Ministry of Public Works Republic of Indonesia

# FINAL REPORT ON THE INSTITUTIONAL REVITALIZATION PROJECT FOR FLOOD MANAGEMENT IN JABODETABEK IN REPUBLIC OF INDONESIA

March 2010

## JAPAN INTERNATIONAL COOPERATION AGENCY

YACHIYO ENGINEERING CO., LTD.

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## PREFACE

This report is made up the performance and achievement of the JICA Technical Cooperation Project "The Institutional Revitalization Project for Flood management in JABODETABEK" (herein after Project ) which are conducted during from March 2007 to March 2010 targeting on river basin of JABODETABEK. Objectives of the Project is that "Non-Structural Flood Mitigation Measures are planned and implemented to reduce flood damage in JABODETABEK." In common, When Non-structural measures are considered, residents evacuation activities come across in mind such as flood alert, hazard map and warning evacuation etc. In this Project, not only that kind of activities but maintenance and operation of the river structures, and furthermore runoff control measures are included.

Outputs of the Project comprise of as below,

- (1) Final Report
- (2) Activity Report
- (3) 7 Manuals and 1 Guideline (Separate Volume)

In final report, performance and achievement of activities are described. In Manuals and Guideline, detailed contents of technology transfer were described. Additionally, newsletter described topic of the project activities were published for disseminating project activities and provided to concerned agencies. Newsletters are issued 6 times and those are attached at the end of the Report.

## Map of Study Area (1)

## Location Map of Study Area



## Area of JABODETABEK





### INDONESIA

## THE INSTITUTIONAL REVITALIZATION PROJECT FOR FLOOD MANAGEMENT IN JABODETABEK

## FINAL REPORT

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## CHAPTER 1 OUTLINE OF PROJECT

#### **1.1 Background of the Project**

Jakarta, capital of the Indonesia, was originally established on natural levee along the Ciliwung River and later, the JABODETABEK including most of the Jakarta has been developed on the lowland, which has been created by the rivers running in parallel from the southern mountains. Due to the topographical conditions, the JABODETABEK is easily flooded and furthermore, flood damage potential has been remarkably increased due to intrusion and concentration of population and properties into flood prone areas. Under these circumstances, Master Plan for Drainage and Flood Control was formulated in 1973 and drainage system has been improved based on the Plan. However, serious flooding occurred in 1997 and 2002, thus causing tremendous damages not only in the JABODETABEK and also in Indonesia because of suspension of capital function of the country.

The Japan International Cooperation Agency (JICA) has implemented "The Study on Comprehensive River Water Management Plan in JABOTABEK" in 1997 and. Also in 2002, the JICA implemented "Urgent Inventory Study on Damage of Flood 2002 in JABODETABEK", in which implementation of non-structural measures is recommended together with structural measures such as river improvement and construction of retarding basins.

Based on the Urgent Inventory study mentioned above, the government of Indonesia requested the technical cooperation named "The Institutional Revitalization Project for Flood Management in JABODETABEK" (the Project) so as to reduce flood damages in JABODETABEK.

In response, the JICA dispatched a reconnaissance study team on September and October in 2005, to collect basic data on flood damage in 2002 and flood reduction/drainage improvement measures and also to analyze issues on reduction of flood damages with objectives to confirm the items and contents of the Project. As a results, the reconnaissance study team concluded that 1) data and records that are necessary for operation and maintenance of flood control and drainage system are insufficient, 2) existing rivers and drainage systems are still below maximum utilization level as planned, 3) criteria of flood risk maps and alert/alarm water level should be revised, and 4) prevention of runoff increase due to urbanization is necessary.

In addition, a preparatory study team in March 2006 and an implementation study team in October 2006 were dispatched and concluded R/D with the government of Indonesia on "The Institutional Vitalization Project for Flood Management in JABODETABEK of Ministry of Public Works".

#### 1.2 Overall Goal, Purpose and Outputs

Below shows the overall goal, purpose and outputs of project. And Project design matrix (PDM) is shown in Table-1.1.

#### 1.2.1 Overall Goal

Non-structural flood mitigation measures are planned and implemented to reduce flood damage in JABODETABEK.

#### **1.2.2 Project Purpose**

Institutional capability for flood mitigation in JABODETABEK is improved by taking non-structural measures.

#### **1.2.3** Project Outputs

- (1) Organizations related to the flood control improve their ability for the management of the river and the operation of the drainage structures.
- (2) Data processing system for the flood control in the JABODETABEK is established.
- (3) Flood information system for the smooth evacuation is established.
- (4) Problems concerning the runoff increase are presented, and the organizations related to the flood control improve their ability to prevent the runoff increase.

#### 1.3 Project Area

Target area of the project is all area of the JABODETABEK (6,128.53 km<sup>2</sup>) as shown in Figure 1.1 and pilot project area is Central Jakarta and Ciliwung River Basin (537 km<sup>2</sup>). In addition, study on runoff control is executed for the Pesanggrahan River Basin (143 km<sup>2</sup>).



Figure-1.1 Project Area

#### 1.4 Counterpart Agencies

Indonesian implementing agencies of the Project is Directorate General of Water Resources (DGWR), Ministry of Public Works. And as the related agencies, below 5 agencies were designated. (Hereinafter, these 6 agencies were called CP agencies.)

Directorate General of Water Resources (DGWR), Ministry of Public Works

In cooperation with

Directorate General of Human Settlement (DGHS), Ministry of Public Works

Directorate General of Spatial Planning (DGSP), Ministry of Public Works

Public Works Dept., Special Capital Province Jakarta (DKI Jakarta)

Water Resources Dept., West Java Province

Public Works Dept., Banten Province

 Table 1.1
 Project Design Matrix of the Project (PDM0) (1/2)

Name of Project : The Institutional Revitalization Project for Flood Management in JABODEGTABEK of Ministry of Public Works Implementation Organization: DGRW in corporation with DGHS, DGSP, Public Works Dept. of DKI Jakarta, Water Resources Dept. of West Java Province and Public Works Dept. of Banten Province Duration: Feb.2007 to Mar. 2010

Narrative Summary	<b>Objectively Verifiable Indicators</b>	Means of Verification	Important Assumption
<b>Overall Goal</b> Non-structural flood mitigation measures are planned and implemented to reduce flood damage in JABODETABEK.	1) The damages for life and property caused by flooding will be reduced in JABODETABEK Area.	Report from Ministry of Public Works (PU), the results of social survey	
Project Purpose Institutional capabilities for flood mitigation in JABODETABEK are improved by taking non-structural measures.	<ol> <li>Status of utilizing inventory database system</li> <li>Improvement of the management of rivers and the constrint of database</li> </ol>	<ol> <li>Inventory database</li> <li>Inprovement of rivers and conversion of drain and</li> </ol>	Project activities are continued beyond the technical cooperation period.
	3) Status of utilizing flood risk maps and criteria for alert operation	3) Flood risk maps and criteria for alert operation	Budgets for flood management projects are allocated properly.
			Government policy on flood management does not change drastically.
			No abrupt changes in environment and natural conditions takes place.
Outputs 1. Organizations related to the flood control improve their ability for the management of the river and the operation of the drainage structures.	<ol> <li>Collected inventory of rivers, drains, river basin structures</li> <li>Clarification of flow capacity of rivers</li> <li>Clarification of flow capacity of rivers</li> </ol>	<ol> <li>Dimensions of rivers/drainage system</li> <li>How capacity</li> <li>Androic of afree</li> </ol>	Coordination with relevant offices in PU and other agencies/organizations is sustained.
2. Data processing system for the flood control in the JABODETABEK is established.	<ol> <li>Characterization of the management of rivers and the operation of drainage.</li> </ol>	<ul> <li>Anarysis of floor floor floor answith</li> <li>4) Manual</li> </ul>	Trained staffs continue working in the present section.
3. Flood information system for the smooth evacuation is established.	<ol> <li>Collected hydrological data</li> <li>Runoff model</li> <li>Overall model</li> <li>Revised flood risk map</li> <li>Revised criteria for alert operation</li> </ol>	<ol> <li>Hydrological data</li> <li>Runoff model</li> <li>Comprehensive flood analysis model</li> <li>Flood risk maps</li> </ol>	
<ol> <li>Problems concerning the runoff increase are presented, and the organizations related to the flood control improve their ability to prevent the runoff increase.</li> </ol>	<ol> <li>Start of activities to prevent runoff increase in the organization concerned.</li> <li>Proposed preventive measures for runoff increase</li> </ol>	<ol> <li>Criteria for alert operation</li> <li>Activities for runoff control</li> <li>Food control measures</li> </ol>	

