility among these institutions. Therefore, it is necessary to establish an institutional framework capable of overseeing the current and future water environment of DKI Jakarta overall, and of managing and supervising both wastewater and sludge treatment in an integrated manner.

G3.2 Scope of the Improved Institutional Framework

Urban water removal includes rainwater, black water, and gray water, and wastewater generated by offices and factories. DPU is responsible for the management of rainwater, including planning, construction and maintenance of drainage systems (drainage networks and storage ponds). Therefore, the new institutional framework must cover all other forms of water posing hazards to the environment and life, such as black water and domestic wastewater, wastewater from offices and factories, and the sludge generated from these sources.

Currently, wastewater management for most residents of DKI Jakarta is dependent on septic tanks in on-site facilities for the treatment of black water. Offices, hotels, and factories have their own individual wastewater treatment plants. The New M/P is proposing, as its ultimate goal, to replace these on-site facilities and individual treatment plants with connection to the sewerage system, as much as possible, taking into account the high population density of DKI Jakarta.

However, it will take long time to put such a comprehensive sewerage system in place. In the meantime, off-site and on-site systems must work in tandem for a considerable duration. Therefore, it is necessary to manage both systems in an integrated manner so that the wastewater management budget is spent in the most efficient way by coordinating and modifying wastewater management planning as the system evolves. Therefore, the new institutional framework must cover both on-site and off-site treatment of wastewater in an integrated manner.

G3.3 Institutional Improvement Basis

Given the background and scope above, DKI's institutional framework for wastewater management should be reviewed and restructured based on the following principles.

(1) It is necessary to establish an institutional framework capable of overseeing the current and future water environment of DKI Jakarta overall, and of managing and supervising both wastewater and sludge treatment in an integrated manner.

(2) It is necessary to manage both off-site system and on-site system in an integrated manner so that the wastewater management budget is spent in the most efficient way by coordinating and modifying wastewater management planning as the sewerage system evolves.

(3) The anticipated framework must have authority and functions concerning budgets, preparation of legislation, planning, construction, operation, and preparation of regulations and guidelines that fit existing government institutions.

G3.4 Examination Matters of Institutional Improvement Plan

DKI Jakarta has fallen behind in sewerage development among major cities of Indonesia, although it is the capital with a population of no less than about nine million and the actual center of politics and economics of Indonesia. Considering this status, DKI Jakarta shall indicate clearly and widely its basic policy and directions for the management of wastewater and sludge, which is "Abolish septic tanks, instead, implement the comprehensive development plan of sewerage system for both black water and gray water steadily and rapidly" to Jakarta citizens and should improve restructure the current institution/organization.

Based on the above principles, four available improvement cases are described for their frameworks and examination matters.

(1) Alternative 1: Reinforce the Management Functions of Each Institution While Maintaining the Existing Organizational Structure.

<Approach>

- Reinforce the management capabilities of each institution.
- Return authority for the existing 35 IPALs that are insufficiently managed from BPLHD to DPU.

<Issues yet to be Clarified>

1) Measures for reinforcing the management capabilities of each institution.
   - BPLHD: Reinforce technical supervision and regulatory capabilities to make them suitable for a regulatory institution.
   - DK: Reinforce planning and design capabilities to correspond to expansion and new construction of sludge treatment facilities.
   - PD PAL JAYA: Reinforce planning and design capabilities to correspond to the expanding sewage treatment area.
2) There is no agency that provides guidance and management for off-site system (sewerage).
3) An agency having responsibility for districts without project profitability (low-income districts and slum districts) is required.
4) In addition to DPU, government bodies at the municipal level and PD PAL JAYA can be considered as managers of the existing 35 IPALs.

5) Who will be the regulatory body for PPP? The regulatory body should have enough political power to coordinate the interest of the general public of DKI Jakarta and that of the private operator. This job requires an engineering function as well as an administrative function. Can BPLHD play such a role?

(2) Alternative 2: Reinforce PD PAL's Capability to Manage both Off-site and On-site Treatment

<Approach>

- Make PD PAL JAYA the central implementing body for both off-site (construction and management of sewage) and on-site (extraction and transport of sludge, construction and management of sludge treatment facilities) treatment.
- Give authority of DK's night soil department to PD PAL JAYA.

<Issues Yet to be Clarified>

1) There is no agency that provides guidance and management for both off-site and on-site treatment.
2) As in Alternative 1, an agency having responsibility for districts with low project profitability is required.
3) The upper limit on PD PAL JAYA's capital investment, which is set by order of the governor of DKI Jakarta must be raised greatly so that PD PAL JAYA can expand its operations.
4) Who will be the regulatory agency for PPP? The regulatory agency should have enough political power to coordinate the interest of the general public of DKI Jakarta and the interest of the private operator. This job requires an engineering function as well as an administrative function. Can PD PAL JAYA play such a role?

(3) Alternative 3: Establish Two Bureaus a Roads Bureau and a Water Resources Bureau in DPU and Place Off-site and On-site Treatment under the Jurisdiction of the Water Resources Bureau.

<Approach>

- Establish a "roads bureau" to take charge of roads and bridges and a "water resources bureau" to take charge of flood management, waterworks, and wastewater management in DPU, and place off-site and on-site treatment under the jurisdiction of the water resources bureau.
- Set one agency at the provincial level (DPU only) and divide duties between two agencies at the municipal level (sub-agency level).
- Place DK's department in charge of night soil under control of DPU's water resources bureau.
- The water resources bureau has responsibilities of development and management of drainage systems for both rainwater and wastewater, because that it is in charge of not only wastewater management but also flood management.

<Issues Yet to be Clarified>

1) Because roads and flood management require very large budgets, there is a good possibility that competition for funds will arise between these budgets and the wastewater management budget within DPU.
2) For both off-site and on-site treatment, it will be necessary to clarify the scope of activities to be implemented by PD PAL JAYA (scope that is profitable) and the scope to be implemented by agencies (scope that is not profitable).

On the other hands, it is possible to consider the cases either making the improved institutional framework a subordinate organization of the existing agencies (DPU, BPLHD, DK) or making it an independent organization by splitting one of the existing agencies. For instance, two cases to improve institutional framework with a focus on DPU are described as the follows;

(4) Alternative 4: Split DPU into an Agency in Charge of Roads and an Agency in Charge of Water Resources, and Place Wastewater Management under the Jurisdiction of the Agency in Charge of Water Resources.

<Approach>

- Split DPU into an agency in charge of roads and bridges and an agency in charge of flood management, waterworks, and wastewater management, and place off-site and on-site treatment under the jurisdiction of the agency in charge of water resources.

G3.5 Improved Institutional Framework Plan

(1) Example of Improved Institutional Framework

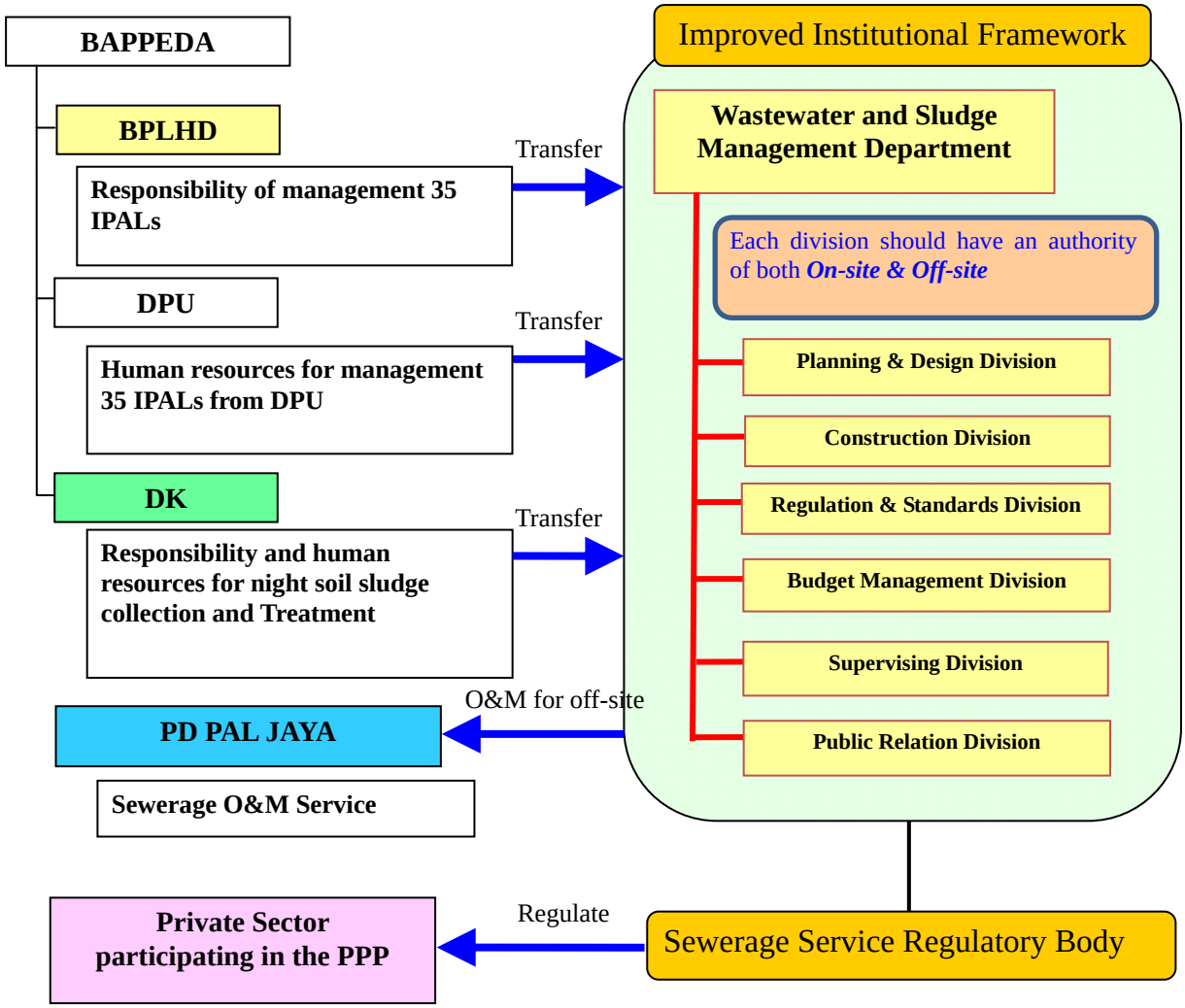
DKI Jakarta has fallen behind in sewerage development among major cities of Indonesia, although it is the capital with a population of no less than about nine million and the actual center of politics and economics of Indonesia. Considering this status, DKI Jakarta shall indicate clearly and widely its basic policy and directions for the management of wastewater and sludge, which is "Abolish septic tanks, instead, implement the comprehensive development plan of sewerage system for both black water and gray water steadily and rapidly" to Jakarta citizens and should improve the current institution/organization.

Figure G3-1 shows an envisioned case as an example of the improved institutional framework. It is hoped that it will serve as a reference for discussion among authorities of DKI Jakarta authorities. To begin, the JICA Team considers that the improved institutional framework must be an managerial one which will oversee all the projects in DKI Jakarta's wastewater and sludge management and will formulate s Jakarta's policies for its citizens.

The JICA Team also considers that such divisions shown in Figure G3-1, starting from the planning and design division, must be established in the improved institutional framework, so that each division has clear responsibility for supervising each activity.

In particular, it will be necessary for each division to have authority for both on-site and off-site treatment in order to formulate measures covering all aspects of wastewater management. Figure G3-1 presents the improved institutional framework as an independent entity in order to show the transfer of authority from the current wastewater management department. However, as was discussed in "G3.3 Institutional Improvement Plan and Examination Matters", either making the improved institutional framework a subordinate organization of the existing agencies (DPU, BPLHD, DK) or making it an independent organization by splitting one of the existing agencies does not present a problem.

When a portion of a specific project is implemented through PPP, it will be necessary to manage the private-sector element of PPP with a contract verification and regulatory body (to be described in detail in section G7) that will be an independent organization.



Source: JICA expert team

Figure G3-1 Example of Organization

G3.6 Preparation for the Establishment of the Improved Institutional Framework for Wastewater/Sludge Management

To improve the function and ability of the said institutional framework, DKI Jakarta should set up a preparatory committee consisting of secondments from the existing institutions/agencies related to wastewater and sludge treatment and the committee shall make concrete discussion on the institution/organization according to the sewerage system development plan. By the end of FY 2013 at the latest, DKI Jakarta should establish the institutional framework for wastewater/sludge management and start it working.

Action plans for Institutional Improvement are shown in Table G3-1and Table G3-2.

Table G3-1 Action plan for Institutional Improvement (Proposed)

Action(s)	2012	2013	2014	2015		2020
(1) Setting up *"Preparation Committee for Institutional Reform"*						
1) Formulate basic policy for the improved institutional framework						
2) Establishment of project team (off-site team, on-site team)						
3) Study and determine the formation of division						
4) Study of scope of works, and coordinate with existing institutions						
5) Revise for provincial ordinance, and approval						
6) Personnel planning						
(2) Formulation of *"Preparatory Section for Wastewater and Sludge Management"*						
1) Employment of professional staff, human resource development						
2) Technical support from external agencies						
(3) Upgrading to *"Wastewater and Sludge Management Department"*						

Source: JICA expert team

Table G3-2 Relations between Institutional Improvement Plan and Off-site and On-site Improvement Plan (Proposed)

Action (s)	2012	2013	2014	2015		2020
(1) Setting up *"Preparation Committee for Institutional Reform"*						
(2) Formulation of *"Preparatory Section for Wastewater and Sludge Management"*						
(3) Upgrading to *"Wastewater and Sludge Management Department"*			Starting of authority			
Off-site Improvement Plan						
(1) F/S and DED for sewage (including Sludge Treatment Plant) supported by DGHS						
(2) Construction of sewerage by New Department						
(3) Commencement sewerage services						
Facility Coverage Ratio	2%	4%	7%	10%		20%
Service Coverage Ratio	2%	2%	4%	6%		15%
On-site Improvement Plan						
(1) Preparation of Regular Sludge removal regulation			→Enforcement			
(2) Preparation of Design Standards for ST			→Enforcement			
(3) Preparation of Design and O&M Standards for ITP			→Enforcement			

Source: JICA expert team

G4 Laws and Regulations

G4.1 Background

After much discussion, authorities of DKI Jakarta authorities issued a number of decrees and regulations regarding management of wastewater and sludge in order to respond to economic and social changes. However, these decrees and regulations, issued without an institutional framework for the integrated management of wastewater and sludge, have caused the current unclearness of responsibility (gaps and overlaps) among these institutions. On the other hand, since water environment preservation must be a priority in urban environment improvement, together with flood control and urban transportation, a direction should be clearly proposed to citizens. Therefore, it is necessary to establish a body of basic law on integrated management of wastewater and sludge, in

parallel with establishment of an integrated institutional framework.

G4.2 Review and the Issuance of Decrees and Regulations

DKI Jakarta shall indicate clearly and widely its philosophy and directions on management of wastewater and sludge to its citizens by establishing a basic law code on integrated management of wastewater and sludge. This body of law will enable DKI Jakarta to reorganize current institutions and review existing decrees and regulations so that the target of the New M/P will be achieved in the most efficient manner.

Table G4-1 shows laws and regulations concerning wastewater treatment that are currently in force.

Table G4-2 gives an example of a systematic structure of laws and ordinances concerning wastewater treatment. Using this example as a reference, it will be important to review current laws and ordinances and to restructure laws, regulations, design guidelines, and methods of operation to ensure that they are systematic and comprehensive based on the concept of water circulation.

Table G4-1 List of Laws and Regulations on Wastewater Treatment

Act
Act of the Republic of Indonesia concerning Environmental Management (No. 23, 1997)
Act of the Republic of Indonesia concerning Conservation of Living Resources and their Ecosystems (No. 5, 1990)
Minister Regulation
Regulation of Minister of Public Works (No. 16, 2008/ Chapter Ⅳ National Policy and Strategies of Residential Wastewater Management System)
Central Government Regulation
Government Regulation of the Republic of Indonesia concerning the Control of Water Pollution (No. 20, 1990)
Government Regulation of the Republic of Indonesia concerning Environmental Impact Assessment (No. 51, 1993)
Local Government Regulation (DKI Jakarta)
Local Government Regulation of Special Capital Region of Jakarta province regarding Domestic Wastewater Management (No. 122, 2005)
Local Government Regulation of Governor DKI Jakarta about Establishment of Organization and Administration of Septic Tank Waste Treatment Unit (No. 133, 2010)
Local Government Regulation of DKI Jakarta concerning PD PAL JAYA of DKI Jakarta (No. 10, 1990)
Local Government Regulation of DKI Jakarta about First Amendment of Local Government Regulation No. 10, 1991 concerning PD PAL JAYA (No. 14, 1997)
Local Government Regulation of DKI Jakarta about Organization and Administration of PD PAL JAYA DKI Jakarta Province (No. 43, 2007)
Local Government Decree (DKI Jakarta)
Decree of the Governor of DKI Jakarta about the Determination of the Quality Standard and Designation of River Water/Water Body also the Quality Standard of Liquid Waste in the Area of DKI Jakarta (No. 582, 1995)
Decree of the Governor of DKI Jakarta about Provisions Wastewater Treatment Piping Systems (No. 45, 1992)
Decree of the Governor of DKI Jakarta about Standard Quality of Sewerage System (No. 1040, 1997)
Decree of the Governor of DKI Jakarta about Stipulation of Tariff Adjustment Wastewater Disposal Service and Wastewater Pipe Connection Fee of PD PAL JAYA (No. 1470, 2006)

Source: JICA expert team

Table G4-2 Systematic Structure of Law on Wastewater Management (Comparison between Indonesia and Japan)

Laws and ordinances in Japan		Largely relevant laws and ordinances in Indonesia
Basic Environment Act		Act of the Republic of Indonesia concerning Environmental Management (No. 23, 1997)
	[Environmental standards]: Environmental Quality Standards for Water Pollution	Act of the Republic of Indonesia through Regulation No. 82 2001 on Water Quality Management and Water Pollution Control
	[Pollution control]: Water Pollution Control Act	
	[Basic Act on Establishing a Sound Material-Cycle Society]: Wastes Management and Public Cleansing Act	The Government of Indonesia Regarding Waste Management No. 18, 2008
	[Environmental impact assessment]: Environmental Impact Assessment Act	Government Regulation of the Republic of Indonesia concerning Environmental Impact Assessment (No. 51, 1993)
Sewage Act		None (under preparation)
	[Environmental standards]: Environmental Quality Standards for Water Pollution	Decree of the Governor of DKI Jakarta on Determination of the Quality Standard and Designation of River Water/Water Body, and on Quality Standard of Liquid Waste in the Area of DKI Jakarta (No. 582, 1995)
	[Water quality standards]: Order for Enforcement of the Sewage Act	Decree of the Governor of DKI Jakarta on Standard Quality of Sewerage system (No. 1040, 1997)
	[Structural standards]: Order for Enforcement of the Sewage Act	None
Johkasou Law		None
	[Environmental standards]: Environmental Quality Standards for Water Pollution	Decree of the Governor of DKI Jakarta on Determination of the Quality Standard and Designation of River Water/Water Body, and on Quality Standard of Liquid Waste in the Area of DKI Jakarta (No. 582, 1995)
	[Water quality standards]: Ordinance for Enforcement of the Johkasou Law	Local Government Regulation of Special Capital Region of Jakarta province regarding Domestic Wastewater Management (No. 122, 2005)
	[Structural standards]: Ordinance for Enforcement of the Johkasou Law	None
	[Structural standards]: Building Standards Act	- Law No. 28 of 2002 on Building Construction - Government Regulation No. 36 of 2005 on Implementation of Law No. 28/2002 on Building Construction - Regulation of the Ministry of Public Works No. 29/PRT/M/2006 on Guideline for Technical Requirement of Building Construction - Regulation of the Ministry of Public Works No.45/PRT/M/2007 on Technical Guidance of State Building Construction）

Source: JICA expert team

G5 Management of Off-site and On-site Treatment

G5.1 Off-site Treatment and On-site Treatment

As was discussed in D4 of PART-D, wastewater management will undergo a sequential shift away from the current format centered on on-site treatment through the phased development of off-site treatment, with the ultimate goal of reaching 80% coverage by off-site treatment. At each phase and each point in time, it will be necessary to connect residents to the sewerage system as the sewerage construction progresses, while at the same time promoting improvement of extant septic tanks as well as ITPs for establishments such as office and commercial buildings. These actions must be with a view

to most efficiently improving living environments and the public water body environment in DKI Jakarta within the scope of limited investment.

Accordingly, it will be necessary for the new wastewater management institution to be a body that supervises both on-site and off-site treatment and engages in comprehensive management that includes planning and budget administration.

On the other hand, it will be important to utilize the private sector in on-site and off-site treatment operations in order to ensure project efficiency based on the concept of a public project that is under the supervision of the new institution.

G5.2 Management of Off-site Treatment

In line with the implementation of phased sewerage projects based on the New M/P, review of the PD PAL JAYA organization which is the public sewerage company shall be conducted, incrementally reinforce its participation in sewerage construction projects and capabilities in operation and management, and improve its maintenance technologies.

G5.3 Management of On-site Treatment

The wastewater management administration (proposed) should examine and implement qualitative and quantitative improvement measures for on-site treatment while monitoring the sewerage development plan and its progress based on environmental improvement targets for public water bodies. It should execute treatment of increasing amounts of sludge and planning and construction of treatment facilities, while at the same time it should build the administrative system for desludging. When doing so, taking into consideration the income and expenditure situation of sewerage works, on balance, it is appropriate to set up subsidies that cover a reasonable portion of septic tank replacement expenses.
In desludging, transportation of sludge, and the operation of ITPs of establishments such as office buildings and commercial buildings, the maximum utilization of private-sector should be examined.

G6 Human Resources Development

Establishment and development of the institutional framework of G.5 above will require many human resources having administrative and technical expertise in water and environment preservation. To foster these human resources, recruitment of subsequent generations and the development of an education system from the long term view point is required.

G6.1 Systematic Development of Management Engineers

The top managers in the new institution should engage in capacity development in off-site treatment through on-the-job training by participating in each project from the feasibility study stage based on the New M/P.

Moreover, when training working-level middle managers to be involved in design or operation & management, provide them with long-term hands-on training at treatment plants in Japan or other locations, setting the times when service for particular projects commences as a target.

For on-site treatment, train planning and construction engineers in Indonesia in such fields as upgrading and replacement of septic tank facilities so that, in essence, facilities become facility-oriented equipment rather than maintenance-oriented.

G6.2 Stabilization of Employment and Treatment Improvement

Give consideration to maintaining employment stability and compensation and to fixed employment of management operators and technical managers. For example, establish a qualification system based both on experience and testing, clarify the responsibilities of qualified persons, then arrange employment terms to give preferential treatment to such qualified persons.

G7 Private Sector Involvement

G7.1 Basic Policy

The development of the public infrastructure for the wastewater and sludge treatment in the off-site system and the sludge treatment in the on-site system requires huge resources to be mobilized. On the other hand, the technical basis and capacity in DKI Jakarta is almost non-existent, since the current coverage remains only 2%. Therefore, in order to execute the New M/P, it is essential to consider positively introduction of the PPP concept in order to accelerate both resource mobilization and technical transfer.

In introducing the PPP concept in wastewater management and sludge management, since the wastewater and sludge treatment system is the infrastructure with the highest public concern, while, on the other hand, it is necessary to secure the profitability of the business entity, the scope, methodology, institution, and management of PPP arrangement should be thoroughly considered. It is also necessary to ensure that there is no misunderstanding on the risk control issues between DKI Jakarta and the business entity. Therefore, it is essential to establish a professional agency which will deal with contractual matters and supervise execution of the PPP contract.

G7.2 Basic Concept of PPP

G7.2.1 Area Classification for Private Sector

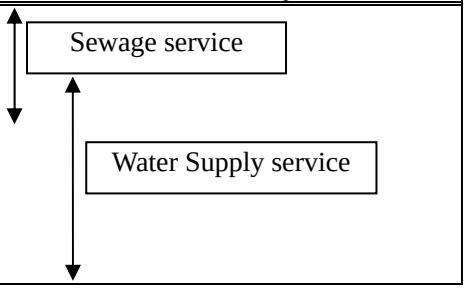
If the areas in which projects are implemented are classified as “commercially viable,” “commercially non-viable,” and “non-integrating gap,” PPP applies in principle for the project within the commercially non-viable classification. However, regardless of this, it produces efficiency in all areas. Accordingly, it is desirable to fully study the form and operation of projects and to make every effort to introduce PPP as far as it is feasible.

Table G7-1 Area Classification for Private Sector (1/2)

Commerciality	Status
Non-Integrating Gap	In the field that Private sector cannot be run even with government support, the project is run by using government finance and/or Foreign ODA.
Commercially Non-viable	In the field that Private sector cannot be run without government support, the project is run by sharing the cost and risk between government and Private sector. Such Public and Private cooperation is called PPP (Public-Private Partnership).
Commercial Viable	In the field that Private sector can be run without government support, PFI (Private Financial Initiative) or undergoing privatization-.

Source: JICA expert team

Table G7-2 Area Classification for Private Sector (2/2)

Commerciality	Measures		Position of Project
Non-Integrating Gap	Government Finance (Foreign Loans)		
Commercially Non-viable	PPP	Government Involvement	
		Involvement of Private Sector	
Commercial Viable	PFI Privatization Private Commission		

Source: JICA expert team

G7.2.2 Project Schemes Utilizing the Private Sector (All Infrastructure Projects)

Table G7-3 arranges the various forms of Private Sector utilization in infrastructure projects in a public/private matrix with property ownership and project management and operation as elements. The table envisions two cases: one in which management and operation are entrusted to the Private Sector with ownership of the property being retained by the Public Sector, and another in which the Private Sector has ownership of the property.

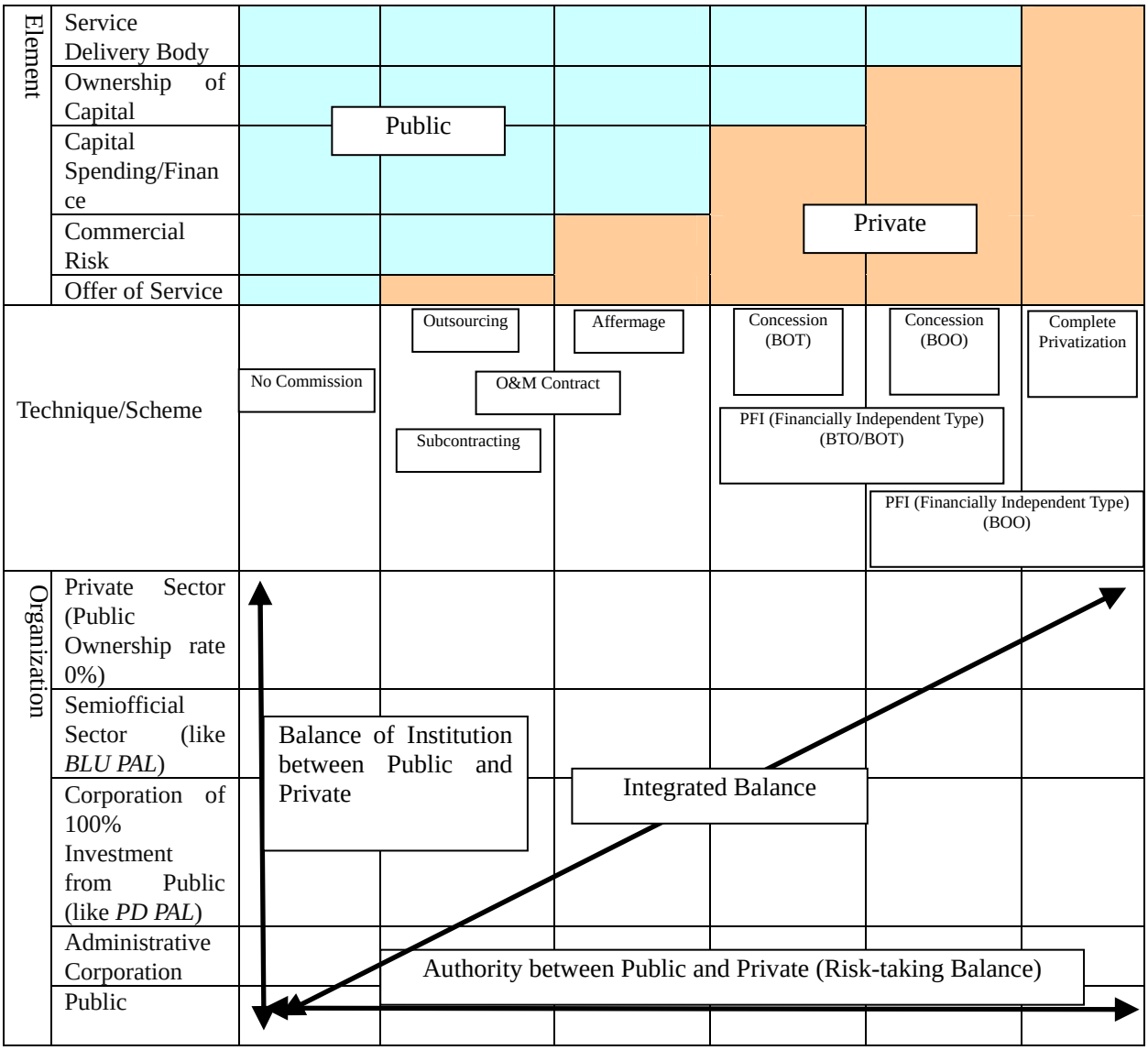
Table G7-4 was prepared by the Development Bank of Japan (DBJ). It is arranged to show each form of Private Sector utilization in terms of whether the "Public Sector" or "Private Sector" is responsible for five items "service delivery body," "ownership of capital," "capital spending/finance," "commercial risk," and "offer of service" under law. The more items are positioned to the right of the table, the greater the degree of responsibility of the Private Sector and the smaller the degree of the Public Sector. Table G7-5 lists main forms of Private Sector utilization being discussed among Japanese enterprises that are seeking to enter overseas PPP infrastructure markets.

Table G7-3 Relationship of Public/Private

		Management/Operation	
		Public	Private
Property Owners	Public	○Subcontracting **Public Domain/Public**	○Delegated Administration Management O&M Contract ○DBO ○Affermage ○PFI BTO/Concession/etc. **Public Domain/Privatization**
	Private	**Private Ownership/Public**	**Private Ownership/Privatization** ○PFI ・BOT/ROT/BOS ・BOO/ROO ・Concession (BOT), etc. ○Privatization ・ Transfer/Share Acquisition/Public-Private Partnership Company ・Sale, etc.

Source: JICA expert team

Table G7-4 Form of PPP



Source: Development Bank of Japan (DBJ)

Table G7-5 Summary of PPP Scheme

Business Scheme	Contents
BOT (Build Operate Transfer)	Private Sector constructs the Facility, operates and manages it during the period of the contract, then transfers it to Public.
BTO (Build Transfer Operate)	After constructing the Facility, Private Sector transfers it to Public and operates and manages it.
BOO (Build Own Operate)	After constructing the Facility, Private Sector keeps it and operates and manages it. After expiring contract, Private sector keeps it or removes.
ROT (Rehabilitate Operate Transfer)	Private Sector rehabilitates the Facility, operates and manages it during the period of the contract, then transfers it to Public
RTO (Rehabilitate Transfer Operate)	After rehabilitating the Facility, Private Sector transfers it to Public and operates and manages it.
DBO (Design Build Operate)	Private Sector designs and constructs the Facility by using public capital and operates and manages it. As the cost is raised by Bond issuance, it is expected low cost.

Source: JICA expert team

G7.3 Regulation on PPP in Indonesia and Current Status

G7.3.1 Regulation on PPP in Indonesia

In Indonesia, Public-Private Partnerships are being issued from National Development Planning based on Presidential Regulation No. 13 of 2010 "Presidential Regulation of the Republic of Indonesia Number 67 of 2005 Regarding Cooperation between Government and Business Entities in Infrastructure Provision." Laws and regulations pertaining to PPP are shown in Table G7-6.

It should be mentioned that a revised version of Presidential Regulation No. 13 of 2010 "Presidential Regulation of the Republic of Indonesia Number 67 of 2005 Regarding Cooperation between Government and Business Entities in Infrastructure Provision" is scheduled to be issued at the end of August 2011. It is reported that this revision will attach more detailed regulations concerning procedures for unsolicited projects, and will not bring any changes to the regulation's basic philosophy.

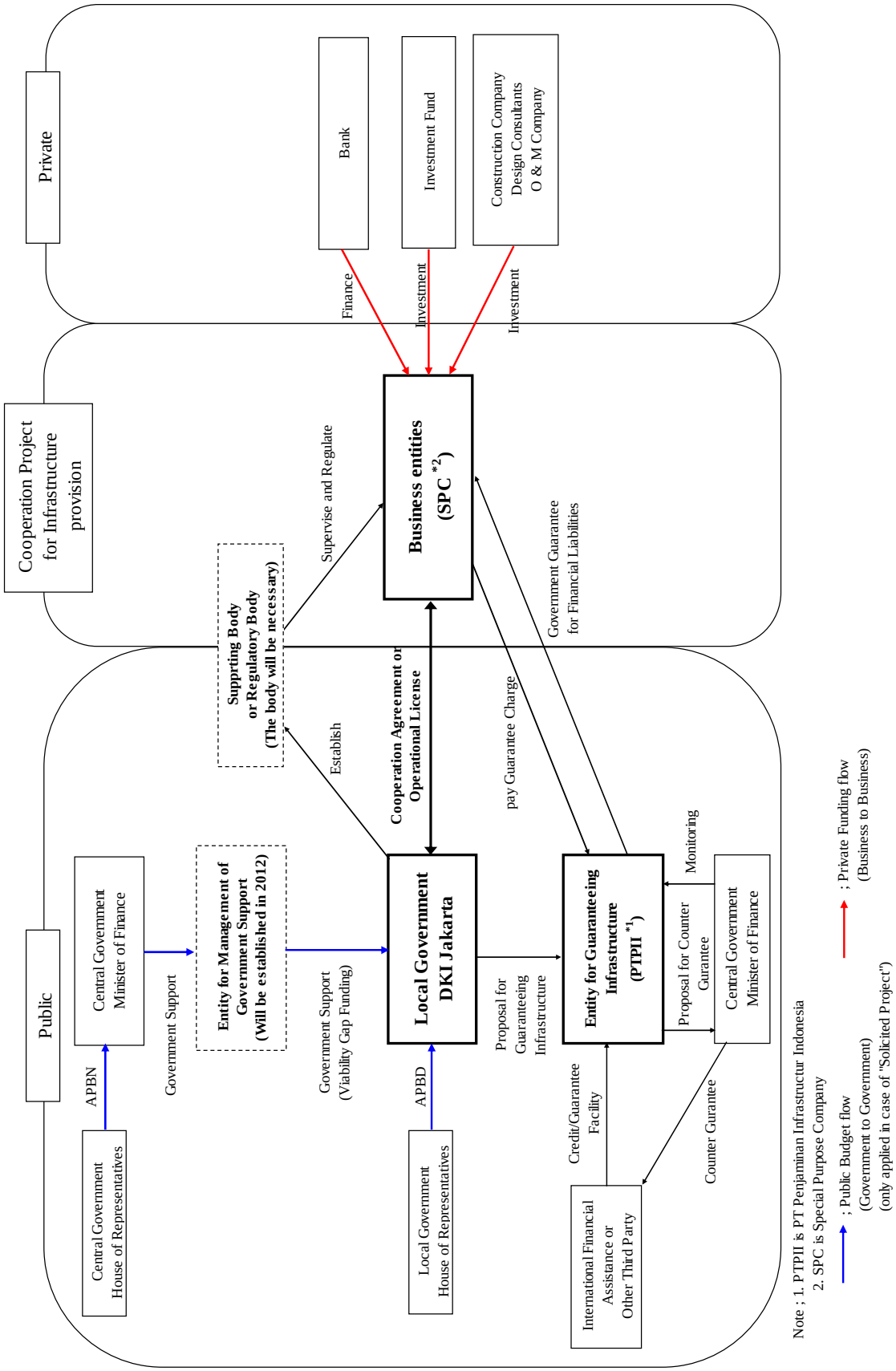
Table G7-6 Regulations on PPP

Presidential Regulation
Presidential Regulation of the Republic of Indonesia Number 42 of 2005 Regarding Committee for Acceleration of Infrastructure Provision Policy
Presidential Regulation of the Republic of Indonesia Number 67 of 2005 Regarding Cooperation between Government and Business Entities in Infrastructure Provision
Presidential Regulation of the Republic of Indonesia Number 13 of 2010 Regarding Amendment upon Presidential Regulation Number 67 of 2005 Regarding the Cooperation between the Government and the Business Entity in the Infrastructure Provision
Presidential Regulation of the Republic of Indonesia Number 78 of 2010 Regarding Infrastructure Guarantee implemented through The Entity for Guaranteeing Infrastructure for the Cooperation Project between the Government and the Business Entity in the Infrastructure Provision
Minister Regulation
Regulation of the Minister of Finance Number:38/PMK.01/2006 Concerning Implementation Instructions for the Control and Management of Infrastructure Provision Risks
Regulation of the Coordinating Minister for Economic Affairs as Head of Committee for Acceleration of Infrastructure Provision Number: KEP-01/M.EKON/05/2006 Regarding Organization and Working Procedures of Committee for Acceleration of Infrastructure Provision
Regulation of the Coordinating Minister for Economic Affairs as Head of Committee for Acceleration of Infrastructure Provision Number: PER-03/M.EKON/06/2006 Regarding Procedures and Criteria for Preparation of Priority List for Public Private Partnership Infrastructure Projects
Regulation of the Coordinating Minister for Economic Affairs as Head of Committee for Acceleration of Infrastructure Provision Number: PER-04/M.EKON/06/2006 Regarding Procedures for Evaluation of Public Private Projects in the Provision of Infrastructure Which Require Government Support
Regulation of State Minister of National Development Planning/Head of National Development Planning Agency Number 3 of 2009 Regarding Drafting Procedure for Preparation of the List of Plan of Cooperation Project Between Government and Business Entity in Infrastructure Provision
Regulation of Minister of Finance No.260/PMK.011/2010 Regarding Guidance for Implementation of Infrastructure Indemnity in Public Private Partnership Project

Source: JICA expert team

G7.3.2 Basic PPP Form

Figure G7-1 presents a basic chart of PPP used in infrastructure development in Indonesia.



Source: JICA expert team

Figure G7-1 Basic Chart of PPP in Indonesia

G7.3.3 The PPP Project Cases

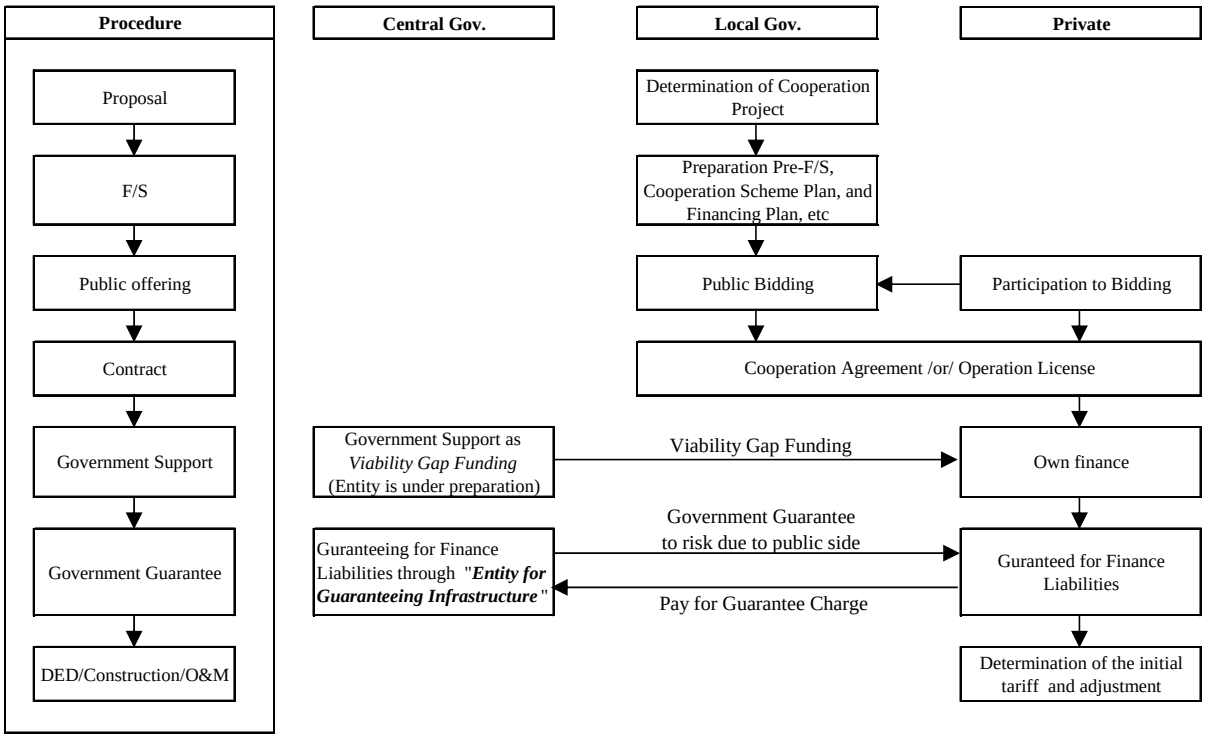
The PPP Project has the following two cases:

- (Case 1) Solicited Project: PPP project is initiated by Public (Government).
- (Case 2) Unsolicited Project: PPP project is initiated by Private.

(1) Case1 Solicited Project

Case 1 refers to initiatives by Public. The process is shown in Figure G7-2. Characteristics are as follows:

(a) If the PPP Project is planned and determined by Public (Government), then it can go directly to public bidding.
(b) Government support can be obtained for Solicited Project.
(c) Most of the PPP Projects in Indonesia are Solicited Project.



Source: JICA expert team

Figure G7-2 Case 1: Solicited Project

(2)) Case 2 Unsolicited Projects

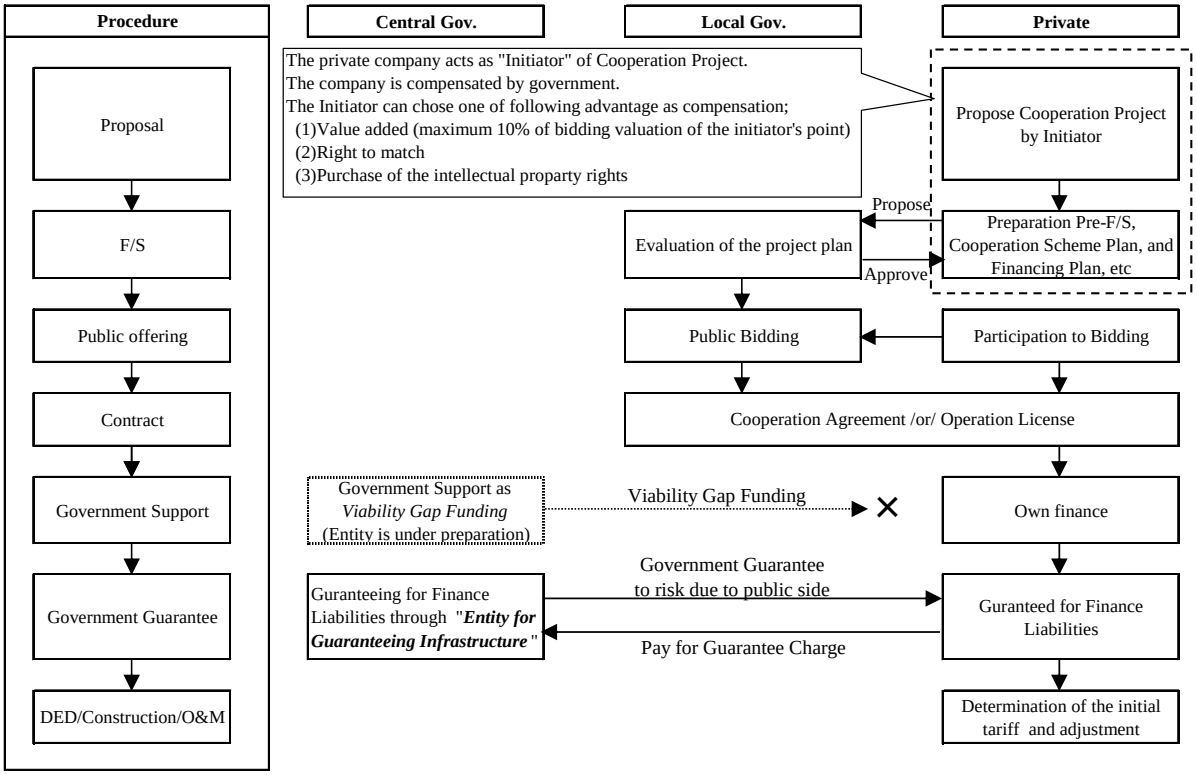
Case two refers to initiatives by Private. The process is shown in Figure G7-3. Characteristics are as follows:

(a) If the PPP Project is initiated by Private, then they will conduct the pre-F/S and plan PPP Project scheme by themselves and then propose it to the Public (Government), then the Public will evaluate and approve it. After that the PPP Project can go to public bidding.
(b) For the PPP Project (initiated by Private) which is approved by the Public (Government), the initiator (Private) can receive one of the three following types of compensation:
  a) The initiator can receive 10% more additional point on the evaluation point (value added).
  b) Right to match: in public bidding, all of the company, including the initiator, submits the document for bidding. If the winning bidder is not the initiator, then the initiator can re-submit a revised bidding document “to match” the winning bidder’s document.
  c) The initiator is also able to choose purchase of intellectual property rights, so the initiator

can receive paid back for the costs of planning phase, such as pre-F/S.

(c) Several conditions in Unsolicited Project are as follows:

- Unsolicited Project cannot receive Government Support.
- Unsolicited Project must be excluded from related Master Plan.
- Unsolicited Project can be technically integrated with the Master Plan.



* In case of PPP project proposed by private sector, the project should be excluded in the Master Plan and technicall integrated into Master Plan of the related sector.

Source: JICA expert team

Figure G7-3 Case 2: Unsolicited Project

G7.3.4 How to bid in PPP Project

Presidential Regulations only stipulate rules on Public Bidding, but contain no detailed explanation on International Competitive Bidding. International bidder limitations depend on Local/Central Government decision.