Table 1.2Project Design Matrix of the Project (PDM0) (2/2)

Important Assumption	-	C/Ps are assigned as planned. Budget for the project is allocated as planned. Coordination with relevant offices in PU and other agencies/organization is established No large-scale flooding occurs during implementation of the project.
Means of Verification	Government of Japan	<ol> <li>I.Experts</li> <li>I.Experts</li> <li>Chief adviser</li> <li>Leader/Rivers and drainage structure management plan</li> <li>Flood management and flood preparedness</li> <li>Runoff conrrol, land use and spatial planning</li> <li>Digital map and survey</li> <li>Digital map and survey</li> <li>Provision of Equipment</li> <li>Technical training of Indonesian counterpart personnel in Japan</li> <li>Auphorting Committee</li> </ol>
Objectively Verifiable Indicators	Input Government of Indonesia	<ol> <li>Facilities : Project Office</li> <li>Personnel : CPs         <ul> <li>Administrative staff</li> <li>Budget :</li> <li>Statrise and other allowances for Indonesian counterpart staff</li> <li>Expenses for utilities such as electricity and water domestic transportation of project equipment (4) Expenses for maintenance of facilities and equipment of project</li> <li>Other contingency expenses related to the project</li> <li>Others : Joint Coordinating Committee</li> </ul> </li> </ol>
Narrative Summary	Activities 1. (Ability for operation and maintenance) 1.1 Preparation of inventory database for rivers and drainage structures	<ol> <li>Execution of post flood survey and analysis of imudation causes.</li> <li>Ts Probaration of the guidelines and manuals on operation and maintenance of trivers and drainage structures.</li> <li>Preparation of the guidelines and manuals.</li> <li>Freparation of flood risk maps and manuals.</li> <li>Revision of criteria for rater operation</li> <li>Revision of criteria for rater operation</li> <li>Rolding of seminars on mitigation of flood damage.</li> <li>Rolding of seminars on mitigation of flood damage.</li> <li>Collection and arrangement of data for preparation of inventory diabase for rivers and drainage structures.</li> <li>Collection and arrangement of rivers and drains and drainage capacity of resting of remotion for post flood survey of rivers and drainage structures.</li> <li>Preparation for post flood survey of rivers and drains and drainage structures.</li> <li>A Preparation for post flood survey of rivers and drainage pump structures.</li> <li>A Preparation for post flood survey of rivers and drainage structures.</li> <li>A Preparation for post flood survey of rivers and drainage structures.</li> <li>A Preparation for post flood control system.</li> <li>Study of present conditions on operation and maintenance of rivers and drainage structures.</li> <li>Study on present condition of hydrological observation for guidelines and manuals.</li> <li>Study on present condition of hydrological observation networks.</li> <li>Roldo information of the and information model.</li> <li>Roudy on present condition of hydrological observation and analysis of the present condition of hydrological observation for guidelines and manuals.</li> <li>A Collection of data and information for revision of flood risk maps and manuals.</li> <li>Roudy on present condit</li></ol>

#### **1.5 Project Implementation Policy**

During the entire period of the Project, the Project were implemented based on the following policies:

#### **1.5.1** Technology Transfer to All Counterpart Agencies

The technical transfer of the Project were executed as follows, so that counterpart agencies can reduce flood damages, applying the technology of non-structural measures to be transferred in the Project to the remaining areas/river basins in the JABODETABEK:

- (1) Establishment and periodical revision of the inventory database for the rivers/drainage channels and their facilities by the counterparts together with experts as the basic data for river administration, corresponding to the respective organizations.
- (2) Implementation of the Post flood surveys so that the problems and issues of the respective organizations can be analyzed in addition to the training at the fields.
- (3) Preparation of the maintenance manual, operation manual and flood information dissemination manual for the model rivers as well as rivers/drainage channels in the pilot project areas, based on the inventory database, post flood surveys and analysis by the comprehensive flood analysis model.
- (4) Establishment of the comprehensive flood analysis model and flood runoff model were established for the pilot project area and runoff control analysis area (Pesanggrahan River Basin), respectively.

#### **1.5.2** Phasing of Activities in Indonesia

Activities in Indonesia for JICA experts were separated and conducted in six (6) times. These activities were grouped into three (3) phases with respective objectives so as to execute effectively and efficiently technology transfer.

#### (1) First Phase: Collection/Analysis of Basic Data and Establishment of Comprehensive Flood Analysis Model (tool for analysis)

The first phase was composed of the first activity (Mar. 2007) and the second activity (May to Oct. 2007).

This phase was used for the collection/analysis of basic data and establishment of the first version of the comprehensive flood analysis model.

The first version of the comprehensive flood analysis model was prepared by the rainy season of 2007/2008 so that it was used for evaluation of flow capacity, planning of maintenance activities, evaluation of gates/pumps operation, simulation of inundation conditions, and analysis of the causes of flooding.

#### (2) Second Phase: Capacity Building on Flood Mitigation and Preparation of Manuals

Second phase was composed of the third activity (Nov. 2007 to Mar. 2008), the forth activity (Apr. to Aug. 2008) and fifth activity (Sep. 2008 to Mar. 2009).

In this phase, technology transfer listed below was executed repeatedly, applying the flood events to be experienced two (2) times in 2007/2008 and in 2008/2009 so as for the counterpart personnel to execute the respective works by themselves after the Project:

- Modification of inventory database
- Post flood survey for operation of gates/pumps, damage investigation of river/drainage structures and flood inundation conditions
- Calibration of runoff discharge, evaluation of flow capacity of channels, analysis of optimum operation of gates and pumps and simulation of flood inundation condition by the comprehensive flood analysis model

Through these works, accuracy of the analysis model was improved and several manuals were prepared/revised such as maintenance manual, operation manual and flood information dissemination manual.

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#### (3) Third Phase: Capacity Building on Flood Mitigation and Completion of Manuals

This phase was composed of the sixth activity from May 2009 to Jan. 2010. The counterpart personnel were trained to complete the respective manuals such as maintenance manual, operation manual and flood information dissemination manual based on the previous experience of operational activities. The respective flood activities were executed based on the manuals from the rainy season 2009/1010.

#### 1.5.3 Preparation of Manuals and Guidelines

In this project, manuals and/or guidelines were prepared before the work activities so that the counterpart personnel could understand easily methodology and procedures, execute the respective work activities by themselves, related to the flood mitigation. Furthermore, the manuals and/or guidelines were revised by themselves based on their actual operation.

#### **1.5.4** Workshops and Seminars

The workshops/seminars were held whenever texts/manuals/reports/hands-out were prepared by the counterpart personnel so that they can understand and evaluate the work activities. In addition, it was expected to make mutual understanding and help increase/strengthen cooperation with other organizations through attending workshops and seminars.

#### **1.6 Project Implementation Plan**

In accordance with the PDM and the project implementation policies described in the preceding chapter, the project activities will be implemented. The time schedule of activity is shown in Table-1.3. The activity flow and time schedule will be revised time to time through the discussion with the counterpart personnel so that the work volume will be realistic and sustainable for the counterpart personnel to conduct the project activities with the support of the JICA Experts.

	Work and Activity Items				20	07					20	08					20	09		
	work and Activity Items	2	4	6	8	10	12	2	4	6	8	10	12	2	4	6	8	10	12	2
	Phase	+	Pł	ase	-1 -	<b>→</b>	-		P	hase	2-2			$\rightarrow$	÷	P	has	e-3	-	<u>→</u>
		1	1			12	22	22	22	22	22	22	22	22	3	33	33	33	33	3
	1 <sup>st</sup> Work in Japan	J																		
[01]	Data and Information Collection and Analysis	X																		
[02]	Study on Implementation Policy, Contents and Methodology	X																		
[03]	Preparation of Inception Report (IC/R) and Plan of Operation on Technology Transfer	x																		
	1 <sup>st</sup> Activity in Indonesia	N																		
[04]	Meeting on Inception Report	Χ																		
[05]	Collection and Analysis of Relevant Data and Materials	X																		
[06]	Field Reconnaissance	X																		
[07]	Formulation of Total Implementation Plan	X																		
	2 <sup>nd</sup> Activity in Indonesia		N	NN	NN	N														
[08]	Workshop on the Project		X																	
[09]	Data Collection and Arrangement for Inventory Database		x	xx	xx															
[10]	Leveling and Cross-sectional Survey		X	XX		İ														
[11]	Arrangement of Existing Digital Maps		X	XX																
[12]	Establishment of One Dimensional Flow Model		X	xx	XX															
[13]	Establishment of Two Dimensional Inundation Model			xx	xx															
[14]	Study on Land Use in the Basin			XX	XX															
[15]	Establishment of Runoff Model			XX	XX															
	2 <sup>nd</sup> Work in Japan					J														
[16]	Explanation of Progress Report I					X														
	3 <sup>rd</sup> Activity in Indonesia					N	INN	Z												
[17]	Implementation of Additional Survey						XX	X												
[18]	Review of Comprehensive Flood Analysis Model and Estimation of Flow Capacity					X	XX	X												
[19]	Implementation of Post Flood Survey					X	XX	X												
[20]	Flood Inundation Survey					X	XX	X												
	3 <sup>rd</sup> Work in Japan							J												
[21]	Explanation of Progress Report 2							X												
	4 <sup>th</sup> Activity in Indonesia								N	INN	N									
[22]	Preparation of Inventory Database								X	XX	X									
[23]	Preparation of Report on Post Flood Survey								X	xx	X									

Table-1.5 This Schedule of Activities	Table-1.3	Time	Schedule	of Activities
---------------------------------------	-----------	------	----------	---------------

	Work and Activity Items	06			20	07					20	80	8			2009					
		2	4	6	8	10	12	2	4	6	8	10 12 2		2	4	6	8	10	12	2	
	Phase	<ul><li>←</li></ul>			-1 -	→ < 12	-	22	22 22	nase 22	2-2 22	22	22	$\rightarrow$	← 2	22 22	1ase	2-5	22	7 2	
[24]	Study on Maintenance Problems of Rivers and Structures and Preparation of Maintenance Manual (Draft)	1	1							XX	X		<u>44</u>		3	<u></u>	33	33	<u></u>	<u> </u>	
[25]	Review of Flood Hazard Map									XX	X	-									
	5 <sup>th</sup> Activity in Indonesia										N	NN	NN	N							
[26]	Additional Survey of River and Drainage										X	xx	xx								
[27]	Data Collection and Analysis on Flood										X	XX	XX								
[28]	Improvement of Operation and Maintenance Manual for River and Drainage Facilities										X	XX	xx								
[29]	Survey for Drainage Pump and Gate							<u> </u>			X	XX	XX	X							
[30]	Data Collection and Analysis on Inundation										X	xx	XX	x							
	4 <sup>th</sup> Work in Japan													J							
[31]	Explanation of Progress Report 3													X							
	6 <sup>th</sup> Activity in Indonesia														N	NN	NN	NN	NN		
[32]	Renewal of Inventory Database for River and Drainage Structures														X	XX	XX				
[33]	Review of Evaluation Model of River System and Evaluation Model of Drainage System														x	XX	XX	xx			
[34]	Flood Analysis of Data Obtained by Post Flood Survey														X	XX	XX	XX			
[35]	Finalization of Operation and Maintenance for River and Drainage Facilities																XX	xx	xx		
[36]	Finalization of Operation Manual for Drainage Pump and Gate																xx	xx	xx		
[37]	Review of Flood Hazard Map											-	-				XX	XX	XX		
[38]	Evaluation of Hydrological Observation Network																хx	XX	XX		
[39]	Finalization of Flood Alert System												<u> </u>				хx	XX	XX		
[40]	Review of Evaluation Model for Basin Runoff														X	XX	xx	xx	xx		
[41]	Calculation and Evaluation of Basin Runoff by Using the Model Mentioned in Above [40]														X	XX	XX	XX	xx		
[42]	Study on Regal Controls for Land Use														X	XX	XX	XX	XX		
[43]	Preparation of Land Use Guideline for Flood Management														X	XX	XX	XX	XX		
	Activities throughout the Project Period																				
[44]	On the Job Training	-	-																		
[45]	Seminar												X				X	Χ			
[46]	Counterpart Training in Japan						<u> </u>	<u> </u>			X	<u> </u>	<u> </u>				X				
[47]	Assistance of Project Evaluation in Term End																X				
[48]									1				ĺ								

## CHAPTER 2 PROJECT PERFORMANCE

#### 2.1 Outputs

Main Outputs of Activities are as follows,

- (1) 7 Draft Manuals and 1 Guideline
- (2) 7 Texts for Manuals and 1 Guideline

#### (1) Draft Manuals and Guideline

Draft Seven Manuals and One Guideline were made up by counterparts in consultation with JICA Experts. List of Manuals and guideline are tabulated in Table-2.1. Manuals and Guideline are made up in separate volumes. Relation between non-structural measures and Manuals/Guideline is shown in Figure-2.1.

Code	NAMA DRAFT PANDUAN (Name of Manuals & Guideline)	First Draft Completion Date
M1	DRAFT PANDUAN INVENTARISASI SUNGAI DAN RASARANA SUNGAI	Feb 2010
	(Manual for Inventory of Rivers and River Structures)	
M2	DRAFT PANDUAN PEMELIHARAAN SUNGAI DAN BANGUNAN SUNGAI	Feb 2010
	(Manual for Maintenance Manual of River Structures)	
M3	DRAFT PANDUAN EVALUASI KAPASITAS ALUR SUNGAI	Feb 2010
	(Manual for Manual of River Facility Evaluation)	
M4	DRAFT PANDUAN OPERASI PINTU AIR DAN POMPA	Feb 2010
	(Manual for Operation Manual of Gates and Pumps)	
M5	DRAFT PANDUAN PEMBUATAN PETA RAWAN BANJIR	Feb 2010
	(Manual of Drawing up Probable Flood Area)	
M6	DRAFT PANDUAN SURVEI PASCA BANJIR	Feb 2010
	(Manual of Post Flood Survey)	
M7	DRAFT PANDUAN SISTEM SIAGA BANJIR	Feb 2010
	(Flood Alert Manual)	
G1	DRAFT PANDUAN PENGENDALIAN ALIRAN PERMUKAAN	Feb 2010
	(Runoff Control Guideline)	

	Table-2.1	List of Manuals and	Guideline	(Indonesian	version)
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#### (2) Text for Manuals and Guideline

Text for Manuals and Guideline ware made up by JICA Experts in collaboration with CP. Texts are aiming to using CP training. In texts, results of data collected, analysis, inspection and other study describes.



7 manuals and 1 Guideline with Texts

Code	Name of Text for Manuals & Guideline(English Version)	First Draft Completion Date
M1	Text for Inventory of Rivers and River Structures	Feb 2009
M2	Text for Maintenance Manual of River Structures	Feb 2009
M3	Text for Manual of River Facility Evaluation	Feb 2009
M4	Text for Operation Manual of Gates and Pumps	Feb 2009
M5	Text for Manual of Drawing up Probable Flood Area	Feb 2009
M6	Text for Manual of Post Flood Survey	July 2009
M7	Text for Flood Alert Manual	July 2009
G1	Text for Runoff Control Guideline	July 2009

Table-2.2List of Text for Manuals and Guideline

Non-Structural Measures targeted on the Project involves 3 categories of comprehensive flood control measure, Flood Plain Management, River Management and Basin Management. Crucial technical items were selected for Manuals and Guideline from each measure respectively. In common, when Non-Structural Measures are mentioned, activities for contributing to resident evacuation such as flood alert and hazard map etc are conceived, but in this project, flood control measures concerning Structural Measures such as maintenance of river structures and operation of gates and pumps are included. Additionally, runoff control measures are also included. Those are the feature of this project.