G7.3.5 About Viability Gap Funding (VGF : Government Support)

- In the implementation of PPP Project with low profitability, the gap is fulfilled by the VGF as financial compensation so the project can be feasible.
- Current Condition, the VGF/Government Support is given directly to the Project (No Entity that manages the VGF). In the future, Central Government is planning to establish the Entity to manage the VGF for the PPP Project.
- Currently, The Ministry of Finance is researching VGF implementation. *Entity for VGF management* is expected to be established by early next year (2012). After the establishment of *Entity for VGF Management*, the government support for the PPP project is expected to be implemented throughout the Entity as VGF.
- One of the PPP project that try to implement the VGF is the Water Supply Project in Sumatera, Lampung.
- Determination of whether a project can receive the VGF is through evaluation by an independent appraiser appointed by the Project implementation entity
- Unsolicited Project cannot receive the VGF.

G7.3.6 About Entity for Guaranteeing Infrastructure

- The Entity responsible to guarantee the PPP Infrastructure Project was established by the Central Government.
- Infrastructure Guarantee means Government guarantee for financial liability for PPP project regarding risk due to public side.
- In Indonesia, there is only one organization, namely PT. PII (PT Penjaminan Infrastruktur Indonesia) is responsible for providing the guarantee for infrastructure PPP Project.

G7.3.7 Errors and Problems Concerning Past Water Supply Projects

Specific examples of full-scale PPP introduction in water supply projects of Southeast Asia can be found in Manila, the Philippines, and Jakarta, Indonesia. A total of four PPP projects are underway, with each city divided into east and west projects (Table G7-7). Of these four PPP projects, the only successful example is the Manila Water Company of East Manila.

Table G7-7 Typical Examples of PPP Projects in Water Supply Business in Southeast Asia

Region	Operator Enterprise	Current Status
Jakarta West	Palyja (Suez/France)	Coverage of the water supply system 60% Non-revenue water rate 45%
Jakarta East	Aetra (Thames/England → a local operator)	Non-revenue water rate 55% Thames withdrew in 2006.
Manila West	Maynilad Company (Suez/France→ a local operator)	Non-revenue water rate over 50% Suez withdrew in 2006.
Manila East	Manila Water Company (Local Capital, United Utility /England), Mitsubishi/Japan	Stock Exchange Listing in 2003 Coverage of the water supply system 100% Non-revenue water rate 16%

Source: JICA expert team

In particular, the lack of success of the two water-supply PPP projects in Jakarta contains important lessons concerning actions not to take when introducing PPP into sewerage projects in Jakarta. The water-supply PPP projects of Jakarta are characteristic for their concession scheme-based approach in which private enterprises have complete responsibility for everything from water-purification facilities to the supply network, and they also have responsibility for new capital investment. On the other hand, they are similar to BOT schemes (in which the government guarantees bulk charge) in that water tariffs paid by residents and water charges paid by the government to the private enterprises are separate, and that water charges are set at a level that guarantees a certain internal rate of return for the private enterprises (i.e., a portion of tariff risk is transferred from Private to Public).

Jakarta privatized its water-supply systems in 1997. Privatization was based on political considerations, did not involve bidding, and was done prior to the development of necessary administration for PPP. Consequently, concession contracts heavily favor private operators. The details of the concession contracts are not disclosed to the public, and they contain only five key performance indicators (KPI), which is an extremely small number for evaluation of water-supply project performance. In addition, penalties applied when KPI are not achieved are extremely lax, with the penalties being only several hundred thousand yen, even when non-revenue water rates and water-supply diffusion rates are not attained. Thus, this leads to situations in which it is better to pay penalties than to make efforts to improve performance.

Furthermore, a high IRR of 22% for private operators is guaranteed in concession contracts. Thus, the contracts state that authorities (DKI Jakarta) must pay water charges needed to secure private operators' profit (IRR of 22%) to the operators, even when raises in water tariffs collected from residents have trouble passing through the city council.

In reality, unless DKI Jakarta raises water tariffs collected from residents, it does not have the financial resources to pay water charges to private operators. Consequently, the difference (between the water tariff and water charge) does not get paid. It is said that this is a factor behind private operators' lack of effort in increasing performance.

In the case of Jakarta's water privatization, the regulatory institution was not established until 2003, after privatization actually took place. Because of this, the regulatory institution also has its hands tied in dealing with the situation.

On the other hand, in the case of Manila's privatization of water-supply services, the regulatory institution was established with support from the World Bank prior to privatization. This regulatory institution selected private operators after conducting international bidding. Concession contracts for water-supply PPP in Manila include 26 KPI, which is sufficient to evaluate the performance of water-supply projects in developing countries. As a result, in the case of the Manila Water Company (East Manila), which has experienced good performance, water tariffs have been revised smoothly every five years. At the same time, however, the Suez-affiliated Maynilad Company (West Manila), which performed poorly, was forced to pull out of Manila in 2007 and was replaced by another private operator.

Thus, it is important to learn the following lessons based on the failed water-supply PPP in Jakarta and successful water-supply PPP in Manila:

(1) Regulatory institutions are required from the PPP preparatory stage.
(2) Regulation and monitoring based on KPI are required.
(3) Public budgetary measures are required when all or a portion of tariff risk is transferred to Public, such as for BOT contracts with government guarantees.

G7.4 Issues and Measures Concerning Introduction of PPP in Sewerage Projects

G7.4.1 Basic Policy

It is desirable to evaluate and implement projects under the following basic policy and based on lessons learned from the kinds of successes and failures in the water-supply projects described above.

In all cases, water-supply and sewerage projects are comprised of infrastructure for common systems; namely, facilities for pumping and treating water. However, water-supply projects produce drinking water and water for domestic use, which are products that clearly have added value, and sales of these products clearly serve as the projects' source of revenue. On the other hand, the final products of sewerage projects are improvements to living environments and public water body environments, which are comparatively difficult to set a price on.

Accordingly, it is important to build systems producing added value such as improved living environments arising from infrastructure installation that is immediately recognized.

(1) Clarification of PPP Position within the Overall M/P

It is important to accurately recognize the profitability and financial resources of the M/P as a whole based on objective economic and fiscal analysis. (Introducing PPP to projects with low profitability will increase the workload of all concerned, both Public and Private.)

(2) Evaluation and Selection of Appropriate Schemes

There are various PPP forms that correspond to project profitability. These include not only the concession and BOT schemes, but also the management contract and lease schemes. Thus, it is important to determine the form that is most applicable.

(3) Identification of Risks and Implementation of thorough Measures to Counter them

When introducing PPP into infrastructure projects, it is important to coordinate and classify the interests of private enterprises, which seek to receive profit; ordinary residents, which hope to receive high-quality services for the cheapest possible price; and government (both central and local), which represents the interests of ordinary residents. It is also necessary to clarify responsibilities for conceivable risks.

(4) Contract Verification / Regulatory Institution

It is necessary to have an institution that guarantees the validity of PPP contracts in terms of their fiscal, revenue, and public benefit-related aspects, that verifies the execution of these contracts, and

that provides proper guidance.

(5) Establishment of Yardsticks for Evaluating Execution, such as Performance Indicators in Contracts

It is important to clarify the importance of the contract verification/regulating institution as well as performance indicators and other yardsticks for measuring contract execution and to build a system that can evaluate projects appropriately and provide feedback.

(6) Management Philosophy and Related Policies of Private Enterprises

In general, profit-seeking private businesses have a viewpoint that stands opposed to those of the general public, which desires high-quality services for the cheapest possible price, and government (both central and local), which represents the public's interests. This means that the management philosophy and posture of a private enterprise and trust placed in it by citizens (i.e., the system beneficiaries) and government stakeholders have a significant connection to a project's success or failure.

Particularly with regard to PPP for public service such as sewage, private enterprises must clearly present their management philosophy vis-à-vis the project and reflect it on concrete project management. At the same time, they must present objective evaluations of their operations to the general public and the government. On the other hand, the government must present quantitative information on the services that are generated by public expenditure and burden imposed on the general public (i.e., beneficiaries). It must also implement measures that induce the general public to take obligatory action as beneficiaries in the form of tariff payment and service maintenance.

In their management and project operation, private enterprises must 1) disclose management conditions and maintain transparency, 2) present objective evaluation and performance data on service operations, 3) work together with communities that receive services, and 4) implement ancillary improvement measures for added product value (including support measures for improved living environments, reduced disease, etc., in the case of sewerage projects) as well as PR activities to gain beneficiaries' understanding of such added value.

On the other hand, citizens must cooperate as individuals with work that leads to improved service. And the government must participate in community activities and completely fulfill its role as a coordinator in the interrelationship between citizens and the Private Sector.

G7.4.2 Clarification of PPP Position within the Overall M/P

When considering the introduction of PPP into sewerage works, it is important to accurately understand the profitability and financial resources of the M/P as a whole based on objective economic and fiscal analysis. It is simultaneously important to clarify the scope of public expenditure as well as the scope within which private enterprises can participate and secure profitability within the realm of the beneficiary burden. On the other hand, it is important to appropriately notify beneficiaries of the service cost.

G7.4.3 Evaluation and Selection of Appropriate Schemes

Clarifying the scope of public expenditure as well as the scope within which private enterprises can participate and secure profitability within the realm of beneficiary burden is tied to selection of the PPP form to be used. There are various PPP forms that correspond to project profitability. These include not only the concession and BOT schemes, but also the management contract and lease schemes. Thus, it is important to determine the form that is most applicable.

G7.4.4 Identification of Risks and Implementation of thorough Measures to Counter them

When introducing PPP, the participating private enterprise and the government (central and local), which guarantees the scheme with public expenditure, must identify risks to the project wherever possible and clarify their scopes of risk responsibility. Table G7-8 presents a summary of risk

management.

Table G7-8 Summary of Risk Management

	Objective	Summary	Goals	Points to remember
Recognition	・To clearly recognize as many risks as possible beforehand. ・To share risk information with stakeholders.	(Risk workshop) ・Meeting of stakeholders ・Discussion led by facilitators ・Equal participation	・Extraction of perfectly appropriate items ・Appropriate classification in accordance with risk characteristics	・Target infrastructure projects of an established scale or larger. ・Implement as required.
Evaluation	・To know quantitatively the impact of risks wherever possible.	・Multi-step evaluation by stakeholders ・Calculation using risk data	・Setting of priorities ・Identification of highly significant risks	・Avoid bias. ・Do not overlook significant risks that are characteristic of the project.
Countermeasure	・To know the most effective advance countermeasures.	・Proposal of advance countermeasures by experienced parties ・Evaluation of countermeasure effects	・Proposal of countermeasures for each item ・Establishment of persons responsible for particular countermeasures	・Classify and propose short-term and long-term countermeasures. ・Consider synergetic/offsetting effects.
Implementation	・To reduce risk by implementing advance countermeasures.	・Formulation of action plans and implementation of individual countermeasures ・Measurement of effects	・Alleviation of risk through implementation ・Acceptance of evaluation results and arrangement of suggestions	・Plan execution in accordance with individual circumstances.
Feedback	・To ascertain effects from implementation of countermeasures, and reflect suggestions on better risk management.	・Identification of feedback recipients for each data type ・Implementation of feedback	・Improvement of management plans to raise effectiveness	・Clarify modifications. ・Conduct evaluation tied to the next phase.

Source: JICA expert team

Moving forward with PPP involves thorough implementation of the following steps: 1) conducting a feasibility study that presumes project implementation by a private enterprise; 2) identification of risks ("PPP test"); and 3) execution of countermeasures for each risk type. Table G7-9 presents major risks in PPP.

Assigning responsibility for risk is an important part of the PPP design process. Ordinarily, it is made part of the process of setting up the SPC. The task of assigning responsibility is largely comprised of four major components: 1) identifying risk in the project; 2) assessing the impact of identified risk; 3) assessing the probability of risk occurrence; and 4) assessing impact on financial aspects.

The first step begins with gathering all of the conceivable risks of the project. The objective of risk assignment is to appropriately apportion risk, ordinarily by shifting them to the Private side, when the benefits of obtaining the project order are greater than the cost of risk transfer.

Risk assignment is purely a preparatory step. In some cases, a risk that was thought attributable to the Public side during the initial stage can later become transferable. Thus, it is important to understand that the assignment of risks can change. Moreover, when a risk remains attributable to the Public side even after risk transfer, it is important to minimize and alleviate this risk.

Table G7-9 Major Risk Items on PPP

Risk item		Description
Common risks		
Political risk	Legislation risk	Risk associated with legislation concerning utilization of private enterprises
	Political risk	Risk associated with change in government or parliamentary approval
	Legal risk	Risk associated with changes in related laws and ordinances
	Permit/license risk	Risk arising from acquirement of or delays for permits and licenses
	Taxation risk	Risk associated with changes in the tax system (e.g., new taxes, tax rate change, etc.)
	Public support risk	Risk that public support established by law, agreement, or contract is not provided
Economic risk	Economic risk	Risk of rising construction cost, operation cost, etc., due to price increase
	Interest rate risk	Risk arising from changes in interest rates
	Foreign exchange risk	Risk of rapid change in foreign exchange rates
Social risk	Community problem risk	Risk associated with citizens' movements or litigation arising from implementation of the project itself or use of private enterprise
	Environmental problem risk	Risk associated with environmental problems or litigation concerning the project or facility construction
Partner risk		Risk associated with the experience or ability of investors of the project company or project partner
Abnormal situation risk (force majeure risk)		Risk of natural disaster (major earthquake, etc.), war, civil uprising, etc.
Risks at the planning stage		
Study risk		Risk arising from inadequate or erroneous study (surveying, ground quality, etc.)
Design risk		Risk arriving from design errors, etc.
Plan alteration/delay risk		Risk associated with change or delay of plans based on environmental assessment, public hearing, etc.
Application risk		Risk associated with lost application cost due to bid failure
Risks at the construction stage		
Site risk		Risk of delay in site purchase/expropriation or site cost that exceeds budget
Related infrastructure development risk		Risk of delay in implementation of related public project, etc.
Construction cost overrun risk		Risk of construction cost overrun
Construction delay risk		Risk of project delay beyond contract period
Completion risk		Risk of project non-completion
Performance risk		Risk of need for additional work due to unmet specifications or standards
Risks at the operation stage		
Development of neighboring infrastructure risk		Risk of reduced demand due to construction of competing/related public or private facility in the project's targeted market area
Market risk	Demand forecast risk	Risk of lower-than-forecast demand
	Fee risk	Risk that fee revision does not take place in accordance with established agreement or contract
Operation management risk	Operation risk	Risk associated with operation, management, or maintenance (e.g., rising operation cost, etc.)
	Facility damage risk	Risk of facility damage caused by traffic accident, fire, etc.
Technical innovation risk		Risk of loss of facility/equipment need or efficiency due to future technical innovation
Default risk		Risk of project bankruptcy due to contractual default, force majeure, etc.

Source: Risk Management Manual on Road Projects, Construction Management Committee, Japan Society of Civil Engineers, March 2010)

G7.4.5 Contract Verification / Regulatory Institution

In order to coordinate the interests of private enterprises, which seek profits, ordinary residents, who expect to receive the highest quality of service at the lowest possible cost, and governments (both central and local), which represents the interests of ordinary residents, it is important to create a strong regulatory framework. Contracts (concession contracts, etc.) signed by private operators and authorities exemplify this framework. It becomes the regulatory institution's task to monitor the implementation of such contracts.

G7.4.6 Establishment of Yardsticks for Evaluating Execution, such as Performance Indicators in Contracts

Regardless of whether it is a Public or Private undertaking, the water services provided by the sewerage body must be objectively evaluated in terms of both quality and quantity. Reflecting such evaluations on sewage treatment charge makes it necessary to conduct them based on numerous indicators in order to ensure that the sewerage system is directly linked to the health and welfare of residents. Performance Indicators (PI) serve as indicators for quantitative ascertainment and analysis of the results and quality of provided maintenance and management service.

Particularly when introducing PPP, it is important to establish a sufficient number of Key Performance Indicators (KPI) at the PPP introduction stage. These KPI should then be presented as conditions when accepting bids from private operators and incorporated into contracts. The regulatory institution must then monitor sewerage project operation based on the KPI and reflect results on negotiations for revision of sewage treatment charge and other matters. If PPP is started without first establishing KPI, conflicts in performance evaluations between the government and private operator become inevitable. This creates the strong possibility of unfortunate results for both sides.

Conducting KPI-based project evaluations makes it possible to evaluate operational execution through the notation of time-oriented indicators. With regard to KPI application, it is important to study frameworks that provide incentives for private operators to improve their operations and water quality. Specifically, this could include incorporating into contracts requirements to conduct of cause analyses when performance of KPI are not met, and the levying of penalties on the private operator, as necessary, and conversely, inclusion of additional contract value for the private operator if performance exceeds KPI targets.

Table G7-10 presents candidate KPI that should be studied for inclusion into sewerage projects in Jakarta. 25 items are selected out of the candidate KPIs as major indicators and shown in hatched lines in the table. The KPIs to be applied on the actual PPP project varies greatly dependent on the type of PPP scheme. The concrete application of KPIs should be decided by the newly established Regulatory Organization, taking into consideration the type of PPP scheme to be applied and the actual case of the similar type of PPP in other countries, prior to the tender for the selection of the PPP operator.

It is thought that the following points, which were derived from operational conditions in ITP and the Setiabudi treatment facility deserve particular attention in sewerage projects in Jakarta. It will be necessary to consider these points as indicators.

1. Cases of illegal dumping of plastic bottles, plastic bags, and other solid waste into wastewater canals. The volume of such waste has a significant impact on the functional maintenance of water treatment facilities, and particularly pre-treatment facilities. Thus, the volume of such waste should be ascertained.
2. It is best to have a high number of water analysis items and frequent analyses. However, because this has a considerable impact on maintenance and management costs, simple treated sewage quality methods should be introduced and routine management methods should be reinforced.
3. The operating rates and conditions of malfunction and repair of wastewater treatment and sludge treatment equipment should be clarified.
4. Wastewater treatment costs and sludge treatment costs should be clarified.
5. In sludge treatment, cake moisture content is a major element in treatment expense. Thus, cake moisture content should be clearly standardized as a performance indicator.
6. Targets for preserving the environment around facilities should be clarified.

Table G7-10 Key Performance Indicators (KPI) that should be Studied for Inclusion in Sewage Projects (Proposed)

No	Key Performance Indicator (KPI)	Definition	Unit
(1) Basic information (fundamental information, such as information needed for calculating performance indicator, etc.)			
1)	Population/area		
1-1-1	DKI population	Total population of the entirety of DKI Jakarta	person
1-1-2	Sewerage plan district population	Population living in the district planning sewerage development	person
1-1-3	Pipeline-installed district population	Population living in the district where pipeline installation has been completed	person
1-1-4	Sewerage-connected population	Population that can connect to the sewerage system that is calculated based on the number of people holding service contracts	person
1-1-5	Administrative district area	Total area of DKI Jakarta	m^2
1-1-6	Sewerage plan district area	Area of the district planning sewerage development	m^2
2)	Customer contracts		
1-2-1	No. of contract holders	Number of people holding service contracts for each fee category	case
1-2-2	Contract building area	Area of contract buildings for each fee category	m^2
3)	Wastewater volume		
1-3-1	Estimated volume of wastewater for treatment	Estimate of wastewater volume to be released into sewage pipelines by contract holders (volume of wastewater estimated from contract building area, number of contract holders, and actual flow volume measurement surveys)	m^3/day
1-3-2	Volume of wastewater influent into treatment facility	Actual wastewater volume flowing into each treatment facility	m^3/day
1-3-3	Accounted-for water as percent of total	Estimated volume of wastewater for treatment ÷ volume of wastewater influent into treatment facility × 100	%
1-3-4	Volume of reused water	Volume of reused treated water	m^3/day
4)	Sludge amount		
1-4-1	Treated sludge volume	Amount of sludge treated at sludge treatment facilities (volume of sludge produced by water treatment facilities)	m^3/day
1-4-2	Removed cake amount	Amount of cake taken away from treatment plants	tons/day
1-4-3	Screen residues amount	Amount of screen residues flowing into treatment plants and removed	tons/day
1-4-4	Treatment sludge moisture content	Percentage of moisture contained in sludge to be treated	%
1-4-5	Removed cake moisture content	Percentage of moisture contained in cake taken away from treatment plants	%
1-4-6	Sludge use volume	Amount of sludge that is reused	m^3/day
5)	Water quality		
1-5-1	Effluent quality regulation value	Regulated item concerning the quality of effluent (BOD, COD_{cr}, TSS, KMnO4, pH, Ammonia, Compound Blue Metillent, Oil & Fat)	mg/L, etc.
1-5-2	Frequency of effluent quality measurement	Frequency of effluent quality measurements taken over the course of a year	times/ year
1-5-3	Water quality measurement item for each treatment process	Water quality measurement item for each treatment process (raw water, primary wastewater, secondary wastewater, effluent, etc.)	item
1-5-4	Water quality measurement frequency for each treatment process	Frequency of quality measurement for each treatment process (raw water, primary wastewater, secondary wastewater, effluent, etc.)	times/ month
1-5-5	Water quality measurement value for each treatment process	Water quality measurement value for each treatment process (raw water, primary wastewater, secondary wastewater, effluent, etc.)	mg/L, etc.
6)	Facilities		
1-6-1	Pipeline installation length	Length of installed sewage pipeline	m
1-6-2	Pipeline installation area	Area of district with installed pipeline	m^2

Table G7-10 Key Performance Indicators (KPI) that should be Studied for Inclusion in Sewage Projects (Proposed)

1-6-3	No. of manholes	Number of manholes being managed	place
1-6-4	WWTP capacity	Planned wastewater treatment capacity of treatment plants	m^3/day
1-6-5	No. of equipment points	Number of equipment points for mechanical equipment and electrical instrumentation equipment	point
7)	Service ratio, etc.		
1-7-1	Service coverage ratio	Sewerage-connected population ÷ DKI Jakarta population × 100	%
1-7-2	Sewerage coverage ratio	Pipeline installation area ÷ DKI Jakarta population × 100	%
1-7-3	Sewerage connection ratio	Sewerage-connected population ÷ pipeline-installed district population × 100	%
8)	Management		
1-8-1	No. of employees	Number of employees involved in wastewater facility management	person
1-8-2	Revenue item	Total revenue, amount of sewage fees collected, amount of sewage fees billed, operating revenue, etc.	IDR
1-8-3	Expenditure item	Total expenditure, wastewater treatment expense, sludge treatment expense, repair expense, employee salary expense, outsourcing expense, etc.	IDR
1-8-4	Wastewater treatment expense	Expense for consumed electricity and consumed chemicals needed for wastewater treatment	IDR
1-8-5	Sludge treatment expense	Expense for consumed electricity and consumed chemicals needed for sludge treatment	IDR
1-8-6	Repair expense	Expense needed for facility repairs	IDR
1-8-7	Wastewater treatment power consumption	Amount of electricity needed for wastewater treatment	kWh
1-8-8	Wastewater treatment chemical consumption	Amount of chemicals needed for wastewater treatment	m^3/day
1-8-9	Sludge treatment power consumption	Amount of electricity needed for sludge treatment	kWh
1-8-10	Sludge treatment chemical consumption	Amount of chemicals needed for sludge treatment	m^3/day
(2) Indicators pertaining to sewerage facility operation and management			
2-1	Water-quality target achievement rate (BOD, etc)	Number of times of water-quality target achievement ÷ number of times of water-quality survey × 100	%
2-2	Water-quality analysis implementation rate (each treatment process)	Number of times water-quality analyses were actually conducted during the year ÷ number of times water-quality analyses were planned during the year (for each process: raw water, primary wastewater, secondary wastewater, effluent, etc.) × 100	%
2-3	Treated water transparency excess rate	Number of times (treated water transparency for each water treatment system [1 time/day] － target transparency) exceeds 0 ÷ 365 × 100	%
2-4	Screen residues volume basic unit	Amount of screen residues ÷ volume of treated wastewater	kg/m^3
2-5	Sludge cake volume basic unit	Removed cake volume ÷ volume of treated wastewater	kg/m^3
2-6	Sludge moisture content excess rate	Number of times (sludge moisture content [1 time/day] － target moisture volume) exceeds 0 ÷ 365 × 100	%
2-7	Wastewater treatment power basic unit	Wastewater treatment power consumption ÷ volume of treated wastewater	kWh/m^3
2-8	Sludge treatment power basic unit	Sludge treatment power consumption ÷ volume of treated wastewater	kWh/m^3
2-9	Rate of in-house power generation during blackouts	(Time of in-house power generation ÷ blackout time) × 100	%
2-10	Equipment operation rate	(Number of operating equipment points ÷ total number of equipment points) × 100	%
2-11	Electrical machinery	(Number of malfunctioning electrical machines ÷ total number of	%

Table G7-10 Key Performance Indicators (KPI) that should be Studied for Inclusion in Sewage Projects (Proposed)

	malfunction rate	electrical machines) × 100	
2-12	Equipment repair man-hour rate	([Repair time × man hours] ÷ [operating time × man hours]) × 100	%
2-13	Regular inspection implementation rate (for each major facility)	Number of actual facility inspections conducted ÷ number of planed facility inspections (for each major facility) × 100	%
2-14	Equipment ledger maintenance rate	Number of equipment points where ledgers are maintained ÷ total number of equipment points × 100	%
2-15	Pipeline ledger maintenance rate	Length of pipeline for which ledgers are maintained ÷ total length of maintained pipeline × 100	%
2-16	Pipeline cleaning rate	Length of cleaned sewage pipeline ÷ total length of maintained sewage pipeline × 100	%
(3) User service indicators			
3-1	Effluent quality standard compliance rate (BOD, etc.)	Number of times of effluent water quality compliance ÷ number of water quality analyses × 100	%
3-2	No. of sewer pipe blockages (per 10,000 people)	Number of sewer pipe blockages ÷ sewerage-connected population $\times 10^4$	case
3-3	No. of accidents causing death or injury to third party (per 10,000 people)	Number of accidents causing death or injury to a third party during the year ÷ sewerage-connected population $\times 10^4$	accident
3-4	No. of complaints regarding sewerage service (per 10,000 people)	Total number of complaints ÷ sewerage-connected population $\times 10^4$	complaint
3-5	Total per-person expenditure of sewerage-connected population	Total expenditure (total cost connected with sewerage project operation) ÷ sewerage-connected population	IDR/ person
3-6	Per-person wastewater treatment expense of sewerage-connected population	Wastewater treatment expense ÷ sewerage-connected population	IDR/ person
3-7	Per-person sludge treatment expense of sewerage-connected population	Sludge treatment expense ÷ sewerage-connected population	IDR/ person
3-8	Average accounted-for water volume per person per day	Accounted-for water volume ÷ sewerage-connected population	m^3/ person
(4) Management indicators			
4-1	Accounted-for water as percent of total	Accounted-for water volume ÷ volume of treated wastewater × 100	%
4-2	Sewage tariff basic unit	Revenue from sewage tariff ÷ volume of treated wastewater	IDR/m^3
4-3	Wastewater treatment basic unit	Wastewater treatment expense (expense for consumed power and chemicals) ÷ volume of treated wastewater	IDR/m^3
4-4	Sludge treatment basic unit	Sludge treatment expense (expense for consumed power and chemicals) ÷ volume of treated wastewater	IDR/m^3
4-5	Expense recovery rate	Amount of sewage tariff collected ÷ wastewater treatment expense × 100	%
4-6	Tariff collection rate	Amount of sewage tariff collected ÷ amount of sewage tariff billed× 100	%
4-7	Rate of total returns	Total revenue ÷ total expense × 100	%
4-8	Treatment-service	Population receiving sewage treatment service ÷ number of employees	person

Table G7-10 Key Performance Indicators (KPI) that should be Studied for Inclusion in Sewage Projects (Proposed)

	population per employee		
4-9	Sewage treatment revenue per employee	Amount of sewage tariff collected ÷ number of employees	IDR/ person
4-10	Operating revenue per employee	Operating revenue ÷ number of employees	IDR/ person
4-11	Ratio of operating revenue against employee salary expenditure	Employee salary expenditure ÷ operating revenue × 100	%
4-12	No. of employees per treatment plant	Number of employees ÷ number of wastewater treatment plants	person
(5) Environmental burden indicators			
5-1	Recycled water usage rate	Amount of used recycled water ÷ volume of treated wastewater × 100	%
5-2	Wastewater sludge recycling rate	Amount of used sludge ÷ amount of generated sludge × 100	%
5-3	Odor intensity excess rate	(Established boundary target ＞ monthly measurement) ÷ 12 × 100	%
5-4	Noise excess rate	(Established boundary target ＞ monthly measurement) ÷ 12 × 100	%
5-5	Maximum treated water quality	Yearly maximum of monthly measurements (BOD, COD, SS, NH_4-N)	mg/L
5-6	Amount of consumed vehicle gasoline	Monthly of gasoline used by work vehicles	L/month
No	Key Performance Indicator (KPI)	Definition	Unit

Source: JICA expert team

G7.4.7 Management Philosophy and Related Policies Required by PPP Enterprises

As the contact points for provision of public capital, the Indonesian government and DKI Jakarta must coordinate the interests of private enterprises and service beneficiaries. They must recognize that social responsibility to service beneficiaries (the general public) the stakeholders who will judge decision-making by private enterprises is essential, and they must implement measures to raise awareness of this responsibility. On the other hand, they must carefully assess the appropriateness of private enterprises (which will be situated at the core of PPP) as partners and implement PPP based on full consideration of their advantages and disadvantages by considering the following points.

(1) Demonstration of Corporate Social Responsibility

Enterprises have a responsibility to explain their economic activities to stakeholders. It is self-evident that companies that cannot explain their activities do not gain social acceptance, and that companies that are not trusted cannot survive. PPP enterprises must do more than pursue profit. They must also make appropriate decisions in response to demands from various stakeholders (e.g., service beneficiaries, investors, and society at large) while taking responsibility for the impacts their actions have on society.

(2) Implementation of Accountability

PPP enterprises must generally disclose and achieve accountability for their business operations. This includes providing data on management indicators and performance indicators. As was discussed in G7.4.6, such accountability is particularly true for sewerage projects.

(3) Quantitative Presentation of added Value and Service Improvement

The connection of sewerage systems to individual houses can be expected to improve living environments in multiple ways. Among them will be reduced work of extracting sludge from septic tanks (which will be subject to stricter regulation in the future), elimination of decay and odor caused by the release of domestic wastewater into gutters, and fewer bacterial pathogens and disease vectors, such as mosquitoes, flies, and rats. PPP enterprises must quantitatively and clearly present improvements in added value and service, such as better living environments and public hygiene that

result from connection to sewerage systems to service beneficiaries. Doing so can promote the sewerage connection rate and lead to higher revenue for enterprises.

(4) Promotion of Appropriate Measures to Improve Management Profitability

PPP enterprises must constantly seek measures to improve project profitability by reducing project costs and expanding related businesses. Approaches that could be considered include introduction of international competitive bidding in procurements and building projects for reuse of treated water in ITP.

(5) Implementation of Public Education and Other Projects to Reduce Project Risk

PPP enterprises must actively implement public education projects on such topics as water conservation, separating out oil from domestic wastewater, and correction of illegal solid waste dumping practices. These efforts must be coordinated with government measures to raise awareness of responsibility among service beneficiaries. These actions will make it possible for PPP enterprises to lower some areas of project risk.

(6) Understanding and Sufficient Dialogue Concerning National Finances and Administrative Background

For PPP projects that are associated with ODA, PPP enterprises must fully respect the long-term outlook and policy of the partner country. Moreover, they must consider the scope within which PPP is formed and its schemes (see 7.2). PPP enterprises must sincerely disclose their basic business format, technical and fiscal policies, and concrete measures pertaining to these policies, and then engage in repeated discussions until mutual understanding is fully attained. On the other hand, as a contact point for provision of public capital, DKI Jakarta has an obligation to fully study whether or not PPP projects are sustainable undertakings that will benefit DKI Jakarta. By having both sides work in such a manner, a trusting relationship indeed, a partnership would begin to form. It is in this way that decisions concerning the implementation or non-implementation of projects should be made.

PART-H ENVIRONMENTAL EDUCATION AND PUBLIC CAMPAIGN ACTIVITIES FOR WASTEWATER SECTOR

PART-H ENVIRONMENTAL EDUCATION AND PUBLIC CAMPAIGN ACTIVITIES FOR WASTEWATER SECTOR

H1 Background

The preparation of the New M/P makes it possible to promote the construction of sewerage works, to improve on-site facilities for household use and maintenance work (regular sludge extraction), and to improve on-site facilities for corporate use and maintenance work. As a result, the budget increases and the citizens and companies are obliged to pay higher treatment costs. However, the people concerned neither recognize nor justify the increased burden toward environmental improvement. Given the importance of their understanding such circumstances and cooperating with each other, campaigns and environmental education shall be conducted.

DKI Jakarta participates in the Accelerated Development of Residential Sanitation Program (PPSP) and is establishing a working group in accordance with a city governor's order in 2011. Currently, BPLHD is holding a meeting (see S/R Part-H). The working group plans to develop a white paper on sanitation in the autumn of 2011 to show basic strategies for making the city hygienic. For the white paper, the working group conducts an environment and health risk assessment (EHRA) to collect data on the current state of sanitation and to identify and evaluate hygienic problems. The PPSP will continue in the next year and later, this project carries on environmental education and campaigns while supporting the program and considering its fruits. Note that the appendix shows the results of environmental education and campaigns for waste and sanitation conducted in Indonesia in 2008 and later.

H2 Action Goal

The Indonesian government, including politicians, the managing staff of relevant agencies, and administrative officials in the metropolitan area of Jakarta, does not give priority to investment in the sanitation sector, so activities for raising their awareness are very important. Moreover, addressing problems in wastewater treatment in DKI Jakarta requires the New M/P activities for letting the people concerned awareness of environmental improvement. The latter includes meetings with residents, public relations in mass media, enlightening documents, billboards, and school education. The environmental education and campaigns in this project shall be conducted with the above-mentioned PPSP project that has started in DKI Jakarta.

H3 Objectives

(1) Implementing the New M/P is effective in addressing problems in the wastewater treatment of DKI Jakarta, but the Indonesian government, the members of the DKI Jakarta assembly and the managing staff of relevant ministries and agencies do not understand importance of investment in "Sanitation." The first objective of the environmental education and campaigns is to raise their awareness.

(2) The second objective is to let the administrative officials of DKI Jakarta improve their ability to draw up a plan for addressing the wastewater treatment problems toward the implementation of the New M/P.

(3) Implementation of the New M/P will improve the quality of administrative services. The third objective is to educate the beneficiaries, such as companies and citizens, to raise their awareness of environmental improvement.

H4 Proposed Environmental Education and Public Campaign Activity

(1) Supporting the PPSP Working Group (1st Objective)

The environmental education and campaigns in this project are activities that support the PPSP working group and that are based on the supporting results. The working group plans to publish a

white paper on sanitation in November 2011 to show DKI Jakarta sanitary strategies, which are developed in consideration of the New M/P.

(2) Training the Administrative Officials in Charge of DKI Wastewater Treatment (2nd Objective)

On-the-job training and JICA training in Japan are used to improve the officials' ability to draw up a plan for addressing problems in wastewater treatment.

(3) Meeting with Residents (3rd Objective)

A meeting is held for the project stakeholders to understand, agree to, and participate smoothly in the project. It takes place in units of communities, Kelurahan districts, and hotel and restaurant operators. The meeting results are reflected in the implementation of the project.

In the Denpasar Sewerage Development Project II, the following educational activities are being conducted such as meetings with residents, which are aimed at the promotion of sewerage connection. As a result, 90% of residents in the planning area express their willingness for a connection to the sewer system. Therefore, these activities would be effective for the project based on the new M/P.

The contents/purpose of educational activities which are being conducted in the Denpasar Project are as follows:

1. Understanding and cooperation for construction period (Smooth construction)
2. Advantage and driving method of promotion of connection (Willingness to connect)
3. Understanding and cooperation of tariff collection system (Tariff retribution)
4. Understanding and cooperation of prevention of disposal wastes into the sewerage system (O&M improvement)

(4) Public Relations in Mass Media (3rd Objective)

Newspaper articles, radio broadcasts, and press interviews are used for the mass of people to understand the project and to cooperate in smooth work. Timely public relations in parallel with the progress of the project are important not only for smooth work but also for the maintenance of safe work.

(5) Producing a Motion Picture (2nd and 3rd Objectives)

A motion picture (up to ten minutes) is produced to introduce the wastewater treatment system defined in the New M/P. It presents an easy-to-understand description of how much and why the current river is contaminated, through data and images, and shows how the promotion of the system and the improvement of on-site facilities contribute to a clean river. The motion picture consists of two kinds of video: one is for administrative officials and the other is for the mass of people, such as communities and companies.

(6) Developing Master Plan Related Documents (1st, 2nd, and 3rd Objectives)

Necessary documents are developed according to the progress of the New M/P. They are handed out in public areas and at a meeting with residents, and include the progress of the project and a request for cooperation in fieldwork.

(7) Billboards (1st, 2nd, and 3rd Objectives)

Billboards that show the nature of the project are fabricated for the mass of people to understand and cooperate in it. They are installed in strategic places, such as roads to airports, main streets, and key public facilities. This program can let many people know about the project.

(8) School Education (3rd Objective)

School education applies to the upper grades of elementary schools. Students are expected to learn about the relationship between daily life and the environment, raise their awareness of environmental conservation, and transfer it to their parents. This program includes a feasible objective and concrete

action plan. The following shows an example of the program.

Example of environmental education programs for elementary schools
(understanding of wastewater treatment)

- Objective: To let students raise awareness of measures against wastewater and understand the payment of treatment charges.
- Scope: Upper grades of elementary schools
- Evaluation: A questionnaire is used to compare interest in attending environmental preservation activities and awareness of paying charges before the program with those after the program.
- Executor: Administrative officials of DKI Jakarta and expert members of the project
- Place: Classrooms of elementary schools
- Introduction: Cards and pictures are used to show the students topics.
- Development: All the attendants have talks with each other in the manner of a game.
- Confirmation: The students take a field tour and return to the classroom for re-discussion.
- Expenditure: Classroom rental fees, educational material costs, and drink costs for the attendees.

Source: JICA expert team

H5 Implementing Schedule

Table H5-1 shows the schedule of the environmental education and campaigns to be conducted before the work starts (2012 and 2013) and after it (2014 and later). The PPSP working group ends its operation at the end of FY 2011, so a follow-up survey will be conducted in FY 2012 in place of the support of the working group. Administrative officials are trained once a year as JICA training in Japan. Meetings with residents, public relations in mass media, and the new M/P-related document creation are to be conducted at the right time by the end of FY 2014. Motion pictures and billboards are to be created in FY 2014 and later. School education is to be given annually from FY 2014, in which the project is to start practically.

Table H5-1 Schedule for Implementing the Environmental Education and Campaigns

Item	2012	2013	2014	2015	2016
Supporting the PPSP working group	⟷	⟷			
Training the administrative officials in charge of DKI wastewater treatment	⟷	⟷	⟷		
Meeting with residents	⟷	⟷	⟷		
Public relations in mass media	⟷	⟷	⟷		
Producing a motion picture			⟷	⟷	⟷
Developing the New M/P-related documents	⟷	⟷	⟷		
Billboards			⟷	⟷	⟷
School education			⟷	⟷	⟷

Source: JICA expert team

PART-I CAPACITY BUILDING FOR COUNTERPART ORGANIZATIONS

PART-I CAPACITY BUILDING FOR COUNTERPART ORGANIZATIONS

I1 Training in Japan

Training in Japan had 2 courses; managers' course and engineer leaders' course. The managers' course was implemented from 6th June, 2011 to 10th June, 2011, and had 5 trainees. The engineer leader' course was implemented from 20th June, 2011 to 7th July, 2011, and had 9 trainees. The following Table I1-5 and Table I1-6 show the programs respectively.

I1.1 Managers' Course

The purposes of the managers' course are as follows;

Purpose of Managers' Course

(1) To understand the wastewater management policy and plan, related organization and regulation in Japan
(2) To understand the management and financial source for sewerage system in Japan
(3) To understand the research and public relations for sewerage system in Japan

The following table shows the main contents of this course (curriculum).

Table I1-1 Main Contents of Managers' Course

No.	Main Contents
1	Sewerage policy
2	Sewerage laws and standard regulations
3	Public relations strategy for sewerage
4	Administration for recycling water and water quality standards
5	Administration for water quality management
6	Administration for on-site system (johkasou)
7	Organizational and business management for sewerage
8	Contracting-out for sewerage
9	Practical training for bio-gas utilization
10	Practical training for membrane process

Source: JICA expert team

From the results of the questionnaire survey which was conducted after the training, the results showed that all trainees could achieve most of goals of the training. Some trainees told that the five days were short to understand the wastewater management in Japan; however, the engineer leaders' course could supplement it. The list of trainees for the managers' course was as follows;

Table I1-2 List of Trainees for Managers' Course

Name	Position and Organization
Mr.Sjukrul Amien	Director of Environmental Sanitation Development, DGHS, MPW
Mr.Handy B Legowo	Head of Sub Directorate of Wastewater System Development, DGHS, MPW
Mr.Ismono	Head of Legal Affairs Bureau, Ministry of Public Works
Ms.Vera Revina Sari	Head of Division for Infrastructure & Environment, Regional Development Planning Board, DKI Jakarta
Mr. Laisa Wahanudin	Head of Sub Directorate, Directorate of Settlements and Housing, National Planning & Development Board

Source: JICA expert team

I1.2 Engineer Leaders' Course

The purposes of the engineer leaders' course are as follows;

Purpose of Engineer Leaders' Course.

(1) To hold a vision for the ideal wastewater treatment system, and to acquire the necessary management skills
(2) To understand the method to prepare sewerage master plans in the metropolitan cities in Japan, and the practical methods to implement these plans

The following table shows the main contents of this course (curriculum).

Table I1-3 Main Contents of Engineer Leaders' Course

No.	Main Contents
1	Sewerage policy
2	Sewerage laws and standard regulations
3	Public relations strategy for sewerage
4	Administration for recycling water and water quality standards
5	Sewerage planning
6	Technology for sewerage (sewer network and facility) and operation and maintenance
7	Contracting-out for sewerage
8	Practical training for wastewater purification
9	Preparation of action plans
10	Administration for water quality management and for on-site system (johkasou)
11	Basic plan for domestic wastewater treatment
12	Treatment technology for night soil, and operation and maintenance for the facility
13	Practical training for water quality analysis
14	Operation and maintenance for johkasou
15	Practical training for night soil treatment
16	Practical training for bio-gas utilization
17	Technology for water works
18	Appropriate technology in developing countries
19	Practical training for johkasou

Source: JICA expert team

From the results of the questionnaire survey which was conducted after the training, the results showed that all trainees could achieve most of the goals of the training as same as the managers' course. Some trainees requested the practical problem solving methods, the low cost wastewater treatment, and the lecture on the financial management, such as the fund raising methods. This training course could not cover these items, so JICA expert team would provide the necessary information during the Project. The list of trainees for the engineer leaders' course is as follows;

Table I1-4 List of Trainees for Engineer Leaders' Course

Name	Position and Organization
Ms. Vika Eka Lestari	Staff of Sub Directorate for Sanitation Development / Directorate of Environmental Sanitation Development, MPW
Ms. Kusumaningrum Mahardiani	Staff of Sub Directorate of Wastewater / Directorate of Environmental Sanitation Development, MPW
Mr. Eko Budi Setiawan	Staff of Sub Directorate of Wastewater / Directorate of Environment Sanitation Development, MPW
Ms. Driah Triastuti	Staff / Spatial Plan and Environment Subdivision, Urban Infrastructure and Environment Division, BAPPEDA
Ms. Dian Triastuti	Staff / Directorate of Program Development, Directorate General of Human Settlements, MPW
Mr. Eko Gumelar	Staff / Sector Pollution Control and Environmental Sanitation, BPLHD

Table I1-4 List of Trainees for Engineer Leaders' Course

Name	Position and Organization
Susanto	
Mr. Andi Chandra	Staff / Secretariat Division of Cleansing Agency, Jakarta
Mr. Hendry Sitohang	Assistant Manager / Program and Development Division, PD PAL JAYA
Ms. Adri Pontianti	Assistant Manager / Customer Service Division, PD PAL JAYA

Source: JICA expert team

As a whole, trainees of both courses were able to understand the cases of Japan, and to hold a vision for the ideal wastewater treatment system, although the level of understanding is different among trainees.

Table I1-5 Schedule of Managers' Course

Date		Time	Place	Lecturer	Program	
4-Jun	Sat	PM			Departure from Jakarta	
5-Jun	Sun	AM			Arrival in Narita	
6-Jun	Mon	9:30 - 11:30	TIC	JICA	Briefing	Explanation of living information
		13:00 - 13:30		JESC	Orientation	Explanation of the course
		13:30 - 17:00		JESC	Lecture	Sewerage policy, sewerage laws and standard regulations, public relations strategy for sewerage, and administration for recycling water and water quality standards
7-Jun	Tue	9:30 - 11:30	TIC	MOE	Lecture	Administration for water quality management and for on-site system (johkasou)
		14:00 - 16:30	Saitama City	Saitama City	Lecture	Organizational and business management for sewerage
8-Jun	Wed	10:30 - 12:00	Yokohama City	Yokohama City	Practical training	Bio-gas utilization
		16:00 - 17:30	MLITT:		Courtesy call	
9-Jun	Thu	9:30 - 11:30	TIC	WA	Lecture	Contracting-out for sewerage
		14:00 - 16:00	TMG	TMG	Practical training	Membrane process
10-Jun	Fri	9:30 - 12:00	TIC	JICA Project Team	Discussion	
		12:00 - 13:30			Lunch meeting	
		14:00 - 15:00			Preparation of training report	
		16:00 - 16:30			Evaluation meeting	
11-Jun	Sat	AM			Departure from Narita	
		PM			Arrival in Jakarta	

Note:
JESC: Japan Environment and Sanitation Center
MLITT: Ministry of Land, Infrastructure, Transport and Tourism
MOE: Ministry of Environment
TIC: Tokyo International Center
TMG Tokyo Metropolitan Government
Source: JICA expert team

Table I1-6 Schedule of Engineer Leaders' Course

Date		Time	Place	Lecturer	Program	
18-Jun	Sat	PM			Departure from Jakarta	
19-Jun	Sun	AM			Arrival in Narita	
20-Jun	Mon	9:30 - 11:30	TIC	JICA	Briefing	Explanation of living information
		13:30 - 14:30		JESC	Orientation	Explanation of the course
		14:30 - 15:00		JESC	Video forum	
		15:00 - 16:30		JICA expert team	Presentation	Job report
21-Jun	Tue	9:30 - 12:30	TIC	JICA expert team	Presentation	Job report
		13:30 - 16:30		JICA expert team	Lecture	Guidance for preparation of action plan
22-Jun	Wed	9:30 - 11:30	TIC	MLITT:	Lecture	Sewerage policy, sewerage laws and standard regulations, public relations strategy for sewerage, and administration for recycling water and water quality

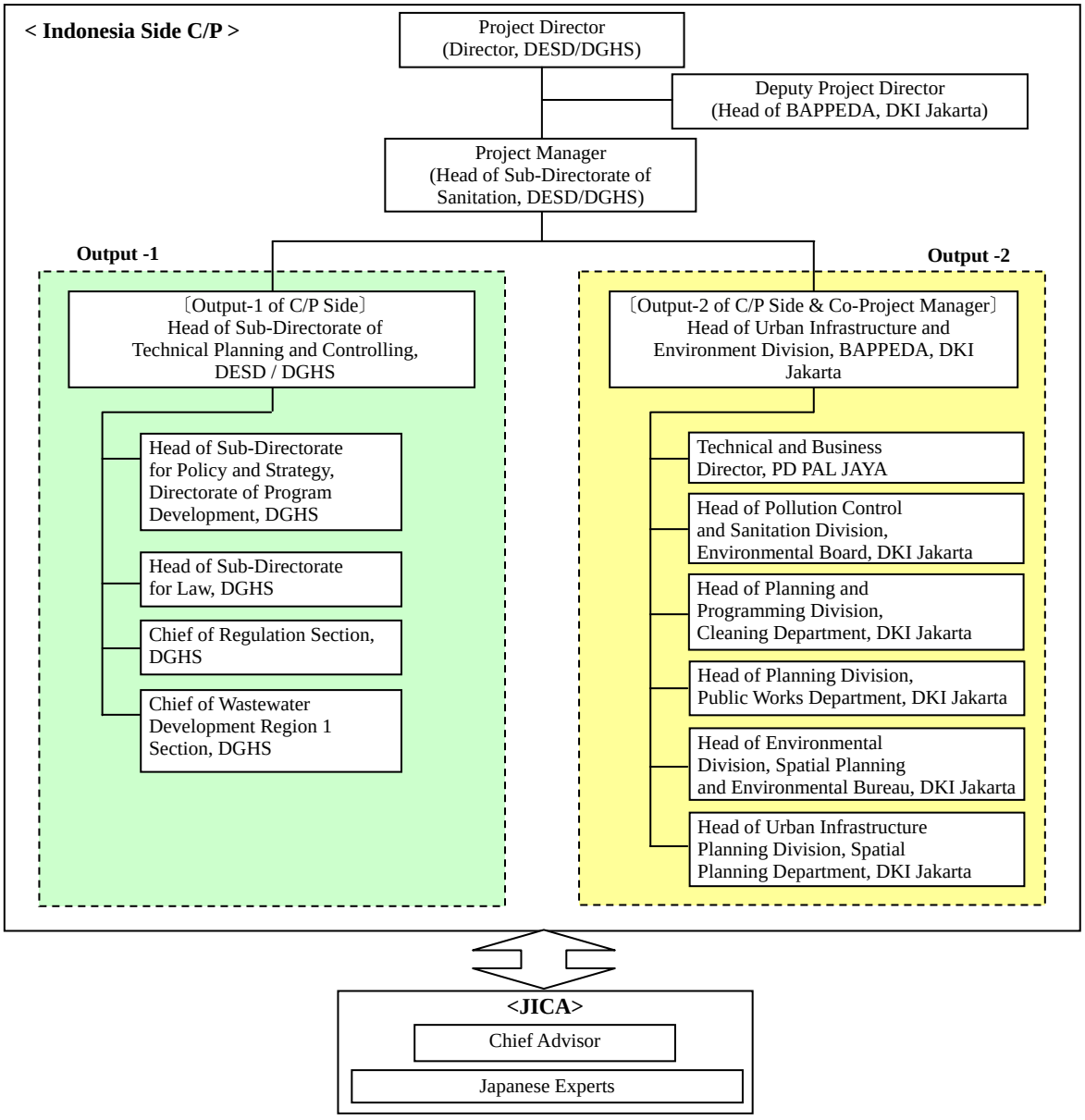
Table I1-6 Schedule of Engineer Leaders' Course

Date		Time	Place	Lecturer	Program	
						standards
		13:30 - 16:30		JSC	Lecture	Sewerage planning
23-Jun	Thu	9:30 - 14:30	TIC	JSC (SBMC)	Lecture	Technology for sewerage (sewer network and facility) and operation and maintenance
		14:30 - 16:30		JSC, JSTPMA	Lecture	Contracting-out for sewerage
24-Jun	Fri	9:30 - 11:30	TMG	JESC	Practical training	Wastewater purification
		14:00 - 16:00	TIC	JESC	Preparation of action plans	
25-Jun	Sat					
26-Jun	Sun					
27-Jun	Mon	9:30 - 11:30	TIC	MOE	Lecture	Administration for water quality management and for on-site system (johkasou)
		13:30 - 16:30		JSC (JESC)	Lecture	Basic plan for domestic wastewater treatment
28-Jun	Tue	9:30 - 11:30	Saitama Prefecture	JEMA	Lecture	Treatment technology for night soil
		13:30 - 16:30		JEMA	Lecture	Operation and maintenance for the facility for night soil
29-Jun	Wed	10:00 - 16:00	JECES	JSC (JECES)	Lecture and practical training	Practical training for water quality analysis, and operation and maintenance for johkasou
30-Jun	Thu	10:00 - 11:30	Saitama Prefecture	Saitama City	Practical training	Treatment technology for night soil
		14:00 - 16:00		Nikko Corporation	Practical training	Production of facility for night soil (johkasou)
1-Jul	Fri	10:00 - 12:00	Kanagawa Prefecture	JSC (JESC)	Practical training	Production of personal facility for night soil (johkasou)
		14:30 - 16:00		JSC (JESC)	Practical training	Bio-gas utilization
2-Jul	Sat					
3-Jul	Sun					
4-Jul	Mon	9:30 - 11:30	TIC	University of Shizuoka	Lecture	Technology for water works
		13:30 - 17:30		Toyo University	Lecture	Appropriate technology in developing countries
5-Jul	Tue	9:30 - 11:30	TMG	TMG	Practical training	Water purification
		14:00 - 15:00		JEC (JESC)	Practical training	Public relations for sewerage
6-Jul	Wed	9:30 - 11:30	TIC	JSC (JESC, JTL)	Lecture	Cooperation project to support the sanitation improvement in developing countries
		13:30 - 17:00		JSC (JESC)	Preparation of action plans	
7-Jul	Thu	9:30 - 15:30	TIC	Toyo University	Presentation of action plans	
		16:00 - 16:30		JICA	Evaluation meeting	
8-Jul	Fri	AM			Departure from Narita	
		PM			Arrival in Jakarta	

Note:
JECES: Japan Education Center of Environmental Sanitation
JESC: Japan Environment and Sanitation Center
JSC: Nihon Sanitation Consortium
JSTPMA Japan Sewage Treatment Plant Operation and Maintenance Association
JTL: Japan Toilet Labo.
MLITT: Ministry of Land, Infrastructure, Transport and Tourism
MOE: Ministry of Environment
SBMC: Sewerage Business Management Center
TIC: Tokyo International Center
TMG Tokyo Metropolitan Government
Source: JICA expert team

I2 Working Groups

The implementation system of the Project is shown in Figure I2-1. C/P of this Project is DKI Jakarta.



Source: JICA expert team

Figure I2-1 Project Implementation System for the Project

In order to conduct the Project activities smoothly, working group (hereinafter referred to as WG) was organized after 2 to 3 persons-in-charges of the Project were nominated from 7 directorates of DKI Jakarta. In principle, this WG meeting is held every two weeks (the meeting is not held only if there is not any progress,). In order to facilitate the capacity development of the C/P staff, the WG meeting is being operated in a style of mini-workshop. Attendants are mostly 20 persons in every meeting. Dates and contents of the WG meeting are as shown in Table I2-1.

Table I2-1 Contents of Working Group Meeting

No.	Date	Main Discussion Contents
1	5th January 2011	1. Survey of 35 individual treatment plants 2. Intermediate survey result of candidate sites for WWTP 3. Volume and water quality of wastewater
2	20th January 2011	1. Flow of sewerage planning (for Japan's case) 2. Organizations related sewerage planning and project implementation: Introduction of the related organizations in Japan and confirmation of the counterpart organization. 3. Intermediate survey result of candidate sites for WWTP
3	13th April 2011	1. Intermediate survey result of candidate sites for WWTP 2. Population projection 3. Final survey result of individual treatment plant for commercial 4. Activities for the coming 3 months (May to July)
4	16th August 2011	1. Method to set sewerage zones

Source: JICA expert team

I3 Training for GIS Database Development

As a capacity development for C/P team, GIS Database development trainings were performed. Major objective of the trainings were intended to increase user base of GIS software in participating institutes. Basic Analysis Course was designed for starter to learn about operations while analysis on GIS. CAD Data Conversion Course was also planned not only to learn very basic operations but also to solve some for more practical issues. Trainings were done on 1st November 2011 until 22nd November 2011. During training period, fourteen (14) attendees have attended the Basic Analysis Course and eleven (11) attendees have attended the CAD Conversion Course. More detailed explanation on training course is shown in I3.1.

In the training course, following objectives were set for the technical aspect.

1. Learn how to change graphical expression using GIS software
2. Learn how to prepare database for GIS software
3. Learn how to use existing GIS database for own use

At the follow up meeting, attendees have prepared and presented their original maps for their professions. Therefore, generally all of the attendees have achieved the goals.

One of the major objectives of this training was to establish social networks among GIS users in C/P team. It is planned to share issues surrounding GIS Database development in DKI Jakarta.

1. Necessity of catching up base map improvement in DKI Jakarta and following their roadmap
2. Necessity of establishing feedback cycle for data quality improvement
3. Necessity of burden sharing and information sharing among participating institutes

During follow-up meeting, C/P team member have mentioned about plan to set up regular meeting to tackle above mentioned issues. Therefore, it is considered that attendee from C/P team member have shared understanding about their issues surrounding GIS Database development in DKI Jakarta.

On the other hand, there were request for the training contents to solve problems in the fields such as procedures for backup, version controls for data sharing and repetition drills for each procedure. These request involved issues which happen in the operation stage. Therefore, it was considered as the findings of this training and issues to be solved in the future as in I3.4.

I3.1 Overview of Training Course

I3.1.1 Background

As a part of capacity development (hereafter CD) the Project has prepared GIS training for C/P team. Major purpose of this CD is to establish sustainable developing environment for GIS database which will be utilized by C/P team to allow sewerage network development planning.

The contents of the training were prepared based on preliminary survey done by the JICA Project team. The result of preliminary survey shows following issues are considered as major cause of difficulties.

1. Major platform to utilize spatial data was CAD and these data were yet to be converted to GIS data
2. There were no information sharing base for methods for converting data and developed results such as GIS database or results of GIS analysis

In addition, from the results of the preliminary survey, it was found that only PD PAL JAYA had experience to operate and maintain GIS Database in C/P team. Therefore, the JICA Project team chose PD PAL JAYA as a main body for operating and maintaining GIS Database.

I3.1.2 Target Attendee for Training

Attendees for training were selected from institutes that are related to sewerage network developments. The conditions to select attendee were not limited by experiences for GIS training. But to cover possible user in the every sections that might use GIS software. In following table shows distribution of attendee for the training.

Table I3-1 Participating Institutes and Distribution of the Attendee

Institution	Expected Roll	Number	Current Status of Spatial Data Development
PD PALJAYA	O/M of GIS Database	7	Developed GIS Database for Sewerage Network and Customer
DTR	Provision of Base map	1	Developed Topological Map and Land Use Map on CAD Platform
BAPPEDA		1	Developed Future Land Use Map
DPU		1	Developed Road Map, River and Channel Network Map
BPLHD		2	Developed Groundwater Distribution Map and Water Quality Map

Source: JICA expert tam

I3.1.3 Objectives of Training Course

Objective of training was to develop capacity to maintain operational GIS database i.e. migration from CAD based operation to GIS based operation.

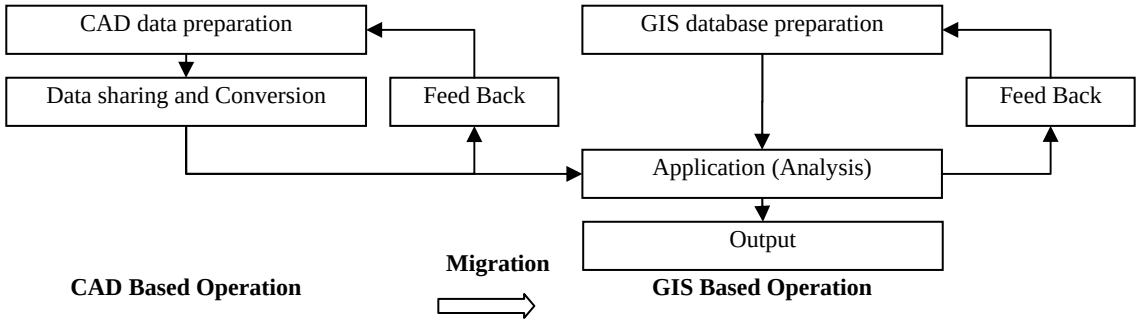
- Poor connection between each participating institute (Data is isolated)
- Major user base are still using CAD only (Browse only not for geo-spatial analysis)

Major problem for C/P team to utilize GIS was poor linkage among participating institutes. It's very costly for each agency to maintain all of the geo-spatial data by oneself. Even if data is existed, since major part of the data is in CAD format, it still requires additional cost to utilize as geo-spatial data.

In the training, courses were designed to establish following condition to solve above mentioned issues.

- Increase GIS users who use same GIS Database as a Base of GIS Analysis
- Establish implementation structure for CAD data conversion for short term

In the training course, attendee learned usage of existing GIS database and CAD Data conversion methodology which required for short term development of GIS Database. Through these trainings, attendees were trained to coordinate the use of GIS database and encourage migration from CAD base operation to GIS base operation. In addition, the JICA Expert team prepared Indonesian version of training material. This was meant for attendee to take over training and establishing capacity development cycle.



Source: JICA expert tam

Figure I3-1 Migration Process to GIS Operation Environment

Current situations in DKI Jakarta is the use of CAD as a major platform to use geo-spatial data. Each C/P institute's operations are completed within their institution only and are yet to be shared among institutions. In this situation, costs for data conversion and operation/maintenance are very high and it is difficult to utilize geo-spatial data in GIS. To change this situation was the objective of this training.

I3.1.4 Basic Analysis Course

In Basic Analysis Course attendee learnt basic GIS operation through utilizing existing GIS Database. The training course had 4 (four) days of practical work session and around 2 (two) weeks of self-learning session. Following tables shows schedule for this training course.

Table I3-2 Training Schedule for Basic Analysis Course

Item	1st Week	2nd Week	3rd Week	4th Week	Remark
Kick-off meeting	△				Material Delivery
Self-Learning	▬				
Hands-on Session		△			Hands-on Session
Preparation for Presentation		▬	▬		
Follow-up Session				△	Presentation

Source: JICA expert tam

Attendee learnt solution for following technical issues.

- How to make a layout from geo-spatial information on the map
- How to prepare GIS data for own needs
- How to utilize existing GIS database for data analysis
- How to utilize GPS device or Smartphone for data preparation

I3.1.5 CAD Data Conversion Course

In CAD Data Conversion Course attendee learnt practical CAD data conversion methodology. The training course had 3 (three) days of practical work session and around 2 (two) weeks of self-learning session. Schedule of this training course is shown below.

Table I3-3 Training schedule for CAD Data Conversion Course

	1st Week	2nd Week	3rd Week	4th Week	Remark
Kick-off meeting	△				Material Delivery
Self-Learning	▬				
Hands-on Session		△			Hands-on Session
Preparation for Presentation			▬		
Follow-up Session				△	Presentation

Source: JICA exert tam

During session, attendee discussed about following topics to improve understanding.

- Ongoing mapping project in DKI Jakarta's policy and progress
- Necessity of feedback cycle, in order to establish quality management and quality assurance for

the GIS Database
- Necessity of burden sharing among participating institutes and standardization in the process of data sharing and data conversion (preparation of SOP)

I3.2 Training Schedule

The training schedules were as follows.

Table I3-4 Planned Schedule and Actual Schedule

			3-Oct	10-Oct	17-Oct	24-Oct	31-Oct	7-Nov	14-Nov	21-Nov
1	Material Preparation	Plan								
		Actual								
2	Kick off meeting	Plan								
		Actual								
3	Self-learning Session	Plan								
		Actual								
4	Hands-on Session	Plan								
	Basic Analysis Course	Actual								
4	Hands-on Session	Plan								
	CAD Data Conversion Course	Actual								
5	Preparation for Presentation	Plan								
		Actual								
6	Follow Up Session	Plan								
		Actual								

Source: JICA exert tam

Table I3-5 Major Events in GIS Training

Date		Program	Remark
2nd November 2011	PM	Pre-Kick-off Meeting	PD-PAL JAYA
8th November 2011	AM	Kick-off Meeting	All member
10th November 2011	AM/PM	Hands-on Session for Basic Analysis Course (1st day)	Team 1
11th November 2011	AM/PM	Hands-on Session for Basic Analysis Course (2nd day)	Team 1
14th November 2011	AM/PM	Hands-on Session for Basic Analysis Course (1st day)	Team 2
15th November 2011	AM/PM	Hands-on Session for Basic Analysis Course (2nd day)	Team 2
17th November 2011	AM/PM	Hands-on Session for CAD Data Conversion Course	Team 1
18th November 2011	AM/PM	Hands-on Session for CAD Data Conversion Course	Team 2
22nd November 2011	AM	Follow-up Meeting	All member

Source: JICA exert tam

I3.3 Results

The training courses (Basic Analysis course and CAD Data Conversion course) were started from 1st November 2011 until 22nd November 2011. During training sessions, 14 (fourteen) attendee attended Basic Analysis course. 11 (eleven) attendee attended CAD Data Conversion course. Pictures of training sessions are as shown below.

	
Kick-off Meeting 1	**Kick-off Meeting 2**
	
Hands-on Session for 1st Team 1	**Hands-on Session for 1st Team 2**

Source: JICA exert tam

Figure I3-2 Pictures of Training Sessions 1

	
Hands-on Session for 2nd Team 1	**Hands-on Session for 2nd Team 2**

Source: JICA Expert Team

Figure I3-3 Pictures of Training Sessions 2

At the follow up meeting, attendees prepared and presented their original maps for their professions. Therefore, generally all of the attendees have achieved their goals. In addition, following topics were discussed among attendees.

1. Necessity of catching up base map improvement in DKI Jakarta and following their roadmap

2. Necessity of establishing feedback cycle for data quality improvement
3. Necessity of burden sharing and information sharing among participating institutes

During follow-up meeting, C/P team member have mentioned about plan to set up regular meeting to tackle above mentioned issues. Therefore, it is considered that attendee from C/P team member have shared understanding about their issues surrounding GIS Database development in DKI Jakarta.

I3.4 Issues to Be Solved

From the result of survey that were done during preparation and training, following issues were recognized.

- Needs of the continuous training for attendee
- Needs of management body for GIS Database development
- Needs of establishing feedback cycle

From hearing, most of attendee has less chance to apply GIS skill in their regular jobs. It makes attendee difficult to maintain skills that were earned from GIS training. Therefore, it is necessary to prepare measures for refining attendee's skills after training sessions.

In addition DKI Jakarta spatial agency is planning to introduce new topological map which covers whole Jakarta area based on new survey result. It requires major update for GIS Database to catch up. To update GIS Database with no much delay, management for cooperation and efficiency for the process to update GIS database shall become issue. Therefore, it is recommended to organize the secretariat to maintain direction and progress for the GIS database development.

Meanwhile, improvement cycle for geo-spatial data in DKI Jakarta is in very poor condition. It is still difficult to modify source data even from inside of DKI Jakarta. It made GIS Database in-service difficult to increase their value. It is important to establish feed-back cycle which includes reflection for source data.

I3.4.1 Needs of the Continuous Training for Attendee

From hearing for the contents of training, attendees requested repetition drills for each procedure. Main cause of this request was described as no chance to apply GIS skills in attendees' regular work. Therefore, as a result attendee may be easily forgotten what they've learned after few months later.

The training sessions were designed to go through major functions of GIS software to become familiar with its functions. On the other hand, compared with training sessions, operations in actual work were mostly done by simple operations. Therefore, repetition drills with more simple operation would make benefit for many operators'. Also, attendee of the training can become trainer for those who are still beginners'. It will increase chance to utilize skills of GIS and ease beginners to understand operation of the GIS software.

From the paragraph above there are two main points which are as follows:

- Give chance for attendee of the training as trainer to utilize skills of GIS software
- Prepare more simple training menu (repetition drills) to accommodate actual condition

I3.4.2 Needs of Management Body for GIS Database Development

Currently, DKI Jakarta spatial agency is planning to introduce new topological map which covers whole Jakarta area based on new survey result (source from DTR). This new topological map shall reflect current condition of terrain, buildings and roads. It requires major update for GIS Database to catch up. To update GIS Database with no much delay, management for cooperation and efficiency for the process to update GIS database shall become issue. Therefore, it is recommended to organize the committee for consensus building. Also, in order to reflect result of the agreement on the implementation, put secretariat which in charge of maintaining direction and progress for the GIS database development is recommended.

The changes for this new topological map will cause huge amount of modification on GIS Database. To make modification in efficient, it is important to consolidate result of the study and progress management in one place. The secretariat can become a body for information sharing and solving above mentioned problems.

- Setting up Steering Committee to Form Consensus
- Setting up Secretariat to Manage Progress and Sharing Information Related to GIS Database Development

I3.4.3 Needs of Establishing Feedback Cycle

In this project, CAD data which provided by DTR has been converted to GIS Database as base map. Meanwhile, during process of CAD data converting, there were many obvious failure have found. Since improvement cycle for geo-spatial data in DKI Jakarta is in very poor condition, it is difficult to modify from source data. Not only in DTR, most of institutes that uses geo-spatial data, they have basically left their failure of the data as it is while they are using it. It made difficult for institutes that are outside of DKI Jakarta to improve quality of the data and add value for it. Feedback cycle for improving this source geo-spatial data is key issues for developing GIS Database while utilizing and maintaining it.

In this training, attendee from each institute have discussed about needs of quality assurance and quality control. Through this discussion, in working-level, awareness of the issue was shared. In next step, with development of GIS Database, the process to improve source of geo-spatial data have to be implemented such as feedback cycle.

From the paragraph above the main points are as follows:

- Needs to establish improvement cycle for source of geo-spatial data such as feedback cycle

I4 Assessment of Capacity Development through the Project

Capacity development was implemented through the activities of the Project (Output-2). The project purpose, output and objectively verifiable indicators to evaluate the achievement are shown in Table A2-1.

As shown in the table, there are not any direct indicators to evaluate the capacity development of C/P. Therefore, JICA expert team evaluated the capacity development of C/P related to “the capacity to prepare the revised wastewater master plan” through the following activities;

- Discussion on the basic items (wastewater collection system, planned population, planned wastewater volume, and other planning conditions) for the preparation of the New M/P at WG meetings
- Discussion on the process to prepare the New M/P, such as examination of the priority zones, at WG meetings
- Discussion on the facility plan for the main sewerage plants at WG meetings
- Discussion on the sewerage treatment system at WG meetings
- Learning about the basic plans, and operation and maintenance for wastewater management through training in Japan
- Implementation of river water quality and quantity analysis, and socio-economic survey with JICA expert team
- Learning about development of GIS database (training)

The member list of WG is shown in Table I4-1. Members are selected from each related agency of DKI Jakarta. During the Project, the same members mostly continue to implement activities with JICA expert team. Therefore, capacity of each C/P member is developed from the qualitative evaluation.

Table I4-1 List of Working Group Members

No.	Name	Position and Organization
1	Liliansari	Director of PD PAL JAYA
2	Rama Boedi	Commissioner of PD PAL JAYA

Table I4-1 List of Working Group Members

No.	Name	Position and Organization
3	Ati Setiawati	Technical and Business Director, PD PAL JAYA
4	Aris S.	Section Head of OM, PD PAL JAYA
5	Setyo Duhkito	Section Head of Development and Program, PD PAL JAYA
6	Hendry Sitohang	Sub-Section Head of Program Management, PD PAL JAYA
7	Yudi Indarto	Director for Administration and Finance, PD PAL JAYA
8	Driah Triastuti	Staff / Spatial Plan and Environment Subdivision, Urban Infrastructure and Environment Division, BAPPEDA
9	Eko Gumelar	Staff of Environmental Impact Control Division, BPLHD
10	Wawan Kurniawan	Staff of Environmental Impact Control Division, BPLHD
11	Jouce Victor	Staff of Spatial & Environment Bureau, Regional Secretary, Spatial Use & Environment Bureau
12	Samsu Hadi	Staff of Macro Planning of Urban, City Spatial Planning Agency
13	Siti Harfiah	Staff of Macro Planning of Urban, City Spatial Planning Agency
14	Weny Budiati	Staff of Macro Planning of Urban, City Spatial Planning Agency
15	Dimas Y. Rukmana	Staff of Macro Planning of Urban, City Spatial Planning Agency
16	Elisabeth T	Staff of Planning For Water Resources Management, Public Works agency

Source: JICA expert team

PART-J ACTION PLAN FOR IMPLEMENTATION OF PRIORITIZED PROJECTS

PART-J ACTION PLAN FOR IMPLEMENTATION OF THE NEW MASTER PLAN

J1 Definition of Action Plan

The action plan consists of the following two plans and shall be defined as follows:

Table J1-1 Definition of Action Plan for Prioritized Projects

No.	Item	Definition
1	Action Plan for Implementation of the New M/P	It includes the actions to be needed for facilitating the projects which will be implemented under Japanese yen loan scheme. It shows the schedule of the required actions such as feasibility study, procedures to be done by the Indonesian side and procedures for Japanese yen loan.
2	Action Plan for Prioritized Capacity Development	It is the action plan for prioritized capacity development of staff to conduct O&M of sewerage and sanitation facilities to be constructed in Zone No.1 and No.6 after the implementation of the projects.

Source: JICA expert team

J2 Action Plan for Implementation of the New Master Plan

The action plan for implementing the New M/P is the one to be needed for facilitating the projects ~~to~~ which will be implemented under Japanese yen loan scheme. The details of the action plan are shown in Table J2-1 and the detailed activities are described hereinafter.

Table J2-1 Action Plan for Implementation of the New Master Plan

No.	Item	Related Organization	2012				2013				2014				Remarks (Related Page in the New M/P)
			1 - 3	4 - 6	7 - 9	10 - 12	1 - 3	4 - 6	7 - 9	10 - 12	1 - 3	4 - 6	7 - 9	10 - 12	
[Implementation of F/S]		JICA F/S Team													
	①Natural conditions and socio-economic surveys		⑥Formulation of execution plan												
	②Preliminary design of facilities		⑦Economic and financial analysis												
	③Cost estimation		⑧Recommendation for implementation organization												
	④Formulation of implementation schedule		⑨Confirmation of environmental and social considerations												
	⑤Examination of procurement methods		⑩Preparation of examining implementation of yen loan projects												
[Procedures by the Indonesian Side]															
1	Secure of facility sites	BAPPEDA													WWTP, STP and PS
2	Approval of the Revised M/P	DKI Governor													
3	Enforcement of Sanitation Law	Cipta Karya													
4	Conducting AMDAL	Cipta Karya													
5	Establishment of Desludging System	(To be decided)													Page D-51 in the New M/P
6	Reorganization of wastewater management sector	DKI													Page G-8 in the New M/P
7	Preparation and submission of IP	Cipta Karya													
8	Securing required budget	BAPPENAS													
[Procedures for Japanese Yen Loan]															
1	Fact Finding Mission	JICA													
2	Appraisal Mission	JICA													
3	Loan Agreement	JICA													
4	Consultant Procurement	Cipta Karya													
5	Consulting Service	Cipta Karya													

Source: JICA expert team

J2.1 Implementation of Feasibility Study (F/S)

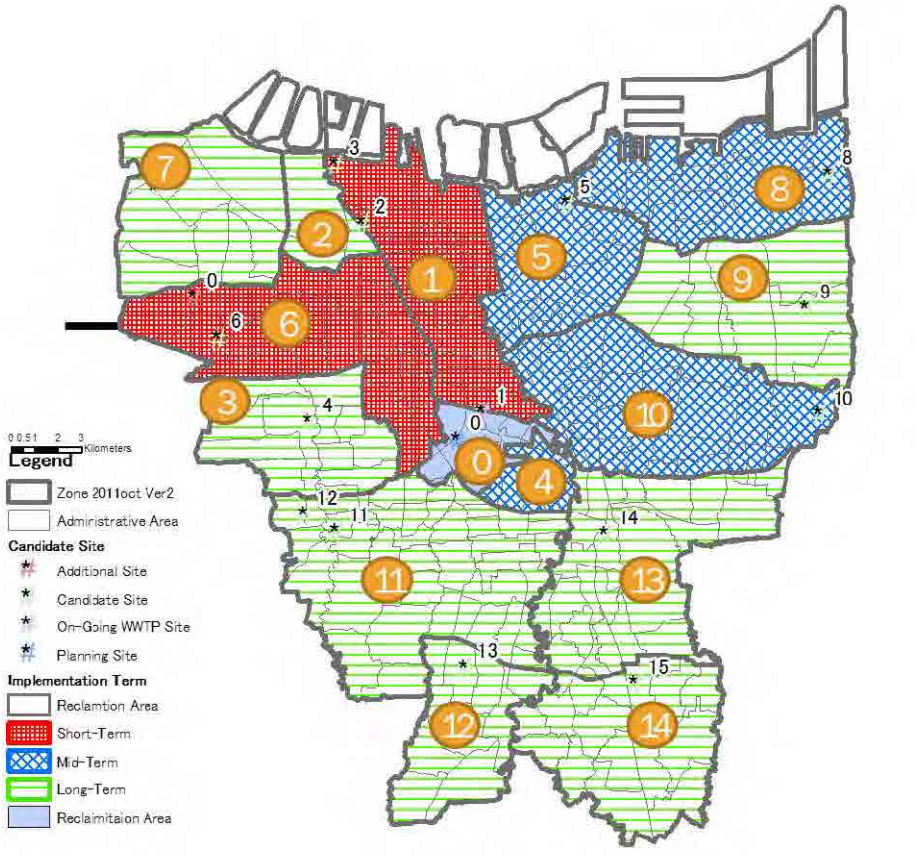
J2.1.1 Outline of Prioritized Projects for F/S

(1) Off-Site System (Sewerage)

1) Prioritized Project Areas

As mentioned in “D2 Setting Sewerage Zones”, the prioritized project areas are Zone No.1 and Zone No.6 for the target areas in the Short-Term Development Plan (target year of 2020). The location of the

prioritized projects is as shown in Figure J2-1 (red colored areas in the figure).



Source: JICA expert team

Figure J2-1 Location of Prioritized Project Areas

The prioritized project areas include one or more cities (or *Wilayah*), districts (or *Kecamatan*) and sub-districts (or *Kelurahan*) and the details are as shown in Table D7-4 of Section D7.

2) Main Facilities

The main facilities of two prioritized projects are as shown in Table J2-2. As seen in the table, the scale of the projects is almost the same.

Table J2-2 Main Facilities of Prioritized Projects for Off-Site System (as of the New M/P)

Facility	Prioritized Area	
	Zone No.1	Zone No.6
Wastewater Treatment Plant	1 plant (264,000m^3/day)	1 plant (313,000m^3/day)
Relay Pumping Station	Nil	1 station
Sewers		
➢ Trunk sewer (dia. 900～2,400mm)	15km	24km
➢ Main sewer (350～800mm)	86km	155km
➢ Secondary & Tertiary sewer (200～300mm)	657km	829km
Sewer - Total	758km	1,008km
House Connection	102,000	131,000

Note: The contents of the facilities are subject to change after the detail examination in F/S.
Source: JICA expert team

(2) On-Site System

1) Contents of the Project for On-Site System

i) Structural improvement of the conventional septic tanks
ii) Introduction of regular desludging system
(It is expected that item i) and ii) are implemented by the Indonesian side as Japanese technical cooperation project, if necessary)
iii) Reinforcement of sludge treatment capacity

2) Main Facilities

The outline of improvement of the existing sludge treatment plants and the construction of the proposed sludge treatment plant is as shown in Table J2-3.

Table J2-3 Outline of Improvement and Construction of Sludge Treatment Plant

Facility & Place	Outline of Improvement & Construction
A. Improvement of the existing STP (1) Pulo Gebang STP (East Jakarta City) (2) Duri Kosambi STP (West Jakarta City) [STP: sludge treatment plant]	<Duri Kosambi STP> The existing facility is discontinued and the sludge treatment function is integrated into the sludge treatment section of the new WWTP(Zone No.6). ◆ Capacity: 930m^3/day ◆ Expected project period: one year (2013) <Pulo Gebang STP> Reduce unsanitary working condition and overwork by using machines for taking out grit and extracting sludge. ◆ Capacity increase by introduction of mechanization: 300m^3/day → 450m^3/day ◆ Required expansion area: 500m^2 ◆ Expected project period: one year (2013)
B. Construction of New STP 1 plant in Southern part of DKI	◆ Capacity: 600m^3/day ◆ Treatment method: Solid liquid separation – activated sludge treatment method ◆ Required land area: 1.5ha ◆ Expected project period: two years (2013-2014)

Source: JICA expert team

J2.1.2 Items for Implementation of Feasibility Study

(1) Study Items

For two prioritized projects, since it is scheduled that PPP F/S by JICA is conducted for Zone No.1, examination for Zone No.6 will be conducted on condition that Japanese yen loan scheme is applied for it. The expected study items for F/S of Zone No.6 are listed in Table J2-4.

Table J2-4 Proposed Main Study Items for F/S

No.	Study Item
1	Natural conditions and socio-economic surveys
2	Preliminary design of facilities (WWTP, STP, PS and sewers)
3	Cost estimation
4	Formulation of implementation schedule
5	Examination of procurement methods
6	Formulation of execution plan
7	Economic and financial analysis
8	Recommendation for implementation organization
9	Confirmation of environmental and social considerations
10	Preparation of examining implementation of yen loan projects

Note: WWTP = Wastewater Treatment Plant, PS = Pumping Station
Source: JICA expert team

(2) Particular Consideration on Each Study Item

1) Natural Conditions and Socio-economic Surveys

Natural conditions and socio-economic surveys shall be conducted by utilization of the local consultant and the contents of the surveys are described as follows:

(a) Natural Conditions Survey

Natural conditions survey will include the following items:

- Topographic survey of the sites for the proposed WWTP, STP and PS
- Soil investigation of the sites for the above mentioned facilities
- Soil investigation of trunk/main sewer route
- Route survey of trunk sewers
- Survey of River water quality and quantity in the prioritized project area
- Water quality and quantity survey of domestic wastewater in the prioritized project area
- Water quality survey of groundwater in the prioritized project area

(b) Socio-economic Survey

Interview survey will be conducted to confirm socio-economic conditions such as water usage, sanitary condition, willingness to connect with sewerage system by households / non-households, etc.

Survey methods are proposed as follows:

- Surveying location: At all sub-districts (*Kelurahan*) in the prioritized project area
- Number of sample: 30 samples each in 25 *Kelurahan* (10 samples each for low income class, mid-income class and high income class), 10 samples each in 25 *Kelurahan* for public and commercial facilities

2) Preliminary Design of Facilities

Particular considerations shall be made in the preliminary design of facilities at F/S stage as follows:

- For wastewater treatment process, the optimum process shall be determined through the discussions with the Indonesian side after the detailed examination through comparison between several types of the process based on the latest technical data.
- For design capacity (or daily maximum wastewater volume) of WWTP, daily peak factor or load factor of its reverse value shall be checked based on the latest water supply data and the most practicable value for DKI Jakarta shall be adopted. If required, the design capacity shall be revised.
- Since it is expected that both rainwater and wastewater are sometimes discharged into the existing drainage system or newly developed sewers (it is not called as the combined system), some consideration in the facility design for allowance in pipe diameters, pump capacity, etc. shall be done.
- For equipment for receiving on-site sludge, pre-treatment and sludge treatment, practicable facility and operation plans shall be examined taking into account the situation of on-site sludge collection and the progress of regular desludging system from septic tank, etc. When examined, the margin for treatment facilities of WWTP to be produced by the time lag between the progress of WWTP development and that of house connections shall be effectively utilized. Through due consideration of the above, efficient and economic integrated treatment method for wastewater treatment and on-site sludge treatment and its operation plan shall be formulated.
- For the route of trunk sewers, construction program shall be prepared by selecting the optimum route taking into account the easiness of construction work after detailed survey of road conditions of the project area.

3) Approximate Project Cost Calculation

The calculation of the approximate project cost will be conducted by dividing the project cost into the

following categories.

- Base cost
- Price escalation on the base cost
- Price contingency on the base cost
- Interest during construction on Japan's ODA loan
- Commitment charge
- Consultant cost (including price escalation and price contingency)
- Non eligible items
  - Land acquisition cost (if required)
  - Duty and tax
  - Administration cost of the implementing agency
  - Interest during construction on loans other than Japan's ODA loan
- Other items
  - Maintenance contract fee after the completion
  - Initial operation cost
  - Development cost for resettlement site (if required)
  - Cost for learning/training, public relations and awareness raising
  - Cost for environmental monitoring
  - Incremental administration cost for the execution of the project

4) Proposal for the Institutional Arrangement for the Implementation of the Priority Project

The institutional arrangement and system of the similar project in Indonesia will be grasped. Then, the institutional arrangement for the priority project will be examined and proposed. Concretely, the following points will be examined and described.

- Confirmation of the institutional arrangement for the implementation of the project
- Areas of responsibility, organizational structure and man-power of the implementing agency (including legal status)
- Financial situation and budget situation of the implementing agency
- Technical capacity of the implementing agency
- Experiences on the similar projects of the implementing agency

5) Confirmation of Environmental and Social Consideration

On the basis of 2010 JICA Guideline for ES, alternative plans will be compared and examined. Also estimation and evaluation of environmental and social impacts will be conducted. For these impacts, mitigation and/or minimization measures, and monitoring plan (including the monitoring form) will be prepared. After the discussion with the Indonesian side, the confirmation result will be finalized and the environmental check list will be prepared. Moreover, the priority projects need AMDAL approval; therefore, it is necessary to support DKI Jakarta to prepare the application of AMDAL after the category of AMDAL is decided.

The survey items to confirm are as follows;

- ◆ Confirmation of environmental and social situation as the base information (land use, natural environment, economic and social situation, etc.)
- ◆ Confirmation of the system and organization related to environmental and social consideration in Indonesia
  - ✓ Regulations and standards related to environmental and social consideration (environmental impact assessment, information disclosure, etc.)
  - ✓ Gaps between the regulations/standards in Indonesia and 2010 JICA Guideline for ES
  - ✓ Role of related agencies
- ◆ Scoping (to clarify environmental and social consideration items, and evaluation methods for project implementation)
- ◆ Estimation of impacts

- Evaluation of impacts and examination of alternatives (including zero option)
- Examination of mitigation/minimization/compensation methods
- Support to prepare environmental management plan and environmental monitoring plan, and to hold stakeholder meetings (purpose of meeting, attendants, contents, etc.)
- Support to prepare the application of AMDAL

J2.2 Internal Procedures in Indonesia

The necessary internal procedures in Indonesia for promoting the implementation of the project are as shown in Table J1-1. The most important items are securing the lands for the facilities and obtaining the approval for the New M/P, which need to be completed at the early stage of F/S. The introduction of the regular desludging system and the restructuring of the institutional arrangement also need to be discussed and to be put in place for implementation at the F/S stage.

J2.3 Procedures for Japan's ODA loan

Indonesian side hopes to implement the project as early as possible so that the improvement target for the short term development plan (2020) will be achieved. For the implementation of the project by utilizing Japan's ODA loan, such procedures as shown in Table J1-1 in which the Loan Agreement will be signed within FY2012, is envisaged.

J3 Action Plan for Capacity Development

J3.1 Basic Policy

DKI Jakarta is a city that has built almost no sewerage systems over the years, but which will require such systems to come into service rapidly over the next 20 years. This situation makes the training of engineers for sewerage design, construction, and management imperative.

Sewerage engineering, in particular, requires that engineers have the ability to integrally demonstrate basic knowledge across the kinds of fields shown in Table J3-1. Heretofore, concerned organizations in DKI Jakarta have hired people who have taken specialized courses in specific fields. However, the number of employees who have a comprehensive understanding of sewerage systems is limited, and therefore it will be necessary to train technical managers who can view such systems from a comprehensive standpoint.

Table J3-1 Required Basic Knowledge Fields

Main Specializations		Drainage/pipeline facilities	Pump stations	Wastewater treatment plants	Environment
Specialization	Required knowledge				
Environmental engineering	Legal systems				✔
	Environmental water quality	✔	✔	✔	✔
Civil engineering	Hydrology	✔	✔	✔	
	Surveying	✔	✔	✔	
	Structure	✔	✔	✔	
	Concrete	✔	✔	✔	
Mechanical engineering	Pumps		✔	✔	
	Blowers		✔	✔	
	Plumbing	✔	✔	✔	
	Sewerage machinery		✔	✔	
Electrical engineering	Substations		✔	✔	
	Systems		✔	✔	
	Measurement		✔	✔	
	Off-grid power generation		✔	✔	
Chemical engineering	Chemical treatment			✔	✔
	Analysis			✔	✔
Microbial engineering	Biological treatment			✔	✔
	Sludge treatment			✔	✔

Source: JICA expert team

J3.2 Action Plan for Human Resources Development

J3.2.1 Training of Technical Managers (Overseas Engineers' Training)

When employees do not have any particularly specialized knowledge, the most effective approach to quickly and strategically developing them into comprehensive sewerage management engineers is to use a training method that combines on-the-job training (OJT) with intensive courses providing specialized knowledge. To accomplish this, onsite training at actual wastewater treatment plants and course study in overseas locations should be planned.

Table J3-2 shows an example of a six-month training program. OJT is divided into a Phase 1 and Phase 2.

Phase 1: Trainees will acquire basic technologies by gaining two months of elementary practical experience at a sewerage facility, followed by intensive courses on the basic knowledge fields shown in Table J3-1.

Phase 2: Trainees will once again receive two months of practical experienced at a sewerage facility based on the basic technologies they acquired in Phase 1. Then they will participate in intensive courses that include review of what they have learned thus far. These steps will solidify their acquisition of the relevant technologies.

Table J3-2 Sample Overseas Engineers' Training Program

Training items		1st month	2nd month	3rd month	4th month	5th month	6th month	Remarks
		Phase 1			Phase2			
OJT								
	Pipeline facilities							
	Pump stations facilities							
	Treatment plant facilities							
	Analysis							
Course training								
	Sewerage planning and design							
	Sewerage maintenance and management							
	General water environments							

Source: JICA expert team

J3.2.2 Training of Workers in Charge of Specific Operations (Basic Training at Domestic Wastewater Treatment Facilities)

Firmly establishing basic knowledge of sewerage systems in Jakarta will require not only training to cultivate the technical managers described above, but also training for all employees involved in sewerage systems to bolster their understanding of the basics of wastewater treatment. Here, basic sewerage system training should be planned for workers who are actually involved in onsite operations as well as administrative personnel.

When providing basic sewerage system training, it is effective to have trainees gain understanding of the principles and mechanisms of wastewater treatment by giving them hands-on experience with wastewater treatment mechanisms. This should be achieved through operation and management of existing ITP facilities that have typical forms of activated sludge treatment. At the same time, it is effective to have trainees acquire fundamental knowledge of sewerage systems and water environments through basic training.

J3.2.3 Action Plan for Human Resources Development and Training Content

Table J3-3 presents an action plan for human resources development to serve as the first-stage prioritized project to be established based on this Master Plan. Table J3-4 presents an example of training content.

The action plan will aim to train 12 technical managers specializing in sewerage systems by 2015 through the implementation of overseas engineers' training, and then to cultivate them as specialist engineers by having them participate in project teams and on-the-job training in planning and construction following the completion of their training. Moreover, it will provide domestic basic sewerage system training to 15 workers who are actually involved in the maintenance and management of sewerage facilities as well as administrative workers by 2015.

Table J3-3 Action Plan for Human Resources Development

Item		2012		2013		2014		2015		2016	
		1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half
Priority project	Planning (F/S)										
	Design and construction										
	Operation										
Overseas engineers' training (12 trainees)	No.1 (2trainees)										
	No.2 (2trainees)										
	No.3 (2trainees)										
	No.4 (2trainees)										
	No.5 (2trainees)										
	No.6 (2traineees)										
Domestic basic sewerage system training (15 trainees)	ITP operation										
	No.1 (5trainees)										
	No.2 (5trainees)										
	No.3 (5trainees)										

Source: JICA expert team

Table J3-4 Training Content (Example)

Training type	Trainees	No. of trainees	Training items		Training content
Overseas engineers' training	Technical managers	12	Overseas onsite training	Pipeline facilities	- Observation of pipeline construction sites (various construction methods) - Onsite training on pipeline inspections and cleaning methods, response to blockages, etc.
				Pump stations facilities	- Study of the configuration and roles of pump stations - Onsite training on pump station operations, risk management, etc.
				Treatment plant facilities	- Study of treatment plant configuration and the roles of various treatment processes - Onsite training on water-quality management and sludge management - Onsite training on facilities maintenance
				Analysis	- Onsite training on water-quality analysis and sludge testing
			Overseas course training	Sewerage planning and design	- Laws and regulations pertaining to sewerage projects - Examples of sewerage schemes in other countries - Basic knowledge on sewerage project management - Outline and characteristics of water-treatment methods and sludge-treatment methods - Configurations and characteristics of machinery and electrical facilities - Facility design calculation, provisional calculation, design drawing, quantification, and quantity survey
				Sewerage maintenance and management	- Basics and methods of water-quality management and sludge management - Basics and methods of facilities maintenance - Risk management methods
				General water environments	- Water-contamination problems - Water-quality conditions and laws and regulations concerning public water bodies - Concepts and basic knowledge concerning water resources management and preservation of water environments
Domestic basic sewerage system training	Workers in charge of operations and administrative personnel	15	Domestic course training	Basic matters	- Basics of wastewater treatment (wastewater treatment and sludge treatment) - Operation management of activated sludge treatment using existing ITP - Concepts and basic knowledge concerning water resources management and preservation of water environments

Source: JICA expert team

J3.2.4 Capacity Development of Staff to Introduce the Regular Deslugding System of On-site Sanitation Facility

(1) Training for Supervising Staff for Regular Desludging

Training will be provided abroad for DKI staff who will participate in the project.

DKI does not have a department specializing in household wastewater treatment. It does not have enough staff with the knowledge and experience in household wastewater treatment. Therefore, even if laws, regulations and guidelines are developed for implementing regular desludging, only a few staff members have the abilities needed to utilize the regulations and guidelines. When the regular desludging system starts, many private businesses will participate in the desludging operation. This will require officials who will control and supervise the operation of these businesses. Therefore, in parallel to the introduction of the regular desludging system, the following training will be conducted.