Figure-2.1 Relation between Non-Structural Measures and Manuals/Guideline

#### 2.2 Schedule of Activities

This Project was started on March 2006 and continued until March 2010. Totally this project has been conducted for about 3 years as shown in Table-2.3. Activities in Indonesia were composed of 6 phases. Detailed activity schedule is attached at the end of report as ATTACHMENT-1 (STUDY TIME SCHEDULE).

FY	2	200	6						20	07											20	80					
Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
Monthly No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Activity in Indonesia																											
Activity in Japan																											
Report																											
				IC,	/R				P/	'R1					P/	̈́R2										PF	13

FY						20	09					
Month	4	5	6	7	8	9	10	11	12	1	2	3
Montthly NO	28	29	30	31	32	33	34	35	36	37	38	39
Activity in Indonesia												
Activity in Japan												
Report												
											F/	R

#### 2.3 Inputs

#### 2.3.1 Input from Indonesian Side

#### (1) Counterpart Personnel

DGWR is the agency with the overall responsibility for the administration and implementation of the Project in coordination with DGHS and DGSP. Directorate of Water Resources Management in DGWR is responsible for the managerial and technical matters of the Project in coordination with DGHS and DGSP.

The counterpart personnel (the C/P) were appointed by the Decree of the Director General of Water Resources No. 67/KPTS/D/2007 dated on 28th March, 2007 and revised by the Decree of the Director General of Water Resources No. 171/KPTS/D/2008 dated on 12th August, 2008. The C/P Team consists of the government officials from the related agencies as shown in Table-2.4 and Table-2.5. Number of Counterparts accounts 62 persons. And of which Fulltime Counterparts were increased in FY 2009 from 10 to 23 persons due to strong initiative of PM of Indonesian implementing agencies.

	Name of Counterpart Agencies	Number of Counterpart
A. Central Government		
Ministry of Public Works	(1) Directorate General of Water Resources	
	1. Dit. River, Lake and Reservoir	12
	2. Dit. Water Resources Management	3
	3. Dit. Programming	1
	4. BBWS Ciliwung-Cisadane	12
	5. BBWS Cidanau-Ciujung – Cidurian	3
	6. BBWS Citarum	1
	(2) Directorate General of Spatial Planning	4
	(3) Directorate General of Human Settlement	4
<b>B.</b> Provincial Government		
I .DKI Jakarta	(4) Public Works of Agency(DPU DKI Jakarta)	8
	(5) Regional Planning and Development Board (BAPPEDA DKI	2
	Jakarta)	
	(6) City Spatial Planning	2
	(DINAS TATA COTA DKI Jakarta)	
II.Banten	(7) Water resources and Settlement Agency	2
	(SD A&P Banten)	
	(8) Regional Planning and Development Board (BAPPEDA Banten)	2
III.West Java	(9) Water Resources Management	2
	(PSDA Jawa Barat)	
	(10) Regional Planning and Development Board (BAPPEDA Jawa	2
	Barat)	
	(11) Spatial Planning and Settlement Java	2
	(Dinas Tata Ruang & Permukiman Jabar)	
Total		62

No.	Name	Function	Status
Α	Counterpart Coordinato	r	
1	Suhartono, ME	Head of Sub-Dir. River, Lake and Reservoir & Natural Disaster Fighting Dir. River, Lake and Reservoir, Dir.Gen. Water Resources	Coordinator of Counterpart
2	Ir. Leonarda B. Ibnu Said, M.Eng	Head of Sub-Dir. Hydrology, Dir. Water Resources Development, Dir. Gen. Water Resources	Coordinator for hydrology activity
3	Ir. Slamet Budi Santoso, Dipl. HE	Head of Sub-Dir. Technical Planning, Dir. Of River, Lake and Reservoir, Dir. Gen. Water Resources	Coordinator for flood management activity
4	Ir. Firman Mulia Hutapea, MUM	Head of Sub-Dir. Spatial Planning of City and Metropolitan, Dir Spatial Planning Regional II, Dir. Gen. Spatial Planning	Coordinator for spatial planning activity
5	Ir. Sumirat, MM	Head of Sub-Dir. Bulding Construction, Dir. Planning of Construction & Environment, Dir. Gen Cipta Karya	Coordinator for environment drainage and building codes activity
6	Ir. Febri Iman Harta, ME	Head of Planning and O&M Sector, BBWS Ciliwung-Cisadane	Coordinator for flood control activity
B	Member of Counterpart	t Team	
L	Dir. Gen. Water Resources		
1	Director of River, Lake a	nd Reservoir	3 6 1
1	Anggia Satriani, ST, M.Eng	Section Head of East Area, Sub-Dir. Technical Planning	Member
2	Ir Surya Dewanto, Sp	Section Head of West Area, Sub-Dir. O&M River, Lake & Reservoir	Member
	Dir. of Water Resources	Management	
1	Ir. Sulad Sriharto, DIpl. HE	Head of Sub-Dir. Of Controlling of Water Resources Management Dir. Water Resources Management	Member
2	Gatut Bayuadji, Sii, MT	Section Head of West Area, Sub. Dir. Hydrology	Member
3	Yunitta Chandra Sari, SE, ST, MT	Section Head of West Area, Sub. Dir of River Area Planning	Member
	<b>BBWS Ciliwung-Cisada</b>	ne	
1	Ir. Bastari, MT.	Section Head of Planning	Member
2	Dina Noviadriana, ST., MT	Staff of Commitment Maker Functionary of Eastern Banjir Canal	Member
3	Fikri Abdurrachman, ST.	Staff of Development and Conservation of Water Resources	Member
	BBWS Cidanau-Ciujung	g-Cidurian	
1	Imam Budiman, BE., SP, MSi.	Section Head of Lake and Reservoir in Water Implementation Network Sector	Member
2	Dedi Mashudi, ST	Staff of Commitment Maker Functionary of River and Coastal Implementer	Member
3	Budi Muhibudin Budiana, ST	Staff of Planning and Programming	Member
	<b>BBWS Citarum</b>		·
1	To be named	Section Head of the Implementation of Lake and Reservoir	Member
Γ	Ditjen Cipta Karya		
	Directorate of Construct	ion and Environment Management	
1	Ir RG. Eko Djuli Sasongko	Head of Section of Building Construction Area II	Member
2	Rogydesa, ST	Staff of Sub-Dir. Building Construction Area II	Member
	<b>Directorate of Sanitation</b>	of Environment and Settlement Development	
1	To be named	Section Head of Operation Technical	Member
Γ	Dir. Gen. of Spatial Planni	ng	

Table-2.5	Composition of	f Counterpart	Team (From	May 2009 -	- March 2010)
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No. 171 / KPTS/ D/ 2008 Date: August 12, 2008