(2) Program Contents

The training program will be designed so that the trainee can learn about Japanese technologies and knowledge and consider improvements in their decentralized wastewater treatment systems in order to make them suitable for Jakarta's conditions. More specifically, the program will include the following content.

- The participants will learn about the institutional framework and the technologies used in the night soil/sludge treatment system in Japan.
- The participants will receive on-site training at wastewater/sludge treatment facilities in order to deepen their understanding of night soil/sludge treatment system in Japan, etc.
- The participants will analyze problems in the current wastewater/sludge treatment systems, etc. in Jakarta as part of the practical training.
- The participants will consider the introduction of appropriate technologies in Jakarta as part of the practical training.
- The participants will consider a human resource development plan in Jakarta as part of the practical training.

Training materials will include audiovisual aids and field books for practical training as well as other materials prepared for the training program. The training materials will be written by experts (including external academic experts) in night soil/sludge treatment technologies. They will then be translated into Indonesia language.

(3) Training Duration, Time and Target Participant

Training shall be conducted for two to three weeks once every three years from 2012 to 2014. Target participants shall be DKI staffs who are in charge of on-site sludge management.

PART - K RECOMMENDATIONS

PART-K RECOMMENDATIONS

<Off-site (Sewerage) System>

1. The New M/P has proposed improvement plans for off-site and on-site treatment system. On the other hand, M/P and improvement plans for drainage system development (including surface drainage and drainage by drainage pipelines) will be formulated in other projects in the near future. Therefore, the Indonesian side is needed to tackle a comprehensive water environment management. (see PART-C: C2.1)
2. At F/S, the wastewater treatment system should be examined based on the detail information and analysis of them. (see PART-D: D6.1.5)
3. At F/S, the characteristics of wastewater in the target areas should be investigated thoroughly because these characteristic are the important parameters for the design of WWTPs. (see PART-D: D4.1)
4. WWTP layout plan should have flexibility for the future strict water standards, treatment water recycling, upgrade of treatment facility in the future, etc. (see PART-D: D7.2.3)
5. For the reclamation area, off-site system is recommended considering the fact that recycle of treated wastewater would be necessary to save the fresh water/groundwater use. Therefore, necessary land area should be kept for WWTP(s) and pumping station(s) before the commencement of development by the developers. Expected sewerage system in the reclamation area is shown in Appendix-7.

<On-site System>

1. At present, structure and other function of the conventional septic tanks should be improved, and the regular desludging system should be introduced until the sewerage system is developed all over DKI Jakarta. The conventional septic tanks do not have appropriate treatment capacity and it lead to the groundwater pollutions, etc. Basically, it is better to prohibit using the conventional septic tanks, and to connect the sewerage or to replace with the packaged aerobic wastewater treatment plants (Johkasou, etc.). However, it takes a long time to develop the sewerage system all over DKI Jakarta, and the economic and institutional environment to make the packaged aerobic wastewater treatment plant as the standard on-site facility for households in DKI Jakarta does not exists. Therefore, it is recommended to minimize the negative impacts of using the conventional septic tanks by strengthening septage management at present (see PART-D: D8.2).
2. Strengthening septage management, which is the management of sludge from on-site sanitation system such as the construction of sludge treatment facilities, introduction of regular sludge system, improvement of the structure of the septic tank, is the nationwide issue not limited to DKI Jakarta. Sanitation Law, including strengthening septage management, should be enacted as soon as possible.
3. It is necessary to establish a new regulation or system that the responsible agency/person has an obligation to install small scale wastewater treatment facility for each house or several houses in new housing development areas, which have a difficulty to access the sewerage system. (see PART-D: D8.2.2)
4. In order to introduce a regular desludging system, the most important issue is to optimize organizational system including utilization of private sector. However, it is indispensable to arrange sludge treatment facility appropriately. Especially for the target areas of the long-term plan, on-site system should be kept for more than 20 years. So the sludge treatment system should be arranged as soon as possible, and this arrangement should be included in the short-term plan. (see PART-D: D8.3)

＜Organizations and Systems＞

1. Laws, organizations, and systems based on the philosophy of “water circulation”
   The basic concept of “water circulation” should be taken as the philosophy of the New M/P, and

should be shared in the all aspect of the administrative development such as all laws, policies, organizations, technologies, systems, environmental education, water, wastewater treatment, and social environments. (see PART-G: G1)

2. Basic policy and institutional framework
   DKI Jakarta has fallen the most behind in sewerage development among cities of Indonesia, although it is the capital with a population of no less than about nine million and the actual center of politics and economics of Indonesia. Considering this status, DKI Jakarta shall indicate clearly and widely its basic policy and directions for the management of wastewater and sludge, which is "Abolish septic tanks and, implement the comprehensive development plan of sewerage system for both black water and gray water steadily and rapidly" to Jakarta citizens and should improve the current institutional framework. (see PART-G: G3.4)

3. Improvement of institutional framework on comprehensive sewage management
   DKI Jakarta should establish an institutional framework which overview all related works of sewerage and sludge treatment and make a concrete policy and plans of DKI Jakarta for its citizens. This institutional framework will engage in preparation of legal framework and drafting, planning, and implementing of system in a comprehensive and coordinated manner based on the said basic philosophy and the basic policy. Furthermore, the framework should promote planning and developing sewage treatment according to the M/P. (see PART-G: G3.4)

4. Preparation for improvement of institutional framework on sewage management
   To improve the said administrative department/body, DKI Jakarta should set up a preparatory committee consisting of secondments from institutions / agencies related to sewage and sludge treatment. The committee shall make concrete discussion on the organization and the system according to the sewerage system development plan. By the end of FY 2013 at the latest, DKI Jakarta should improve the institutional framework of sewage management and start it working. (see PART-G: G3.4)

5. Authority of institutional framework on sewage management
   The improved institutional framework of wastewater and sludge management should have administrative function concerning budgets, preparation of legislation, planning, construction, operation, and preparation of regulations and guidelines as well as being an authorized department that unifies directions of both on-site and off-site treatment so that the wastewater management budget is spend in the most efficient way. (see PART-G: G3.4)

6. Establishment of law system
   It will be important to review current laws and ordinances and to restructure laws, regulations, design guidelines, and methods of operation to ensure that they are systematic and comprehensive based on the concept of water circulation.

   On Output-1, draft Sanitation Law, Criteria of sewerage discharge standards, and Guideline for preparation of sewerage master plan are preparing. Based on the circumstances, the preparatory committee and the improved institutional framework of wastewater and sludge management will review the existing decrees and regulations and renew them to achieve targets of short-term, medium-term and long-term plans on on-site and off-site treatment aiming comprehensive management of wastewater. (see PART-G: G4.2)

7. Organization of operation of off-site treatment
   In line with the implementation of phased sewerage projects based on the New M/P, review the organization of PD PAL JAYA, which is the public sewerage company, incrementally reinforce its participation in sewerage construction projects and capabilities in operation and management, and improve its maintenance technologies. (see PART-G: G5.2)

8. Management system of on-site treatment
   The sewage management administration should examine and implement qualitative and quantitative improvement measures for on-site treatment while sequentially watching sewerage development plan and its progress based on environmental improvement targets for public water bodies. It should execute treatment of increasing amounts of sludge and planning and

construction of treatment facilities, while at the same time it should build the administrative system for desludging. When doing so, taking into consideration the income and expenditure situation of sewerage works, on balance, it is appropriate to set up subsidies that cover the reasonable portion of septic tank replacement expenses.

In desludging, transportation of sludge, and the operation of ITPs of establishments such as office buildings and commercial buildings, the maximum utilization of private-sector should be examined. (see PART-G: G5.3)

9. Introduction of private sector into sewerage development project
   Considering that sewage and sludge treatment system is social infrastructure with the greatest publicity and that the business entities need to ensure profitability, introduction of private sector should be carried out after deliberate investigation on the scope of works, techniques, organization and application. (see PART-G: G7.1)

10. Establishment of a division for PPP contract and operational management
    It is necessary to make sure that there is no contradiction between DKI Jakarta and the PPP entity pertaining to their mutual risk management. Therefore, DKI Jakarta should establish a specialized division which deals with PPP contracting works and their operational management. (see PART-G: G7.1)

11. Realistic PPP
    When considering the 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 WWTPs 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 the one of realistic PPP option for the sewerage works.
    In addition to the BOT model, there is the Management Contract model in which the management of the concerned public entity is entrusted to the private operator on management fee basis for the limited period. In this model, private enterprises do not bear capital investment or financing risk, nor do they bear the tariff risk. This model is an option to be considered in sewerage works whose project profitability is low. (see PART-E: E3.8.5)

12. Institutional framework for developing human resources
    In order to establish and develop the institutional framework, many human resources, who have the administrative and technical capacity on the water environment preservation measures, are required. In order to foster these human resources, recruitment of younger generations and the development of the education system from the long term view point is required. (see PART-G: G6)

APPENDICES

Appendix − 1 : List of Counterpart

PEMERINTAH PROVINSI DAERAH KHUSUS
IBUKOTA JAKARTA

KEPUTUSAN GUBERNUR PROVINSI DAERAH KHUSUS
IBUKOTA JAKARTA

NOMOR 28/2011

TENTANG

PEMBENTUKAN TIM PENDAMPING PROYEK PENGEMBANGAN KAPASITAS SEKTOR AIR LIMBAH MELALUI REVIEW MASTER PLAN AIR LIMBAH

DENGAN RAHMAT TUHAN YANG MAHA ESA

GUBERNUR PROVINSI DAERAH KHUSUS IBUKOTA JAKARTA,

Menimbang :

a. bahwa dalam rangka menindaklanjuti Record of Discussion Between Japan International Cooperation Agency and Authorities Concerned of The Government of The Republic of Indonesia on Japanese Technical Cooperation for Project For Capacity Development of Wastewater Sector Through Reviewing The Wastewater Management Master Plan in DKI Jakarta tanggal 17 Juni 2010 perlu dipersiapkan rencana penyusunan Review Master Plan Air Limbah di DKI Jakarta;

b. bahwa berdasarkan pertimbangan sebagaimana dimaksud dalam huruf a, serta untuk memperlancar dan efektivitas penyusunan, perlu menetapkan Keputusan Gubernur tentang Pembentukan Tim Pendamping Proyek Pengembangan Kapasitas Sektor Air Limbah Melalui Review Master Plan Air Limbah;

Mengingat :

1. Undang-Undang Nomor 10 Tahun 2004 tentang Pembentukan Peraturan Perundang-undangan;

2. Undang-Undang Nomor 32 Tahun 2004 tentang Pemerintahan Daerah sebagaimana telah beberapa kali diubah terakhir dengan Undang-Undang Nomor 12 Tahun 2008;

3. Undang-Undang Nomor 29 Tahun 2007 tentang Pemerintahan Provinsi Daerah Khusus Ibukota Jakarta sebagai Ibukota Negara Kesatuan Republik Indonesia;

4. Undang-Undang Nomor 32 Tahun 2009 tentang *Perlindungan dan* Pengelolaan Lingkungan Hidup;

5. Peraturan Daerah Nomor 10 Tahun 2008 tentang Organisasi Perangkat Daerah;

MEMUTUSKAN

Menetapkan : KEPUTUSAN GUBERNUR TENTANG PEMBENTUKAN TIM PENDAMPING PROYEK PENGEMBANGAN KAPASITAS SEKTOR AIR LIMBAH MELALUI REVIEW MASTER PLAN AIR LIMBAH.

KESATU : Membentuk Tim Pendamping Proyek Pengembangan Kapasitas Sektor Air Limbah Melalui Review Master Plan Air Limbah di Provinsi Daerah Khusus Ibukota Jakarta dengan susunan keanggotaan sebagaimana tercantum dalam Lampiran Keputusan Gubernur ini.

KEDUA : Penanggung Jawab sebagaimana dimaksud pada diktum KESATU mempunyai tugas :

a. memastikan bahwa pelaksanaan Review Master Plan Air Limbah di Provinsi DKI Jakarta berjalan dengan baik; dan
b. melaporkan pelaksanaan proyek kepada Gubernur setiap 1 (satu) tahun sekali atau tergantung kebutuhan.

KETIGA : Tim Pengarah sebagaimana dimaksud pada diktum KESATU mempunyai tugas :

a. mengarahkan dan mengawasi rencana kerja tahunan dari proyek sejalan dengan rencana operasional;
b. mengkaji kemajuan proyek dan mengevaluasi penyelesaian target dan pencapaian tujuan;
c. mengidentifikasi ketetapan cara atau metode penyelesaian isu-isu utama yang muncul dari atau terkait proyek; dan
d. melaporkan hasil pelaksanaan tugas sebagaimana huruf a, huruf b dan huruf c di atas kepada Penanggung jawab setiap 4 (empat) bulan sekali.

KEEMPAT : Tim Teknis sebagaimana dimaksud pada diktum KESATU mempunyai tugas:

a. memberikan pendampingan teknis bagi pelaksanaan proyek;
b. memfasilitasi koordinasi antar pemangku kepentingan terkait pelaksanaan proyek; dan
c. melaporkan hasil pelaksanaan tugas sebagaimana huruf a dan huruf b kepada Tim Pengarah setiap 1 (satu) bulan sekali.

KELIMA : Tim Pelaksana sebagaimana dimaksud pada diktum KESATU mempunyai tugas :

a. memfasilitasi komunikasi antara Tim Teknis dengan Tim Konsultan Pelaksana Proyek;
b. membantu pelaksanaan tugas harian Tim Teknis; dan
c. melaporkan hasil pelaksanaan tugas sebagaimana huruf a dan huruf b kepada Tim Teknis setiap 2 (dua) minggu sekali.

KEENAM : Sekretariat Tim sebagaimana dimaksud pada diktum KESATU berkedudukan di Divisi Teknis dan Bisnis PD PAL Jaya.

KETUJUH : Biaya yang diperlukan dalam pelaksanaan tugas TIM sebagaimana dimaksud pada diktum KESATU, dibebankan pada Rencana Kerja Anggaran Perusahaan (RKAP) PD PAL Jaya Tahun Anggaran 2011 atau sumber pembiayaan lain yang sah dan tidak mengikat.

KEDELAPAN : Keputusan Gubernur ini mulai berlaku pada tanggal ditetapkan.

Ditetapkan di Jakarta
pada tanggal 6 Januari 2011

a.n. GUBERNUR PROVINSI DAERAH KHUSUS IBUKOTA JAKARTA
SEKRETARIS DAERAH,

FAJAR PANJAITAN
NIP 195508261976011001

Tembusan :

1. Gubernur Provinsi DKI Jakarta
2. Wakil Gubernur Provinsi DKI Jakarta

Lampiran Keputusan Gubernur Provinsi Daerah Khusus Ibukota Jakarta

Nomor 28/2011
Tanggal 6 Januari 2011

TIM PENDAMPING PROYEK PENGEMBANGAN KAPASITAS SEKTOR AIR LIMBAH MELALUI REVIEW MASTER PLAN AIR LIMBAH

I. Penanggung Jawab : Sekretaris Daerah Provinsi DKI Jakarta

II. Tim Pengarah :

Koordinator ① : Deputi Gubernur Bidang Tata Ruang dan Lingkungan Hidup Provinsi DKI Jakarta

Anggota ② : 1. Asisten Pembangunan dan Lingkungan Hidup Sekda Provinsi DKI Jakarta

③ 2. Kepala Badan Perencanaan Pembangunan Daerah Provinsi DKI Jakarta

④ 3. Kepala Badan Pengelola Lingkungan Hidup Daerah Provinsi DKI Jakarta

⑤ 4. Kepala Dinas Pekerjaan Umum Provinsi DKI Jakarta

⑥ 5. Kepala Dinas Kebersihan Provinsi DKI Jakarta

⑦ 6. Direktur Utama PD PAL Jaya

III. Tim Teknis :

Koordinator ⑧ : Kepala Bidang Prasarana Sarana Kota dan Lingkungan Hidup Badan Perencanaan Pembangunan Daerah Provinsi DKI Jakarta

Anggota ⑨ : 1. Kepala Bidang Pengendalian Pencemaran dan Sanitasi Lingkungan Badan Pengelola Lingkungan Hidup Daerah Provinsi DKI Jakarta

⑩ 2 Kepala Bidang Perencanaan Ruang Kota Dinas Tata Ruang Provinsi DKI Jakarta

⑪ 3. Kepala Bidang Pengelolaan Sumber Daya Air Dinas Pekerjaan Umum Provinsi DKI Jakarta

⑫ 4. Kepala Bidang Teknik Pengelolaan Kebersihan Dinas Kebersihan Provinsi DKI Jakarta

⑬ 5. Kepala Bagian Lingkungan Hidup Biro Tata Ruang dan Lingkungan Hidup Setda Provinsi DKI Jakarta

⑭ 6. Kepala Bagian Prasarana Kota Biro Prasarana dan Sarana Kota Setda Provinsi DKI Jakarta

⑮ 7 Direktur Teknik dan Bisnis PD PAL Jaya

IV. Tim Pelaksana

Koordinator

16 1. Kepala Bidang Pengembangan dan Program PD PAL Jaya

Anggota

17 : 2. Kepala Subbidang Tata Ruang, Lingkungan Hidup, Energi dan Sumber Daya Alam Badan Perencanaan Pembangunan Daerah Provinsi DKI Jakarta

18 3. Kepala Subbidang Pengendalian Habitat dan Sanitasi Lingkungan Badan Pengelola Lingkungan Hidup Daerah Provinsi DKI Jakarta

19 4. Kepala Seksi Perencanaan Makro Ruang Kota Dinas Tata Ruang Provinsi DKI Jakarta

20 5. Kepala Seksi Perencanaan Pengelolaan Sumber Daya Air Dinas Pekerjaan Umum Provinsi DKI Jakarta

21 6. Kepala Seksi Pengembangan Metode Pengelolaan Kebersihan Dinas Kebersihan Provinsi DKI Jakarta

22 7. Kepala Subbagian Tata Air Biro Prasarana dan Sarana Kota Setda Provinsi DKI Jakarta

23 8. Kepala Subbidang Pengelolaan Program PD PAL Jaya

a.n. GUBERNUR PROVINSI DAERAH KHUSUS
IBUKOTA JAKARTA
SEKRETARIS DAERAH,

FADJAR PANJAITAN
NIP 195608261976011001

The Goverment of DKI Jakarta Province

Decree of Governoor of DKI Jakarta Province

No. 28/2011

On

Formation of counterpart for The Project of Capacity Development of Wastewater Sector

Through Reviewing the Wastewater Management Master plan

By the blessed of GOD Almighty

Governoor of DKI Jakarta Province

Considering : a. That in order to following up the and authorities Concerned of the Government of the Repblic Indonesia on Japanese technical Cooperation for the project of Capacity Development of Wastewater Sector Through Reviewing the Wastewater Management Master plan in DKI Jakarta, dated 17th June 2010, it is necessary to prepare the plan of drafting the Review Master plan for Wastewater in DKI Jakarta

b. based on the consideration as mentioned in letter a, to accelerate and effectiveness of the drafting, it is necessary to enacted the Governoor decree on establishment of the counterpart team for the Project of Capacity Development of Wastewater Sector Through Reviewing the Wastewater Management Master plan.

Recalling : 1. Law No 10 year 2004 on establishment of legislation.

2. law No 32 year 2004 on Local Government as in several times changing, last with the law No 12 year 2008

3. Law no 29 year 2007 on Goverment of DKI Jakarta Province as the capital of Republic Indonesia

4. Law no 32 year 2009 on Protection and Environmental management

5. Regional regulation No 10 year 2008 on Local Staff Organization

DECIDED

Enacted : The Governoor Decree on the establishment of Counterpart team for the Project of Capacity Development of Wastewater Sector Through Reviewing the Wastewater Management Master plan

First : Establish the counterpart for the Project of Capacity Development of Wastewater Sector Through Reviewing the Wastewater Management Master plan in DKI Jakarta with the formation of the member as mentioned in the attachment of this Governoor Decree

Second : The Responsible person as mentioned in the First has duties:

a. To make sure the implementation for the Review Master Plan of Wastewater in DKI Jakarta goes well; and
b. Reporting the implementation of the Project to the Governoor onec in every 1 (one) year or depend on the necessity.

Third : Sterring team as mentioned in the First have duties:

a. Directing and monitoring the annual plan of the project in line with the operational plan.
b. Review the progress of the project and evaluated the finishing of the target and achievement of the objective.
c. Identify the determination of ways or completion method from the issues raised from or related with the project; and
d. Report the implementation of the duties as mentioned in letter a, b, and c above to the responsible Person once in every 4 (four) months

Fourth : The Technical team as mentioned in the First have duties:

a. To give the technical counterparting to the implementation of the Project
b. To facilitate the coordination between stakeholder related with the implementation of the project; and
c. To report the implementation of the duties as mentioned in letter a and b to the streering team once in every 1 (one) month

Fifth : The Implementer team as mentioned in the First have duties:

a. Facilitating the communication between Technical team and Consultant team of the project
b. Assist the implementation of daily duty of the Technical team; and
c. Report the implementation of the duties as mentioned in letter a and b to the technical team once in every 2 (two) weeks.

Sixth : The secretariate of the team as mentioned in the First, located in the division of Technical and business of PD PAL Jaya.

Seventh : The cost required on the implementation of the team duties as mentioned on the First, bear to the Company Budgeting Work Plan (Rencana Kerja Anggaran Perusahaan) PD PAL Jaya, fiscal year 2011 or other legitimate financial source.

Eighth : This governoor decree is valid from the enacted date.

Enacted in Jakarta

On date of January 6th 2011

On behalf of Governoor of DKI Jakarta

Regional Secretary

Fadjar Panjaitan

Nip 195508261976011001

CC:

1. Governoor of DKI Jakarta Province
2. Deputy Governoor of DKI Jakarta Province

Attachment : The Decree of Governoor of DKI Jakarta Province

Number 28/2011

Dated January 6th 2011

COUNTERPART TEAM FOR THE PROJECT OF CAPACITY DEVELOPMENT OF WASTEWATER SECTOR THROUGH REVIEWING THE WASTEWATER MANAGEMENT MASTER PLAN

I. Responsible Person : The regional Secretary of DKI Jakarta Province

II. Streering Team :

Coordinator : Deputy Governoor on Spatial and Environmental of DKI Jakarta Province

Member :

1. Assistant Development and Environtmental, Regional Secretary of DKI Jakarta Province
2. Head of BAPPEDA, DKI Jakarta Province
3. Head of BPLHD, DKI Jakarta Province
4. Head of Public Works Agency (Dinas PU), DKI Jakarta Province
5. Head of Cleansing Agency (Dinas Kebersihan), DKI jakarta Province
6. President Director of PD PAL Jaya

III. Technical Team : Head of City Infrastructure and Environmental Division, BAPPEDA DKI Jakarta Province

Member :

1. Head of Pollution control and Sanitation Division, BPLHD DKI Jakarta Province
2. Head of City Spatial Planning Division, Spatial Agency (Dinas Tata Ruang) DKI Jakarta Province
3. Head of Water Resources Management Division, Public Works Agency (Dinas PU), DKI Jakarta Province
4. Head of Cleansing Menagement Technic Division, Cleansing Agency (Dinas Kebersihan), DKI Jakarta Province

5. Head of Environmental Division, Bureau of Spatial adn Environmental, Regional Secretary of DKI Jakarta Province
6. Head of City Infrastructure Division, Bureau of City Infrastructure, Regional Secretary of DKI Jakarta Province
7. Director of Technical and Business, PD PAL Jaya

IV. Implementer Team

Coordinator :

1. Head of Development and Program Division, PD PAL Jaya

Member :

2. Head of Sub-division of Spatial, Environmental, Energy and Water Resources, BAPPEDA DKI Jakarta Province
3. Head of Subdivison of Habitat Control and Sanitation, BPLHD DKI Jakarta Province
4. Head of Urban Macro Planning Section, Spatial Agency (Dinas Tata Ruang), DKI Jakarta Province
5. Head of Water Resources Management Planning section, Public Works Agency (Dinas PU), DKI Jakarta Province
6. Head of Development of Cleansing Management Method Section, Cleansing Agency (Dinas Kebersihan) DKI Jakarta Province
7. Head of Water Management Sub-division, Bureau of City Infrastructure, Regional Secretary of DKI Jakarta Province
8. Head of Program Management Sub-division, PD PAL Jaya

On behalf of Governoor DKI Jakarta Province

Regional Secretary

Fadjar Panjaitan

Nip 195508261976011001

Appendix − 2 : Minutes of meeting (Inception Report)

MINUTES OF MEETING

ON

THE FIRST JOINT COORDINATING COMMITTEE

FOR

THE PROJECT FOR CAPACITY DEVELOPMENT OF WASTEWATER SECTOR THROUGH REVIEWING THE WASTEWATER MANAGEMENT MASTER PLAN IN DKI JAKARTA

At the commencement of the Project for Capacity Development of Wastewater Sector through Reviewing the Wastewater Management Master Plan in DKI Jakarta (hereinafter referred to as "the Project"), the Government of the Republic of Indonesia (hereinafter referred to as "GOI") and Japan International Cooperation Agency (hereinafter referred to as "JICA") hold the 1st Joint Coordinating Committee (hereinafter referred to as "JCC") meeting chaired by Director General of Human Settlements, Ministry of Public Works, on 15th December 2010 in Jakarta.

During the JCC meeting, JICA and the Indonesian authorities concerned discussed on the issues related to the implementation of the Project. As the result of the discussions, JICA and the Indonesian authorities concerned agreed on the matters referred to in the documents attached hereto, subject to approval by the competent higher authorities on both sides.

Jakarta, 15th December 2010

Shigenori OGAWA
Senior Representative
Indonesia Office
Japan International
Cooperation Agency (JICA)

Budi Yuwono P.
Director General
of Human Settlements
Ministry of Public Works
The Republic of Indonesia

Fadjar Panjaitan
Provincial Secretary of
DKI Jakarta
The Republic of Indonesia

Dedy Supriadi Priatna
Deputy for Infrastructure
BAPPENAS
The Republic of Indonesia

ATTACHMENT

1. Commencement of the Project

At the 1st JCC meeting, JICA and GOI formally declared the commencement of the Project. JICA formally introduced to GOI, JICA Long Term Expert, Mr. Hideichiro NAKAJIMA, and also JICA Expert Team, headed by Mr. Masahiro TAKEUCHI.

2. Preparation of Domestic Wastewater Law and Related Regulations (Output 1)

JICA Long Term Expert explained the frameworks of the project and action to be taken for preparation of Domestic Wastewater Law and related regulations. It was suggested to GOI to prioritize laws and regulations to be prepared through this project.

GOI agreed on it.

3. Revision of Wastewater Management Master Plan in DKI Jakarta (Output 2)

JICA Expert Team explained the Inception Report which contains mainly the following:

(1) Purpose and scope of the Project
(2) Overall schedule of the Project
(3) Basic policies of the Project
(4) Project implementation policies
(5) Project implementation organization and staffing plan
(6) Reports

GOI requested JICA to prepare the reports in Indonesian Language, not only in English. JICA noted it.

GOI requested JICA to identify and propose the candidate site for sewerage treatment plants in Master Plan at the early stage of project, so that DKI Jakarta can start preparation of land acquisition earlier. JICA noted it.

GOI mentioned that the activities of the Project shall be adjusted to the City Sanitation Strategy of DKI Jakarta to be prepared by DKI Jakarta, and also shall coordinate with the other related activities.

4. New JCC members

GOI proposed the following related parties as the JCC member, in addition to the members listed in "ANNEX VI JOINT COORDINATION COMMITTEE" of Record of Discussion dated 15th December 2010 (hereinafter referred as to "the R/D")..

- Head of Planning and Foreign Aid Bureau, Secretary General, Ministry of Public Works
- Director of Loan & Grant, Directorate General, Loan Management, Ministry of Finance

JICA agreed on it. The revised list of JCC members are attached as Annex-2.

5. Revision of Project Framework, Project Design Matrix (PDM) and Plan of Operation (PO)

(1) JICA proposed to revise descriptions in "ANNEX 1: PROJECT FRAMEWORK" of the R/D as follows:

a) Originally written as:

5. Activities

(2-2-5) To conduct topographic and geological survey at sewage treatment plant sites"

shall be revised as:

5. Activities

(2-2-5) To select the sewage treatment plant sites based on the technical suitability

b) Serial number of "5. Activities"shall be revised as follows:

Serial Number (Original)	Activity	Serial Number (Revised)
2-2-8	To conduct Initial Environmental Examination (IEE)	2-2-12
2-2-9	To develop an improvement plan of the organizational functions	2-2-8
2-2-10	To develop an activity plan of environmental education in wastewater sector	2-2-9
2-2-11	To evaluate the selected alternative option by economical, financial, technical, social and environmental aspects	2-2-10
2-2-12	To identify priority actions to be taken for implementation of the master plan and make an action plan including implementation of a feasibility study and capacity development for related stakeholders	2-2-11

GOI agreed on it.

Project Design Matric (PDM) attached to the R/D shall be revised accordingly. The revised PDM is attached in Annex-3.

(2) Regarding Plan of Operation (PO) attached to the R/D, JICA also proposed that the target for the activities of Output-1 shall be revised as "Domestic Wastewater Laws and Related Regulations".

GOI agreed on it. The revised PO is attached in Annex-4.

6. Training of Indonesian Personnel in Japan

GOI requested that the Counterpart Trainings in Japan should be conducted at the earlier stage of the Project.

JICA noted it.

7. Further Discussions

GOI stated that Directorate General of Human Settlement, the Ministry of Public Works has already prepared "Review of Master Plan and Detail Design for Jakarta Wastewater Development Project" (hereinafter referred to as "Review Master Plan 2009") by their own budget, and they would like to accelerate the construction of sewerage system in DKI Jakarta. In this regards, GOI expressed their intention to propose JICA for Preparatory Survey on development of sewerage system in DKI Jakarta, starting from the middle of June 2011, in parallel with this Project. GOI also expressed their strong intension for the implementation of construction works using Japanese ODA Loan.

JICA noted it and suggested to have another meeting to discuss how to accelerate the development of sewerage system in DKI Jakarta in order to catch up with the original schedule. JICA also emphasized that it would depend on GOI's strong initiative and participation in implementing the Project with assistance of JICA experts.

Annexes

Annex-1 List of Attendants
Annex-2 List of Joint Coordinating Committee Member (Revision-1)
Annex-3 Revised Project Design Matrix (PDM)
Annex-4 Revised Plan of Operation (PO)

Annex-1

List of Attendants

[Indonesian side]

Ministry of Public Works

Mr. Syukrul Amien	Director of Environmental Sanitation Development, DGHS
Mr. Antonius Budiono	Director of Program Development, DGHS
Mr. Handy B. Legowo	Sub-Director of Sanitation, Directorate of Environmental Sanitation Development, DGHS
Ms. Rini Agustin	Sub-Director of Foreign Affairs, DGHS
Ms. Emah Sudjimah	Section Head of Development and Facilitation, Sub-directorate of Wastewater System Development, Directorate of Environmental Sanitation Development, DGHS
Mr. Indra Bangun	Staff of Foreign Cooperation Bureau, Secretary General
Mr. Sunarjo	Staff of Directorate of Program Development, DGHS
Mr. Budi Felinov	Staff of Directorate of Program Development, DGHS
Mr. Joko Karsono	Staff of Directorate of Program Development, DGHS
Mr. Dahlan	Staff of Law Division, DGHS

DKI Jakarta

Ms. Sarwo Handayani	Head of BAPPEDA
Ms. Tyas	Assistant Deputy Governor for Environment
Mr. Dudi Gardesi	Section Head of Planning and Maintenance of Water Resources, Public Works Agency
Mr. Tauhid Tjakra	Assistant of Development and Environment, Secretary of Province
Ms. Esti	Secretary of Director of PD PAL JAYA
Ms. Aktina Tetradewi	Staff of Assistant Deputy Governor for Environmental Division
Mr. Eko Gumelar	Staff of Environmental Impact Control Division, Environmental Board (BPLHD)
Mr. Wawan Kurniawan	Staff of Environmental Impact Control Division, Environmental Board (BPLHD)
Ms. Liliansari Loedin	President Director, PD PAL JAYA
Ms. Driah T.	Staff of BAPPEDA

BAPPENAS

Mr. Aldy K. Mardikanto	Staff of Planning, Directorate of Housing and Settlement, Deputy of Infrastructure

[Japanese side]

JICA Indonesia Office

Mr. Shigenori Ogawa	Senior Representative, JICA Indonesia Office
Ms. Keiko Kitamura	Project Formulation Advisor, JICA Indonesia Office

Project Team

(JICA Long-term Expert)

Mr. Hideichiro Nakajima	Chief Advisor/Sewerage Policy Advisor

(JICA Short-term Expert)

Mr. Masahiro Takeuchi	Leader/Sewerage Planning
Mr. Kazushi Hashimoto	Sub-Leader/On-site System-1
Dr. Lalit Agrawal	Wastewater Treatment Planning
Mr. Takashi Miyagawa	Institution-1/Environmental Education
Mr. Atsushi Kato	Coordinator/Assistant of Sewerage Planner

Annex-2

List of Joint Coordinating Committee Members

Position	Institution
Indonesian Side	
Chairperson	Director General of Human Settlements, Ministry of Public Works
Member	Deputy Governor for Spatial Planning and Environment, DKI Jakarta
	Head of BAPPEDA, DKI Jakarta
	Assistant of Development and Environment, Secretary of Province, DKI Jakarta
	Head of Public Works Department, DKI Jakarta
	Head of Environmental Management Board, DKI Jakarta
	Head of Cleansing Department, DKI Jakarta
	Director of Settlements and Housing, BAPPENAS
	Director of Program Development, Directorate General of Human Settlements, Ministry of Public Works
	Director of Environmental Sanitation Development, Directorate General of Human Settlements, Ministry of Public Works
	President Director of PD PAL JAYA
	Head of Planning and Foreign Aid Bureau, Secretary General of Ministry of Public Works
	Director of Loan & Grant, Directorate General, Loan Management, Ministry of Finance
Japanese Side	
Member	Chief Representative of JICA Indonesia Office
	JICA Experts
	Other personnel concerned, to be assigned by JICA, if necessary.

Project Design Matrix-2 (PDM2)

Project Title: The Project for Capacity Development of Wastewater Sector through Reviewing the Wastewater Management Master Plan in DKI Jakarta

Implementing Agencies: Directorate General of Human Settlement of Ministry of Public Works (MPW) and DKI Jakarta

Cooperating Agency: PD PAL JAYA

Project Site: DKI Jakarta

Target Group:
(Direct): Staff members of MPW, DKI Jakarta and PD PAL JAYA
(Indirect): Residents of DKI Jakarta

Duration: 2010 – 2012 (2 years)
Date: 15th December 2010

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
[Overall Goal] 1. Proper policy, system and plan in wastewater sector are established. 2 DKI Jakarta has enough capacity to improve wastewater sector conditions.	1-1 Domestic Wastewater Law is enacted. 1-2 Regulations and standards related to Domestic Wastewater Law are enacted. 2-1 Finance is prepared. 2-2 Revised wastewater management master plan is implemented.	Domestic Wastewater Law Regulations and standards related to Domestic Wastewater Law Record and information from MPW and DKI Jakarta Record and information from MPW and DKI Jakarta	
[Project Purpose] Capacity of Ministry of Public Works and DKI Jakarta in formulation of wastewater sector policies and wastewater management plans is enhanced.	1-1 Draft Domestic Wastewater Law is submitted to the parliament. 1-2 Draft Regulations and standards related to Domestic Wastewater Law are submitted to MPW. 2. An action plan of the implementation of the revised Wastewater Management Master Plan in DKI Jakarta is developed (with information on timeframe, target, organization/section in charge, sources of the budget for each work item).	Information from MPW and DKI Jakarta Information from MPW and DKI Jakarta Action plan	1. Improvement of the wastewater management system remains as a priority in the policy of Ministry of Public Works and DKI Jakarta. 2. Financial resources for implementation of the master plan are available 3. Land for sewage treatment plants is secured.
[Outputs] 1. Domestic Wastewater Law and its regulations are prepared. 2. The wastewater management master plan in DKI Jakarta is revised.	1-1 Draft Domestic Wastewater Law is developed. 1-2 Regulations and standards related to Domestic Wastewater Law are developed. 2-1 Revised wastewater management master plan is approved in DKI Jakarta.	Draft Domestic Wastewater Law Related regulations and standards Revised wastewater management master plan	

Activities		Inputs		Important Assumption
		Japanese Side	Indonesian Side	
1	**Domestic Wastewater Law and its regulations are prepared.**	1. Experts (1) Long-term expert - Chief Advisor/Sewerage Policy Advisor (2) Short-term expert team 1) Leader/Sewerage planning 2) Sub-leader/On-site system 3) Urban planning 4) Wastewater treatment planning 5) Sewerage facilities planning 6) Urban drainage 7) GIS 8) Institution 9) Economics/finance 10) Environmental and social consideration 11) Environmental education 12) Coordinator 2. Equipment (1) Personal computer and software for GIS: 2 sets (2) Printer: 2 sets 3. Training in Japan 4. Local cost	1. Assignment of Counterpart personnel 2. Project office spaces and other necessary facilities 3. Necessary data/ information 4. Allocation of operational cost for the Project	
1-1	To collect and analyze basic information related to national wastewater sector, and identify institutional and technical issues based on existing data and previous study			
1-2	To select priority laws and regulations comprises norms, standards, guidelines and criteria to be developed or revised			
1-3	To develop draft of laws and regulations comprises norms, standards, guidelines and criteria that are selected in activity (1-2)			
1-4	To hold a seminar with relevant organizations / stakeholders in the wastewater sector to share and discuss the result of activity (1-3)			
1-5	To develop or revise laws and regulations identified in activity (1-2) based on the result of activity (1-4) and (2-2-13)			
2	**The wastewater management master plan in DKI Jakarta is revised.**			
2-1	**To conduct survey for reviewing the wastewater management master plan in DKI Jakarta**			
2-1-1	To review the existing data and information including progress of the master plan, related plans and policies			
2-1-2	To assess capacity of wastewater sector in DKI Jakarta and PD PAL JAYA.			
2-1-3	To identify flood condition and major drainage facilities			
2-1-4	To conduct site survey and data analysis			
2-1-5	To analyze socio economic data for establishing the master plan			
2-1-6	To identify institutional issues (organizational, financial and human resources related) in the relevant organizations in wastewater in DKI Jakarta			
2-1-7	To conduct field survey for selection of sewage treatment plant sites			
2-1-8	To conduct water quality survey			
2-1-9	To evaluate the present condition and to identify the issues			

Activities		Inputs		Important Assumption
		Japanese Side	Indonesian Side	
2-2	**To review the master plan**			
2-2-1	To develop the basic plan for wastewater management including targets, strategies and actions			
2-2-2	To develop the frame work for wastewater management system			
2-2-3	To develop the planning data (qualities and quantity of wastewater generation)			
2-2-4	To make a zoning of off-site system and on-site system			
2-2-5	To select the sewage treatment plant sites based on the technical suitability			
2-2-6	To develop alternative studies of the master plan (construction cost, OM cost, environment and others)			
2-2-7	To select the most appropriate alternative option			
2-2-8	To develop an improvement plan of the organizational functions			
2-2-9	To develop an activity plan of environmental education in wastewater sector			**[Pre-conditions]**
2-2-10	To evaluate the selected alternative option by economical, financial, technical, social and environmental aspects			Appropriate human resources are assigned and budget is allocated to the Project.
2-2-11	To identify priority actions to be taken for implementation of the master plan and make an action plan including implementation of a feasibility study and capacity development for related stakeholders			
2-2-12	To conduct Initial Environmental Evaluation (IEE)			
2-2-13	To publish the revised wastewater management master plan in DKI Jakarta			

Plan of Operation-2 (PO2)

Project Title: The Project for Capacity Development of Wastewater Sector through reviewing the Wastewater Management Master Plan in DKI Jakarta
Duration: July 2010 ~ June 2012 (2 years)

				2010						2011												2012					
				7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
			Joint coordinating committee					○						○					○								○
			Terminal Evaluation																				○				
1. Domestic Wastewater Law and its regulations are prepared.		Target	Person in-charge																								
1-1	To collect and analyze basic information related to national wastewater sector, and identify institutional and technical issues based on existing data and previous study	Domestic Wastewater Law and Related Regulations	Mr. Handy Legowo (DGHS),Mr. Rudy Arifin (DGHS),Chief of Wastewater Development Region 1 Section																								
1-2	To select priority laws and regulations comprises norms, standards, guidelines and criteria to be developed or revised		Mr. Handy Legowo (DGHS),Mr. Rudy Arifin (DGHS), Mrs. Kuswahyuni (Head of Sub-division of Law)																								
1-3	To develop draft of laws and regulations comprises norms, standards, guidelines and criteria that are selected in activity (1-2)		Mr. Handy Legowo (DGHS),Mr. Rudy Arifin (DGHS), Mrs. Kuswahyuni (Head of Sub-division of Law)																								
1-4	To hold a seminar with relevant organizations / stakeholders in the wastewater sector to share and discuss the result of activity (1-3)		Mr. Handy Legowo (DGHS),Mr. Rudy Arifin (DGHS), Mrs. Kuswahyuni (Head of Sub-division of Law)																								
1-5	To develop or revise laws and regulations identified in activity (1-2) based on the result of activity (1-4) and (2-2-13)		Mr. Handy Legowo (DGHS),Mr. Rudy Arifin (DGHS), Mrs. Kuswahyuni (Head of Sub-division of Law)																								
Training in Japan																											
2.The wastewater management master plan in DKI Jakarta is revised			Person in-charge																								
2-1	To conduct survey for reviewing the wastewater management master plan in DKI Jakarta																										
2-1-1	To review the existing data and information including progress of the master plan, related plans and policies		Head of Urban Infrastructure and Environment Division, DKI Jakarta																								
2-1-2	To assess capacity of wastewater sector in DKI Jakarta and PD PAL JAYA		All C/P related to output 2																								
2-1-3	To identify flood condition and major drainage facilities		Head of Planning and Programming Division																								
2-1-4	To conduct site survey and data analysis		All C/P related to output 2																								
2-1-5	To analyze socio economic data for establishing the master plan		All C/P related to output 2																								
2-1-6	To identify institutional issues (organizational, financial and human resources related) in the relevant organizations in sanitation and sewerage in DKI Jakarta		BAPPEDA																								
2-1-7	To conduct field survey for selection of sewage treatment plant sites		Environmental Board, DKI Jakarta PD PAL JAYA																								
2-1-8	To conduct water quality survey		Environmental Board, DKI Jakarta																								
2-1-9	To evaluate the present condition and to identify the issues		All C/P related to output 2																								
2-2	To review the master plan																										
2-2-1	To develop the basic plan for wastewater management including targets, strategies and actions		BAPPEDA, Environmental Board, DKI Jakarta PD PAL JAYA																								
2-2-2	To develop the frame work for wastewater management system		BAPPEDA, Environmental Board, DKI Jakarta PD PAL JAYA																								
2-2-3	To develop the planning data (qualities and quantity of wastewater generation)		BAPPEDA, Environmental Board, DKI Jakarta PD PAL JAYA																								
2-2-4	To make a zoning of off-site system and on-site system		BAPPEDA, Environmental Board, Cleansing Department DKI Jakarta PD PAL																								
2-2-5	To select the sewage treatment plant sites based on the technical suitability		BAPPEDA																								
2-2-6	To develop alternative studies of the master plan (construction cost, OM cost, environment and others)		BAPPEDA																								
2-2-7	To select the most appropriate alternative option		All C/P related to output 2																								
2-2-8	To develop an improvement plan of the organizational functions		BAPPEDA																								
2-2-9	To develop an activity plan of environmental education in wastewater sector		BAPPEDA, Environmental Board, DKI Jakarta PD PAL JAYA																								
2-2-10	To evaluate the selected alternative option by economical, financial, technical, social and environmental aspects		BAPPEDA																								
2-2-11	To identify priority actions to be taken for implementation of the master plan and make an action plan including implementation of a feasibility study and capacity development for related stakeholders		BAPPEDA																								
2-2-12	To conduct Initial Environmental Evaluation (IEE)		Environmental Board, DKI Jakarta																								
2-2-13	To publish the revised wastewater management master plan in DKI Jakarta		BAPPEDA																								
Training in Japan																											

DESD/DGHS: Directorate of Environmental Sanitation Development, Directorate General of Human Settlements, Ministry of Public Works

Appendix − 3 : Minutes of Meeting (Interim Report)

Minutes of 2nd JCC Meeting and Confirmation Meeting on Basic Plan

Project	**The Project for Capacity Development of Wastewater Sector through Reviewing the Wastewater Management Master Plan in DKI Jakarta**
Date & Time	For 2nd JCC: 27th July 2011 / 09:30 ～ 12:00 For Confirmation Meeting on Basic Plan: 2nd August 2011 / 10:00 ～ 12:00
Place	For 2nd JCC: Conference Room 3rd Floor, Directorate General of Human Settlement For Confirmation Meeting on Basic Plan: Conference Room 7th Floor, DGHS
Meeting title	The Second Joint Coordinating Committee and Confirmation Meeting on the Basic Plan
Attendants	***Attendant List for 2nd JCC***

[Indonesian side]

(Ministry of Public Works)

Mr. Susmono	Secretary of Director, General, Directorate General of Human Settlements (DGHS)
Mr. Syukrul Amien	Director, Directorate of Environmental Sanitation Development (PPLP), DGHS
Mr. Handy B. Legowo	Sub-Director, PPLP, DGHS
Ms. Emah Sudjimah	Head of Division, PPLP, DGHS
Ms. Mahardiani K	Staff of PPLP, DGHS
Mr. Pongsilurang	Head of Working Unit, PPLP Jabodetabek, DGHS
Mr. Sunarjo	Staff of DGHS
Ms. EE Fitri	Staff of Directorate of Foreign Planning and Coordination (PKLN)
Mr. Fajar Nur	Staff of PKLN
Mr. Rizki	Staff of PKLN

(DKI Jakarta)

Ms. Saptastry Ediningtyas Kusumadewi	Assistant Deputy Governor for Environment
Ms. Aktina Teradewi	Staff of Assistant Deputy Governor for Environment
Ms. Sarwo Handayani	Head of Regional Planning and Development Board (BAPPEDA)
Ms. Vera Revina Sari	Head of Division of City Infrastructure and Environment, BAPPEDA
Mr. Dudi Gardesi	Head of Division of Planning and Maintenance of Water Resource, Public Works Agency (DPU)
Mr. Novizal	Staff of DPU
Ms. Elisabeth T	Staff of DPU
Mr. Andono Warih	Head of Division, Regional Environment Management Board (BPLHD)
Mr. Eko Gumelar	Staff of BPLHD
Mr. Budhi Karya	Head of Division, Cleansing Agency (DK)
Mr. Robet	Staff of DK
Ms. Liliansari Loedin	President Director, PD PAL JAYA

[Japanese side]

(JICA Indonesia Office)

Ms. Kitamura Keiko	Project Formulation Advisor, JICA Indonesia Office

(Project Team)

<JICA Long-term Expert>	
Mr. Nakajima Hideichiro	Chief Advisor/Sewerage Policy Advisor
Ms. Dewi Agustina	JICA (secretary) for Long term expert
<JICA Short-term Expert>	
Mr. Takeuchi Masahiro	Leader/Sewerage Planning
Mr. Hashimoto Kazushi	Sub-Leader/On-site System-1
Mr. Morita Akira	On-site System-2
Mr. Takashima Shigeki	Urban Planning
Dr. Lalit Agrawal	Wastewater Treatment Planning
Mr. Tsunoji Hiromi	Sewerage Facilities Planning
Mr. Sato Tadafumi	Urban Drainage
Mr. Tanaka Uyu	GIS
Mr. Miyagawa Takashi	Institution-1/Environmental Education
Dr. Emori Hiroyoshi	Institution-2
Mr. Akagi Makoto	Economics/Finance
Ms. Matsubara Hiromi	Environmental and Social Consideration
Ms. Anisa Muslicha	Assistant for JICA Expert Team
Ms. Titis R	Assistant for JICA Expert Team
Mr. Denny S	Assistant for JICA Expert Team
Ms. Nandia G	Assistant for JICA Expert Team
Ms. Hana Nurul Karima	Assistant for JICA Expert Team
Mr. Adachi Gaku	Jakarta Office of Yachiyo Engineering Co. Ltd.