No.	Name	Function	Status						
1	To be named	Section Head of Metropolitan Spatial Planning Management	Member						
2	Ida Avu Gede Mirah	Staff of Province Spatial Planning	Member						
_	Arnadi ST MT	Management Section							
3	Liza Sorava	Staff of Metropolitan Spatial Planning Management Section	Member						
5	Kusumadevi . ST	Starr of Medoportain Spanar Flamming Management Section							
F	Public Work Agency of DI	XI							
1	To be named	Section Head of Water Controlling, Sub-Agency of Technical	Member						
2	To be neared	Guidance of Water Resources	Manahan						
2	To be named	Environmental Technique and Engility Management	Member						
3	Budi Mulvanto	Section Head of Maintenance and Control of Water	Mambar						
5	Dudi Muryanto	Sub-Agency of Environmental Technique and Facility	wiennoer						
		Management							
		(Section Head of Maintenance of Flood Control Facility &							
		Infrastructure)							
A	gency of Water Resource	es Management of West Java							
1	Ir. Rudi	Section Head of Flood and Drought Controlling	Member						
		Sub-Agency of Operation & Management							
		(Section Head of Maintenance, Sector Operation and							
		Maintenance)							
2	Suherman	Section Head of Controlling and Protection of	Member						
		Balai PSDA Ciliwung-Cisadane							
ł	ublic Work Agency of Ba	inten	3.6 1						
1	H. Djoko Suryanto, ME	Head of Balai PSDA of Cidurian-Cisadane River Area	Member						
2	H. Bai Iskandar, AIP,	Section Head of River and Coastal	Member						
т	MM Designal Dianning and De	(Section Head River, Lake and Reservoir)							
1	Regional Planning and De	Head of Sub Sector Spatial & Construction Dianning	Momhor						
1	MDM	(Head of Sub-Sector Spatial & Construction Flaining	Member						
		Fnerov & Natural Resources)							
2	Ir Hindradman D MM	Head of Sub-Sector Water Management Facility and City	Member						
_		Utilities							
		(Head of Sub-Sector Public Works, Housing & Land							
		Affair)							
F	Regional Development Bo	ard of West Java							
1	Eko Priastono, ST,	Head of Sub-Sector Spatial & Construction Planning	Member						
	MPPM	(Head of Sub-Sector Spatial Planning & Environmental)							
2	Linda Al Amin, SH, MM	Head of Sub-Sector Water Management, Facility, and City	Member						
		Utilities							
		(Head of Sub-Sector Regional Infrastructure)							
	Regional Development Bo	ard of Banten	Manufactor						
1	Ir. Indro Sarwono, MSc.	Head of Sub-Sector Area Facility	Member						
		(Head of Sub-Sector of Spatial Planning & Regional							
2	Khairuddin ST MSi	Head of Sub Sector Water Resources Eacility	Mambar						
2	Kilan udulli, 51, Mist.	(Head of Sub-Sector Arrangement the Regional	Wennoer						
		Infrastructure)							
A	gency of Spatial Plannin	g and Settlement of West Java							
1	To be named	Head of Sub-Agency Regional Spatial Planning	Member						
2	Budi Budiman Wahyu,	Staff of Planning Section, Sub-Agency	Member						
	ST, MT	Settlement							
A	Agency of City Planning D	DKI Jakarta							
1	To be named	Section Head of Green-Opened Space & Water Municipal,	Member						
		Sub-Agency Planning of City Facility & Infrastructure							
2	To be named	Section Head of Arrangement and Guidance of Work	Member						
		Program , Programming Sub-Agency							
С	Full time Counterpart N	Aember							
Ι	Dir. of Programming, Dir. Gen. Water Resources								

No.	Name	Function	Status
1	Ambar Puspitosari, ST	Staff of Sub. Dir. Policy & Strategy	Member
Ι	Dir. of Water Resources M	lanagement	
1	Juniferanne N.	Staff of Sub-Dir. Controlling of Water Resources	Member
	Brahmana, S. Psi	Management	
2	Andi Widiyanto, ST.	Staff of Sub-Dir. Controlling of Water Resources	Member
		Management	
3	Ayu Suci Wijayanti, ST	Staff of Sub-Dir. Hydrology and Water Quality	Member
I	<b>BBWS Ciliwung-Cisadane</b>		
1	Heriantono Waluyadi,	Principal Supervisor of Situ Rehabilitation	Member
	ST, MT		
A	Agency of Public Work D	KI Jakarta	
1	Ika Agustin Ningrum, ST	Staff of Sub-Agency of Technical Guidance of Water	Member
		Resources	
2	Dwi Murti Nuraili, MT.	Staff of Sub-Agency of Technical Guidance of Water	Member
		Resources	
3	Eko B. Santoso	Staff of Maintenance and Water Control Sub-Agency of	Member
		Water Resources Management	

#### (2) **Provision of Office Spaces and Facilities**

Directorate of Water Resources Management provided the office of the Project with appropriate furniture in the first floor of the building of Directorate of River, Lake and Reservoir. The C/Ps have conducted the project activities in collaboration with the JICA Experts in this office.

Project office moved to other building on October 2008 due to demolish for new PU building construction.



Photo-2.1 Project Office (Oct 2008-Mar 2010)



#### 2.3.2 Inputs from Japanese Side

#### (1) Dispatch of JICA Expert Team

JICA Expert team consists of Long-term Expert as the Chief Advisor and the Short-term Experts. During the Project activity in Indonesia, one (1) Long-term Expert and nine (9) Short-term Experts were dispatched to assist the Project activities conducted by the C/Ps. List and Assignment schedule of JICA Experts are shown in Table-2.6 and Table-2.7.

Name of Expert	Affiliation	Role	Assign Period				
Long Term Expert	Long Term Expert						
Takaaki KUSAKABE	Ministry of Land, Infrastructure and Transport, Infrastructure and Transport (MLIT)	Chief Adviser	Nov 2007 – Nov 2009				
Short Term Expert							
Masatomo WATNABE	Yachiyo Engineering Co.,Ltd	Team Leader	Sep 2008 – Mar 2010				
Susumu HEISHI	Yachiyo Engineering Co.,Ltd	Team Leader/drainage structure management plan	Mar 2007 – Aug 2008				
Tamotsu SHINGU	Yachiyo Engineering Co.,Ltd	Deputy Team Leader/drainage structure management plan	Sep 2008 – Mar 2010				
Yousuke USUI	IDEA Consultants. Inc	Flood Management and flood preparation(I)	Mar 2007 – Aug 2009				
Tetsuhiro IMAGAWA	Yachiyo Engineering Co.,Ltd	Flood Management and flood preparation(I)	Jun 2009 – Nov 2009				
Uyuu TANAKA	Yachiyo Engineering Co.,Ltd	Flood Management and flood preparation(I)	Dec 2009 – Jan 2010				
Makoto YONEKURA	Yachiyo Engineering Co.,Ltd	Runoff Control,Land use and spatial planning (I)	May 2007 – Dec 2009				
Tadafumi SATO	Yachiyo Engineering Co.,Ltd	Runoff Control,Land use and spatial planning (I)	Oct 2008 – Aug 2009				
Koichi KAMIMURA	Yachiyo Engineering Co.,Ltd	Digital Map and Survey	May 2007 – Jul 2008				

Table-2.6	List of HCA	Expert
1 apre-2.0	LIST OF JICA	LAPEIL



Yachiyo Engineering Co., Ltd

#### 2.3.3 Provision of Machinery / Equipment

The equipment was provided for the Project to facilitate the project activities as shown in Table-2.8.

Item	Qty	Place of Procurement	Procurement Period
1. CAD Software (AUTOCAD 2008)	2	In Indonesia	2 <sup>nd</sup> Activity in Indonesia
2. Image Processing Software (ERDAS IMAGINE 9.1)	1	In Indonesia	2 <sup>nd</sup> Activity in Indonesia
3. GIS Software (ArcGIS 9.2)	2	In Indonesia	2 <sup>nd</sup> Activity in Indonesia
4. Digital Map	1	In Indonesia	2 <sup>nd</sup> Activity in Indonesia
5. Personal Computer	9	In Indonesia	2 <sup>nd</sup> Activity in Indonesia
6. Printer	1	In Indonesia	2 <sup>nd</sup> Activity in Indonesia
7. Portable Type Electromagnetic Current Meter	3	In Japan	3 <sup>rd</sup> Activity in Indonesia
8. Satellite Image	1	In Japan	2 <sup>nd</sup> Works in Japan
9. Flood Inundation Simulation Program	3	In Japan	2 <sup>nd</sup> Works in Japan

 Table-2.8
 List of Equipment Provided (As of March, 2010)



#### 2.3.4 CP Training in Japan

Two times of Counterpart Training in Japan were implemented during Project period. List of trainee are shown in Table-2.9 and Itinerary of Training in Japan are shown in Table-2.10, Table-2.11.