Attendant List for Confirmation Meeting on Basic Plan

[Indonesian side]

(Ministry of Public Works)

Mr. Sjukrul Amien	Director,. PPLP DJCK
Mr .Handy B. Legowo	Sub-Director. PPLP DJCK
Mr. Pongsilurang	Head of Working Unit, PPLP Jabodetabek, DGHS

(DKI Jakarta)

Ms. Liliansari	President, PD PAL JAYA
Ms. Driah T	Bappeda DKI
Mr. Fadly Haley Tanjung	Bappeda DKI
Mr. Salim	Dinas Pertamanan (Park Agency)
Mr. Hendr	Dinas Pertamanan (Park Agency)
Ms. Aktina Teradewi	Sewerage Facilities Planning
Mr. Dimas Yoga R	Staff of DTR
Ms. Weny Budiati	Staff of DTR
Mr. Robet	DK
Mr. Wawan Kurniawan	BPLHD
Mr. Eko Gumelar S	BPLHD

[Japanese side]

(JICA Indonesia Office)

Ms. Kitamura Keiko	Project Formulation Advisor
Ms. Juni Melani	Program Officer

(Project Team)

<JICA Long-term Expert>	
Mr. Nakajima Hideichiro	Chief Advisor/Sewerage Policy Advisor
Ms. Dewi Agustina	JICA (secretary) for Long term expert
<JICA Short-term Expert>	
Mr. Takeuchi Masahiro	Leader/Sewerage Planning
Mr. Morita Akira	On-site System-2
Mr. Takashima Shigeki	Urban Planning
Dr. Lalit Agrawal	Wastewater Treatment Planning
Mr. Tsunoji Hiromi	Sewerage Facilities Planning
Mr. Miyagawa Takashi	Institution-1/Environmental Education
Dr. Emori Hiroyoshi	Institution-2
Mr. Akagi Makoto	Economics/Finance
Ms. Titis R	Assistant for JICA Expert Team
Mr. Denny S	Assistant for JICA Expert Team

Mr. Nakajima, Chief Advisor and JICA Long-term Expert, explained the progress of Output-1 (Domestic Wastewater Law) and leader of JICA Short-term Expert, Mr. Takeuchi explained the Interim Report (IT/R) and Basic Plan for Output-2 (Reviewing Wastewater Management Master Plan) to the JCC members.

Both sides agreed in principle with the contents of the IT/R except the comments made by BAPPEDA as follows:

1. BAPPEDA has a role of steering development and planner of the program and its coordination. Therefore, words of “there is no agency which coordinates the policies of the organizations involved in wastewater management” should be revised accordingly.
2. For the explanation on institution in the level of control & monitoring, the role of Dinas Pengawasan dan Penertiban Bangunan (Building Control and Monitoring Agency) should be added.
3. Explanation on the “special budgetary frameworks” should refer to RPJMD (Regional Medium Term Development Plan) of DKI Jakarta 2007 – 2012 on Dedicated Program and it is necessary to be explained that the prioritized fields of budget are not only “flooding measures” and “transportation measures”.
4. Explanation on the position of PD PAL JAYA in the budgetary system of Government of DKI Jakarta Province is needed to be completed with the explanation of its law regulations.
5. The budget in the amount of Rp5.2 trillion is not only for flood control and subway development, but also for all dedicated programs. Therefore, the related part should be revised accordingly.

The Japanese side confirmed the comments and agreed to incorporate these comments into the draft final report to be submitted to the Indonesian side in December 2011.

Regarding the Basic Plan, the Indonesian side made comments as follows:

1. In the Basic Plan, the sewerage coverage ratios for the Improvement Target are set as 20% in 2020, 40% in 2030 and 80% in 2050. As for the improvement target, we agree to the target in 2050. However, we consider that the targets in 2020 and 2030 are too optimistic. Targeted figures for the facilities (wastewater treatment plant, sewer pipes, etc.) are acceptable as they are. However, the rate of house connections seems not to increase so much because only 8 years are left to the target year of 2020. Therefore, the coverage ratio should be divided into two (2) ratios, that is, the facility coverage ratio and the service coverage (or house connection) ratio. For the improvement target in the year 2020, the facility coverage ratio should be set as 20%, while the service coverage ratio is set as 10%.
2. For the service coverage ratio, the progress of the ratio for a short span of time should be expressed for easier understanding.
3. For the improvement ratio on On-site System, more specific targets such as CST (Conventional Septic Tank), MST (Modified Septic Tank), etc., should be set.
4. In RTRW2030 of DKI Jakarta, the new city plan includes reclamation areas in the northern part of DKI Jakarta. Therefore, the Basic Plan should show the sewerage zones including those reclamation areas.
5. In the Old M/P, there were six (6) sewerage zones and the New M/P will adopt different sewerage zones. Therefore, the Basic Plan should explain the difference.
6. Facility coverage ratio and service coverage ratio in 2014 should be 4% instead of 2% since the capacity of Setiabudi WWTP and network will be expanded by 2014.

The Japanese side revised the Basic Plan based on the comments made by the Indonesian side and submitted the revised version on 9th August 2011 of the Basic Plan to the Indonesian side as attached to this minutes.

Other comments made by the Indonesian side as mentioned below shall be taken into account in the course of preparation for the draft final report:

1. For BOD generated from other sources than domestic wastewater and treated wastewater from commercial & institutional buildings and industry, it will be assumed for three (3) categories such as BOD at upstream area, BOD from solid waste and BOD from untreated industrial wastewater.

Remarks & Comments:

Attachment: Basic Plan (Revised Version of 9th August 2011)

Appendix − 4 : Population and Area of Each Sewerage Zone for Kelurahan Basis

Population and area of each sewerage zone for Kelurahan basis are shown in Table A4-1.

Table A4-1 Population and Area of Each Sewerage Zone for Kelurahan Basis

Sewerage Zone No.	Kelurahan	Area (ha)	Population (person)	
		2030&2050	2020	2030&2050
0	MANGGARAI	72	29,284	29,573
0	MANGGARAI SELATAN	8	5,191	5,678
0	BUKIT DURI	11	4,984	5,450
0	MENTENG DALAM	42	7,549	8,256
0	SETIABUDI	67	4,048	4,088
0	KARET	92	9,271	9,363
0	KARET SEMANGGI	90	4,143	4,184
0	KARET KUNINGAN	174	27,912	31,136
0	MENTENG ATAS	57	25,906	28,899
0	KUNINGAN TIMUR	136	5,257	5,309
0	PASAR MANGGIS	78	29,972	30,269
0	GUNTUR	66	7,799	9,141
0	KUNINGAN BARAT	2	480	536
0	SENAYAN	118	4,867	4,915
0	SELONG	16	817	825
0	KEBON MANGGIS	0	50	50
0	KAMPUNG MELAYU	1	529	520
0	MENTENG	3	370	408
0	PEGANGSAAN	0	12	14
0	KEBON MELATI	1	231	256
0	KARET TENGSIN	150	22,610	29,610
0	BENDUNGAN HILIR	18	3,084	3,156
0	GELORA	18	223	229
Total Population for Sewerage Zone No. 0		**1,220**	**194,589**	**211,865**
1	PASAR MANGGIS	0	39	39
1	KEBON MANGGIS	0	50	49
1	CIDENG	125	20,539	22,756
1	PETOJO UTARA	113	24,099	26,699
1	KEBON KELAPA	79	10,227	11,330
1	GAMBIR	250	3,155	3,496
1	PETOJO SELATAN	114	20,932	23,655
1	DURI PULO	68	26,519	29,381
1	MANGGA DUA SELATAN	130	40,569	45,847
1	KARANG ANYAR	50	34,444	38,161
1	PASAR BARU	95	5,208	5,328
1	GUNUNG SAHARI UTARA	0	0	1
1	KARTINI	52	23,245	25,754
1	SENEN	0	4	4
1	KENARI	0	15	15
1	KEBON SIRIH	83	13,254	13,560
1	GONDANGDIA	147	6,872	7,614
1	CIKINI	78	10,228	11,559
1	MENTENG	239	27,874	30,882
1	PEGANGSAAN	97	24,359	26,988
1	KAMPUNG BALI	72	15,158	15,507
1	KEBON KACANG	72	24,714	27,382
1	KEBON MELATI	126	31,406	34,795
1	PETAMBURAN	0	40	44
1	BENDUNGAN HILIR	0	5	5
1	GROGOL	1	41	47
1	TOMANG	0	36	38
1	JELAMBAR BARU	0	14	15
1	PINANGSIA	94	12,576	13,265
1	GLODOK	37	13,529	14,270
1	MANGGA BESAR	55	12,271	12,942
1	TANGKI	38	20,093	21,193
1	KEAGUNGAN	35	39,794	46,363
1	KRUKUT	56	28,131	29,671
1	TAMAN SARI	68	28,427	32,470
1	MAPHAR	63	37,008	39,033
1	PEKOJAN	78	43,536	49,728
1	ROA MALAKA	53	8,438	8,900
1	KRENDANG	33	30,185	34,478
1	TAMBORA	29	15,956	19,531
1	JEMBATAN LIMA	47	32,976	34,781
1	DURI UTARA	37	29,676	31,301
1	TANAH SEREAL	63	46,821	54,551
1	ANGKE	79	40,727	42,956
1	JEMBATAN BESI	52	44,840	51,218
1	KALI ANYAR	31	37,532	39,587
1	DURI SELATAN	38	21,398	22,569
1	PENJARINGAN	455	103,277	111,943
1	PEJAGALAN	197	46,401	50,294
1	KAPUK MUARA	0	1	1
1	PLUIT	778	67,729	60,728

Table A4-1 Population and Area of Each Sewerage Zone for Kelurahan Basis

Sewerage Zone No.	Kelurahan	Area (ha)	Population (person)	
		2030&2050	2020	2030&2050
1	ANCOL	494	13,485	14,012
Total Population for Sewerage Zone No. 1		**4,901**	**1,137,853**	**1,236,736**
2	KAPUK	255	63,702	72,762
2	KEDAUNG KALI ANGKE	54	8,402	9,597
2	JELAMBAR BARU	1	253	267
2	WIJAYA KUSUMA	0	41	47
2	ANGKE	0	9	9
2	PEJAGALAN	171	40,205	43,579
2	KAPUK MUARA	895	27,998	22,781
2	PLUIT	0	0	0
Total Population for Sewerage Zone No. 2		**1,376**	**140,610**	**149,042**
3	GROGOL UTARA	330	52,686	58,774
3	GROGOL SELATAN	282	58,028	64,733
3	CIPULIR	93	28,703	31,391
3	PETUKANGAN UTARA	280	69,192	77,187
3	PETUKANGAN SELATAN	0	1	2
3	ULUJAMI	111	31,977	34,972
3	KEBON JERUK	369	68,085	77,769
3	SUKABUMI UTARA	156	57,846	67,396
3	KELAPA DUA	145	34,243	39,895
3	SUKABUMI SELATAN	167	32,300	36,893
3	MERUYA UTARA	406	50,939	59,349
3	MERUYA SELATAN	323	38,413	47,020
3	JOGLO	446	50,770	62,146
3	SRENGSENG	455	54,909	63,974
Total Population for Sewerage Zone No. 3		**3,563**	**628,092**	**721,501**
4	MANGGARAI	35	14,115	14,255
4	MANGGARAI SELATAN	48	31,495	34,445
4	BUKIT DURI	96	43,617	47,702
4	MENTENG DALAM	209	37,572	41,090
4	TEBET TIMUR	133	28,899	31,606
4	TEBET BARAT	164	34,869	38,134
4	KEBON BARU	126	54,813	59,946
4	MENTENG ATAS	39	17,903	19,972
4	KUNINGAN TIMUR	85	3,289	3,322
4	KAMPUNG MELAYU	0	244	240
4	BIDARA CINA	0	85	84
Total Population for Sewerage Zone No. 4		**935**	**266,901**	**290,796**
5	MANGGA DUA SELATAN	0	19	21
5	PASAR BARU	86	4,723	4,832
5	GUNUNG SAHARI UTARA	123	20,114	22,285
5	KARTINI	0	25	27
5	GUNUNG SAHARI SELATAN	414	24,034	26,628
5	KEMAYORAN	59	24,952	27,645
5	KEBON KOSONG	101	31,045	40,657
5	SERDANG	82	36,058	40,751
5	HARAPAN MULYA	53	20,562	22,782
5	UTAN PANJANG	54	36,340	43,145
5	CEMPAKA BARU	97	35,230	39,032
5	SUMUR BATU	114	29,619	33,473
5	SENEN	84	7,892	8,919
5	BUNGUR	63	16,073	16,444
5	TANJUNG PRIOK	2	234	254
5	PAPANGGO	224	47,182	56,491
5	SUNGAI BAMBU	140	29,646	34,798
5	SUNTER AGUNG	525	109,293	128,288
5	SUNTER JAYA	513	72,519	85,124
5	RAWABADAK SELATAN	0	96	113
5	ANCOL	393	10,721	11,140
5	PADEMANGAN BARAT	151	89,795	97,329
5	PADEMANGAN TIMUR	97	50,666	54,917
5	KELAPA GADING BARAT	0	11	14
Total Population for Sewerage Zone No. 5		**3,375**	**696,849**	**795,109**
6	GROGOL UTARA	0	1	1
6	SENAYAN	0	14	14
6	CIDENG	0	1	1
6	KAMPUNG BALI	0	43	44
6	KEBON KACANG	0	0	0
6	KEBON MELATI	0	8	8
6	PETAMBURAN	88	36,306	40,224
6	KARET TENGSIN	2	309	404
6	BENDUNGAN HILIR	141	24,534	25,099
6	GELORA	316	3,865	3,955
6	KAPUK	0	91	104
6	CENGKARENG TIMUR	13	3,124	3,295
6	KEDAUNG KALI ANGKE	238	36,948	42,203
6	DURI KOSAMBI	535	94,786	110,434

Table A4-1 Population and Area of Each Sewerage Zone for Kelurahan Basis

Sewerage Zone No.	Kelurahan	Area (ha)	Population (person)	
		2030&2050	2020	2030&2050
6	RAWA BUAYA	371	50,965	58,214
6	CENGKARENG BARAT	1	223	254
6	GROGOL	101	29,373	33,551
6	JELAMBAR	157	57,072	65,189
6	TANJUNG DUREN UTARA	133	29,411	31,021
6	TOMANG	179	46,120	48,645
6	JELAMBAR BARU	149	47,644	50,253
6	WIJAYA KUSUMA	227	48,636	55,553
6	TANJUNG DUREN SELATAN	136	45,748	55,998
6	ANGKE	0	15	16
6	KEDOYA UTARA	326	72,690	88,977
6	DURI KEPA	366	82,166	86,663
6	KEDOYA SELATAN	219	57,080	77,067
6	SEMANAN	528	104,430	121,670
6	KALI DERES	21	3,469	3,963
6	JATIPULO	84	52,411	55,282
6	KOTA BAMBU UTARA	67	39,380	44,981
6	SLIPI	98	28,544	33,256
6	PALMERAH	220	97,309	111,149
6	KEMANGGISAN	210	47,446	50,043
6	KOTA BAMBU SELATAN	58	24,755	26,110
6	KEMBANGAN UTARA	417	73,350	99,035
6	KEMBANGAN SELATAN	473	36,941	43,040
6	PEJAGALAN	0	1	2
Total Population for Sewerage Zone No. 6		**5,874**	**1,275,209**	**1,465,718**
7	KAPUK	365	91,229	104,204
7	CENGKARENG TIMUR	340	81,648	86,118
7	CENGKARENG BARAT	392	82,696	94,458
7	KAMAL	492	53,933	61,604
7	TEGAL ALUR	560	117,007	136,322
7	PEGADUNGAN	794	86,916	106,392
7	KALI DERES	482	79,548	90,861
7	KAMAL MUARA	1,119	17,169	12,690
Total Population for Sewerage Zone No. 7		**4,544**	**610,146**	**692,649**
8	TANJUNG PRIOK	419	53,411	57,892
8	PAPANGGO	80	16,767	20,075
8	SUNGAI BAMBU	97	20,495	24,057
8	KEBON BAWANG	173	84,502	91,592
8	WARAKAS	108	46,149	50,021
8	RAWABADAK UTARA	127	62,131	74,390
8	KOJA	243	55,011	65,865
8	LAGOA	158	91,783	115,455
8	TUGU SELATAN	186	42,362	50,722
8	RAWABADAK SELATAN	178	51,181	60,076
8	TUGU UTARA	239	92,906	109,054
8	KALI BARU	348	99,883	103,785
8	CILINCING	687	70,376	69,602
8	SEMPER BARAT	318	99,420	116,700
8	MARUNDA	894	35,249	28,682
8	SEMPER TIMUR	432	52,606	61,749
8	ANCOL	15	404	420
Total Population for Sewerage Zone No. 8		**4,702**	**974,636**	**1,100,137**
9	PULO GADUNG	29	5,467	5,376
9	RAWA TERATE	184	15,855	17,223
9	CAKUNG BARAT	622	51,236	54,564
9	UJUNG MENTENG	422	30,427	33,051
9	CAKUNG TIMUR	936	56,762	61,660
9	SUKAPURA	566	69,560	75,397
9	ROROTAN	1,018	42,914	56,701
9	KELAPA GADING BARAT	744	51,468	68,004
9	PEGANGSAAN DUA	555	70,330	92,926
9	KELAPA GADING TIMUR	313	57,695	72,575
Total Population for Sewerage Zone No. 9		**5,389**	**451,714**	**537,477**
10	KEBON MANGGIS	78	23,643	23,250
10	PALMERIAM	65	24,832	24,420
10	KAYU MANIS	55	33,876	36,076
10	UTAN KAYU UTARA	100	63,111	91,868
10	PISANGAN BARU	72	47,685	51,799
10	UTAN KAYU SELATAN	117	30,234	29,732
10	KAYU PUTIH	384	47,380	46,593
10	RAWAMANGUN	264	41,417	40,729
10	PISANGAN TIMUR	180	55,657	59,272
10	JATINEGARA KAUM	130	27,479	29,264
10	PULO GADUNG	148	28,278	27,808
10	CIPINANG	150	43,031	42,316
10	JATI	207	38,858	42,210
10	RAWA TERATE	231	19,939	21,659

Table A4-1 Population and Area of Each Sewerage Zone for Kelurahan Basis

Sewerage Zone No.	Kelurahan	Area (ha)	Population (person)	
		2030&2050	2020	2030&2050
10	JATINEGARA	653	85,785	84,360
10	PENGGILINGAN	424	82,448	87,803
10	CAKUNG BARAT	0	4	4
10	PULO GEBANG	676	92,025	99,964
10	KAMPUNG MELAYU	47	29,672	29,180
10	BALI MESTER	67	13,021	13,866
10	RAWA BUNGA	84	19,495	21,176
10	CIPINANG BESAR SELATAN	72	15,016	15,991
10	CIPINANG MUARA	164	39,136	38,485
10	CIPINANG BESAR UTARA	113	52,097	51,232
10	PONDOK BAMBU	91	14,702	15,657
10	KLENDER	297	79,771	84,953
10	DUREN SAWIT	171	22,472	24,411
10	MALAKA JAYA	85	35,852	38,181
10	PONDOK KELAPA	1	160	174
10	MALAKA SARI	104	29,910	29,413
10	PONDOK KOPI	70	13,271	14,416
10	KWITANG	44	17,921	19,855
10	KENARI	90	12,886	13,183
10	KRAMAT	71	33,747	37,389
10	PASEBAN	82	26,403	29,252
10	CEMPAKA PUTIH BARAT	125	41,591	47,002
10	RAWASARI	124	17,088	17,482
10	CEMPAKA PUTIH TIMUR	217	28,244	31,292
10	KEBON SIRIH	0	11	11
10	JOHAR BARU	117	42,301	46,866
10	KAMPUNG RAWA	30	16,681	18,481
10	GALUR	27	20,643	24,510
10	TANAH TINGGI	62	43,024	47,667
Total Population for Sewerage Zone No. 10		**6,289**	**1,450,797**	**1,549,252**
11	KARET SEMANGGI	0	9	9
11	KUNINGAN BARAT	96	20,806	23,210
11	MAMPANG PRAPATAN	80	30,240	35,442
11	PELA MAMPANG	200	62,473	63,091
11	TEGAL PARANG	105	47,595	52,052
11	BANGKA	309	28,391	31,050
11	PEJATEN BARAT	297	53,883	60,109
11	PASAR MINGGU	195	41,438	45,319
11	JATI PADANG	240	40,222	40,620
11	RAGUNAN	147	14,638	14,783
11	CILANDAK TIMUR	208	24,645	24,889
11	PEJATEN TIMUR	298	61,747	62,358
11	GROGOL SELATAN	0	0	0
11	CIPULIR	95	29,349	32,098
11	KEBAYORAN LAMA UTARA	200	74,912	83,569
11	PONDOK PINANG	679	81,614	100,471
11	KEBAYORAN LAMA SELATAN	229	57,478	62,861
11	GANDARIA SELATAN	160	29,270	29,560
11	CIPETE SELATAN	238	27,425	27,696
11	CILANDAK BARAT	590	81,383	89,006
11	LEBAK BULUS	439	48,060	53,613
11	PONDOK LABU	348	52,511	53,030
11	SENAYAN	25	1,013	1,023
11	RAWA BARAT	66	8,611	8,696
11	SELONG	127	6,537	6,602
11	GUNUNG	142	13,915	14,052
11	KRAMAT PELA	124	24,112	24,353
11	MELAWAI	127	5,262	5,314
11	PETOGOGAN	85	22,695	22,921
11	PULO	110	11,415	12,484
11	GANDARIA UTARA	157	52,715	53,236
11	CIPETE UTARA	170	50,851	55,613
11	PANCORAN	141	25,021	27,364
11	DUREN TIGA	190	21,663	21,879
11	KALIBATA	245	49,377	54,001
11	CIKOKO	67	16,650	18,210
11	PENGADEGAN	99	30,964	36,290
11	RAWAJATI	142	17,144	18,749
11	TANJUNG BARAT	119	14,964	16,365
11	PETUKANGAN UTARA	0	3	3
11	PETUKANGAN SELATAN	211	42,372	47,268
11	ULUJAMI	94	27,102	29,640
11	PESANGGRAHAN	196	39,341	43,025
11	BINTARO	456	68,582	76,507
11	CAWANG	0	44	47
11	CILILITAN	0	33	35
11	BALE KAMBANG	0	53	60

Table A4-1 Population and Area of Each Sewerage Zone for Kelurahan Basis

Sewerage Zone No.	Kelurahan	Area (ha)	Population (person)	
		2030&2050	2020	2030&2050
Total Population for Sewerage Zone No. 11		**8,246**	**1,458,528**	**1,578,573**
12	RAGUNAN	322	32,182	32,500
12	CILANDAK TIMUR	175	20,646	20,850
12	KEBAGUSAN	278	49,015	53,605
12	PONDOK LABU	0	14	14
12	TANJUNG BARAT	237	29,737	32,523
12	JAGAKARSA	516	80,917	99,615
12	LENTENG AGUNG	315	79,341	97,673
12	SRENGSENG SAWAH	557	71,689	84,021
12	CIGANJUR	367	46,721	60,398
12	CIPEDAK	405	54,624	74,136
12	CIJANTUNG	0	46	50
Total Population for Sewerage Zone No. 12		**3,172**	**464,932**	**555,385**
13	TANJUNG BARAT	0	0	0
13	BIDARA CINA	124	41,623	40,932
13	CIPINANG CEMPEDAK	166	36,161	35,561
13	RAWA BUNGA	0	2	3
13	CIPINANG BESAR SELATAN	98	20,583	21,920
13	CIPINANG MUARA	102	24,432	24,026
13	CAWANG	194	37,717	40,166
13	CILILITAN	182	51,161	55,575
13	KRAMAT JATI	144	38,688	38,045
13	BATU AMPAR	253	43,290	51,894
13	BALE KAMBANG	169	30,344	34,631
13	DUKUH	173	26,304	28,574
13	KAMPUNG TENGAH	197	39,556	42,125
13	GEDONG	203	34,092	38,906
13	PONDOK BAMBU	322	51,960	55,335
13	DUREN SAWIT	291	38,205	41,501
13	MALAKA JAYA	19	7,814	8,321
13	PONDOK KELAPA	570	69,521	75,518
13	MALAKA SARI	29	8,212	8,075
13	PONDOK KOPI	158	30,027	32,617
13	PINANG RANTI	215	27,301	32,726
13	MAKASAR	145	46,279	52,817
13	KEBON PALA	213	54,851	58,414
13	HALIM PERDANA KUSUMA	1,299	46,522	50,535
13	CIPINANG MELAYU	263	49,998	54,311
13	SUSUKAN	38	6,855	7,301
13	RAMBUTAN	96	17,212	18,697
13	SETU	118	7,601	8,257
13	BAMBU APUS	124	10,402	11,299
13	CEGER	166	7,367	8,408
13	LUBANG BUAYA	362	67,674	77,234
Total Population for Sewerage Zone No. 13		**6,433**	**971,754**	**1,053,724**
14	TANJUNG BARAT	1	143	156
14	LENTENG AGUNG	1	155	191
14	GEDONG	56	9,361	10,683
14	CIJANTUNG	246	45,165	49,061
14	BARU	197	30,726	32,722
14	KALI SARI	252	42,247	45,891
14	PEKAYON	302	52,551	59,974
14	CIBUBUR	496	67,947	72,361
14	KELAPA DUA WETAN	336	46,053	49,046
14	CIRACAS	396	75,325	81,823
14	SUSUKAN	174	31,169	33,193
14	RAMBUTAN	132	23,858	25,916
14	PONDOK RANGON	472	28,397	35,746
14	CILANGKAP	547	25,220	30,232
14	MUNJUL	281	23,065	25,055
14	CIPAYUNG	185	25,096	26,726
14	SETU	163	10,505	11,412
14	BAMBU APUS	207	17,419	18,922
14	CEGER	161	7,149	8,159
Total Population for Sewerage Zone No. 14		**4,605**	**561,551**	**617,269**
Reclamation Area		**5,146**	**0**	**110,049**
Total (Area and Population Except Reclamation Area)		**64,624**	**11,284,161**	**12,555,233**
Total (Area and Population)		**69,769**	**11,284,161**	**12,665,282**

Appendix − 5 : Minutes of Meeting for the General Coordination Meeting on 21st October 2011

Minutes of Meeting (MM-CP-211021)

Project	**The Project for Capacity Development of Wastewater Sector through Reviewing the Wastewater Management Master Plan in DKI Jakarta**
Date & Time	21st October 2011 / 9：00 ～ 11：30
Place	**Cipta Karya, Ministry of Public Works**
Purpose	**Coordination among PU, DKI Jakarta, JICA Expert Team and PPP F/S Team on Wastewater Management in DKI Jakarta**
Attendants	**[Cipta Karya]** Mr. Sjukrul Amien: Director of Environmental Sanitation Development, DGHS Mr. Handy B. Legowo: Sub-Director of Sanitation, Directorate of Environmental Sanitation Development, DGHS Ms. Emah Sudjimah: Section Head of Development and Facilitation, Sub-directorate of Wastewater System Development, Directorate of Environmental Sanitation Development, DGHS **[BAPPEDA]** Ms. Vera Revina Sari: Head of City Infrastructure and Environment Division **[PD PAL JAYA]** Ms. Liliansari Loedin: President Director, PD PAL JAYA Ms. Ati Setiawati: Technical and Business Director, PD PAL JAYA
	[JICA Project Team] Mr. Hideichiro Nakajima: Chief Advisor/Sewerage Policy Advisor Mr. Masahiro Takeuchi: Leader of Short-term expert team Dr. Lalit Agrawal: Expert for Wastewater Treatment Planning, Short-term expert team Mr. Hiromi Tsunoji: Expert for wastewater facility, Short-term expert team Mr. Uyu Tanaka: Expert for GIS, Short-term expert team **[JICA PPP F/S Team]** Mr. Kenichi Yamamoto Mr. Koichi Suzuki **[JICA Indonesia Office]** Mr. Shigenori Ogawa: Senior Representative, JICA Indonesia Office Ms. Keiko Kitamura: Project Formulation Advisor, JICA Indonesia Office

The main points discussed in the meeting are described as below:

Session 1 : Explanation by JICA Expert Team in Review Master Plan

Mr. Takeuchi, leader of JICA Short Term Expert Team (JICA Expert Team) explained about the outline of the project and Dr. Lalit, expert of wastewater treatment planning, made presentation of the sewerage zoning, land requirement and treatment process. After the presentation, there were discussions as follows:

- Ms. Vera of BAPPEDA explained about the availability of the lands for WWTP proposed by JICA Expert Team. The results were summarized as in the table below.

Site No.	Location Proposed by JICA Expert Team	Development Phase	Status	Notes
1	**Pejagalan**	Short Term (2020)	OK with Notes	Please re-design the Pejagalan WWTP Layout, 50 % area should be green.

2	**Muara Angke**	Long Term (2050)	Not Yet Decided	We maybe cannot use the area in fisherman villages, we should find another area in Muara Angke
6	**Duri Kosambi**	Short Term (2020)	OK	Belongs to Cleansing Agency
5	**Sunter Pond**	Mid Term (2030)	OK	
10	**Pulo Gebang**	Mid Term (2030)	OK	
7	**Kamal – Pegadungan**	Mid Term (2030)	OK	
3	**Srengseng City Forest Park**	Long Term (2050)	Maybe OK with Notes	The design of WWTP layout should be integrated well with the forest park, most important things, how to make WWTP hidden in the forest park
8	**Marunda**	Long Term (2050)	Maybe OK	Because it is in long term, and it is also part of the planning for pond development.
9	**Rorotan**	Long Term (2050)	Maybe OK	
12	**Ulujami Pond Planning**	Long Term (2050)	Maybe OK	
14	**Kp. Dukuh Pond Planning**	Long Term (2050)	Maybe OK	
15	**Ceger RW 05 Pond Planning**	Long Term (2050)	Maybe OK	
13	**Ragunan**	Long Term (2050)	Not Yet Decided	Should be confirmed the location for WWTP and confirmed with Ragunan Master Plan and ownership
11	**Bendi Park**	Long Term (2050)	Not Yet Decided	

- Mrs. Vera also explained about Daan Mogot land of Housing Agency which is the land proposed by DKI where a low cost apartment will be constructed and so BAPPEDA asked Housing Agency to keep/spare some area for WWTP with the land area of not more than 3 ha.

  DKI proposed a land called as BMW land to the M/P team, but there is a problem with land ownership.
- Mr. Sjukrul Amien stated that the result of this meeting will be reported to the Governor.
- Mrs. Liliansari gave information to Mr. Sjukrul Amien that the sewerage zones proposed by JICA Expert Team will be changed according to the availability of the lands.
- Mrs. Liliansari informed that JICA Expert Team should include the existing sewerage service area (Setiabudi Pond and Krukut Pumping Station which is planned for WWTP construction) as a part of sewerage zones of DKI Jakarta (to name it with new number or put it as a part of zone 1 or zone 4).
- There was a small correction on slide No. 7 River Water Quality (BOD Load): smaller ranked zone has bigger BOD Load than the higher ranked zone (e.g. zone 10 ranked as No.4 has 1.15, while zone 1 ranked as No. 2 has 1.04).
- The JICA Expert team stated that they will check and revise the zoning based on the comment.

Session II: Brief Explanation on PPP by PPP F/S Team

Mr. Yamamoto and Mr. Suzuki of PPP F/S team explained about technical and financial aspects on PPP F/S.

After the presentation, there were discussions as follows:

- Ms. Liliansari requested PPP F/S team that the PPP F/S must follow the Master Plan (M/P), so it must input the strategy, etc. included in the M/P.
- The PPP F/S team confirmed it.

- Ms. Liliansari also stated about the tariff that the existing condition should be enacted by the Local government with many considerations including the subsidy from the government, so it should be discussed furthermore.
- Mr. Yamamoto explained that this PPP is trying to reduce subsidies by the central or local government, and it is the main point.
- Ms. Liliansari stated that the target of PPP F/S team and the new M/P should be synchronized in the term of target year.
- Ms. Ati informed that in the central Zone, some of the buildings already had their own ITP, so it is also one of the problems, because we tried to cross subsidy between commercial and residential.
- Mr. Sjukrul Amien stated that the new M/P should consider the subsidy from central government, calculating the profit and loss.
- Mr. Sjukrul Amien also stated that:
  - If PPP project deals with construction of WWTP only and responsible for the main WWTP, we should consider who will take responsibility for the connection pipes.
  - Will PPP also be responsible for the connection pipes or local/central government?
  - We should have further discussion about this matter.

Other Comments

- Mr. Ogawa of JICA Indonesia Office stated that JICA intends to start PPP F/S as early as possible and whether it is possible for the F/S to be started immediately after the sewerage zones are determined and the candidate sites for WWTP are approved by the Governor.
- Mr. Sjukrul Amien agreed to the proposal by Mr. Ogawa.
- Ms. Liliansari requested the PPP F/S team to submit more detailed technical proposal to the Indonesian side since the presentation today is not so clear for the technical aspect.
- Mr. Nakajima asked to the Indonesian side the following:
  - When the land issue is explained to the Governor, it should be explained to him that if wastewater treatment with a high space saving innovation technology is applied, the initial cost become too high.

The meeting is concluded with thanks from the both sides.

Remarks & Comments:

Appendix − 6 : Letter of Governor of DKI Jakarta

PEMERINTAH PROVINSI DAERAH KHUSUS IBUKOTA JAKARTA
SEKRETARIAT DAERAH
Jalan Medan Merdeka Selatan No. 8 - 9
JAKARTA

Kode Pos : 10110

Nomor : 1631/-1.774.13
Sifat : Segera
Lampiran :
Hal : Lokasi IPAL Review Master Plan Pengelolaan Air Limbah DKI Jakarta untuk Tahap Pengembangan I (2012 - 2020)

16 Desember 2011

Kepada

Yth. 1. Direktur Jenderal Cipta Karya Kementerian Pekerjaan Umum
2. Deputi Menteri Negara Perencanaan Pembangunan Nasional/Kepala Badan Perencanaan Pembangunan Nasional Bidang Sarana dan Prasarana

di

Jakarta

Sehubungan dengan kebutuhan lahan untuk IPAL Tahap Pengembangan I (2012 – 2020) Review Master Plan Pengelolaan Air Limbah DKI Jakarta, dengan ini saya sampaikan lokasi lahan IPAL sebagai berikut :

1. Zona I : Pejagalan, Kelurahan Penjaringan, Kota Administrasi Jakarta Utara
   Luas sebesar ± 6,9 Ha, dimana desain dibuat terintegrasi antara fasilitas fisik IPAL (± 3,3 Ha) dengan area hijau (± 3,6 Ha).

2. Zona 6 : IPAL Duri Kosambi, Kota Administrasi Jakarta Barat
   Luas lahan untuk IPAL Sistem Terpusat sebesar ± 3 Ha (tidak termasuk untuk fasilitas pengolahan lumpur septic tank yang sudah ada).

Atas perhatian dan kerja sama Saudara, saya ucapkan terima kasih.

SEKRETARIS DAERAH PROVINSI DKI JAKARTA,

FADJAR PANJAITAN
NIP 19550826197601100 1

Tembusan :

1. Gubernur Provinsi DKI Jakarta
2. Wakil Gubernur Provinsi DKI Jakarta
3. Asisten Pembangunan dan Lingkungan Hidup Sekda Provinsi DKI Jakarta
4. Kepala Badan Perencanaan Pembangunan Daerah Provinsi DKI Jakarta
5. Kepala Badan Pengelola Keuangan Daerah Provinsi DKI Jakarta
6. Kepala Dinas Pekerjaan Umum

6. Kepala Dinas Pertamanan dan Pemakaman Provinsi DKI Jakarta
7. Kepala Dinas Kebersihan Provinsi DKI Jakarta
8. Direktur Utama PD PAL Jaya
9. JICA Indonesia

DKI Jakarta Local Government

Regional Secretariat

Jalan Merdeka selatan no. 8-9

Jakarta

==========

No: 1631/-1.774.13

Content: Urgent

Attachment:-

Subject: **Location of WWTP of Review Master Plan Wastewater Management DKI Jakarta for Phase 1 (2012-2020) Development**

To

1. Director General of Cipta Karya, Ministry of Public Works
2. Deputy State Minister of National Development Planning/Head of National Development Planning Board (Bappenas), Division of Infrastructure and Its Facilities

In Jakarta

Related with the land necessity for development of WWTP in Phase 1 (2012-2020) of Review Master Plan of Waste Water Management in DKI Jakarta, herewith I inform you the location of WWTP land are as follows:

1. Zone 1 : Pejagalan, Kelurahan (Sub-district) Penjaringan, City Administrative North Jakarta. The area is ±6,9 Ha, in which the design will be integrated between the WWTP physical facilities (± 3,3Ha) and the green area (± 3ha).
2. Zone 6 : WWTP Duri kosambi, City Administrative West Jakarta. The area is ± 3Ha for centralized WWTP (not included the existing septic sludge treatment plant)

Thank you for your attention and cooperation.

Regional Secretary of DKI Jakarta Province

Fadjar Panjaitan

Nip. 195508261976011001

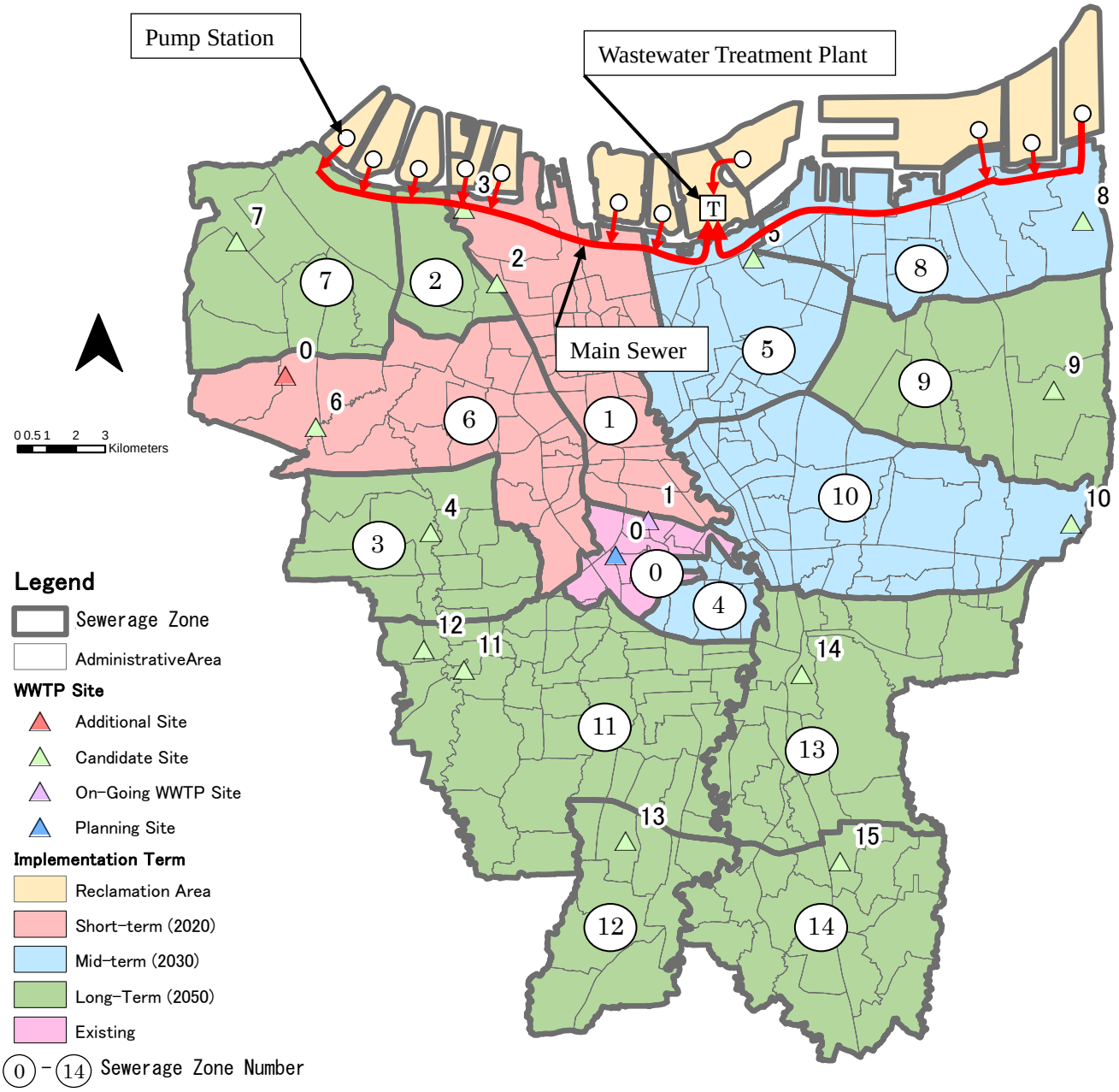
CC

1. Governor of DKI Jakarta
2. Vice Governor of DKI Jakarta
3. Assistant of Development and Environment, Regional Secretary of DKI Jakarta
4. Head of Regional Development Planning Board (Bappeda) DKI Jakarta Province
5. Head of Regional Financial Management Board (BPKD) DKI Jakarta province
6. Head of Park and Funeral Agency DKI Jakarta Province
7. Head of Cleansing Agency
8. President Director PD PAL JAYA
9. JICA Indonesia

Appendix − 7 : Expected Sewerage System in the Reclamation Area

Expected Sewerage System in the Reclamation Area

(Land for WWTP shall be allocated in the reclamation area)



Appendix − 8 : Answer to Comments by the Indonesian Side on 22nd March, 2012

Japan International Cooperation Agency

Directorate General of Human Settlements, Ministry of Public Works
DKI Jakarta
PD PAL JAYA

The Project for Capacity Development of Wastewater Sector Through
Reviewing the Wastewater Management Master Plan
In DKI Jakarta

Answer to Comments by the Indonesian Side

On 22nd March, 2012

April 2012

Yachiyo Engineering Co., Ltd.
Japan Environmental Sanitation Center
Water Agency Inc.

Draft Final Report on the Project for Capacity Development of Wastewater Sector through Reviewing the Wastewater Management Master Plan in DKI Jakarta

13th April 2012

Answer to Comments by the Indonesian Side

A: From BAPPENAS

No.	Page/Section for Comment	Contents of Comment	Answer by JICA Expert Team
1	Apply to entire the Draft of Final Report	The draft of final report should elaborate in more detail the costs and benefits attained from this activity, especially those of related to development effect towards community in and around the project's site.	As far as the economic benefit of the activities of MP is concerned, the detailed explanation on the items and the calculation basis for our economic analysis in MP is already included in PART-E of Main Report (E2.4 from E2.5 (page E-4 to E-11), which is attached herewith as refer to **page E-4 and E-6 to E-12 in Main Report(M/R)**). Please note that our economic analysis followed the Japanese Guideline 'Cost-Benefit Analysis Manual of Sewerage, Nov. 2006, Japan Sewerage Works Association' which is commonly used by JICA for their appraisal of sewerage project. We also incorporated some of the benefit items indicated in the WSP's publication 'Economic Impact of Sanitation in Southeast Asia, A four-country study conducted in Cambodia, Indonesia, the Philippines and Vietnam under the Economics of Sanitation Initiative (ESI), Research Report February 2008'. Some of the numerical data was picked up from the statistics published by DKI such as 'Jakarta Dalam Angka 2009 (Jakarta in Figures 2009)', 'Badan Pusat Statistik Provinsi DKI Jakarta' and 'Surveillance of Health Agency,

No.	Page/Section for Comment	Contents of Comment	Answer by JICA Expert Team
			Integrated Surveillance System (STP) based on Puskesmas (Public Health Center) Data Record'. In particular, the benefit directly related to development effect towards community has been estimated as follows; (1) 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. (2) Effect of improvement in quality of public waters - Reduced cost of purifying water at waterworks facilities (3) Effect of rise in land value - Increased value of land
		Social costs which might occur, such as resettlement cost and the lost of source of revenue of the community in and around the project's site are not likely taken into account as one of components specified in the calculation of costs and benefits of the project.	We assume that, as far as the construction of facilities proposed in M/P such as WWTPs uses the lands owned by DKI government, the social costs such as resettlement cost and the loss of source of revenue of the community in and around the project's site would not occur.
2	Apply to entire the Draft of Final Report	The calculation as mentioned in the above point A-1 will help DKI Jakarta Provincial Government to determine fair and realistic target in relation to the project implementation and give a more comprehensive illustration to	It is undeniable that the improvement of wastewater management in DKI Jakarta requires sizable investment. We believe that the purpose of Master Plan is to indicate the milestones, in terms of the sewerage

No.	Page/Section for Comment	Contents of Comment	Answer by JICA Expert Team
		the provincial government on the size of the project itself. It is expected that the illustration as mentioned above will encourage the DKI Jakarta Provincial Government to contribute more earnestly in the project implementation through the allocation its local budget into the project.	investments, toward achieving the idealistic standard of water environment which is essential for Indonesia and DKI Jakarta to prosper in harmony with its own social demands and the globalization. In the actual planning of particular investment in the particular zone like Feasibility Study, considering the policy priority, budget allocation, implementation capacity etc., such adjustment of the size of investment would be made as the phased implementation of the investment, so that the size of investment would be realistic from the view point of the availability of DKI's local budget in particular.