Detailed plan is described as follows,

NO	Name of Trainee	Position	Schedule
	Mr. Ir. Sulad Sriharto, Dipl. HE	Head of Sub-directorate of Water	7 Sep-20 Sep 2008
		Resources Management Control	(14 days)
	Ms. Ida Ayu Gede Mirah Arnadi, ST. MT	Staff of Sub-directorate of Province	7 Sep-27 Sep 2008
1		and Regency, directorate of Spatial	(21 days)
		Planning for Regional II	
	Mr. Henra Ramadhani	Directorate General of Water	26 Oct -19 Nov 2009
		Resources, Directorate of River, Lake	(25days)
		and Reservoir	
2	Ms.Fadly Nila Aliefia	Directorate General of Water	26 Oct -19 Nov 2009
		Resources, Directorate of River, Lake	(25days)
		and Reservoir	

Table-2.9	List of '	Trainee	in	Japan
				o apan

#### (1) **1th Counterpart Training**

The training for Government Officials of Flood Management Agencies in JABODETABEK was implemented in September 7 to 26, 2008. The topic of the training is "Comprehensive Flood Mitigation in Japan", and 1senior official and 1 junior technician were participated in the training. Lecture on the institutional, regal and planning aspects were conducted and field survey in Neya, Tsurumi, Naka and Ayase rivers were also conducted.

Since then, 2 trainee made presentation about their result in "Seminar on Flood Mitigation in JABODETABEK" held in 4 December 2008.

#### (2) **2th Counterpart Training**

Two counterparts were dispatched to Japan for counterpart training program of JICA-MPW the Institutional Revitalization Project for Flood Management in JABODETABEK from 26 Oct 2009 - 19 November 2009.

To train the Japanese practice for Comprehensive Flood Control Measures. Especially, River improvement plan in consideration of Runoff Control Measures such as rainfall storage and infiltration facilities and land use regulation for flood control. Main objectives are as follows,

- > Training for the comprehensive flood control management in urban areas.
- > Training for the regulation of runoff increase
- > Training for river improvement in consideration of environment.

No.	Io. Date		Date Activities	
1	7-Sep	S	Trip to Japan	in Flight
2	8-Sep	М	Arrival in Japan to Hotel, Briefing, program orientation	Tokyo
3	9-Sep	Т	River Management in Japan, Characteristics of urban river and disaster	Tokyo
4	10-Sep	W	Outline of comprehensive flood mitigation measures and their history (including runoff control measures in Japan)	Tokyo
5	11-Sep	Т	Pre-explanation of rivers for site inspection (Tsurumi River) and (Naka River, Ayase River)	Tokyo
6	12-Sep	F	ditto (Neya River), Preparation of site inspection	Tokyo
7	13-Sep	S	Holiday	Tokyo
8	14-Sep	S	Holiday	Tokyo
9	15-Sep	М	Inland travel (Tokyo - Osaka), Outline of rivers in Osaka to be Explained by Osaka Prefecture	Osaka
10	16-Sep	Т	Site inspection: Underground diversion channels in Neya River under Osaka Prefecture	Osaka
11	17-Sep	W	Site inspection: Retention in housing area, retarding basin in subdivision under Osaka Prefecture	Osaka
12	18-Sep	Т	Travel to Tokyo, Preparation of Training Report	Tokyo
13	19-Sep	F	Preparation of Training Report, Reporting to JICA/presentation of Training Report (Trainee-1)/Preparation of Training Report (Trainee-2)	Tokyo
14	20-Sep	S	Trip to Indonesia (Trainee-1)/ Holiday (Trainee-2)	Tokyo
15	21-Sep	S	Holiday (Trainee-2)	Tokyo
16	22-Sep	М	Site Inspection: Tsurumi River retarding basin, water-resist buildings along Rivers under MLIT (Trainee-2)	Tokyo
17	23-Sep	Т	Site Inspection: Shin-wa storm retarding basin, Kiri-ga-oka retarding basin in watershed of Tsurumi River under MLIT (Trainee-2)	Tokyo
18	24-Sep	W	Site inspection: Gaikaku Floodway, pump stations in Naka River/Ayase River under MLIT (Trainee-2)	Tokyo
19	25-Sep	Т	Site inspection: Oh-yashi regulating reservoir, Project site for retention and infiltration in Naka River/Ayase River under Saitama Prefecture ) (Trainee-2)	Tokyo
20	26-Sep	F	Preparation of Training Report (Trainee-2), Reporting to JICA/presentation of Training Report (Trainee-2)	Tokyo
21	27-Sep	S	Trip to Indonesia (Trainee-2)	

 Table-2.10
 Itinerary of CP Training in Japan 2008

No.	Dat	e	Activities	
1	25-Oct	S	Arrival in Japan, Tolyo	in Flight
2	26 Oat	м	Arrival in Japan to Hotel, Briefing, program orientation	Talma
2	20-001	IVI	Briefing and program orientation	токуо
3	27-Oct	Т	Expalnation of river in Japan and runoff control	Tokyo
4	20.0.4	<b>XX</b> 7	Outline of comprehensive flood mitigation measures and their history	T . 1
4	28-Oct	w	(including runoff control measures in Japan)	токуо
~	20.0.1	T	Pre-explanation of rivers for site inspection of Uchi River Works under	<b>T</b> 1
5	29-Oct	1	Tokyo Metropolitan	Гокуо
-	20.0.4	Б	Site inspection of Sumida river and river scape	<b>T</b> 1
6	30-Oct	F	Preparation of site inspection for Osaka	Токуо
7	31-Oct	S	Holiday	Tokyo
8	1-Nov	S	Holiday	Tokyo
	<b>.</b>		Inland travel (Tokyo - Osaka)	
9	2-Nov	Μ	Comprehensive flood control measure in Neva River Basin	Osaka
10	3-Nov	Т	Sight seeing bus tour in Kyoto and Lake Biwa Channel museum of Kyoto	Osaka
			Site inspection: Underground diversion channels in Neva river under Osaka	
11	4-Nov	W	prefecture	Osaka
			Disaster reduction and human renovation future institution	
12	5-Nov	Т	Kobe sight seeing and Inland travel (Kobe $\rightarrow$ Tokyo)	Tokyo
			Explanation of Elood analysis	
13	6-Nov	F	And introduction of simple water level warning device	Tokyo
1/	7-Nov	S	Holiday	Tokyo
15	8 Nov	5	Holiday	Tokyo
15	0-1404	5	Comorehensive flood control	TOKyO
16	0 Nov	м	Site Inspection: Kanda river underground retarding pond under Tokyo	Tokyo
10	9-1101	IVI	Metropolitan	TOKYO
17	10 Nov	т	Site Inspection: Nirvoushuku wair at Tama river under NII T	Tokyo
17	10-1404	1	Site inspection: Oh Vashi regulating reservoir	ТОКУО
18	11-Nov	w	Project site: for retention and infiltration in Naka river / Avase River under	Tokyo
10	11-1404	**	Saitama Prefecture	TOKYO
-			Site inspection: Oh-vashi regulating reservoir. Project site for retention and	
10	12 Nov	т	infiltration in Naka Divor/Avasa Divor under Saitama Drafactura	Tokyo
19	12-1100	1	(Trained 2)	TOKYO
			(Indirec-2) Site increasion:Edo river land using	
20	13-Nov	F	Site inspection. Edu Tiver land using Paparting IICA / Presentation of training report	
21	14 Nov	c	Holiday	Tolwo
21	14-NOV	2 2	Holiday	Tokyo
	13-1100	6	Site inspection: Goileaky Floodway, sump stations in Naka Biyer/Ayesa	TOKYO
23	16-Nov	Μ	Site inspection: Gaikaku Floodway, pump stations in Naka Kivel/Ayase	
			River under MLTT	
24	17-Nov	Т	site inspection: Regulation pound , the take Sai center for natural	
			Mini work shop	
25	18-Nov	W	Nilli Work-shop	Tokyo
<u> </u>			Mini work shop	-
26	19-Nov	Т	Paperting to UCA /presentation of Training Depart	Tokyo
			Leave to Independent	
27	20-Nov	F		Tokyo
1	1	1		

Table-2.11	Itinerary	of	CP	Train	ing	in	Ja	pan	2009
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#### 2.4 **Project Activities**

#### 2.4.1 1st and 2nd Activities in Indonesia

#### (1) Summary

In the 1st Activity in Indonesia, Inception Report Meeting was held between JICA Expert Team and Counterpart Team and the implementation policy and schedule of the Project were discussed.