B: From BAPPEDA DKI Jakarta

No.	Page/Section for Comment	Contents of Comment	Answer by JICA Expert Team
1	Apply to entire the Draft of Final Report	The writing of institution name at both central and local level (DKI Jakarta Province) should be consistent, such as Public Works Agency (Dinas Pekerjaan Umum/DPU DKI Jakarta); Cleansing Agency (Dinas Kebersihan/DK DKI Jakarta; etc.). The report should be prepared more systematically (the elaboration order should be consistent).	We will follow your comment that all the terms should be consistent in the Final Report (F/R). We will follow your comment that the sequence of description should be consistent in F/R.

No.	Page/Section for Comment	Contents of Comment	Answer by JICA Expert Team
2	B-27 Regarding the average tariff rate of wastewater treatment which is amounting to IDR6,070 /m^3 with basic calculation of amount of wastewater of 12,960 m^3/day (in 2009)	Based on annual report of PD PAL, the amount of wastewater treated in 2009 was 18,031.68m^3/day, therefore the amount of average tariff rate should be revised. With current tariff, compared to other 4 cities, the tariff applied by PD PAL is not the highest.	Agreed. We will reflect it in F/R and we will revise the financial analysis accordingly. Pages to be modified in F/R are as follows: - B-26,B-27 - E-17: E3.6 Calculation of benefit - E-23: E3.7 Financial Analysis Results (refer to **page B-26, B-27, E-17, E-23 in M/R**)
3	B-41 Regarding Present Condition and Issues on Organization Structure Table B1-28	It is illustrated that the number of BPLHD staff is 259 persons and Cleansing Agency is 1,653 person and not all of those employees deal with wastewater treatment. Therefore, it would be better if the consultant can go to the detail of number of employees that directly involved in the wastewater treatment for the basis of further performance evaluation.	Agreed. We will reflect it in F/R. We put the numbers of staff which are directly related with wastewater belonging to BPLHD and Cleansing Agency respectively in Table B1-10 and Table B1-28. These numbers of staff are 5 in BPLHD, 13 in the provincial office of DK, and 200 in persons in Cleansing Sub-agency respectively. (refer to **page B-21, B-41 in M/R**)

No.	Page/Section for Comment	Contents of Comment	Answer by JICA Expert Team
4	B-62 Regarding River Water Quality and Flow	- In the evaluation of water quality, please explain the justification of the use of Class D (BOD: 20 mg/L) of water quality standard for the water body as not all of rivers are used for Class D. Some of them are used for Class C or B based on the Gubernatorial Decree No. 582/1995. - In addition, please refer to the new regulation about the river class. - Please explain the result of measurement of heavy metal contained in the river water.	- Based on the existing water quality data from BPLHD and the results of river water quality survey by JICA Expert Team, it is found that most of water quality items including organic matter, fecal coliform, nitrogen and phosphate etc., are exceeding the water quality standard. Therefore, by comparing with the water quality items of group D, which is the lowest water quality standard value, the highly polluted area has been selected in particular and the river water quality conditions have been evaluated as the results of the survey. - We applied Governor's Decree No. 585-1995 which is the new regulation about the river class as mentioned in Table B1-19. - We indicated the frequency which the detected mercury, total chromium, cadmium and lead are exceeding the standard values in Figure B3-13 in F/R. As a result, it has been found through the periodical water quality analysis conducted by BPLHD that water environmental pollution has also been generated by heavy metals in the main rivers of DKI Jakarta.
	Figure B3-4 : BOD at 29 location along Cilliwung River	Please elaborate what the figure is all about.	We deleted this Figure. Instead, we added our examination results of the data collected from BPLHD in Supporting Report.

No.	Page/Section for Comment	Contents of Comment	Answer by JICA Expert Team
	Figure B3-6 : the relation between BOD and COD	Please elaborate what the figure is all about.	BOD is widely adopted as the indicator for the water pollution by organic matters because the theory of measurement is simple. But the error of measured value is relatively high because the theory is based on the oxygen volume consumed not by complete oxidation but by decomposition of biodegradable organic matter only. On the other hand, the accuracy of CODCr is relatively high because the theory is based on the oxygen volume consumed by complete oxidation using chemical reaction though relatively complicated method. In order to clarify whether or not it is appropriate to apply BOD in the evaluation for pollution by organic matters, the reliability of BOD value measured in the survey has been confirmed by checking the relations between BOD and CODCr
	Figure B3-9 : BOD at the location from midstream to Jakarta Bay along Ciliwung River	Please explain why the measurement results in the rainy season (February 2011) in some spots are worse compared to that of June 2011 (dry season).	The result of measurement is based on grab sampling so it is difficult to say any exact reason for worsen result at some locations in rainy season compared to dry season from midstream to Jakarta Bay along the Ciliwung River. We still think it could be the due to different time of sampling in both the season, specific seasonal discharge in the river and other unknown reasons.

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5	B-100 Table B4-1: Outline of Setiabudi WWTP	Based on the correction as mentioned in the above point No. 2 on the amount of wastewater of 18,031.68 m^3/day, then the amount of wastewater treated at the West Dam is 13,523.76 m^3/day whilst at the East Dam is 4,507.92 m^3/day. Therefore, the table should be revised.	Agreed. We will reflect it in the Final Report. In addition, we will revise the financial analysis accordingly. Modifications: - Table B4-1 (refer to **page B-100, B-101 in M/R**) - Same as No.2 of the above
6	C-12 About Wastewater Treatment Process	The available explanation on this issue are only those matters that need to be taken into account in making the WWTP (Wastewater Treatment Plant), but not give any alternative treatment system multiplied by wide area and cost, etc., and this is very different with C2.3 Desludging and sludge treatment process which explanation is comprehensive.	Please read C-12 (Section C2.2) in conjunction with D-54 to D-61 (Section D6.1.5 (1)-(5)) where alternatives of the treatment systems and guidelines for the selection of the treatment system have been explained. For quick reference, we will add a note as "alternatives of the treatment systems and guidelines for the selection of the treatment system have been presented in Section D6.1.5 (1)-(5)".
7	C-13 About Extracting Sludge from septic tanks	Currently, the operation of Septic Tank in DKI Jakarta is simply followed by on-call desludging instead of the routine-base and this adversely affects the sedimentation process in the septic tank. Therefore, in designing the septic tank, it needs to also take into account the sludge extracting period, which is once in five years or even more.	It is important to extract sludge from septic tank so as not to increase the sludge in the tank. According to our calculation, sludge generated from household consisting 5 persons in a year is 1 m^3 in case of treating black water only. It means if desludging frequency is 5 years, 5m3 should be extracted every five years. When considering the volume of vacuum track, 3m3 of extraction would be recommended at a time every three years. In case of modified septic tank, in which both black water and gray water are

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			treated, generates more sludge. More often desludging is recommended. Therefore we proposed every three year desludging for conventional septic tank and every year desludging for modified septic tank. Further investigation is recommended to determine the appropriate frequency of regular desludging by DKI However in case of not working ST, sludge in a tank does not increase according to above mentioned calculation, because sludge soaks into soil without sedimentation. Such a ST should be changed to a modified ST as soon as possible.
8	D-9 About (2) Future and Process and Suggestion, 1) (b) Change of Land Use	The location of IPAL site is not mentioned in RTRW. As a matter of fact, the location is not intended to be used for IPAL. Thus, title and contents of this section needs to be revised to become explanation on the location of IPAL that will need to be incorporated into the Detailed Spatial Plan (not regional spatial plan or RTRW).	Agreed. Accordingly we will revise the title and content of the relevant part in DFR (D-9 &D-10, Section D2.1.3 (2)). We will correct "land owing agency" to "land management agency" in the report since DKI is sole owner of the land. Accordingly we will correct the organization of the Implementation Committee also in F/R.
9	D-14 Table D2.5. WWTP Sites and Required Area	It will be better if the column of "approval on 21 Oct 2011" is not included	Agreed. We will remove both the columns of "approval" from the Table D2-3 (D-14). In F/R, we will revise the "Note" below the table as follows: "Regarding the status of land approval for WWTPs in 14 sewerage zones, please refer to MM dated 21st October 2011 and letter dated 16th

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			December 2011 attached with the Appendix-5 and 6 of F/R."
10	D-49 Regarding D.5.3.4. Proposal for JICA Technical Cooperation Project for the Regular Desludging	Please clarify why this should be taken as part of the New Master Plan? This should not be incorporated into the Master Plan and simply made as the recommendation for respected activity.	Proposal for JICA technical cooperation will be removed from PART D formulation of the New M/P. Training program for human resource development for on-site will be included in PART J Action Plan. PART K Recommendation will include the central government's promulgation of sanitation law including strengthening septage management including regular desludging and sludge treatment.
11	D-54 Regarding design influent quality, BOD: 200 mg/L and SS: 200 mg/L	Please clarify the difference value specified in with M/P 1991 with that of stated in the WWTP Setiabudi, which is higher.	Agreed. We will revise D-54 (Section D6.1.5 (1)) giving the detail explanation related with the values in F/R.
12	D-85 and D-87 Regarding Layout WWTP in Zone 1 and Zone 6	In order to avoid the misleading information regarding the wide of area that can be used towards the available land, all WWTP layouts should be excluded from the Master Plan.	Agreed. We will remove the layout of both the WWTPs of Zone No.1 and No.6. We will retain only layout of land in DFR (D-85 (Figure D7-5) and D-87 (Figure D7-7). Accordingly we will revise the title of both the figures in F/R.
13	D-98 Regarding D9.1. Construction and Running Cost	Please explain the basis for calculation of costs. Since the detail information has not been received yet, it is more difficult to learn and allocate the fund for the WWTP compared to the whole costs for sewerage system.	Construction cost estimates are explained in **Attachment No.1**. For detailed calculation data, we will include them in Supporting Report.

No.	Page/Section for Comment	Contents of Comment	Answer by JICA Expert Team
14	E-17 and E-18 Table E3-6: Sewerage Tariff Unit Value per Floor Space Unit Area and per Waste Volume (2009) and Table E3-7: Sewerage Tariff Revenue Unit Price per Wastewater volume Unit Estimate (at Existing Tariff Levels)	This calculation should be further clarified and the basic calculation should also be incorporated. Likewise for Table E3-7. This clarification is paramount important as this will be used as the basis for further calculation, especially that of related to the revenue plan.	The calculation basis is explained in "Table E3-21 Pro forma calculation of sewerage charge unit price per unit wastewater volume", as the part of Supporting Report (page S/R-E-43). Total fee of household and non-household in Table E3-21 is deleted to avoid confusion. (refer to **page S/R-E-39 in S/R**)
15	E-22 Regarding Sewerage Tariff Revenue Table E-3-16, E3-17, E3-18, and E3-19	Please explain how to determine the tariff rate for households customers and non-household customer in each stage as the basis for "revenue from sewerage service".	It is estimated based on the land use data of the Spatial Plan of 2007 and the Spatial Plan of 2030 (RTRW 2030). The estimation will be explained in the Supporting Report in F/R. (refer to **Attachment No.2**)
16	E-26 Regarding E3.8 Required Government Investment	- Title and contain of this section should be revised to become about the financing source and scheme in complete, i.e. potential funding from APBN (National Income and Expenditure Budget), APBD (Regional Income and Expenditure Budget), loan, grant, and private (PPP). - The discussion on proportion of funding share between Central Government and DKI Jakarta Provincial Government should not the portion but that the amount of sharing portion is depending on the agreement between Central Government and the provincial government and is different for every project. - The discussion should be connected with the Law no. 29 of 2007 on the Special	Agreed. The title of E3.8 is changed to 'E3.8 Funding Source' and we include APBN, APBD, Loan, grant and private (PPP) as possible funding sources. (refer to **page E-26 in M/R**) Discussion about the proportion of sharing funding between Central Government and DKI Jakarta is worded as 'According to DKI, the amount of sharing proportion depends on the agreement between Central Government and Regional Government DKI Jakarta and could be varied for each project. DKI pointed out that the Law No.29 year 2007 about the DKI Jakarta as the capital of the State of Republic Indonesia stipulates that the funding

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		Capital Province of Jakarta as the capital of the Republic of Indonesia, whereby the financing for special government affair will be allocated from the state budget or APBN (National Income and Expenditure Budget).	for the implementation of the governmental special matters will be budgeted on APBN. However, the assumption used for the financial evaluation (85% JICA ODA Loan, 50% grant by central government, 35% on-lending, 15% DKI own resources) in E3 is unchanged, because we cannot conduct the financial evaluation without assumption. Request: Please provide Law No.29 year 2007 about the DKI Jakarta as the capital of the State of Republic Indonesia.
17	G-6 About G3.4 New Institution Framework Plan	It is recommended that this should not be discussed in the Master Plan as it is unclear whether the new institutions are for all level (planning, implementation, operating, monitoring) or for certain level.	The title of G3.4 will be changed from 'New Institution Framework' to 'Improved Institutional Framework' and other wording which implies 'new' will be changed to 'improved'.
18	Section of G7 Private Sector Involvement and G8 Sewage Charges and Collection	- Removed to Part E and the title should be adjusted as the contents are explaining more about the financing instead of the institutional aspect. - The discussion of PPP should be more connected with the analysis on financial and economic feasibility and recommendation of the most appropriate PPP scheme for DKI Jakarta. - The discussion on PPP should not be directly prearranged to Zone 1 but it should be made more general for the zone fulfilling the criteria of PPP.	G7.2.3 and G7.2.4, which discuss mainly the financial aspects of PPP, will be moved to Part E as 'E3.8.3 PPP for Water and Sewerage Projects in Developing Countries' and 'E3.8.4 Possible PPP Option for the sewerage projects in DKI Jakarta' so that it will be linked to the result of the economic and financial analysis. Other portion of G7 which discuss about the regulatory and institutional aspects of PPP will remain in Part G. Specific mention to' Zone-1' is avoided and such wording as 'such zone where much commercial

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			building and higher financial viability is envisaged' is used. 'G8 Sewage Charges and Collection' will be moved to Part E as E4. The wording in new E3.8.5 is amended as follows; "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…would be one of the realistic options for the sewerage works."
19	Apendix-3: Minutes of Meeting (Interim Report) related to the "Basic Plan"	- In the RTRW (Regional Spatial Plan) 2030, the city plan includes the reclamation area in North Jakarta. Hence, in its review the MP should explain the wastewater treatment in such reclamation area. In addition, it is necessary to complete it with the explanation on wastewater treatment in Kepulauan Seribu Regency.	- For the reclamation area, there is no information available for the development of the area during the project period. Therefore, we will add a recommendation in PART-K that off-site system is recommended considering the fact that recycle of treated wastewater would be necessary to save the fresh water/ground water use. Therefore, necessary Land area should be kept for WWTP(s) & pumping station(s) before the commencement of development by developers. - For Seribu islands, current situation and issues are clarified in B5-3 of PART-B and recommendations were given. - It is explained in D2.2 of PART-D "Comparison between Old M/P and New M/P for Development Demarcation". However, we

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			will add more explanation to make the readers understood easier.
20		- Please clarify the completeness of Main Report that should be submitted to the counterpart - Final Report should be completed with draft of new Master Plan as the result of the review on the current Master Plan.	- Supporting report was submitted to the counterpart agencies on 6th March 2012 with a summary of the Main Report in Bahasa. - The New Master Plan (draft) was re-compiled from the DFR and has already been submitted explained in 3rd JCC.

C: From DGHS

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1	Apply to entire the Draft of Final Report	- It has been agreed that the calculation of economic analysis in the DFR needs to be more detailed.	The detailed explanation on the items and the calculation basis for our economic analysis in MP is already included in PART-E of Main Report (E2.4 from E2.5 (page E-4 to E-11) which is attached herewith as refer to **page E-4 and E-6 to E-12 in (M/R)**). Please note that our economic analysis followed the Japanese Guideline 'Cost-Benefit Analysis Manual of Sewerage, Nov. 2006, Japan Sewerage Works Association' which is commonly used by JICA for their appraisal of sewerage project. We also incorporated some of the benefit items indicated in the WSP's publication 'Economic Impact of Sanitation in

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			Southeast Asia, A four-country study conducted in Cambodia, Indonesia, the Philippines and Vietnam under the Economics of Sanitation Initiative (ESI), Research Report February 2008'. Some of the numerical data was picked up from the statistics published by DKI such as 'Jakarta Dalam Angka 2009 (Jakarta in Figures 2009)', 'Badan Pusat Statistik Provinsi DKI Jakarta' and 'Surveillance of Health Agency, Integrated Surveillance System (STP) based on Puskesmas (Public Health Center) Data Record'.
		- The data basis and the basic Assumption in EA need to be negotiated first with the DKI Jakarta Provincial Government, so that the resulting value in accordance with the existing condition and the achievement of development targets that are owned by the Provincial Government of DKI Jakarta.	The data basis and basic assumptions for economic analysis were primarily based on our overall experiences of DKI Jakarta during the survey & study conducted under the Project and the Japanese guideline which is commonly used by JICA for their appraisal though; these were not particularly so much discussed as should be due to limitation of time and was not so much desirable at MP stage. In the Feasibility Study stage for the particular investment and for the particular zone the data basis and the basic assumption for the economic analysis should be conducted in close coordination with DKI.
		- The estimated cost for DKI Jakarta MP realization, which primarily constructed for priority zones through Government budget (ODA Loan and Local Budget), which is Zone 6, need to be reviewed. Compared with the results of calculations by the PPP	According to PPPFS Team, the only cost figures they have already indicated to GOI and DKI was WWTP: US$120-200 million and main sewers: US$200-300 million. As far as WWTP is concerned, their lowest

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		scheme, the estimated cost was too high.	estimation (US$120 million) was based on the assumption that the WWTP capacity is 198,000m^3/day (max), process: Conventional Activated Sludge (CAS) method assuming that the sufficient land space is available to construct WWTP using CAS process and a transmission pump station can be built in the available land space in Zone-1 so that the depth of the trunk sewer end at WWTP is not very deep. After the investigation, however, it becomes evident that all those assumptions need to be changed. WWTP capacity should be raised to 264,000m^3/day (max), more costly process than CAS should be used due to the limited availability of land space at Pejagalan site and the depth of the trunk sewer end at WWTP is very deep (30m) and the cost of installing lifting pump is very expensive because there is no available land for a transmission pumping station in Zone-1. All these factors will push up the construction cost of WWTP. PPPFS Team will present their detailed cost estimation to GOI and DKI shortly. PPPFS Team confirmed that the estimated cost in MP is not high compared to their current cost estimation of Zone-1. In order to make the size of investment for Zone-6 realistic from the view point of DKI's budget allocation, the possibility of phased implementation will be considered at the Feasibility Study stage.

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		- The Draft of Final Report has not yet been certainly explained who will be the regulator and operator for wastewater management in DKI Jakarta. Due to that issue, DKI Jakarta Government has been agreed to decide internally. Meanwhile, the Ministry of Public Works adding that the institutional aspects should take another look at existing institutions which has dominant function in handle wastewater. - The DKI Jakarta Provincial Government suggesting in order to make MP DKI Jakarta become a Governor Law need intensive further internal discussion.	It is our MP Team's intension that we won't specify the concrete institution in DKI as operator to be or regulator to be in DFR. In DFR, we indicated the required roles in the improved institutional framework and leave it to Indonesia side to decide who will fulfill what role. We agree that the creation of new institution is not necessary if the restructuring of existing institutions can result in the fulfillment of all the required roles indicated in DFR. We compiled the New Master Plan (M/P) prepared from the Final Report as attached herewith (Refer to **Attachment No.3**). DKI Jakarta Provincial Government is requested to confirm the New M/P (modify it if necessary) and prepare the documents for Governor's Decree.

Attachment No.1

Attachment No.1

Japan International Cooperation Agency

Directorate General of Human Settlements, Ministry of Public Works
DKI Jakarta
PD PAL JAYA

The Project for Capacity Development of Wastewater Sector Through Reviewing the Wastewater Management Master Plan In DKI Jakarta

Explanation Paper on the Cost Estimation of Priority Projects in Short –term Plan in New Master Plan (Zone-1 and Zone-6)

April 2012

Yachiyo Engineering Co., Ltd.
Japan Environmental Sanitation Center
Water Agency Inc.

Explanation Paper on the Cost Estimation of Priority Projects in Short –term Plan in New Master Plan (Zone-1 and Zone-6)

PART-A: Total Project Cost for Off-site and On-site System

Although we explained in the Draft Final Report on 23rd February 2012 that the project cost for the prioritized projects in Zone-1 and Zone-6 for the Short-term plan is 15trillion IDR, it is the total investment cost including Facilities Replacement cost up to the year 2050. When the Facilities Replacement cost is excluded from the total cost, the initial investment cost is calculated as follows:

A1. Total Initial Investment Cost of Off-site and On-site System Development in Short-term Plan

The initial investment cost of Short-term plan is as shown in **Table A-1**. Please note that this cost includes not only Construction Cost but also Non-Construction Cost such as engineering cost, physical contingency and VAT tax.

Table A-1 Total Initial Investment Cost of Off-site and On-site System Development

(Million IDR)

Items		Initial Investment Cost
Off-site System		
	Zone-1	5,192,315
	Zone-6	7,110,408
	Sub-total	**12,302,723**
On-site System		
	Construction of a new STP in South area	42,100
	Duri Kosambi STP integrated with WWTP (Zone-6)	155,279
	Rehabilitation and Extension of Pulo Gebang STP	24,390
	Co-treatment of on-site sludge at WWTP (Zone-1)	131,904
	Sub-total	**353,673**
Total		**12,656,396**

PART-B: Construction Cost and Non-Construction Cost of Off-site System

B1. Construction Cost and Non-Construction Cost of Off-site System

Table B-1 shows the construction cost and non-construction cost of off-site system.

Table B-1 Construction Cost and Non-Construction Cost of Off-site System

(Million IDR)

Items		Zone 1	Zone 6	Zone1+Zone6	Remarks
A.Construction Cost					
	a. Direct Construction Cost	3,756,694	5,144,455	8,901,149	
	b. Indirect Construction Cost	488,370	668,779	1,157,149	13%
	Sub-total	4,245,064	5,813,235	**10,058,298**	
Non-Construction Cost					
	B. Engineering Cost	262,969	360,112	623,081	7%
	C. Physical Contingency	212,253	290,662	502,915	5%
	D. Land Use Cost	0	0	0	
	(A+B+C+D)	(4,720,286)	(6,464,009)	(11,184,295)	
	E. Value added Tax	472,029	646,401	1,118,430	10%
	Sub-total	947,251	1,297,175	**2,244,426**	
Grand Total		5,192,315	7,110,410	**12,302,723**	

B2. Direct Construction Cost of Off-site system in Short-term Plan

The direct construction cost of Sewerage Zone-1 and Zone-6 is comparable well to the direct construction cost calculated based on the actual contract prices of the recent sewerage projects in Malaysia, Vietnam and Indonesia (Denpasar) under Japan's ODA loan through International Competitive Bidding (ICB) process.

The breakdown of direct construction cost mentioned in **Table B-1** is shown in **Table B-2** below.

Table B-2 Direct Construction Cost of Sewerage Zone-1 and Zone-6 excluding Replacement Cost

(Million IDR)

Items	Zone 1	Zone 6	Zone1+Zone6
House Connection Cost	361,275	464,054	**825,329**
Collection Sewer Line	1,893,787	2,791,067	**4,684,854**
Lift Pump Station	0	107,094	**107,094**
Wastewater Treatment Plant	1,501,632	1,782,240	**3,283,872**
Direct Cost Total	3,756,694	5,144,455	**8,901,149**

Calculation base for the costs in the above table shall be referred to **Attachment-1**.

B2-1. Construction Cost for Sewers

B2-1-1. Base for Applied Unit Cost for Sewers

New Master Plan calculates the direct construction cost of sewers by using the actual unit construction costs of different diameter pipes of DSDP-II adding the escalation factor during 2009-2011 (Indonesia's CPI has increased 12%) and the assumed pipe length of each diameter pipes. The assumed pipe length is calculated based on the completely separate system concept. The unit construction cost of pipe laying work of each diameter pipe is as shown in **Attachment-2**.

B2-1-2. Comparison between New M/P and DSDP-II for Construction Cost of Sewers

In order to confirm whether or not the cost estimate in the New M/P is reasonable, we compared the construction cost of sewers (including pump stations and wet pits) in two projects, that is, prioritized project in Zone-6 of the New M/P and Denpasar Sewerage Development Project-II (DSDP-II). The results are shown in **Table B-3.**

Table B-3 Comparison between New M/P (Zone-6) and DSDP-II

No.	Item		Unit	[A] New M/P (Zone-6)	[B] DSDP-II (ICB only)	[A]/[B]	Remarks
[1]	Service Population		PE	1,172,574	53,760	21.8	
[2]	House Connection		No.	130,956	7,680	17.1	Number of HC in DSDP-II is based on the Master Plan of DSDP
[3]	Total Construction Cost		Million IDR	5,813,235	481,303	---	Engineer's Estimate base
[4]	Construction Cost excluding WWTP (incl. indirect cost)		Million IDR	4,030,995	456,395	8.8	Excluding cost of WWTP (= cost of pipe works)
[5]	Pipe Length (main, secondary and tertiary)		km	1,766	72	24.5	For DSDP-II, LCB is not included.
[6]	Unit Cost per Person (PE)	[4]/[1]	IDR/PE	3,437,732	8,489,490	0.40	For pipe works and pump stations
				4,957,670	*8,952,809*	*0.55*	*For total construction cost*
[7]	Direct Cost (For pipe works only)		Million IDR	4,684,854	252,975	18.52	
[8]	Unit Cost (For pipe works only)	[7]/[5]	IDR/m	2,652,805	3,513,542	0.76	For DSDP-II, price escalation is included.

Service Population in DSDP based on the Master Plan of DSDP

	Number of HC (No.)	Service Population (PE)
DSDP-I	9,008	63,056
DSDP-II	7,680	53,760
DSDP-III	19,210	134,470
Total	35,898	251,286

Note: Number per HC is assumed as 7 PE.

It can be said that the cost estimate in the New M/P is reasonable based on the evaluation results as follows:

(1) Compared with the service population ratio, the construction cost ratio (item [4]) is about 9 times (New M/P is about 20 times larger than DSDP-II). This means that the construction cost of the New M/P is relatively lower than that of DSDP-II.
(2) Unit cost per person (it means the cost required for one person) for the New M/P (item [6]) is only 40% of that of DSDP-II. This means that the benefit-versus-cost of the New M/P is much higher than that of DSDP-II.
(3) Direct cost ratio (item [7]) of about 19 is almost proportional to the difference of the service population.
(4) Unit cost of pipe works of the New M/P is lower than that of DSDP-II. It is considered that it is caused by the big difference of pipe length.

B2-2. Construction Cost of Wastewater Treatment Plant (WWTP)

B2-2-1. Base for Applied Unit Cost for WWTP

Unit Direct Cost of WWTP in New M/P is IDR7,584,000/m^3 (IDR1,782,240million÷235,000m^3/day).

As shown in **Table B-4**, this unit direct cost of WWTP is lower than the direct cost calculated based on the actual contract price of Viet Nam contract. This is also comparable to the direct cost calculated based on Malaysia contract price considering the escalation factor during 2005-2011 (Malaysia's CPI has increased 16%) and the difference of the treatment process. Treatment process of the New M/P (modified activated sludge process with space-saving technology) costs 30% higher than the Conventional activated sludge process which is used in Vietnam and Malaysia projects. The unit price of WWTP in Zone-1 must be higher than this unit cost since they need to use more expensive technology than CAS process or modified activated sludge process since the available land is severely limited.

Table B-4 Comparison of Unit Cost of WWTP (Actual Contract in Vietnam, Malaysia and New M/P)

Country	Process Type	Capacity	Area of WWTP Site	Area-to-Capacity Ratio	Unit Contract Price	Unit Direct Cost				Remark
						without Price Escalation	with Price Escalation (for Malaysia only)		When Space-saving Technology and Modified AS is applied to Malaysia cases(*4)	
					[A]	[B]=[A]/1.13	[C]=[B] x 1.16(*1)	[D]=[C] x 107.38	[E]=[D] x 1.3	
		m^3/day	m^2	$m^2/(m^3/day)$	JPY/m^3	JPY/m^3	JPY/m^3	IDR/m^3	IDR/m^3	
Viet Nam	CAS	140,000	170,000	1.21	**83,764**	**74,128**	**74,128**	**7,959,000**(*2)	**7,959,000(*2)**	Completed in 2009
Malaysia	CAS	88,000	87,000	0.99	52,295	46,279	53,684	5,764,000	7,493,200	Completed in 2005
	CAS	94,250	95,000	1.01	50,979	45,114	52,333	5,619,000	7,304,700	
	CAS	37,500	33,000	0.88	57,061	50,497	58,576	6,289,000	8,175,700	
				(Average)	**53,445**	**47,297**	**54,864**	**5,890,000**(*3)	**7,657,000**	
New M/P (Zone-1)	Modified AS with space-saving technology	198,000	69,000	0.35	**79,870**	**70,628**	**70,628**	**7,584,000**	**7,584,000**	See note-5
New M/P (Zone-6)	Modified AS with space-saving technology	235,000	82,000	0.35	**79,870**	**70,628**	**70,628**	**7,584,000**	**7,584,000**	

JPY1.0 = IDR107.38 (average from Mar. to Aug. 2011) US$1.0=JPY79.87 (same as above)

Notes:
1. Unit direct cost of Malaysia includes price escalation (+16%) during 2005 - 2011 (Malaysia's CPI has increased 16%).
2. Unit direct cost of WWTP in New M/P is lower than the unit direct cost of Viet Nam contract.
3. Unit direct cost of New M/P is higher than the unit direct cost of Malaysia. But if the following factor (note-4) is considered, it is comparable to the unit direct cost of Malaysia.
4. Since there is a constraint for the land area of DKI Jakarta, the area-to-capacity ratio of WWTP in New M/P should be very small (0.35 m^2/m^3/day) compared with Viet Nam and Malaysia cases (0.88 to 1.21). Therefore, the space-saving technology needs to be adopted for WWTP in New M/P which is more expensive than CAS in Malaysia. Further more, adoption of the modified activated sludge processes with advanced treatment functions (Modified AS) would increase the unit cost of WWTP further. Therefore, in New M/P, we assumed that the price increase compared with that of Malaysian case would be at least 30% higher. The detailed cost will be confirmed at the F/S stage.

   Unit direct cost of New M/P: IDR7,584,000 < IDR7,657,000 (unit direct cost of Malaysia 5,890,000 x 1.3)
5. As for Zone-1, since the usable land in Pejagalan WWTP site was decided to be only 50% of 69,000m^2 (or 6.9ha) in DKI Jakarta's letter in November 2011, the unit price of WWTP must be higher than this unit cost since more expensive technology than CAS or modified AS is required.

B2-2-2. Comparison of Unit Cost for WWTP between New M/P and On-going WWTP Project

(1) Comparison of Unit Cost (Daily Average flow basis)

For the cost estimate of WWTP in the New M/P, we applied the construction costs in the Japanese ODA loan projects in Viet Nam and Malaysia because costs for large-scale WWTPs are not available

in Indonesia.

Meanwhile, PD PAL JAYA is now implementing WWTP project by MBBR (moving bed bio-reactor) process with a treatment capacity of 250L/s (or 21,600m^3/day). Therefore, we checked the applied unit price in **Table B-4** with that applied in MBBR process WWTP.

It is difficult to compare both processes as they are because they are completely different processes. Therefore, we examined which facilities in New M/P's WWTP are not included in MBBR process type WWTP as shown in **Table B-5**. We found out that such indispensable items for the large scale WWTP as Grit Chamber, Main pump (inlet pump), Primary settling tank and Sludge Treatment Facility are not included in MBBR WWTP.

Table B-5 Comparison between Process in New M/P and MBBR Process

Main Facility	Sub-Facility	Process in New M/P	MBBR	Cost (%)	Cost not included in MBBR (%)
Control Facility	Sub-station	✔	✔	0.2	
	Administration building	✔	✔	1.2	
Grit Chamber	Inlet pipe to grit chamber	✔		0.1	0.1
	Grit chamber	✔		3.9	3.9
	Main pump	✔		3.4	3.4
Treatment Facility	Distribution tank	✔		0.3	0.3
	Primary settling tank	✔		11.9	11.9
	Aeration tank	✔	✔	33.5	
	Final settling tank	✔	✔	17.7	
	Chlorination facility	✔	✔	1.2	
	Blower facility	✔	✔	7.7	
Water Supply Facility	Rapid filter	✔	✔	0.3	
	Water supply building	✔	✔	0.4	
Sludge Treatment Facility	Thickening facility	✔		2.4	2.4
	Dewatering facility	✔		16.1	16.1
	Total			100.0	38.0

We compared the unit cost for daily average wastewater flow basis of MBBR process and the process in New M/P as shown in **Table B-7**. As a result, it is found that the unit cost of New M/P's WWTP is not so much different from the adjusted unit cost of MBBR.

Table B-7 Comparison of Unit Cost of MBBR and Process in New M/P

MBBR Process			Process in New M/P
[A] Construction Cost (Engineer's Estimate) (IDR)	Unit Cost (Q_{max}) IDR/(m^3/day)	[B] Unit Cost (Q_{ave}) IDR/(m^3/day)	[C] Unit Cost (Q_{ave}) IDR/(m^3/day)
65,972,227,094	3,054,270	4,072,360	7,584,000
	Q_{max} = 21,600m^3/day	Q_{ave} = 16,200m^3/day	Q_{ave} = 235,000m^3/day
Adjusted based on Table B-5: [A] x100/(100-38)			
106,406,817,894	4,926,242	6,568,322	7,584,000
Comparison of unit cost: [C]/[B] x 100			115.5%

(2) Other Aspects

MBBR method is usually adopted for small-scale WWTP. While, the activated sludge process and its modified version proposed in the New M/P is reliable process for a large-scale WWTP. Therefore, we assumed the activated sludge process and its modified version as the standard process in Master Plan.

Since there is no experience of the large scale activated sludge process WWTP in Indonesia, we used the unit cost obtained as the results of ICB in Vietnam and Malaysia, that is JPY79,870 as the unit contract price and JPY 70,628 as the unit direct cost, for the basis of the cost estimation of WWTP in

Master Plan. This is the Engineer's Estimate. Please be reminded that the actual cost (price) is decided through tendering process. If we set the lower unit cost in the Engineer's Estimate, some of the competent international construction companies would be reluctant to join the tender and competitiveness in the tender would be affected, which would not be beneficial to the Indonesian side.

We should admit that the initial investment cost, particularly that for Zone-6, is still very sizable. We would like to propose the staged or phased implementation of Zone-6 to reduce the size of investment for an initial few years to the sustainable level for GOI and DKI, the details of which will be worked out in the Feasibility Study.

Table A1. Quantity and Direct Construction Cost for Zone-1 and Zone-6

[Quantity]

ITEM		Unit	ZONE-1	ZONE-6	Total
Sewerage Zone Area		ha	4,901	5,874	10,775
(1) House Connection		Place	101,952	130,956	232,908
(2) Collection Sewer Line					
1) Tertiary and Secondary	φ 200mm～ φ 300mm	m	656,638	829,313	1,485,951
2) Main	φ 350mm～ φ 800mm	m	86,069	154,809	240,877
3) Trunk	φ 900mm～ φ 1,200mm	m	5,263	11,532	16,795
4) Conveyance	φ 1,350mm～ φ 2,400mm	m	10,269	12,426	22,694
	sub total	m	758,238	1,008,080	1,766,318
(3) Lift Pump Station					
1) P1		m3/min		171.8	
2) P2		m3/min			
3) The number of Lift Pump Station		Place	0	1	1
(4) Wastewater Treatmment Plant					
1) Wastewater Treatmment Plant Capacity (Maximum wastewater flow)		m3/day	264,000	313,000	577,000
2) Pump Station Capacity		m3/min	244.7	282.5	527
(5) Land Use					
1) Site for Lift Pump Station P1		m2		2,000	2,000
2) Site for Lift Pump Station P2		m2			0
3) Site for Wastewater Treatmment Plant		m2	69,200	82,000	151,200

[Direct Construction Cost]

ITEM		UNIT COST	ZONE-1	ZONE-6	Total
		IDR.	(×Million IDR.)		
(1) House Connection		3,544×1,000 IDR/Place	361,275	464,054	**825,329**
(2) Collection Sewer Line					
1) Tertiary and Secondary	φ 200mm～ φ 300mm	984 ～ 1,635 × 1,000 IDR/m	807,717	1,018,759	10,144,598
2) Main	φ 350mm～ φ 800mm	1,936 ～ 7,768 × 1,000 IDR/m	373,380	761,287	9,990,725
3) Trunk	φ 900mm～ φ 1,200mm*[1]	19,438 ～ 29,806 × 1,000 IDR/m	124,359	294,624	2,546,535
4) Conveyance	φ 1,350mm～ φ 2,400mm*[2]	51,287 ～ 82,164 × 1,000 IDR/m	588,331	716,397	3,018,448
	sub total		1,893,787	2,791,067	**4,684,854**
(3) Lift Pump Station					
1) P1	Civil/Archtect Works	500,390～722,040 × 1,000 IDR/m3/min		53,547	53,547
	Mecanical Facility			42,838	42,838
	Eletrical Facility			10,709	10,709
	P1 total		0	107,094	107,094
2) P2	Civil/Archtect Works	500,390～722,040 × 1,000 IDR/m3/min			0
	Mecanical Facility				0
	Eletrical Facility				0
	P2 total		0	0	0
	sub total		0	107,094	**107,094**
(4) Wastewater Treatmment Plant					
1) Civil/Archtect Works		WWTP = 885US$/m3/day=7,584,00IDR/m3/day	750,816	891,120	1,641,936
2) Mecanical Facility			600,653	712,896	1,313,549
3) Eletrical Facility			150,163	178,224	328,387
	sub total		1,501,632	1,782,240	3,283,872
Direct Cost	(1)+(2)+(3)+(4)		3,756,694	5,144,455	8,901,149
(5) Land Use Cost		With assuming the sites of wastewater treatment plants and pumping stations are owned by public, the land use cost does not occur.			
1) Lift Pump Station	P1		0	0	0
2) Lift Pump Station	P2		0	0	0
3) Wastewater Treatmment Plant			0	0	0
	sub total		0	0	0
	Total		3,756,694	5,144,455	**8,901,149**

Yen= IDR 79.87

Notes:

1. Shield tunnel method will be applied for 80% of the total length.
2. Jacking method will be applied for 50% of the total length.

Attachment-2

Table A2 Unit Direct Construction Cost for Sewer Pipe Laying

Diameter	Earth Covering Depth	Open Cut Method		Manhole	Jacking Method		Shield Tunnel Method	House Connection
		PVC (VU)	RC (HP)		Small-Diameter	Large-Diameter		
(mm)	(m)	(1,000 Rp./m)	(1,000 Rp./m)	(1,000 Rp./No.)	(1,000 Rp./m)	(1,000 Rp./m)	(1,000 Rp./m)	(1,000 Rp./m)
150	1.0～1.5m	984						
200	1.0～1.5m	1,110						
250	1.0～1.5m	1,293						
300	1.0～1.5m	1,635						
350	1.0～1.5m	1,936						
400	1.5～2.0m	3,063						
450	1.5～2.0m	3,848						
500	2.0～3.0m		4,711					
600	2.0～3.0m		5,424					
700	3.0～4.0m		6,937					
800	3.0～4.0m		7,768					
900	5.0m					19,438		
1,000	7.0m					25,781		
1,100	7.0m					28,056		
1,200	8.0m					29,806		
1,300	6.0m							
1,350	8.0m						51,287	
1,500	9.0m						55,840	
1,650	9.0m						60,873	
1,800	10.0m						66,386	
2,000	10.0m						71,144	
2,200	11.0m						76,403	
2,400	11.0m						82,164	
2,600	12.0m						87,979	
2,800	12.0m						94,258	
3,000	12.0m						101,002	
MH Type-1	1.0～1.5m			9,989				
	1.5～2.0m			12,704				
MH Type-2	2.0～3.0m			24,174				
	3.0～4.0m			31,654				
MH Type-3	4.0～5.0m			42,664				
	5.0～6.0m			47,962				
House Connection						Length：2～4m、Depth：1～3m		3,544

Note: Above unit costs include price escalation of 1.119 estimated by CPI growth from of 2009

Attachment-3

Table A3 Project Cost for Sewerage Development Plan by each Zone (Revised)

Unit : Million IDR

Items	Cost	Zone No.						
	Total	1	2	3	4	5	6	7
A. Construction Cost	56,125,784	5,127,423	946,911	3,046,184	520,238	3,398,813	6,923,407	3,263,191
a. Direct Construction Cost	49,668,836	4,537,543	837,974	2,695,738	460,388	3,007,799	6,126,909	2,887,780
(1) House Connection Cost	4,694,090	361,275	103,078	306,360	75,824	252,490	464,054	302,778
(2) Collection Sewer Line	25,700,306	1,893,787	527,414	1,485,046	384,564	1,359,651	2,791,067	1,700,773
(3) Lift Pump Station	467,854	0	25,466	14,440	0	19,690	107,094	25,067
(4) Wastewater Treatmment Plant	14,993,568	1,501,632	182,016	872,160	0	963,168	1,782,240	841,824
(5) Facilities Replacement (from 2014 to 2050)	3,813,018	780,849	0	17,732	0	412,800	982,454	17,338
b. Indirect Construction Cost	6,456,949	589,881	108,937	350,446	59,850	391,014	796,498	375,411
B. Engineering Cost	3,476,818	317,628	58,658	188,702	32,227	210,546	428,884	202,145
C. Physical Contingency	2,806,289	256,371	47,346	152,309	26,012	169,941	346,170	163,160
D. Land Use Cost	0	0	0	0	0	0	0	0
Total	**62,408,892**	**5,701,422**	**1,052,914**	**3,387,195**	**578,478**	**3,779,300**	**7,698,461**	**3,628,495**
E. Value Added Tax	6,240,889	570,142	105,291	338,719	57,848	377,930	769,846	362,850
Grand Total	**68,649,781**	**6,271,565**	**1,158,206**	**3,725,914**	**636,325**	**4,157,230**	**8,468,307**	**3,991,345**

Unit : Million IDR

Items	Zone No.						
	8	9	10	11	12	13	14
A. Construction Cost	4,620,518	3,558,238	7,327,577	7,113,142	2,660,143	4,598,258	3,021,741
a. Direct Construction Cost	4,088,954	3,148,883	6,484,581	6,294,816	2,354,109	4,069,255	2,674,108
(1) House Connection Cost	332,536	406,387	497,467	689,282	212,307	403,621	286,631
(2) Collection Sewer Line	1,812,432	2,058,008	2,751,112	3,524,888	1,466,826	2,348,713	1,596,025
(3) Lift Pump Station	34,220	18,843	41,595	121,097	0	35,225	25,117
(4) Wastewater Treatmment Plant	1,334,784	652,224	2,237,280	1,918,752	674,976	1,281,696	750,816
(5) Facilities Replacement (from 2014 to 2050)	574,982	13,421	957,127	40,797	0	0	15,519
b. Indirect Construction Cost	531,564	409,355	842,996	818,326	306,034	529,003	347,634
B. Engineering Cost	286,227	220,422	453,921	440,637	164,788	284,848	187,188
C. Physical Contingency	231,026	177,912	366,379	355,657	133,007	229,913	151,087
D. Land Use Cost	0	0	0	0	0	0	0
Total	**5,137,770**	**3,956,572**	**8,147,876**	**7,909,436**	**2,957,938**	**5,113,019**	**3,360,016**
E. Value Added Tax	513,777	395,657	814,788	790,944	295,794	511,302	336,002
Grand Total	**5,651,547**	**4,352,229**	**8,962,664**	**8,700,380**	**3,253,732**	**5,624,321**	**3,696,018**

Attachment No.2

D9.1 Setting Procedure of Allocation Ratio of Wastewater Flow Volume between Household and Non-household based on the Area of Land Use

1. Area of land use by category

The area of land use of DKI are classified into four categories as 'Household', 'Non-household', Industry and Warehouse' and 'Openned Area'.

The area of wach land use category in 2007 and 2030 are given in Table S/R-D9-41 based on GIS Data Base.

Table S/R-D9-41 Area of each land use category in 2007 and 2030

Unit: m^2

Zone No.	2007					2030				
	Household	Non-household	Industry and Warehouse	Openned Area	Total	Household	Non-household	Industry and Warehouse	Green Openned Area	Total
Formula	A1	B1	C1	D1	E1	A2	B2	C2	D2	E2
0(Existing area)			111,578	236	111,814					0
1	19,733,710	15,796,228	4,495,582	7,491,493	47,517,012	17,757,346	18,484,860		12,767,793	49,009,999
2	4,129,517	740,772	2,744,892	6,132,770	13,747,950	6,871,731	1,729,486	1,727,437	3,429,864	13,758,517
3	23,508,925	3,782,602	43,721	8,293,690	35,628,938	28,369,110	2,340,712		4,919,151	35,628,972
4	6,493,716	1,821,775	301,401	729,835	9,346,728	6,382,951	1,213,426		1,750,351	9,346,728
5	15,243,252	8,002,345	3,663,084	6,390,955	33,299,636	14,545,784	8,910,127	1,845,159	8,449,749	33,750,819
6	33,013,686	11,465,551	2,784,946	11,478,927	58,743,110	32,272,362	10,226,025	3,997,694	12,247,030	58,743,110
7	18,374,787	3,181,738	4,363,292	19,477,255	45,397,073	21,065,968	5,717,493	3,550,192	15,109,995	45,443,647
8	17,269,918	4,794,685	8,596,687	14,031,853	44,693,143	13,736,670	2,424,032	17,166,170	13,697,248	47,024,119
9	17,738,717	4,063,423	11,392,790	20,690,036	53,884,966	22,185,599	3,290,303	15,251,818	13,157,292	53,885,012
10	38,723,364	10,611,142	5,146,524	8,405,188	62,886,218	34,672,514	9,514,593	5,662,793	13,036,318	62,886,218
11	58,381,601	14,799,498	247,948	9,031,214	82,460,261	59,677,092	9,398,365		13,384,805	82,460,262
12	21,835,517	3,723,480	60,251	6,097,688	31,716,937	17,637,163	3,634,656		10,445,117	31,716,937
13	37,144,075	11,089,235	586,581	15,509,635	64,329,526	33,235,926	7,246,256		23,847,344	64,329,526
14	26,806,774	6,982,232	1,808,983	10,448,237	46,046,227	20,759,387	4,900,936	3,080,123	17,305,780	46,046,227
15(Reclamation area)	5,071,045	4,382,397	157,218	2,586,808	12,197,469	5,041,145	4,267,533		2,888,791	12,197,469
Total	343,468,603	105,237,104	46,505,480	146,795,820	642,007,007	334,210,747	93,298,801	52,281,387	166,436,626	646,227,561

Source; GIS data base, JICA expert team

2. Area ratio by land use category

The area ratio of the above are showed in Table S/R-D9-42.