During the second activity in Indonesia, items were various and each item had much quantity of work, even though it was substantially the kick-off period of the Project. Unlike the ordinary JICA development study scheme, it is required that C/P should have tackled activity for the Project independently. Five (5) fulltime C/P, three (3) from the PU and two (2) from the DKI Jakarta, have been assigned. However, they are too busy to work with the JICA Experts everyday. In this context, some embarrassment of C/P to activity was seen at the beginning. However, as a result of C/P's tackling activity earnestly, it is judged that the activity result comparatively good was obtained as the second activity in Indonesia.

In addition to the activities of the Project, the following activities were done on the C/P's own initiative. The JICA Experts also joined/supported the above C/P's own activities and made the recommendations according to need.

- Coordination meeting of related agencies for restoration of the storage ponds in the JABODETABEK on May 7, 2007.
- Three-day workshop on Institutional Revitalization Project for Flood Management in JABODETABEK during the period from 9 to 11 of July, 2007.
- Coordination meetings of the retarding basins along the Western Floodway and the Ciliwung River with the related agencies in DKI Jakarta on Aug. 16 and Sep. 3, 2007, including the field inspection along the Ciliwung River.

#### (2) Activity for [Capacity Development of Operation and Maintenance for River and Drainage Facilities] (for Project Output - 1) and for [Capacity Development of Data Collection and Analysis for Flood] (for Project Output - 2)

Activities in this category consist of the following items:

- Workshop on the Project
- Data collection and arrangement for inventory database
- Leveling and cross-sectional survey
- Establishment of one –dimensional flow model including review of tide data and rainfall analysis

#### 1) Workshop on the Project

Two workshops were planned in this period, in order to discuss/explain the inception report and data collection for the inventory database. However, the planned workshops were cancelled by the following reasons:

- During the first activity in Indonesia, the Inception Report Meeting was held with the participation of all C/P and representatives from the agencies concerned.
- Three days' workshop on the Project was held during the period from 9 to 11 of July, 2007 by the C/P's own initiative with the participants from the agencies concerned.
- ◆ Five (5) personnel have been assigned as the fulltime C/P. However, they are too busy to work with the JICA Experts everyday for data collection and establishment of the Comprehensive Flood Analysis Model. Therefore, other periodical meetings with the C/P were required.

The C/P meetings were planned bi-weekly with the following contents:

- Explanation/discussion on Flood Control Planning (Procedures and Methodology)
- Progress of Project including "Data collection for Inventory Database" and "Comprehensive Flood Analysis Model"
- Discussions on problems which have been encountered by the C/Ps

The C/P meetings were held four times on July 25, August 09, August 28 and September 19 of 2007. The C/P participating the meetings consist of the fulltime C/P and younger C/P. In addition, the engineers under Municipalities in DKI Jakarta, which are in charge of maintenance of micro and sub-micro drainage systems, are also invited to the meetings.

#### 2) Data Collection and Arrangement for Inventory Database

Data for inventory database consist of data and information of the river structures, drainage structures and the storage ponds in the Pilot Project Area and the Runoff Control Analysis Area. Data collection and arrangement are being carried out by the C/P and the JICA Expert together. The present condition of activities is as follows:

#### **River Structures**

The DGWR has prepared operation and maintenance manual for flood control structures named "Pedoman Operasi & Pemeliharaan Bangunan Pengendali Banjir". Data are being collected at Cil-Cis Office, in accordance with the manual.

#### **Drainage Structures**

Data of drainage network, especially location and size, is necessary not only for database but also for Comprehensive Flood Analysis Model. Drainage network of the limited flood prone areas are obtained from the DPU DKI. But it is necessary to collect the network installed in the pilot area and the runoff control analysis area of the Pesanggrahan River from the SDPU of municipalities in DKI Jakarta.

#### **Retarding Ponds**

There are many retarding ponds called as "Situ" in the pilot project area and the runoff control analysis basin. Those retarding ponds have certain purposes. However, those ponds also have the flood control function. Data of those retarding pond, such as storage area, catchment area, dimensions of outlets, etc. were collected at Cil-Cis Office and are being examined carefully.

#### 3) Leveling and Cross-sectional Survey

Leveling and cross-sectional survey in the pilot project area and runoff control analysis area are being carried out by subletting to PT. Megaplana Nusa Indonesia through the competitive bidding. The survey consists of the following items:

#### **Benchmark Network Setting with Leveling**

- Setting up of Bench Marks (12points in total)
- Leveling (130km in total)

#### **<u>River Cross-section Survey</u>**

- Total length of rivers/drains: 194 km
- Nos. of cross-sections to be surveyed: 1,350 sections

The objective rivers/drains and objective bench marks were determined through the discussions between the C/P and the JICA Experts.

Draft results of the survey were submitted by the subcontractor and are being checked by the JICA Experts and C/P. According to the checking results, there are discrepancies of the elevations of the Bench Marks between this survey results and those of the Cili-Cis Offices. In addition, there are discrepancies of the elevations between this survey results and those in the maps of DKI Jakarta with a scale of 1:5,000.

#### 4) Establishment of One-dimensional Flow Model

To establish the one – dimensional flow model of the pilot project area, the following activities were implemented.

#### **Review of Tide Data**

Tide is one of the most important factors, which affects the flow capacities of the river/drainage channels

and inundation conditions.

The hourly tide levels are observed at the Tanjung Priok and Sunda Kelapa stations by PT. Pelabuhan Indonesia II (Pelindo II) in the project area. At present, however, there is no compilation of the annual records by Pelindo II. The tide records at the Tanjung Priok station for recent years were collected through the head office of Pelindo II. The harmonic analysis of the records was conducted as an initial analysis by the JICA Experts and those results were explained to the C/P. Additional data collection and additional analysis will be conducted in the next activities. The analysis results will be used to review the flood preparedness plan.

#### **Rainfall Analysis**

The rainfall observation in JABODETABEK is being done by several agencies. Among them, BMG is in charge of compilation of all observation records. At present, however, the data compilation system of BMG stops functioning properly.

Therefore, the rainfall records of the stations for the BMG and BBWS Ciliwung- Cisadane were collected and are being analyzed.

The water level observation of the rivers in JOBODETABEK is being done by BBWS Ciliwung-Cisadane. The records were collected and are being arranged.

#### **Establishment of One-dimensional Flow Model**

One dimensional flow model is being prepared by giving channel data based on the results of the cross-sectional survey. Special attention is paid to the sites of the bridges, the weirs, and other crossing facilities, which becomes the bottle-neck sites of the flow capacities of the channels.

#### (3) Activity for [Capacity Development of Flood Information System] (for Project Output - 3)

Activities in this category consist of the following items:

- Arrangement of existing digital maps
- Establishment of two-dimensional inundation model
- Establishment of comprehensive flood analysis model

#### 1) Arrangement of Existing Digital Maps

Topographic information consisting of the elevation and land use is the basic data for establishing the flood inundation model and the runoff model of the pilot project area and the runoff control analysis area.

In order to establish both models, the pilot project area and the runoff control analysis area were divided into meshes, and elevation and land use data were obtained for the respective meshes. In addition, occupation ratio by houses/buildings was given to each mesh for the inundation model. Arrangement or making data for the model was done by the subcontractor under instruction and supervision by the JICA Experts. The process and results were explained to the C/P by the JICA Experts.

The digital maps used and outputs are as follows:

#### **Digital Map Used**

- Digital map with a scale of 1:25,000
- National Survey and Mapping Coordination AgencyDKI Jakarta
- Digital map with a scale of 1:5,000
- Outputs
  - Mesh cell data of elevations: mesh sizes with 7.5 sec  $\approx 230$  m
  - Mesh cell data of present land use: same as above.

In addition, mesh cell data of the past land use and the future land use plan is also being prepared, in order to evaluate the increase of runoff discharge due to urbanization by use of the runoff model. The past land use and the future land use plan are estimated based on the following maps collected by the C/P and the JICA Experts together:

- Past land use: Previous maps during 1980th made by National Survey and Mapping Coordination

Agency.

- Future land use plan: Land use plans prepared by the spatial planning agencies of the regencies in the pilot project area and the runoff control analysis area.