Table S/R-D9-42 Area Ratio by land use category for each Zone

Unit: %

Zone No.	2007					2030				
	Household	Non-household	Industry and Warehouse	Openned Area	Total	Household	Non-household	Industry and Warehouse	Green Openned Area	Total
Formula	A1/E1	B1/E1	C1/E1	D1/E1	E1/E1	A2/E2	B2/E2	C2/E2	D2/E2	E2/E2
0(Existing area)	0%	0%	100%	0%	100%	-	-	-	-	-
1	42%	33%	9%	16%	100%	36%	38%	0%	26%	100%
2	30%	5%	20%	45%	100%	50%	13%	13%	25%	100%
3	66%	11%	0%	23%	100%	80%	7%	0%	14%	100%
4	69%	19%	3%	8%	100%	68%	13%	0%	19%	100%
5	46%	24%	11%	19%	100%	43%	26%	5%	25%	100%
6	56%	20%	5%	20%	100%	55%	17%	7%	21%	100%
7	40%	7%	10%	43%	100%	46%	13%	8%	33%	100%
8	39%	11%	19%	31%	100%	29%	5%	37%	29%	100%
9	33%	8%	21%	38%	100%	41%	6%	28%	24%	100%
10	62%	17%	8%	13%	100%	55%	15%	9%	21%	100%
11	71%	18%	0%	11%	100%	72%	11%	0%	16%	100%
12	69%	12%	0%	19%	100%	56%	11%	0%	33%	100%
13	58%	17%	1%	24%	100%	52%	11%	0%	37%	100%
14	58%	15%	4%	23%	100%	45%	11%	7%	38%	100%
15(Reclamation area)	42%	36%	1%	21%	100%	41%	35%	0%	24%	100%
Total	53%	16%	7%	23%	100%	52%	14%	8%	26%	100%

3. Area ratio between household and non-household

With focusing on the area of household and non-household, caluculated results of each area ratio when the total area of household and non-household is taken as 100% are showed in table-3.

The allocation ratio of wasetewater flow volume between household and non-household adopted to estimation of revenue from sewerage service by each zone is assumed to be equivalent to the average area ratio of household and non-household in 2007 and 2030 of which calculated in Table S/R-D9-43.

Table S/R-D9-43 Area Ratio between Household and Non-household for each zone

Unit: %

Zone No.	2007			2030			Average of 2007 and 2030		
	Household	Non-household	Total	Household	Non-household	Total	Household	Non-household	Total
Formula	a1=A1/(A1+B1)	b1=B1/(A1+B1)	(A1+B1)/(A1+B1)	a2=A2/(A2+B2)	b2=B2/(A2+B2)	(A2+B2)/(A2+B2)	average of a1 and a2	average of b1 and b2	
0(Existing area)	-	-	-	-	-	-	-	-	-
1	55.5%	44.5%	100%	49.0%	51.0%	100%	**52.3%**	**47.7%**	100%
2	84.8%	15.2%	100%	79.9%	20.1%	100%	**82.3%**	**17.7%**	100%
3	86.1%	13.9%	100%	92.4%	7.6%	100%	**89.3%**	**10.7%**	100%
4	78.1%	21.9%	100%	84.0%	16.0%	100%	**81.1%**	**18.9%**	100%
5	65.6%	34.4%	100%	62.0%	38.0%	100%	**63.8%**	**36.2%**	100%
6	74.2%	25.8%	100%	75.9%	24.1%	100%	**75.1%**	**24.9%**	100%
7	85.2%	14.8%	100%	78.7%	21.3%	100%	**81.9%**	**18.1%**	100%
8	78.3%	21.7%	100%	85.0%	15.0%	100%	**81.6%**	**18.4%**	100%
9	81.4%	18.6%	100%	87.1%	12.9%	100%	**84.2%**	**15.8%**	100%
10	78.5%	21.5%	100%	78.5%	21.5%	100%	**78.5%**	**21.5%**	100%
11	79.8%	20.2%	100%	86.4%	13.6%	100%	**83.1%**	**16.9%**	100%
12	85.4%	14.6%	100%	82.9%	17.1%	100%	**84.2%**	**15.8%**	100%
13	77.0%	23.0%	100%	82.1%	17.9%	100%	**79.6%**	**20.4%**	100%
14	79.3%	20.7%	100%	80.9%	19.1%	100%	**80.1%**	**19.9%**	100%
15(Reclamation area)	53.6%	46.4%	100%	54.2%	45.8%	100%	**53.9%**	**46.1%**	100%
Total	76.5%	23.5%	100%	78.2%	21.8%	100%	77.4%	22.6%	100%

D9.2 Method for Estimation of Revenue from Sewerage Service by each Zone

1. Calculated conditions

(1) Allocation ratio of wastewater flow volume between Household and Non-household

The allocation ratio of wasetewater flow volume between household and non-household is assumed to be equivalent to the percentage of each land use area by each zone. The above ratio is given in the following table.

Table S/R D9-44 Allocation Ratio of Wastewater Flow Volume between Household and Non-household based on Land Use Area

Zone No.	Average of 2007 and 2030 *		
	Household	Non-household	Total
0(Existing area)	-	-	-
1	52.3%	47.7%	100%
2	82.3%	17.7%	100%
3	89.3%	10.7%	100%
4	81.1%	18.9%	100%
5	63.8%	36.2%	100%
6	75.1%	24.9%	100%
7	81.9%	18.1%	100%
8	81.6%	18.4%	100%
9	84.2%	15.8%	100%
10	78.5%	21.5%	100%
11	83.1%	16.9%	100%
12	84.2%	15.8%	100%
13	79.6%	20.4%	100%
14	80.1%	19.9%	100%
15(Reclamation area)	53.9%	46.1%	100%
Total	77.4%	22.6%	100%

* Average ratio based on the data of land use area at 2007(current data) and 2030(future data)

(2) Setting up for sewerage coverage ratio of household and non-household by each zone

Sewerage coverage ratio of household and non-household are assumed to be same.

2. Each formuras for calculation

(1) Amount of Wastewater Flow

- [Amount of wastewater flow by each year (m^3/day)] = [Designed average amount of wastewater flow (m^3/day)] × [Sewerage Service Coverage Ratio by Each Zone(%)]

Hereinafter,

Sewerage service coverage ratio by each zone is defined as follows:

Sewerage Service Coverage Ratio by Each Zone

=Sewerage Service Coverage Population by Each Zone / (Administrative Population in Each Zone x 0.8)

=Wastewater equivalent to Sewerage Service Coverage Population by Each Zone / (Wastewater equivalent to Administrative Population in Each Zone x 0.8)

(2) Revenue from sewerage service

- [Revenue from sewerage service by each year(IDR/year)] = [Amount of wastewater flow(m^3/day)] × [Unit sewerage tariff(IDR/m^3)] × [Sewerage tariff collection ratio(%)] × 365 days

The unit sewerage tariff and the sewerage tariff collection ratio are mentioned in ’E3.6.1 Sewerage Tariff Revenue Unit Value per Wastewater Volume’ and ’E3.6.3 Tariff Collection Ratio’ of Main Report respectively.

(3) Revenue Ratio of Household and Non-household

- [Revenue Ratio of Household and Non-household(%)] = [Revenue from household/or/Non-household(IDR/year)] / [Total revenue by each year(IDR/year)] × 100

(4) Sewerage Unit Tariff Value per Wastewater Volume

- [Sewerage Unit Tariff Value per Wastewater Volume(IDR/m^3)] = [Revenue from household/or/Non-household(IDR/year)] / [Amount of wastewater flow(m^3/day)]/ 365 days

3. Calculation results

The revenue per year from sewerage service of each zone is estimated based on the above conditions and formulas. Detailed calculation results are given in Table S/R-D9-45 Calculation Sheet of Revenue from Sewerage Service (Breakdown) (Case where sewerage fee is unchanged).

S/R-D9.45 Calculation sheet of Revenue from Sewerage Service (Breakdown) (Case where sewerage fee is unchanged)

(1) Sewerage Service Coverage Ratio

Items				Unit		2,012	2,013	2,014	2,015	2,016	2,017	2,018	2,019	2,020	2,021	2,022	2,023	2,024	2,025	2,026	2,027	2,028	2,029	2,030
Increase Rate of Sewerage Tarif		Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Unit Sewerage Tariff (IDR/m^3)		Household		IDR/m3		4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621
		Non-household		IDR/m3		457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562
Sewerage Coverage Ratio				%		2%	4%	7%	10%	12%	15%	17%	20%	21%	20%	22%	24%	27%	30%	33%	38%	41%	43%	42%
Service Coverage Ratio				%		2%	2%	4%	6%	8%	10%	11%	13%	15%	17%	18%	21%	22%	24%	26%	28%	30%	33%	35%
Service Coverage Ratio / Sewerage Coverage Ratio				%		100%	37%	52%	58%	62%	64%	66%	67%	72%	81%	85%	88%	82%	79%	78%	74%	75%	77%	84%
Sewerage Service Coverage Ratio by each zone																								
Short-term (2012-2020)	Zone 1	Household		%		0%	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	100%	100%	100%	100%	100%	100%	100%
		Non-household		%		0%	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	100%	100%	100%	100%	100%	100%	100%
	Zone 6	Household		%		0%	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	100%	100%	100%	100%	100%	100%	100%
		Non-household		%		0%	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	100%	100%	100%	100%	100%	100%	100%
Medium-term (2021-2030)	Zone 4	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	67%	100%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	67%	100%
	Zone 5	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%	22%	33%	44%	56%	67%	78%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%	22%	33%	44%	56%	67%	78%
	Zone 8	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%	22%	33%	44%	56%	67%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%	22%	33%	44%	56%	67%
	Zone 10	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	14%	21%	28%	35%	42%	49%	56%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	14%	21%	28%	35%	42%	49%	56%
Long-term (2030-2050)	Zone 2	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Zone 3	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Zone 7	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Zone 9	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Zone 11	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Zone 12	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Zone 13	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Zone 14	Household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Non-household		%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

S/R-D9.45 Calculation sheet of Revenue from Sewerage Service (Breakdown) (Case where sewerage fee is unchanged)

(2) Amount of Wastewater Flow

Formula for Calculation

[Amount of wastewater flow by each year (m3/day)] = [Designed average amount of wastewater flow (m3/day)] × [Sewerage Service Coverage Ratio by Each Zone(%)]

Items			Unit	Amout of wastewater flow	2,012	2,013	2,014	2,015	2,016	2,017	2,018	2,019	2,020	2,021	2,022	2,023	2,024	2,025	2,026	2,027	2,028	2,029	2,030
Amount of Wastewater Flow by each zone			m3/day	69,409,658	0	0	1,355,301	2,710,603	4,065,904	5,421,206	6,776,507	8,131,809	9,487,110	10,842,412	12,197,713	14,146,839	15,336,446	16,965,252	18,594,059	20,222,865	22,072,658	23,922,451	25,772,244
			%		0%	0%	2%	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	27%	29%	32%	34%	37%
Short-term (2012-2020)	Zone 1	Household	m3/day	478,483	0	0	47,848	95,697	143,545	191,393	239,242	287,090	334,938	382,787	430,635	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483
		Non-household	m3/day	5,263,316	0	0	526,332	1,052,663	1,578,995	2,105,326	2,631,658	3,157,990	3,684,321	4,210,653	4,736,984	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316
	Zone 6	Household	m3/day	650,935	0	0	65,093	130,187	195,280	260,374	325,467	390,561	455,654	520,748	585,841	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935
		Non-household	m3/day	7,160,281	0	0	716,028	1,432,056	2,148,084	2,864,112	3,580,140	4,296,168	5,012,196	5,728,224	6,444,253	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281
Medium-term (2021-2030)	Zone 4	Household	m3/day	55,247	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,416	36,831	55,247
		Non-household	m3/day	607,712	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	202,571	405,141	607,712
	Zone 5	Household	m3/day	329,400	0	0	0	0	0	0	0	0	0	0	0	0	0	36,600	73,200	109,800	146,400	183,000	219,600
		Non-household	m3/day	3,623,399	0	0	0	0	0	0	0	0	0	0	0	0	0	402,600	805,200	1,207,800	1,610,399	2,012,999	2,415,599
	Zone 8	Household	m3/day	446,837	0	0	0	0	0	0	0	0	0	0	0	0	49,649	99,297	148,946	198,594	248,243	297,891	347,540
		Non-household	m3/day	4,915,203	0	0	0	0	0	0	0	0	0	0	0	0	546,134	1,092,267	1,638,401	2,184,535	2,730,668	3,276,802	3,822,936
	Zone 10	Household	m3/day	705,054	0	0	0	0	0	0	0	0	0	0	0	49,485	98,971	148,456	197,942	247,427	296,912	346,398	395,883
		Non-household	m3/day	7,755,599	0	0	0	0	0	0	0	0	0	0	0	544,339	1,088,678	1,633,017	2,177,357	2,721,696	3,266,035	3,810,374	4,354,713
Long-term (2030-2050)	Zone 2	Household	m3/day	104,197	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	m3/day	1,146,166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 3	Household	m3/day	337,841	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	m3/day	3,716,248	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 7	Household	m3/day	360,333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	m3/day	3,963,663	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 9	Household	m3/day	388,575	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	m3/day	4,274,330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 11	Household	m3/day	786,642	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	m3/day	8,653,065	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 12	Household	m3/day	294,933	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	m3/day	3,244,264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 13	Household	m3/day	512,431	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	m3/day	5,636,737	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 14	Household	m3/day	333,231	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	m3/day	3,665,537	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub Total		Household	m3/day	5,784,138	0	0	112,942	225,884	338,825	451,767	564,709	677,651	790,593	903,534	1,016,476	1,178,903	1,278,037	1,413,771	1,549,505	1,685,239	1,839,388	1,993,538	2,147,687
		Non-household	m3/day	63,625,520	0	0	1,242,360	2,484,719	3,727,079	4,969,439	6,211,798	7,454,158	8,696,518	9,938,877	11,181,237	12,967,936	14,058,409	15,551,481	17,044,554	18,537,627	20,233,270	21,928,913	23,624,557

S/R-D9.45 Calculation sheet of Revenue from Sewerage Service (Breakdown) (Case where sewerage fee is unchanged)

(3) Revenue from Sewerage Service

Formula for Calculation

[Revenue from sewerage service by each year(IDR/year)] = [Amount of wastewater flow(m3/day)] × [Unit sewerage tariff(IDR/m3)] × [Sewerage tariff collection ratio(%)] × 365 days

Unit: Million IDR/year

Items			Total	2,012	2,013	2,014	2,015	2,016	2,017	2,018	2,019	2,020	2,021	2,022	2,023	2,024	2,025	2,026	2,027	2,028	2,029	2,030
Sewerage Tariff Collection Ratio		Household				60%	61%	62%	63%	64%	65%	66%	67%	68%	68%	69%	70%	71%	72%	73%	74%	75%
		Non-household				90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Revenue from Sewerage Service (Million IDR/year)																						
Short-term (2012-2020)	Zone 1	Household	18,909,076,282	0	0	47,946,945	97,392,231	148,335,860	200,777,831	254,718,143	310,156,798	367,093,795	425,529,133	485,462,814	546,894,837	554,386,547	561,878,257	569,369,967	576,861,677	584,353,387	591,845,098	599,336,808
		Non-household	25,711,549,049	0	0	79,112,459	158,224,917	237,337,376	316,449,834	395,562,293	474,674,752	553,787,210	632,899,669	712,012,128	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586
	Zone 6	Household	25,724,142,348	0	0	65,227,619	132,493,602	201,797,947	273,140,656	346,521,727	421,941,162	499,398,960	578,895,121	660,429,645	744,002,532	754,194,348	764,386,163	774,577,979	784,769,794	794,961,610	805,153,425	815,345,241
		Non-household	34,978,310,832	0	0	107,625,572	215,251,144	322,876,715	430,502,287	538,127,859	645,753,431	753,379,003	861,004,574	968,630,146	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718
Medium-term (2021-2030)	Zone 4	Household	1,521,258,333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,490,172	45,557,016	69,200,531
		Non-household	2,009,583,411	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,448,234	60,896,467	91,344,701
	Zone 5	Household	12,829,498,484	0	0	0	0	0	0	0	0	0	0	0	0	57,524,412	116,603,537	177,237,376	239,425,929	303,169,196	368,467,177	435,319,871
		Non-household	16,992,400,222	0	0	0	0	0	0	0	0	0	0	0	0	82,088,890	164,177,780	246,266,670	328,355,560	410,444,450	492,533,340	574,622,230
	Zone 8	Household	9,057,109,620	0	0	0	0	0	0	0	0	0	0	0	0	0	42,979,008	87,104,123	132,375,345	178,792,673	226,356,109	275,065,651
		Non-household	11,981,859,768	0	0	0	0	0	0	0	0	0	0	0	0	0	60,514,443	121,028,887	181,543,330	242,057,773	302,572,216	363,086,660
	Zone 10	Household	16,670,652,789	0	0	0	0	0	0	0	0	0	0	0	56,560,590	114,670,785	174,330,585	235,539,991	298,299,002	362,607,618	428,465,839	495,873,665
		Non-household	22,091,171,793	0	0	0	0	0	0	0	0	0	0	0	81,819,155	163,638,310	245,457,464	327,276,619	409,095,774	490,914,929	572,734,084	654,553,238
Long-term (2030-2050)	Zone 2	Household	130,514,541	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	172,279,193	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 3	Household	3,385,370,183	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	4,468,688,641	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 7	Household	5,867,480,052	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	7,745,073,669	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 9	Household	7,787,526,076	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	10,279,534,420	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 11	Household	7,882,635,696	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	10,405,079,119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 12	Household	923,565,452	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	1,219,106,396	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 13	Household	2,888,362,870	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	3,812,638,988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zone 14	Household	4,591,365,307	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Non-household	6,060,602,205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub Total		Household	118,168,558,032	0	0	113,174,564	229,885,833	350,133,807	473,918,486	601,239,871	732,097,960	866,492,755	1,004,424,254	1,145,892,459	1,347,457,959	1,480,776,092	1,660,177,551	1,843,829,436	2,031,731,747	2,246,374,657	2,465,844,663	2,690,141,767
		Non-household	157,927,877,707	0	0	186,738,030	373,476,061	560,214,091	746,952,122	933,690,152	1,120,428,182	1,307,166,213	1,493,904,243	1,680,642,274	1,949,199,459	2,113,107,504	2,337,529,992	2,561,952,480	2,786,374,968	3,041,245,689	3,296,116,411	3,550,987,132
Total			**276,096,435,740**	**0**	**0**	**299,912,594**	**603,361,894**	**910,347,898**	**1,220,870,608**	**1,534,930,023**	**1,852,526,143**	**2,173,658,968**	**2,498,328,498**	**2,826,534,733**	**3,296,657,418**	**3,593,883,595**	**3,997,707,542**	**4,405,781,916**	**4,818,106,715**	**5,287,620,346**	**5,761,961,074**	**6,241,128,899**
				8,595,608,127									**42,727,710,736**									

(4) Revenue Ratio of Household and Non-household

Formula for Calculation

[Revenue Ratio of Household and Non-household(%)] = [Revenue from household/or/Non-household(IDR/year)] / [Total revenue by each year(IDR/year)] × 100

[Sewerage Unit Tariff Value per Wastewater Volume(IDR/m3)] = [Revenue from household/or/Non-household(IDR/year)] / [Amount of wastewater flow(m3/day)]/ 365 d

Items		Unit	2,012	2,013	2,014	2,015	2,016	2,017	2,018	2,019	2,020	2,021	2,022	2,023	2,024	2,025	2,026	2,027	2,028	2,029	2,030
Revenue Ratio of Household and Non-household	Household	%	0.5%	0.5%	37.7%	38.1%	38.5%	38.8%	39.2%	39.5%	39.9%	40.2%	40.5%	40.9%	41.2%	41.5%	41.9%	42.2%	42.5%	42.8%	43.1%
	Non-household	%	99.5%	99.5%	62.3%	61.9%	61.5%	61.2%	60.8%	60.5%	60.1%	59.8%	59.5%	59.1%	58.8%	58.5%	58.1%	57.8%	57.5%	57.2%	56.9%
Sewerage Unit Tariff Value per Wastewater Volume	Household	IDR/m3	4,575,621	4,575,621	2,745,373	2,788,269	2,831,166	2,874,062	2,916,958	2,959,855	3,002,751	3,045,648	3,088,544	3,131,441	3,174,337	3,217,234	3,260,130	3,303,026	3,345,923	3,388,819	3,431,716
	Non-household	IDR/m3	457,562	457,562	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806
	Average	IDR/m3	5,033,183	5,033,183	606,270	609,845	613,419	616,994	620,569	624,143	627,718	631,293	634,867	638,442	642,017	645,592	649,166	652,741	656,316	659,890	663,465

S/R-D9.45 Calculation sheet of Revenue from Sewerage Service (Breakdown) (Case where sewerage fee is unchanged)

(1) Sewerage Service Coverage Ratio

Items				Unit		2,031	2,032	2,033	2,034	2,035	2,036	2,037	2,038	2,039	2,040	2,041	2,042	2,043	2,044	2,045	2,046	2,047	2,048	2,049	2,050
Increase Rate of Sewerage Tarif			Household	%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			Non-household	%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Unit Sewerage Tariff (IDR/m^3)			Household	IDR/m3		4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621	4,575,621
			Non-household	IDR/m3		457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562	457,562
Sewerage Coverage Ratio				%		43%	44%	45%	47%	50%	53%	56%	58%	61%	64%	66%	69%	71%	72%	74%	76%	78%	79%	79%	80%
Service Coverage Ratio				%		38%	41%	43%	44%	46%	48%	50%	52%	54%	56%	59%	61%	63%	66%	68%	70%	72%	75%	77%	80%
Service Coverage Ratio / Sewerage Coverage Ratio				%		89%	92%	95%	93%	92%	90%	89%	89%	88%	89%	89%	88%	89%	90%	92%	92%	92%	94%	97%	100%
Sewerage Service Coverage Ratio by each zone																									
	Short-term (2012-2020)	Zone 1	Household	%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Non-household	%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Zone 6	Household	%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Non-household	%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Medium-term (2021-2030)	Zone 4	Household	%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Non-household	%		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Zone 5	Household	%		89%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Non-household	%		89%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Zone 8	Household	%		78%	89%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Non-household	%		78%	89%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Zone 10	Household	%		63%	70%	77%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%
			Non-household	%		63%	70%	77%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%	84%
	Long-term (2030-2050)	Zone 2	Household	%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
			Non-household	%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
		Zone 3	Household	%		0%	0%	0%	0%	0%	0%	0%	0%	0%	14%	29%	43%	57%	71%	86%	100%	100%	100%	100%	100%
			Non-household	%		0%	0%	0%	0%	0%	0%	0%	0%	0%	14%	29%	43%	57%	71%	86%	100%	100%	100%	100%	100%
		Zone 7	Household	%		0%	0%	0%	0%	14%	29%	43%	57%	71%	86%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Non-household	%		0%	0%	0%	0%	14%	29%	43%	57%	71%	86%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Zone 9	Household	%		0%	0%	20%	40%	60%	80%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Non-household	%		0%	0%	20%	40%	60%	80%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Zone 11	Household	%		0%	0%	0%	0%	0%	7%	13%	20%	27%	33%	40%	47%	53%	60%	67%	73%	80%	87%	93%	100%
			Non-household	%		0%	0%	0%	0%	0%	7%	13%	20%	27%	33%	40%	47%	53%	60%	67%	73%	80%	87%	93%	100%
		Zone 12	Household	%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	50%	75%	100%
			Non-household	%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	50%	75%	100%
		Zone 13	Household	%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%	25%	38%	50%	63%	75%	88%	100%
			Non-household	%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%	25%	38%	50%	63%	75%	88%	100%
		Zone 14	Household	%		0%	0%	0%	0%	0%	0%	14%	29%	43%	57%	71%	86%	100%	100%	100%	100%	100%	100%	100%	100%
			Non-household	%		0%	0%	0%	0%	0%	0%	14%	29%	43%	57%	71%	86%	100%	100%	100%	100%	100%	100%	100%	100%

S/R-D9.45 Calculation sheet of Revenue from Sewerage Service (Breakdown) (Case where sewerage fee is unchanged)

(2) Amount of Wastewater Flow

Formula for Calculation

[Amount of wastewater flow by each year (m3/day)] = [Designed average amount of wastewater flow (m3/day)] × [Sewerage Service Coverage Ratio by Each Zone(%)]

Items			Unit	Amout of wastewater flow	2,031	2,032	2,033	2,034	2,035	2,036	2,037	2,038	2,039	2,040	2,041	2,042	2,043	2,044	2,045	2,046	2,047	2,048	2,049	2,050
Amount of Wastewater Flow by each zone			m3/day	69,409,658	27,401,050	29,029,857	30,995,462	32,521,868	34,072,163	36,251,771	39,002,633	40,820,913	42,639,193	45,036,629	47,434,064	49,213,786	51,762,154	53,739,269	55,716,385	57,693,500	59,976,259	62,259,018	64,541,777	68,074,898
			%		39%	42%	45%	47%	49%	52%	56%	59%	61%	65%	68%	71%	75%	77%	80%	83%	86%	90%	93%	98%
Short-term (2012-2020)	Zone 1	Household	m3/day	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483	478,483
		Non-household	m3/day	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316	5,263,316
	Zone 6	Household	m3/day	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935	650,935
		Non-household	m3/day	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281	7,160,281
Medium-term (2021-2030)	Zone 4	Household	m3/day	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247	55,247
		Non-household	m3/day	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712	607,712
	Zone 5	Household	m3/day	329,400	256,200	292,800	329,400	329,400	329,400	329,400	329,400	329,400	329,400	329,400	329,400	329,400	329,400	329,400	329,400	329,400	329,400	329,400	329,400	329,400
		Non-household	m3/day	3,623,399	2,818,199	3,220,799	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399	3,623,399
	Zone 8	Household	m3/day	446,837	397,188	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837	446,837
		Non-household	m3/day	4,915,203	4,369,069	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203	4,915,203
	Zone 10	Household	m3/day	705,054	445,368	494,854	544,339	593,825	593,825	593,825	593,825	593,825	593,825	593,825	593,825	593,825	593,825	593,825	593,825	593,825	593,825	593,825	593,825	593,825
		Non-household	m3/day	7,755,599	4,899,052	5,443,391	5,987,730	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070	6,532,070
Long-term (2030-2050)	Zone 2	Household	m3/day	104,197	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104,197
		Non-household	m3/day	1,146,166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,146,166
	Zone 3	Household	m3/day	337,841	0	0	0	0	0	0	0	0	0	48,263	96,526	144,789	193,052	241,315	289,578	337,841	337,841	337,841	337,841	337,841
		Non-household	m3/day	3,716,248	0	0	0	0	0	0	0	0	0	530,893	1,061,785	1,592,678	2,123,570	2,654,463	3,185,355	3,716,248	3,716,248	3,716,248	3,716,248	3,716,248
	Zone 7	Household	m3/day	360,333	0	0	0	0	51,476	102,952	154,428	205,905	257,381	308,857	360,333	360,333	360,333	360,333	360,333	360,333	360,333	360,333	360,333	360,333
		Non-household	m3/day	3,963,663	0	0	0	0	566,238	1,132,475	1,698,713	2,264,951	2,831,188	3,397,426	3,963,663	3,963,663	3,963,663	3,963,663	3,963,663	3,963,663	3,963,663	3,963,663	3,963,663	3,963,663
	Zone 9	Household	m3/day	388,575	0	0	77,715	155,430	233,145	310,860	388,575	388,575	388,575	388,575	388,575	388,575	388,575	388,575	388,575	388,575	388,575	388,575	388,575	388,575
		Non-household	m3/day	4,274,330	0	0	854,866	1,709,732	2,564,598	3,419,464	4,274,330	4,274,330	4,274,330	4,274,330	4,274,330	4,274,330	4,274,330	4,274,330	4,274,330	4,274,330	4,274,330	4,274,330	4,274,330	4,274,330
	Zone 11	Household	m3/day	786,642	0	0	0	0	0	52,443	104,886	157,328	209,771	262,214	314,657	367,100	419,543	471,985	524,428	576,871	629,314	681,757	734,199	786,642
		Non-household	m3/day	8,653,065	0	0	0	0	0	576,871	1,153,742	1,730,613	2,307,484	2,884,355	3,461,226	4,038,097	4,614,968	5,191,839	5,768,710	6,345,581	6,922,452	7,499,323	8,076,194	8,653,065
	Zone 12	Household	m3/day	294,933	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73,733	147,467	221,200	294,933
		Non-household	m3/day	3,244,264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	811,066	1,622,132	2,433,198	3,244,264
	Zone 13	Household	m3/day	512,431	0	0	0	0	0	0	0	0	0	0	0	0	64,054	128,108	192,161	256,215	320,269	384,323	448,377	512,431
		Non-household	m3/day	5,636,737	0	0	0	0	0	0	0	0	0	0	0	0	704,592	1,409,184	2,113,776	2,818,368	3,522,960	4,227,552	4,932,145	5,636,737
	Zone 14	Household	m3/day	333,231	0	0	0	0	0	0	47,604	95,209	142,813	190,418	238,022	285,626	333,231	333,231	333,231	333,231	333,231	333,231	333,231	333,231
		Non-household	m3/day	3,665,537	0	0	0	0	0	0	523,648	1,047,296	1,570,945	2,094,593	2,618,241	3,141,889	3,665,537	3,665,537	3,665,537	3,665,537	3,665,537	3,665,537	3,665,537	3,665,537
Sub Total		Household	m3/day	5,784,138	2,283,421	2,419,155	2,582,955	2,710,156	2,839,347	3,020,981	3,250,219	3,401,743	3,553,266	3,753,052	3,952,839	4,101,149	4,313,513	4,478,272	4,643,032	4,807,792	4,998,022	5,188,251	5,378,481	5,672,908
		Non-household	m3/day	63,625,520	25,117,629	26,610,702	28,412,507	29,811,712	31,232,816	33,230,790	35,752,413	37,419,170	39,085,927	41,283,576	43,481,226	45,112,637	47,448,641	49,260,997	51,073,353	52,885,708	54,978,237	57,070,766	59,163,295	62,401,990

S/R-D9.45 Calculation sheet of Revenue from Sewerage Service (Breakdown) (Case where sewerage fee is unchanged)

(3) Revenue from Sewerage Service

Formula for Calculation

[Revenue from sewerage service by each year(IDR/year)] = [Amount of wastewater flow(m3/day)] × [Unit sewerage tariff(IDR/m3)] × [Sewerage tariff collection ratio(%)] × 365 days

Unit: Million IDR/year

Items			Total	2,031	2,032	2,033	2,034	2,035	2,036	2,037	2,038	2,039	2,040	2,041	2,042	2,043	2,044	2,045	2,046	2,047	2,048	2,049	2,050
Sewerage Tariff Collection Ratio		Household		75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
		Non-household		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Revenue from Sewerage Service (Million IDR/year)																							
Short-term (2012-2020)	Zone 1	Household	18,909,076,282	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808	599,336,808
		Non-household	25,711,549,049	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586	791,124,586
	Zone 6	Household	25,724,142,348	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241	815,345,241
		Non-household	34,978,310,832	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718	1,076,255,718
Medium-term (2021-2030)	Zone 4	Household	1,521,258,333	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531	69,200,531
		Non-household	2,009,583,411	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701	91,344,701
	Zone 5	Household	12,829,498,484	497,508,424	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977	559,696,977
		Non-household	16,992,400,222	656,711,120	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010	738,800,010
	Zone 8	Household	9,057,109,620	320,909,926	366,754,202	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477	412,598,477
		Non-household	11,981,859,768	423,601,103	484,115,546	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989	544,629,989
	Zone 10	Household	16,670,652,789	557,857,874	619,842,082	681,826,290	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498	743,810,498
		Non-household	22,091,171,793	736,372,393	818,191,548	900,010,703	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857	981,829,857
Long-term (2030-2050)	Zone 2	Household	130,514,541	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130,514,541
		Non-household	172,279,193	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	172,279,193
	Zone 3	Household	3,385,370,183	0	0	0	0	0	0	0	0	0	60,453,039	120,906,078	181,359,117	241,812,156	302,265,195	362,718,234	423,171,273	423,171,273	423,171,273	423,171,273	423,171,273	423,171,273
		Non-household	4,468,688,641	0	0	0	0	0	0	0	0	0	79,798,011	159,596,023	239,394,034	319,192,046	398,990,057	478,788,069	558,586,080	558,586,080	558,586,080	558,586,080	558,586,080	558,586,080
	Zone 7	Household	5,867,480,052	0	0	0	0	64,477,803	128,955,606	193,433,408	257,911,211	322,389,014	386,866,817	451,344,619	451,344,619	451,344,619	451,344,619	451,344,619	451,344,619	451,344,619	451,344,619	451,344,619	451,344,619	451,344,619
		Non-household	7,745,073,669	0	0	0	0	85,110,700	170,221,399	255,332,099	340,442,799	425,553,498	510,664,198	595,774,898	595,774,898	595,774,898	595,774,898	595,774,898	595,774,898	595,774,898	595,774,898	595,774,898	595,774,898	595,774,898
	Zone 9	Household	7,787,526,076	0	0	97,344,076	194,688,152	292,032,228	389,376,304	486,720,380	486,720,380	486,720,380	486,720,380	486,720,380	486,720,380	486,720,380	486,720,380	486,720,380	486,720,380	486,720,380	486,720,380	486,720,380	486,720,380	486,720,380
		Non-household	10,279,534,420	0	0	128,494,180	256,988,361	385,482,541	513,976,721	642,470,901	642,470,901	642,470,901	642,470,901	642,470,901	642,470,901	642,470,901	642,470,901	642,470,901	642,470,901	642,470,901	642,470,901	642,470,901	642,470,901	642,470,901
	Zone 11	Household	7,882,635,696	0	0	0	0	0	65,688,631	131,377,262	197,065,892	262,754,523	328,443,154	394,131,785	459,820,416	525,509,046	591,197,677	656,886,308	722,574,939	788,263,570	853,952,200	919,640,831	985,329,462
		Non-household	10,405,079,119	0	0	0	0	0	86,708,993	173,417,985	260,126,978	346,835,971	433,544,963	520,253,956	606,962,949	693,671,941	780,380,934	867,089,927	953,798,919	1,040,507,912	1,127,216,905	1,213,925,897	1,300,634,890
	Zone 12	Household	923,565,452	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92,356,545	184,713,090	277,069,636	369,426,181
		Non-household	1,219,106,396	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121,910,640	243,821,279	365,731,919	487,642,558
	Zone 13	Household	2,888,362,870	0	0	0	0	0	0	0	0	0	0	0	0	80,232,302	160,464,604	240,696,906	320,929,208	401,161,510	481,393,812	561,626,114	641,858,416
		Non-household	3,812,638,988	0	0	0	0	0	0	0	0	0	0	0	0	105,906,639	211,813,277	317,719,916	423,626,554	529,533,193	635,439,831	741,346,470	847,253,108
	Zone 14	Household	4,591,365,307	0	0	0	0	0	0	59,628,121	119,256,242	178,884,363	238,512,483	298,140,604	357,768,725	417,396,846	417,396,846	417,396,846	417,396,846	417,396,846	417,396,846	417,396,846	417,396,846	417,396,846
		Non-household	6,060,602,205	0	0	0	0	0	0	78,709,120	157,418,239	236,127,359	314,836,478	393,545,598	472,254,717	550,963,837	550,963,837	550,963,837	550,963,837	550,963,837	550,963,837	550,963,837	550,963,837	550,963,837
Sub Total		Household	118,168,558,032	2,860,158,803	3,030,175,840	3,235,348,399	3,394,676,683	3,556,498,562	3,784,009,071	4,071,147,702	4,260,942,256	4,450,736,811	4,700,984,404	4,951,231,997	5,137,001,788	5,403,003,881	5,609,377,852	5,815,751,824	6,022,125,796	6,260,403,274	6,498,680,752	6,736,958,230	7,105,750,248
		Non-household	157,927,877,707	3,775,409,620	3,999,832,108	4,270,659,887	4,480,973,222	4,694,578,102	4,994,891,974	5,373,914,966	5,624,443,778	5,874,972,590	6,205,299,413	6,535,626,237	6,780,842,360	7,131,965,122	7,404,378,765	7,676,792,408	7,949,206,050	8,263,732,321	8,578,258,592	8,892,784,863	9,379,590,327
Total			**276,096,435,740**	**6,635,568,423**	**7,030,007,948**	**7,506,008,286**	**7,875,649,905**	**8,251,076,663**	**8,778,901,045**	**9,445,062,668**	**9,885,386,034**	**10,325,709,401**	**10,906,283,817**	**11,486,858,234**	**11,917,844,148**	**12,534,969,003**	**13,013,756,617**	**13,492,544,232**	**13,971,331,846**	**14,524,135,595**	**15,076,939,344**	**15,629,743,092**	**16,485,340,575**
				224,773,116,877																			

(4) Revenue Ratio of Household and Non-household

Formula for Calculation

[Revenue Ratio of Household and Non-household(%)] = [Revenue from household/or/Non-household(IDR/year)] / [Total revenue by each year(IDR/year)] × 100

[Sewerage Unit Tariff Value per Wastewater Volume(IDR/m3)] = [Revenue from household/or/Non-household(IDR/year)] / [Amount of wastewater flow(m3/day)]/ 365 days

Items		Unit	2,031	2,032	2,033	2,034	2,035	2,036	2,037	2,038	2,039	2,040	2,041	2,042	2,043	2,044	2,045	2,046	2,047	2,048	2,049	2,050
Revenue Ratio of Household and Non-household	Household	%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%	43.1%
	Non-household	%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%	56.9%
Sewerage Unit Tariff Value per Wastewater Volume	Household	IDR/m3	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716	3,431,716
	Non-household	IDR/m3	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806	411,806
	Average	IDR/m3	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465	663,465

Attachment No.3

Japan International Cooperation Agency

Directorate General of Human Settlements, Ministry of Public Works
DKI Jakarta
PD PAL JAYA

The Project for Capacity Development of Wastewater Sector Through Reviewing the Wastewater Management Master Plan In DKI Jakarta

THE NEW MASTER PLAN

March 2012

Yachiyo Engineering Co., Ltd.
Japan Environmental Sanitation Center
Water Agency Inc.

The New Master Plan

Contents

The New Master Plan (M/P) for Improvement of Wastewater Management in DKI Jakarta

Chapter 1 Purpose, Period and Vision for the New M/P

1.1 Purpose for Formulating the New M/P

The purposes for formulating the New M/P for improvement of wastewater management in DKI Jakarta are as follows:

- Development of sewerage system could not proceed as planned and the coverage remains as low as less than 2%, although Cipta Karya of Ministry of Public Works formulated a master plan featuring drainage, sewerage and sanitation development in DKI Jakarta for the target year of 2010 through "the Study on Urban Drainage and Wastewater Disposal Project in the City of Jakarta" under JICA development study (hereinafter referred to as the "Old M/P").
- More than 90% of the domestic wastewater is currently being discharged into public bodies (rivers and sea) or underground through septic tanks without treatment. This causes the deterioration of water quality of surface water and groundwater as well.
- Due to the poor water quality of the surface water, water supply sources have to be obtained from the remote areas outside of DKI Jakarta and it leads to the high water tariff and excessive extraction of groundwater which is considered as the main cause of a large scale land settlement in the region. Moreover, the poor water quality also causes the water-borne disease in the region.
- Sewerage facilities such as wastewater treatment plants require relatively large area to construct treatment facilities. However, it is getting more difficult to find such a large land in DKI Jakarta due to the rapid economic growth in the near future. It is important to secure the lands for the sewerage facilities based on the New M/P.

1.2 Period

The New M/P proposes development plans for improvement of wastewater management in DKI Jakarta for the following development years and prioritized projects as the short-term development plan.

(Year) 2012 2020 2030 2050

Short-term Development Plan	Medium-term Development Plan	Long-term Development Plan
Prioritized Projects are proposed.	**Facility plans are proposed.**	**Facility plans are proposed.**

1.3 Vision

Vision for the New M/P is set as follows:

[Vision]

"Create sustainable water cycling society in DKI Jakarta"

Improve the current river water quality up to the level that river water can be used as water sources for water supply system in DKI Jakarta by the year 2050.

Chapter 2 Current Situation and Improvement Targets

2.1 Current Situation of Sewerage and Sanitation in DKI Jakarta

Figure S2-1 shows the current situation of treating & discharging wastewater in DKI Jakarta. Also, Figure S2-2 and 3 explain the current situation of mass balance for BOD and SS basis in the region respectively.

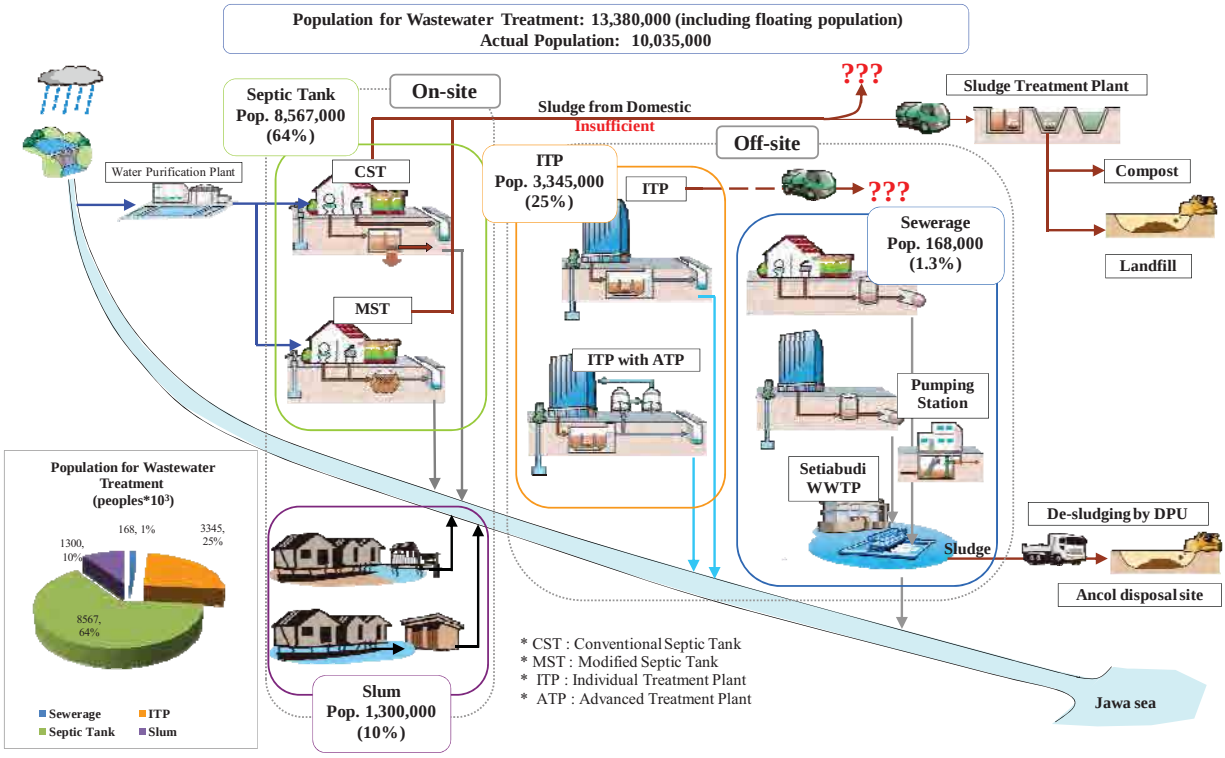
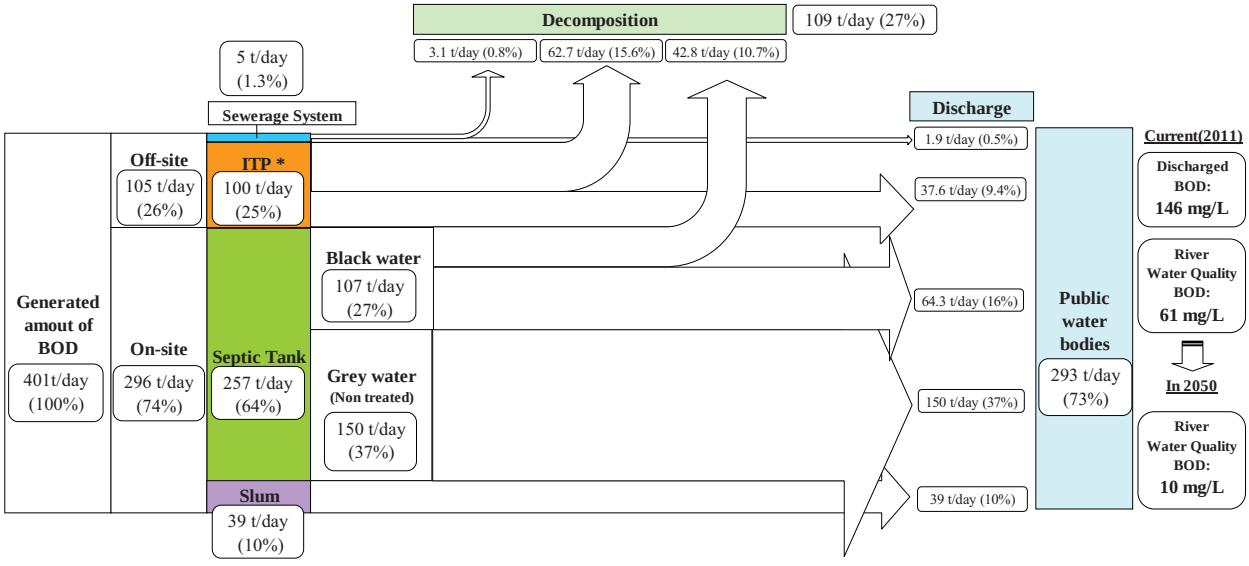


Figure S2-1 Current Situation for Wastewater Discharge in DKI Jakarta



* ITP : Individual Treatment Plant

Figure S2-2 Current Situation of Mass Balance for BOD Basis

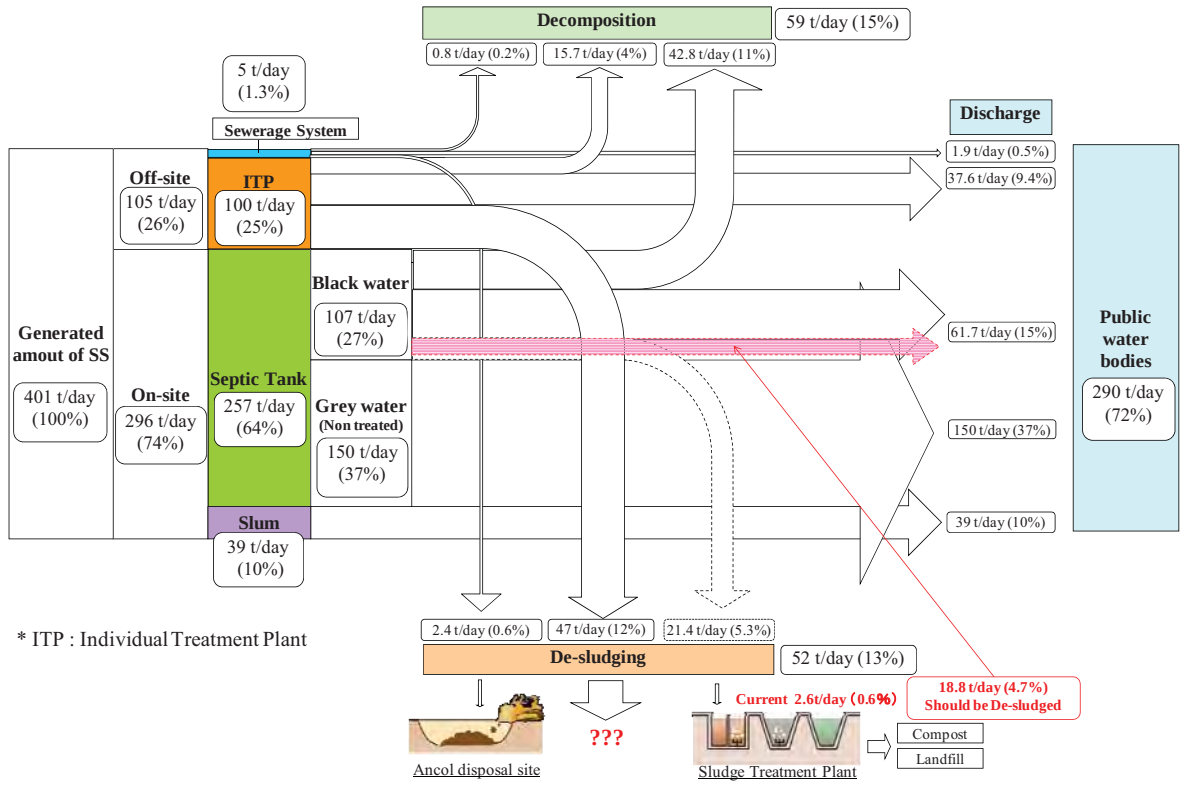


Figure S2-3 Current Situation of Mass Balance for SS Basis

More than 70% of the generated amount of BOD is being discharged to public water bodies (including groundwater). Meanwhile, more than 70% of the generated amount of SS is also discharged to public water bodies. It is clear that this situation is deteriorating river water quality in DKI Jakarta as well as worsening groundwater quality.

2.2 Improvement Targets

In order to fulfill the vision mentioned above, the following targets are proposed in the New M/P:

Table S2-1 Improvement Targets for Wastewater Management in DKI Jakarta

Item		Unit	Short-term Plan			Medium-term Plan	Long-term Plan
			Y2012	Y2014	Y2020	Y2030	Y2050
Design Population		1,000PE	12,665	12,665	12,665	12,665	12,665
Administration Population		1,000PE	10,035	10,361	11,284	12,665	12,665
Off-site	Facility Coverage Ratio	%	2	7	20	40	80
	Service Coverage Ratio	%	2	4	15	35	80
	Served Population	*1,000PE*	*168*	*387*	*1,685*	*4,478*	*10,166*
On-site	On-site Treatment Ratio	%	85	96	85	65	20
	Served Population for On-site	*1,000PE*	*8,567*	*9,974*	*9,599*	*8,188*	*2,500*
	Regular Desludging Coverage ratio	*%*	*0*	*20*	*50*	*75*	*100*
	Change CST to MST (MST/(CST+MST))	*%*	*2*	*16*	*25*	*50*	*100*
Slum areas	Open Defecation Ratio	%	13	0	0	0	0
	Open Defecation Population	*1,000PE*	*1,300*	*0*	*0*	*0*	*0*
River Water Quality (BOD)		mg/L	61	54	33	24	10

Chapter 3 Formulation of the New M/P to Achieve the Targets

3.1 Demarcation between Off-site and On-site Areas

The demarcation between off-site and on-site areas is shown below:

System	Area to be Applied
Off-site System	Applied to all the DKI Jakarta area
On-site System	Applied to the areas where off-site system development is technically difficult

3.2 Development Stages

The proposed projects in the New M/P will be implemented in the following three (3) stages:

Development Plan	Period	Remark
Short-term development plan	2012 to 2020	Implemented as the priority projects
Medium-term development plan	2021 to 2030	Population reaches to it maximum
Long-term development plan	2031 to 2050	Population will be kept to the same level

3.3 Sewerage Zones and Prioritized Project Areas for Each Target Development Year

Sewerage zones for each target development year have been determined as shown below:

Priority	Zone No.	Target Development Year
1	**1**	Short-Term Plan: Year 2012 to 2020
2	**6**	
3 to 6	**4, 5, 8 & 10**	Mid-Term Plan: Year 2021 to 2030
7 to 14	**2, 3, 7, 9, 11, 12, 13 & 14**	Long-Term Plan: Year 2031 to 2050

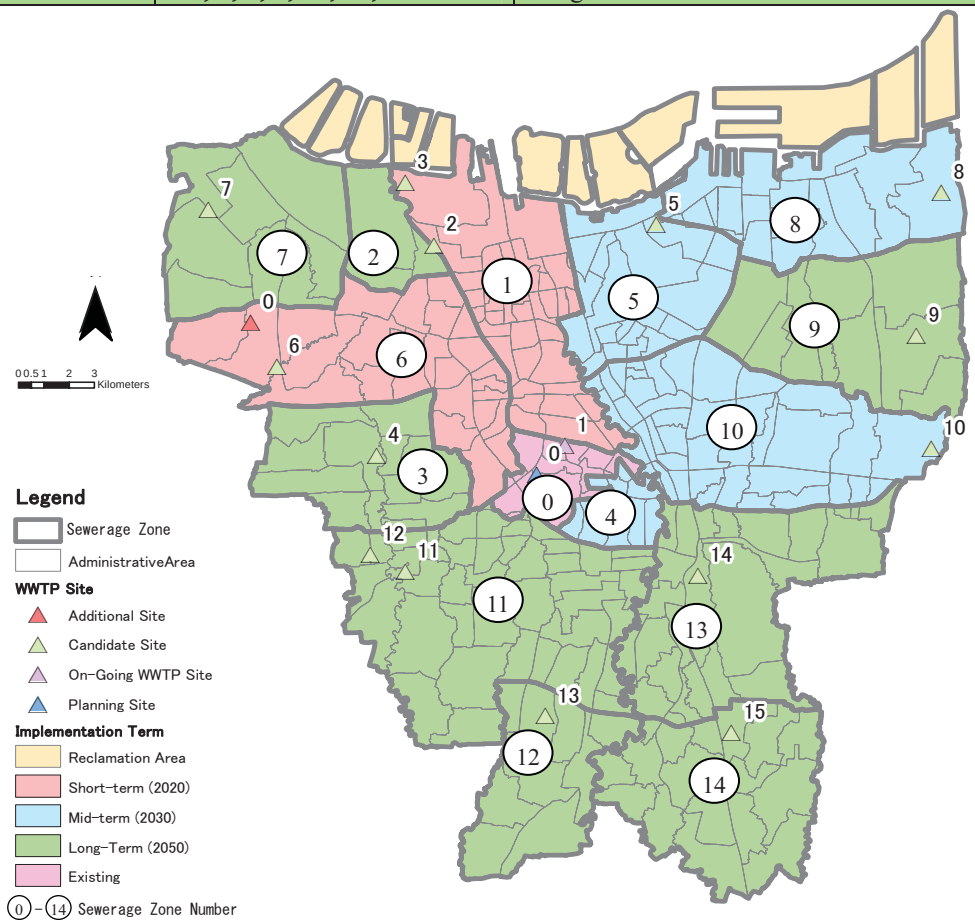


Figure S3-1 Sewerage Zones for Each Target Development Year[1]

[1] The zoning and each target development year are subject to change after the detailed examination in feasibility study (F/S).

3.4 Summary of Off-site and On-site System Development Plans

The summary of the New M/P is as shown in Table S3-1 below:

The projects for the Short-Term development plan (sewerage Zone No.1 and No.6 and sludge treatment facilities to support the introduction of regular desludging) are considered as the prioritized project. The facility plans were prepared for these prioritized projects.

Table S3-1 Summary of the New M/P

No.	Item	Unit	Short-Term (2020)	Mid-Term (2030)	Long-Term (2050)	New M/P (2050)
1	Sewerage Zone		No.1 & No.6	No.4, 5, 8 & 10	No.2, 3, 7, 9, 11, 12, 13 & 14	14 Zones
2	Project area	ha	10,775	15,301	37,328	63,404
3	Design population	PE	2,702,454	3,735,294	5,905,620	12,343,368
4	Coverage ratio (for each zone)	%	80	80	80	80
5	Coverage ratio (for whole DKI)					
	(1) Facility coverage ratio	%	20	40	80	80
	(2) Service coverage ratio	%	15	35	80	80
6	Design wastewater flow		(Unit wastewater × Design Pop. × Coverage Rate = 80%)			
	(1) Unit wastewater	LCD	Daily average: 200LCD, Daily maximum: 267LCD			
	(2) Daily average wastewater flow	m^3/day	433,000	598,000	946,000	1,977,000
	(3) Daily maximum wastewater flow	m^3/day	577,000	798,000	1,261,000	2,636,000
7	Secondary & tertiary sewer					
	(1) Diameter	mm	φ200～φ300	φ200～φ300	φ200～φ300	
	(2) Length of pipeline	km	1,486	2,043	4,741	8,271
8	Main sewer					
	(1) Diameter	mm	φ350～φ800	φ350～φ800	φ350～φ800	
	(2) Length of pipeline	km	241	471	1,203	1,915
9	Trunk sewer					
	(1) Diameter	mm	φ900～φ2,200	φ900～φ2,400	φ900～φ2,400	
	(2) Length of pipeline	km	39.5	36.4	82.0	157.9
10	Relay pumping station					
	(1) Place	unit	1	3	9	13
	(2) Lifting capacity	m^3/min	172	27～83	10～194	
11	WWTP					
	(1) Place	unit	2	3	8	13
	(2) Capacity (daily maximum wastewater)	m^3/day	264,000～313,000	62,000～331,000	32,000～337,000	2,636,000
12	Sludge Treatment Facilities (On-site sludge)					
	(1) Improvement of Existing STP	No.	1			1
	- Capacity	m^3/day	450	-450 (Integrated to WWTP)		0
	(2) New Construction of STP	No.	1			1
	- Capacity	m^3/day	600			600
	(3) STP at WWTP (capacity for on-site sludge)	m^3/day	1,720	1,920		3,640

Note:
1. Sewerage Zone No.0 (the existing sewerage zone) and the reclamation area are not included in the above table.
2. Figures in the above table are subject to change after the detailed examination in F/S.

3.5 Improvement Plan for Off-site and On-site Systems

(1) Off-site System

The design daily average wastewater flow and the design daily maximum wastewater flow of proposed WWTPs are shown in Table S3-2.

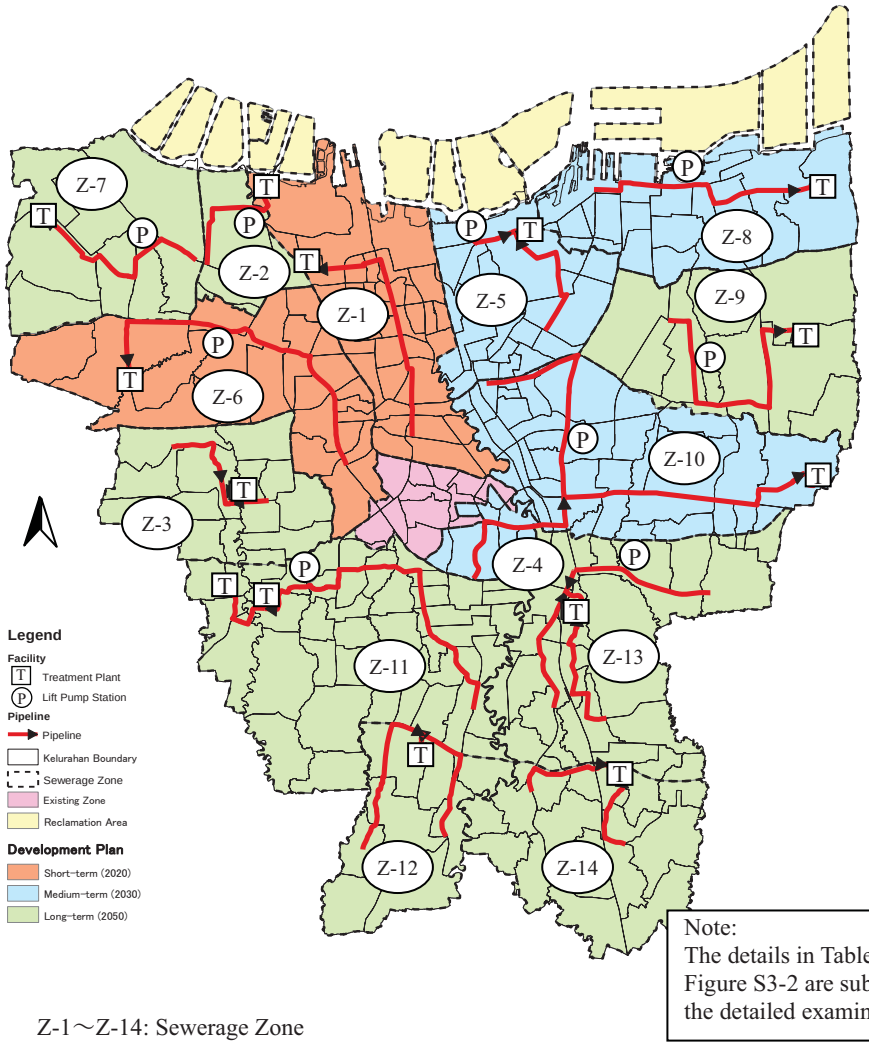
Table S3-2 Design Wastewater Flow for WWTPs in the New M/P

Development Plan	Sewerage Zone	Daily Average (m^3/day)	Daily Maximum (m^3/day)
Short-term	1	198,000	264,000
	6	235,000	313,000
Medium-term	4, 5, 8 & 10	47,000～248,000	62,000～331,000
Long-term	2, 3, 7, 9, 11, 12, 13 & 14	24,000～253,000	32,000～337,000
Total		1,977,000	2,636,000

Main sewer facilities in each sewerage zone per development plan are shown in Table S3-3 and the general layout of main sewerage facilities are shown in Figure S3-2.

Table S3-3 Main Sewer Facilities in Each Sewerage Zone per Development Plan

Sewerage Zone	Area (ha)	Lateral Pipe (no.)	Sewer Pipeline (m)					Relay Pump Station (no.)
			Secondary/ Tertiary Sewer	Main Sewer	Trunk Sewer (Jacking)	Trunk Sewer (Shield)	Total	
[Short-Term Development plan: 2012～2020]								
1 & 6	10,775	232,908	1,485,951	240,878	16,795	22,694	1,766,318	1
[Medium-Term Development plan: 2021～2030]								
4, 5, 8 & 10	15,301	326,877	2,043,273	470,962	20,942	15,442	2,550.619	3
[Long-Term Development plan: 2031～2050]								
2, 3, 7, 9, 11, 12, 13 & 14	37,328	1,324,671	4,741,416	1,203,205	63,917	18,078	6,026,616	9
Total	63,404	1,324,671	8,270,641	1,915,044	101,654	56,214	10,343,553	13



Note:
The details in Table S3-4 & S3-5 and Figure S3-2 are subject to change after the detailed examination in the F/S.

Z-1～Z-14: Sewerage Zone

Figure S3-2 Layout Plan for Main Sewerage Facilities in Each Sewerage Zone

(2) On-site System

The New M/P proposes to connect as much households as possible to the sewers by 2050, thereby reducing the harm of septic tanks. In the meantime, it proposes to minimize the harm of septic tanks until houses are connected with sewers by following measures as shown in Table S3-4.

Table S3-4 Outline of Improvement Plan for On-site System

Issues to be Solved	Measure
On-site desludging is implemented on an on-call basis only. Sludge accumulates in the tank and the effective treatment capacity decreases. This leads to deterioration of the treatment function and the leaking of sludge out of the system, which then causes environmental pollution of rivers and underground water sources.	Introduce the regular desludging system in DKI Jakarta.
Conventional septic tank treats black water (wastewater from toilet) only. Grey water (domestic wastewater from kitchen, etc., other places than toilet) is discharged without treatment and is polluting public water bodies.	Replace with modified septic tanks that treat both black water and gray water.
Individual Treatment Plant (ITP) of commercial buildings and office buildings are not appropriately operated and desludging is rare. Some ITPs do not meet the effluent standard set by DKI Jakarta (2005).	Operate ITP appropriately and perform desludging based on stronger ITP management.
Weak institutional arrangement	Improve the institutional arrangement.

[Estimated generated sludge volume is as follows: (unit: m^3/day)

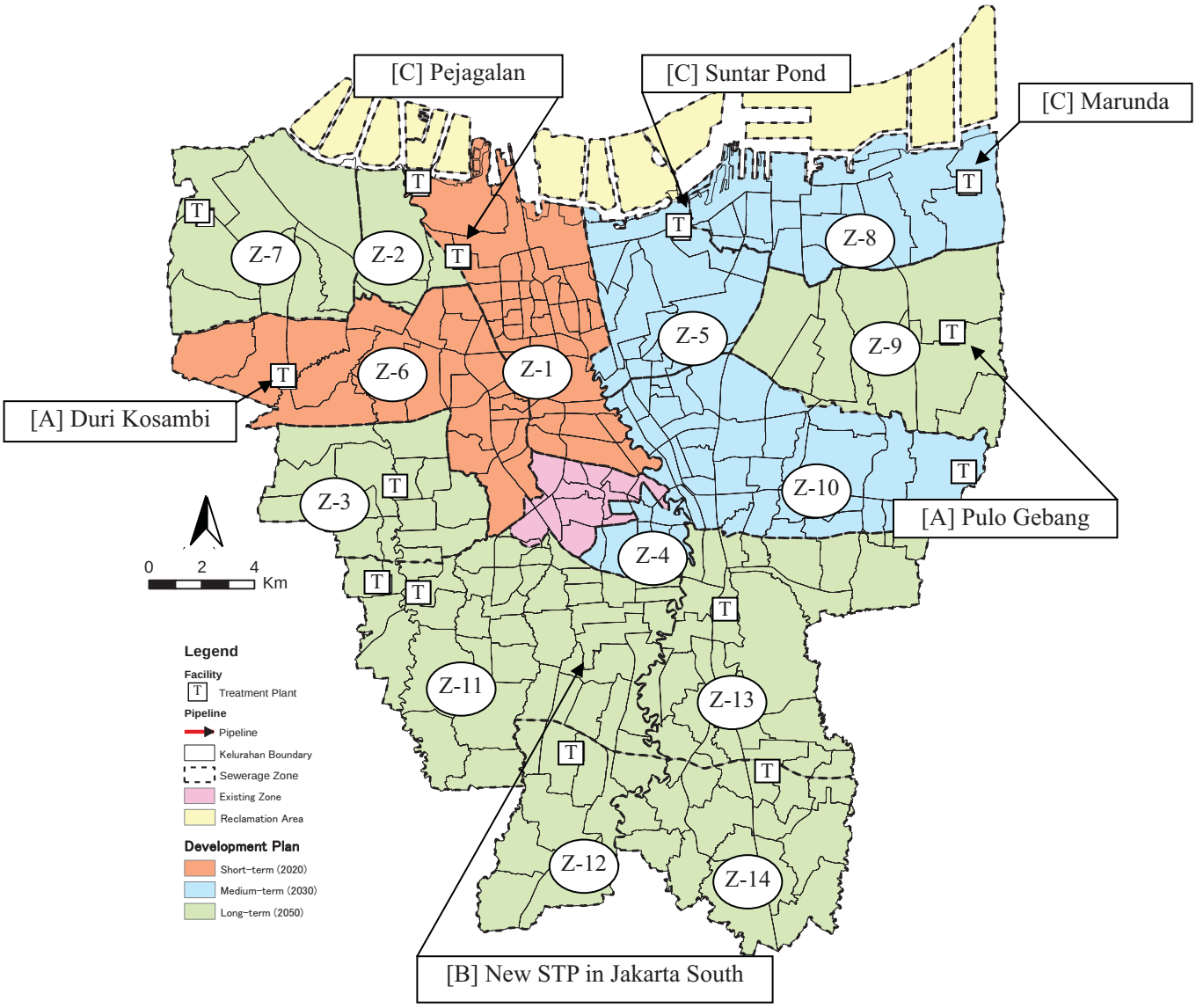
Year	2012	2014	2015	2020	2025	2030	2035	2040	2045	2050
CST	257	307	354	544	495	403	298	183	77	0
MST	0	620	679	960	1,366	1,638	1,723	1,660	1,433	1,000
ITP	0	457	530	866	1,418	1,847	1,731	1,385	808	0
Sludge(total)	257	1,385	1,564	2,370	3,279	3,887	3,752	3,229	2,317	1,000
Capacity	600	450	1,050	1,050	600	600	600	600	600	600
Co-treatment	0	934	514	1,320	2,679	3,287	3,152	2,329	1,717	400

The facility improvement plan to support the Improvement Plan for on-site system is shown in Table S3-5 and the location of each method of Improvement is shown in Figure S3-3.

Table S3-5 Outline of Facility Improvement Plan for Sludge Treatment[2]

Method for Improvement	Outline of Improvement Plan
[A] Existing sludge treatment plants (STPs)	[Short-term plan] • Integrating Duri Kosambi STP with newly constructed WWTP: Up to 950 m^3/day • Rehabilitation and expansion of Pulo Gebang STP: Up to 450m^3/day [Medium-term plan] • Integrating Pulo Gebang STP with newly constructed WWTP: Up to 940m^3/day
[B] Constructing a new sludge treatment plant (STP) in the southern area of DKI	• Capacity of new STP: 600 m^3/day
[C] Co-treatment of septic sludge at WWTPs	• Off-site WWTPs to be constructed under the short- and medium-term plans receive and treat septic sludge (sludge from on-site facilities). [Receiving WWTP] • (Zone No.1)-Pejagalan WWTP: Up to 790 m^3/day • (Zone No.5)-Suntar Pond WWTP: Up to 410 m^3/day • (Zone No.8)-Marunda WWTP: Up to 570 m^3/day

[2] The estimated volume of sludge collected from on-site system and the facility improvement plan are subject to change after the detailed examination in F/S.



Z-1～Z-14: Sewerage Zone

Figure S3-3 Layout Plan for Facilities related to Improvement of Sludge Treatment

Chapter 4 Prioritized Projects for Short-Term Development Plan

4.1 Outline of the Prioritized Projects

(1) Off-site System

Outline of the prioritized project proposed in Zone No.1 and No.6 is as shown in Table S4-1 below:

Table S4-1 Outline of Prioritized Projects for Off-site System in Zone No.1 and No.6

No.	Item	Unit	Zone No.1	Zone No.6
1. General				
1-1	Project area	ha	4,901	5,874
1-2	Design population	PE	1,236,736	1,465,718
1-3	Coverage ratio	%	80	80
1-4	Served population	PE	989,389	1,172,574
1-5	Unit wastewater flow	LCD	Daily average: 200, Daily maximum: 267	
1-6	Design wastewater flow		Unit wastewater flow × Served population	
	- Daily average	m^3/day	198,000	235,000
	- Daily maximum	m^3/day	264,000	313,000
2. Sewerage System				
2-1	Sewers			
(1)	Secondary & tertiary sewer			
	- Diameter	mm	φ200～φ300	φ200～φ300
	- Length of pipeline	km	657	829
(2)	Main sewer			
	- Diameter	mm	φ350～φ800	φ350～φ800
	- Length of pipeline	km	86	155
(3)	Trunk sewer			
	- Diameter	mm	φ900～φ2,200	φ900～φ2,400
	- Length of pipeline	km	15.5	24.0
2-2	Relay pumping station			
	(1) Place	unit	0	1
	(2) Lifting capacity	m^3/min	--	172
2-3	WWTP			
	(1) Place	unit	1	1
	(2) Capacity (daily maximum wastewater)	m^3/day	264,000	313,000

Note: Figures in the above table are subject to change after the detailed examination in F/S.

(2) On-site System

The contents for on-site system improvement to be conducted during the short-term development plan are as follows:

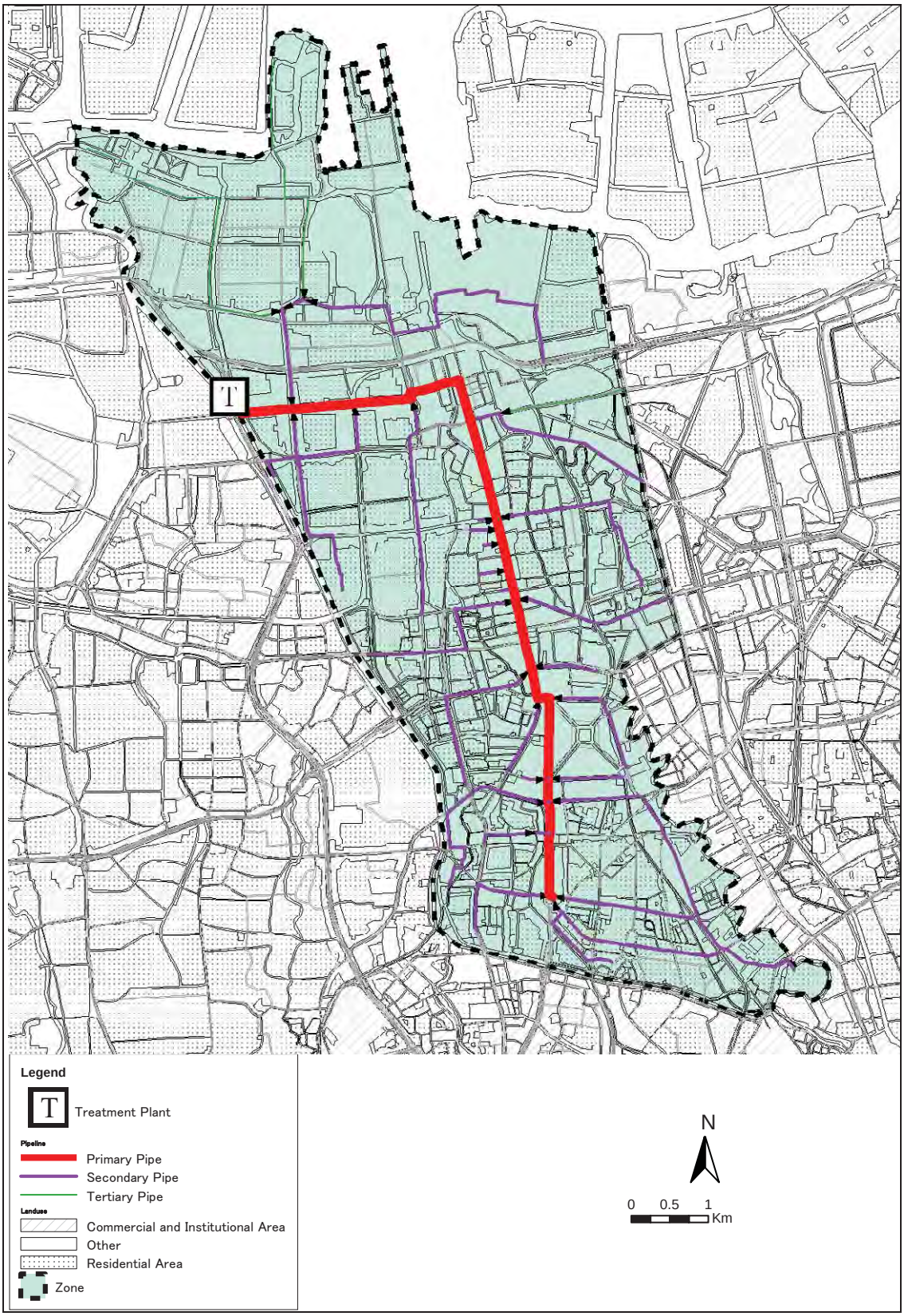
Table S4-2 Outline of On-site System Improvement as the Prioritized Project

No.	Item	Unit	Quantity
Sludge Treatment Plant (STP) – Rehabilitation & New Construction			
(1)	Integration to new WWTP	No.	1
	- Treated at new WWTP	m^3/day	930
	Improvement	No.	1
	- Capacity	m^3/day	450
(2)	New Construction	No.	1
	- Capacity	m^3/day	600
(3)	Treated at new WWTP	m^3/day	790

4.2 Facility Plan for Off-site System

(1) Sewerage Facilities in Sewerage Zone No.1

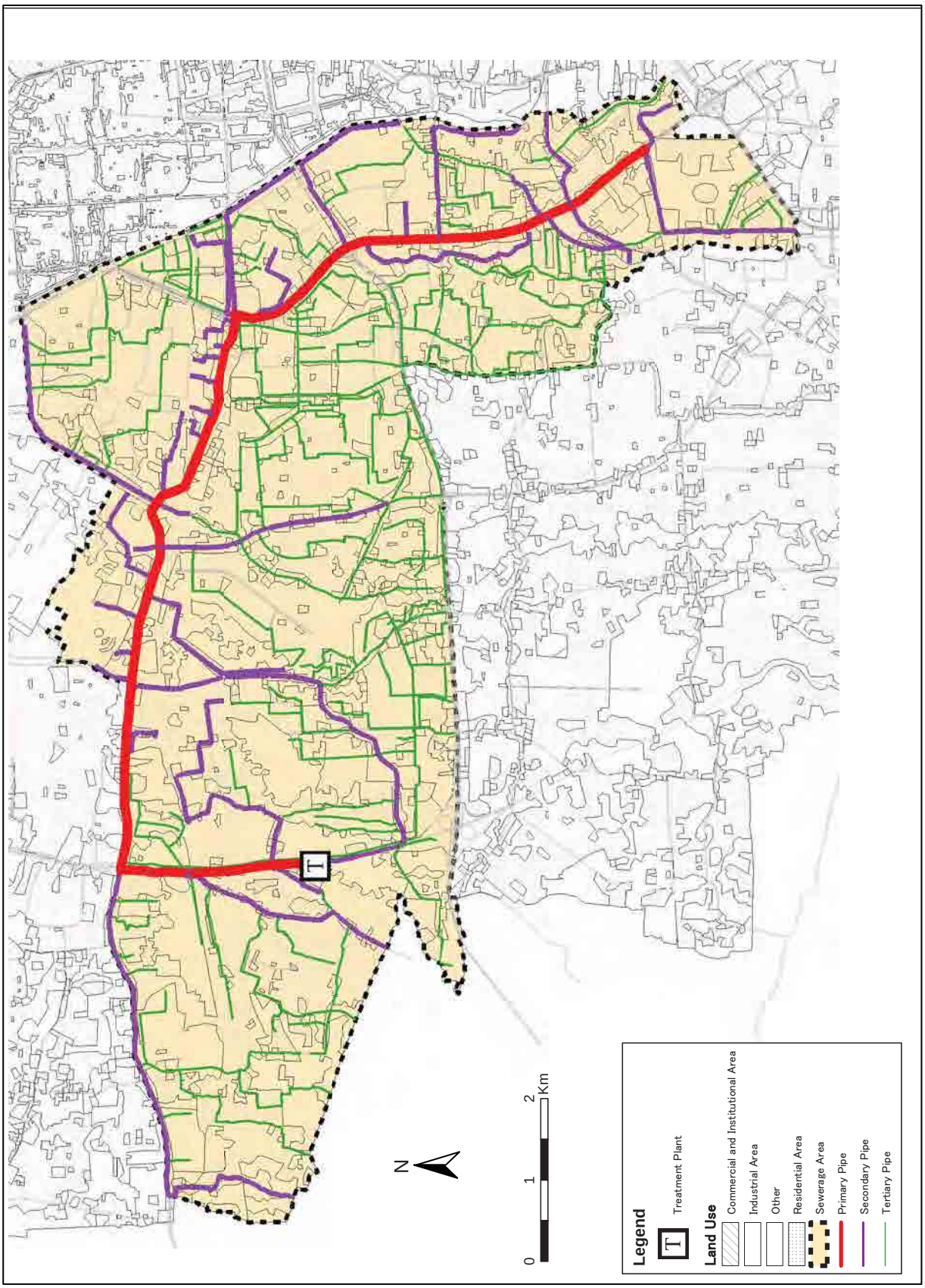
[Sewer Pipeline Route and Location of WWTP]



Note: Pipeline routes and the zone boundary are subject to change after detailed examination in F/S.

(2) Sewerage Facilities in Sewerage Zone No.6

[Sewer Pipeline Route and Location of WWTP]



Note: Pipeline routes and the zone boundary are subject to change after detailed examination in F/S.

4.3 Facility Plan for On-site System

The new STP will be located in the southern Jakarta area.

(1) Necessary size of the land: 1.5ha (0.4ha for buildings and 1.1ha for parking and green area)

(2) Criteria for selecting the land is as follows:

1) To support the efficient regular desludging operation, new STP should be located in the convenient place for the transportation of the sludge collected from any part of southern Jakarta area.

*Sludge collected from central, northern, western, eastern Jakarta will be treated at the newly built WWTPs in the short-medium term plans.

2) No flood, no land slide, close to the water body, open land with good sun shine, good geological structure and soil condition.

3) Land acquisition is easy. No environmental problem (beauty and odor aspect).

4.4 Institutional Framework

DKI's institutional framework for wastewater management should be reviewed and restructured based on the following principles.

(1) It is necessary to establish an institutional framework capable of overseeing the current and future water environment of DKI Jakarta overall, and of managing and supervising both wastewater and sludge treatment in an integrated manner.

(2) It is necessary to manage both off-site system and on-site system in an integrated manner so that the wastewater management budget is spent in the most efficient way by coordinating and modifying wastewater management planning as the system evolves.

(3) The anticipated framework must have authority and functions concerning budgets, preparation of legislation, planning, construction, operation, and preparation of regulations and guidelines that fit existing government institutions.

ANNEX

A1. Cost Estimation for Implementing the Projects proposed in the New M/P

A1.1 Total Cost for the Projects

Table A1-1 shows the result of the cost estimation for implementing the whole projects proposed in the New M/P including construction cost for the short-term, medium-term and long-term development plans. The project cost has been estimated in local currency and foreign currency. Direct construction cost has been estimated for the following items:

[Off-site (sewerage system)]

- ✓ House connection
- ✓ Collection sewer line (secondary & tertiary sewer, sewer main and trunk sewer)
- ✓ Lift pump station
- ✓ Wastewater treatment plant
- ✓ Facility replacement

[On-site]

- ✓ Integrating Duri Kosambi STP with newly constructed WWTP
- ✓ Rehabilitation and expansion of Pulo Gebang STP
- ✓ Integrating Pulo Gebang STP with newly constructed WWTP
- ✓ Construction of a new STP in South Jakarta
- ✓ On-site sludge treatment facilities added to newly constructed WWTPs
- ✓ Facility replacement

As indirect costs, the following items have been considered:

- ✓ Indirect construction cost
- ✓ Engineering cost
- ✓ Physical contingency
- ✓ Land use cost (However, he land use cost is not accounted with assuming the sites of facilities are owned by public.)

The cost for capacity development of the Indonesian side organizations is considered to be included in the engineering cost.

Table A1-1 Total Construction Cost for Off-site and On-site System Development

Unit: Million IDR

development contents			Construction cost			Remarks
			Initial construction cost	Facilities replacement cost (2013-2050)	Total	
A. Short-term plan						
(1)	Zone No.1	Development of sewerage system	5,192,315	1,079,250	6,271,565	
		On-site sludge treatment facilities	131,904	68,590	200,494	Co-treatment of On-site sludge
		Sub-total	5,324,219	1,147,840	6,472,059	
(2)	Zone No.6	Development of sewerage system	7,110,408	1,357,898	8,468,307	
		Integration Duri Kosambi STP with newly constructed WWTP	155,279	80,745	236,025	Co-treatment of On-site sludge
		Sub-total	7,265,688	1,438,644	8,704,331	
(3)	Rehabilitation and expansion of Pulo Gebang STP		24,390	0	24,390	
(4)	Construction of a new STP in south area		42,100	20,275	62,375	
		Total of Short-term plan	12,656,397	2,606,758	15,263,155	
B. Medium-term plan						
(1)	Zone No.4	Development of sewerage network	636,325	0	636,325	
(2)	Zone No.5	Development of sewerage system	3,586,678	570,552	4,157,230	
		On-site sludge treatment facilities	68,457	28,752	97,208	Co-treatment of On-site sludge
		Sub-total	3,655,134	599,304	4,254,438	
(3)	Zone No.8	Development of sewerage system	4,856,836	794,711	5,651,547	
		On-site sludge treatment facilities	95,171	39,972	135,143	Co-treatment of On-site sludge
		Sub-total	4,952,008	834,683	5,786,691	
(4)	Zone No.10	Development of sewerage system	7,639,771	1,322,893	8,962,664	
		Integration Pulo Gebang STP with newly constructed WWTP	156,949	65,919	222,868	
		Sub-total	7,796,720	1,388,812	9,185,531	
		Total of Medium-term plan	17,040,187	2,822,798	19,862,985	
C. long-term plan						
(1)	Zone No.2	Development of sewerage system	1,158,206	0	1,158,206	
(2)	Zone No.3	Development of sewerage system	3,701,406	24,508	3,725,914	
(3)	Zone No.7	Development of sewerage system	3,967,381	23,963	3,991,345	
(4)	Zone No.9	Development of sewerage system	4,333,679	18,550	4,352,229	
(5)	Zone No.11	Development of sewerage system	8,643,992	56,387	8,700,380	
(6)	Zone No.12	Development of sewerage system	3,253,732	0	3,253,732	
(7)	Zone No.13	Development of sewerage system	5,624,321	0	5,624,321	
(8)	Zone No.14	Development of sewerage system	3,674,569	21,449	3,696,018	
		Total of Long-term plan	34,357,286	144,858	34,502,144	
		Grand total	64,053,869	5,574,415	69,628,284	

A1.2 Capital Investment Considerations

From 2013 when construction is expected to start for short, medium and long-term sewerage development projects and on-site sludge treatment plants development projects, the approximate total construction cost that must be capital-invested and financed by 2050, which is the long-term development year, is as given in Table A1-2 and Table A1-3.

Table A1-2 Total Capital Investment Cost required for Short, Medium and Long-term Sewerage Development Projects

<Initial Construction Cost>

Unit : Million IDR

Items			Cost		
			Local currency	Foreign currency	Total
A. Construction Cost			41,185,186	10,631,889	51,817,074
	a. Direct Construction Cost		36,447,067	9,408,751	45,855,818
	(1)House Connection Cost		4,694,090	0	4,694,090
	(2)Collection Sewer Line	Tertiary and Secondary	10,144,598	0	10,144,598
		Main	9,990,725	0	9,990,725
		Trunk	1,273,268	1,273,268	2,546,535
		Conveyance	603,690	2,414,758	3,018,448
		Sub-total	22,012,280	3,688,026	25,700,306
	(3)Lift Pump Station	Civil/Architect Works	233,930	0	233,930
		Mecanical Facility	37,429	149,714	187,143
		Electrical Facility	23,391	23,391	46,781
		Sub-total	294,749	173,105	467,854
	(4)Wastewater Treatmment Plant	Civil/Architect Works	7,496,784	0	7,496,784
		Mecanical Facility	1,199,485	4,797,942	5,997,427
		Electrical Facility	749,678	749,678	1,499,357
		Sub-total	9,445,948	5,547,620	14,993,568
	b. Indirect Construction Cost	13% of Direct Construction Cost	4,738,119	1,223,138	5,961,256
B. Engineering Cost		7% of Direct Construction Cost	2,551,295	658,613	3,209,907
C. Physical Contingency		5% of the sum of Direct Construction Cost and Indirect Construction Cost	2,059,259	531,594	2,590,854
D. Land Use Cost			0	0	0
Total			**45,795,740**	**11,822,096**	**57,617,835**
E. Value Added Tax		10%	4,579,574	1,182,210	5,761,784
Grand Total			**50,375,314**	**13,004,305**	**63,379,619**

<Facility Re placement (2013-2050)>

Unit : Million IDR

Items			Cost		
			Local currency	Foreign currency	Total
A. Construction Cost			1,192,197	3,116,512	4,308,710
	a. Facilities Replacement Cost (Direct Construction Cost) (from 2013 to 2050)	Mecanical Facility	567,645	2,270,578	2,838,223
		Electrical Facility	487,397	487,397	974,795
		Sub-total	1,055,042	2,757,976	3,813,018
	b. Indirect Construction Cost	13% of Direct Construction Cost	137,155	358,537	495,692
B. Engineering Cost		7% of Direct Construction Cost	73,853	193,058	266,911
C. Physical Contingency		5% of the sum of Direct Construction Cost and Indirect Construction Cost	59,610	155,826	215,435
Total			**1,325,660**	**3,465,396**	**4,791,057**
D. Value Added Tax		10%	132,566	346,540	479,106
Grand Total			**1,458,226**	**3,811,936**	**5,270,162**

Table A1-3 Total Capital Investment Cost Required for Short, Medium and Long-term On-site Sludge Treatment Plants Development Projects

<Initial Construction Cost>

Unit : Million IDR

Items			Cost		
			Local currency	Foreign currency	Total
A. Construction Cost			343,172	208,073	551,245
	a. Direct Construction Cost		303,692	184,135	487,827
	(1) Civil and Building works		242,393	0	242,393
	(2) Mechanical facilities		16,812	184,135	200,948
	(3) Electrical facilities		44,486	0	44,486
	b. Indirect Construction Cost	13% of Direct Construction Cost	39,480	23,938	63,418
B. Engineering Cost		7% of Direct Construction Cost	21,258	12,889	34,148
C. Physical Contingency		5% of the sum of Direct Construction Cost and Indirect Construction Cost	17,159	10,404	27,562
D. Land Use Cost			0	0	0
Total			**381,589**	**231,366**	**612,955**
F. Value Added Tax		10%	38,159	23,137	61,295
Grand Total			**419,748**	**254,503**	**674,250**

<Facility Re placement (2013-2050)>

Unit : Million IDR

Items			Cost		
			Local currency	Foreign currency	Total
A. Construction Cost			71,018	177,728	248,747
	a. Facilities Replacement Cost (from 2013 to 2050)	Mecanical Facility	14,360	157,282	171,642
		Electrical Facility	48,488	0	48,488
		Sub-total	62,848	157,282	220,130
	b. Indirect Construction Cost	13% of Direct Construction Cost	8,170	20,447	28,617
B. Engineering Cost		7% of Direct Construction Cost	4,399	11,010	15,409
C. Physical Contingency		5% of the sum of Direct Construction Cost and Indirect Construction Cost	3,551	8,886	12,437
Total			**78,969**	**197,624**	**276,593**
D. Value Added Tax		10%	7,897	19,762	27,659
Grand Total			**86,865**	**217,387**	**304,252**

A2. Economic and Financial Evaluation

A2.1 Economic Evaluation

Whether the projects of the M/P are optimal distribution of resources from the standpoint of the national economy or not is verified by calculation of Net Present Value (NPV), Benefit/Cost Ratio (B/C Ratio) and Economic Internal Rate of Return (EIRR).

The targets of economic analysis are sewerage (off-site) plans and on-site plans of short-term plan (2012 - 2020) and medium-term plan (2021 - 2030).

Concretely, as for off-site, projects of zones No.1 & No.6 (short-term) and No.4, No.5, No.8 & No.10 (medium-term) are set as target of the analysis. As for on-site, development of new on-site sludge treatment plant in South area, rehabilitation and expansion of existing STP, and integration with newly constructed WWTPs, and co-treatment for on-site sludge at off-site WWTPs are set as the targets.

As a result of economic analysis, NPV, B/C and EIRR were as given in Table A2-1.

Table A2-1 Results of Economic Analysis

Cost/benefit ratio (B/C ratio)	1.07
*Net Present Value (NPV)	1,234,803 Million IDR
Economic Internal Rate of Return (EIRR)	13.9 %

*Discount rate of project = 12%

From the above table, B/C ratio exceeds 1.0 and NPV exceeds zero. Also, since EIRR was 13.9%, which excess 12% established as capital opportunity cost that indicates limited profitability related to capital for public construction, the project is considered economically feasible.

(1) Financial Evaluation

Financial analysis was conducted to evaluate whether or not the project established by the New M/P is financially feasible. The results of financial analysis are evaluated by calculating Net Present Value (NPV), Benefit/Cost Ratio (B/C Ratio) and Financial Internal Rate of Return (FIRR).

Sewerage projects (off-site) are targets of financial analysis.

Zones No.1 and No.6, which are priority projects of the New M/P, are targets of financial analysis. The analysis is conducted to evaluate whether the projects are financially feasible for repayment of 35% of the construction cost, assuming 35% of the construction cost is procured by loan, and the rest 65% is no need to be repaid because it depends on subsidies. Table A2-2 shows the results of financial analysis.

Table A2-2 Results of Financial Analysis (Summary)

Evaluation Items	Unit	Zone No.1		Zone No.6		Zone No.1 and Zone No.6		Evaluation Criteria
		Case1	Case2	Case1	Case2	Case1	Case2	
B/C Ratio	-	0.71	1.83	0.40	1.03	0.54	1.38	B/C Ratio>1
	Evaluation	N.F.F.	F.F.	N.F.F.	F.F.	N.F.F.	F.F.	
NPV	Mill. IDR	-1,397,280	4,028,732	-3,677,844	175,741	-5,075,124	4,204,473	NPV>0
	Evaluation	N.F.F.	F.F.	N.F.F.	F.F.	N.F.F.	F.F.	
FIRR	%	No solution	9.66%	No solution	1.57%	No solution	5.79%	FIRR>r
	Evaluation	N.F.F.	F.F.	N.F.F.	F.F.	N.F.F.	F.F.	r=1.15%
Financial Evaluation		**N.F.F.**	**F.F.**	**N.F.F.**	**F.F.**	**N.F.F.**	**F.F.**	

Note: F.F. = Financially Feasible, N.F.F. = Not Financially Feasible

The results of financial analysis show that all projects of zone No.1 and zone No.6 require gradual increase of sewerage tariff, and that sewerage system project profitability can be secured by raising the tariff by 30% every 3 years from 2016, and eventually raising up approximately to 3 times level of the current level in stages through the 4 times revisions by 2025 (case 2).

In addition, the results of analysis for both Zone No.1 and Zone No.6 as a single business were as given in the table. The results show that FIRR can be secured 5.79% if sewerage charge is increased.