#### 2) Establishment of Two-dimensional Inundation Model

Two (2)-dimensional inundation model is being prepared, using the mesh data with 230 m meshes prepared the above arrangement of the existing digital maps, combining with the one-dimensional flow model. The road embankment, channel embankment and the local drains are also included in the model. The hydrological data are used as the input data.

#### 3) Establishment of Comprehensive Flood Analysis Model

The comprehensive flood analysis model is under preparation, combining the following models.

- Runoff analysis model
- One dimensional flow model
- Two-dimensional inundation model

The priorities for preparation of model are as follows:

- Priority 1: Areas inside the WBC (Central area of Jakarta)
- Priority 2: The WBC and the Ciliwung River
- Priority 3: The remaining areas

#### (4) Activity for [Capacity Development for Runoff Control Measures] (for Project Output - 4)

Activities in this category consist of the following items:

- Study on policy of runoff control measures
- Establishment of runoff model

#### 1) Study on Policy of Runoff Control Measures

The policies of the runoff control measures are being discussed with the C/P and the JICA Experts. Although the policies of the runoff control measures will be established based on the results of the runoff discharge analysis by use of the runoff model, it is considered that the following measures will be firstly applied to the runoff control measures.

- Restoration of storage ponds (situ-situ) in the basins
- Retarding basins along the rivers.
- Obligation of water retention area to large scale land developer.

#### 2) Establishment of Runoff Model

As described in (Arrangement of Existing Digital Maps), the pilot project area and the runoff control analysis area were divided into the mesh cells with 230 m and respective mesh cells data, such as elevations and land use conditions were obtained. By using the obtained data of mesh cells, the distributed runoff model, corresponding to the present and the past conditions, is being prepared.

Table 2.12 Achievement of Kiver and Kiver Structure Survey					
(1)Benchmark Network Setting with Leveling					
(a) Setting up of Bench Marks (12 points in total)		12 Points in total			
(b) Leveling (130km in total)		130 km in total			
(2)River Cross Sectional Survey					
Name of river/ Drainage channel	Length	Number of Cross			
		section			
① Ciliwung	23.9 km	122 Section			
② Ciliwung Drain	21.5 km	210 Section			
③ K Angke	8.0 km	74 Section			
④ K Cideng	15.7 km	159 Section			
5 K Grogol	18.6 km	121 Section			
6 K Kurkut	5.0 km	37 Section			

#### Table-2.12 Achievement of River and River Structure Survey

The Institutional Revitalization Project for Flood Management in JABODETABEK

⑦ K Sekretaris	7.3 km	48 Section
⑧ M Karang	2.9 km	32 Section
9 Mampang	6.6 km	33 Section
10 WBC	17.1 km	179 Section
1 Pesangrahan	17.3 km	87 Section
① Secondary Drainage	48.5 km	250 Section
Total	193.4 km	1343 Section
(3) River Profile Survey		
① Ciliwung Drain	21.5 km	
② K. Cideng	15.7 km	
Total	37.2 km	



Figure-2.2 Location of River Survey

#### 2.4.2 3rd Activity in Indonesia

#### (1) Summary

Third activity in Indonesia was the first rainy season of the Project and was planned as first period of the second phase for capacity building on flood mitigation and preparation of manuals. Therefore, the flood monitoring meetings were held with the fulltime C/Ps every day based on the data and information from the agencies concerned, in order to clarify the flood in JABODETABEK and to monitor the activities by the agencies concerned. (Fortunately, there were only two (2) floods in the JABODETABEK during this rainy season.) In addition to the flood monitoring meeting, the post flood survey and study on 01/Feb/2008 flood was carried out in the Project. Through these activities, major issues and points to be improved on the flood mitigation were considered and discussed among the C/Ps and the JICA Experts. Based on these results, the next activities will be implemented efficiently. Therefore, it is judged that the activity result comparatively good was obtained as the third activity in Indonesia.

The data of the flood monitoring meetings and the post flood survey and study on 01/Feb/2008 flood are compiled as the attachments of this report.

On the other hand, there was an organization reform in DGWR, the Ministry of Public Works. In this context, change of the coordination section of the Project is foreseen. The coordination of the Project will be a subject in the next (forth) activity period.

# (2) Activity for [Capacity Development of Operation and Maintenance for River and Drainage Facilities] (for Project Output - 1) and for [Capacity Development of Data Collection and Analysis for Flood] (for Project Output - 2)

Activities in this category consist of the following items:

- ◆ Implementation of Post Flood Survey [5-1]
  - Preparation of post flood survey manual on operation and damage investigation of structure (draft) and workshop
  - Execution of discharge observation
  - Survey on operation and damage condition of structure
- ◆ Implementation of Additional Survey [5-2]
- Review of Comprehensive Flood Analysis Model and Estimation of Flow Capacity [5-3]

#### 1) Implementation of Post Flood Survey

#### <u>Preparation of Post Flood Survey Manual on Operation and Damage Investigation of Structure</u> (Draft) and Workshop

There are many rivers and drainage channels in JABODETABEK. The major rivers and drainage channels in the DKI Jakarta are shown in Figure-2.4.2.

#### **Execution of Discharge Observation**

In order to implement the discharge observation, three (3) sets of the portable type current velocity meters were procured in this activity. The JICA Experts prepared the users guide of the equipment and a simple guideline of the discharge observation by use of the current meter.

After the site inspection of the water level observation stations by the C/Ps and JICA Experts, the following sites were determined to the candidate sites for the discharge observation and the cross sectional survey of those sites was conducted:

- Manggarai Station (Ciliwung River)
- Depok Station (Ciliwung River)
- Bendungan Hilir Station (Krukut River)

After the preparation including the trial-run observation, there is no actual observation done by the project



Figure-2.3 Major Rivers and Drainage Channel in DKI Jakarta

It is necessary for the agencies concerned to clarify the causes of the damages of floods for individual rivers and drainage channels. In this context, it is important to survey/compile the operation records of the river/drainage structures and the damages of those structures. The JICA Experts prepared the outline of the manual including the contents and sections in charge, and discussed with the C/Ps.

The workshop on the draft manual was firstly planned to be held on Dec. 2007, in order to discuss the contents of the manuals in detail. However, the workshop was postponed by the following reason, through the discussion with the coordination section of the Project in DGWR:

- The Meeting on Progress Report I was held with the participation of the representative of the agencies concerned and the C/Ps in the initial stage of the third activity in Indonesia.
- ◆ The period of the third activity in Indonesia was in rainy season. There are many ordinary activities for the agencies concerned. Therefore, it is difficult to hold the workshop in this season. Instead of the workshop, it is better to discuss this activity among the selected C/Ps.

and also by the agencies concerned, since there is no flood of the river in this rainy season. The discharge observation will be implemented from the next rainy season by the agencies concerned in cooperation with the JICA Expert Team

#### Post Flood Survey on Operation and Damage Condition of Structure

Based on the outline prepared and discussed between C/Ps and the JICA experts, the post flood survey on 01/Feb/2008 flood was carried out not only for operation and damage condition of structure but also inundation condition of the flood. In addition, the study of the drainage system around the Siantar Pump Station as the representative drainage system in the Central Jakarta area was also carried out. The Survey and study results are compiled as the attached report (Attachment –I).

Fortunately there are only two (2) floods in this rainy season, that is, 02/Jan/2008 flood and 01/Feb/2008 flood. The 01/Feb/2008 flood was selected as a sample, considering the damage of the flood.

The characteristic of two floods are summarized as follows:

- ◆ 02/Jan/2008 Flood: There were damages along the Ciliwung River due to the rainfall in the mountainous area of the Ciliwung River basin. However, flood damages were limited to the areas along the rivers.
- ◆ 02/Feb/2008 Flood: There were many inundation areas in and around DKI Jakarta, due to the heavy rainfall in and around DKI Jakarta. Although the flood water declined quickly, people suffered the damages not only from the flood damage but also from the traffic congestion/standstill for a long time succeeding to the flood.

#### 2) Implementation of GPS Survey

Topographic information is the basics for the flood mitigation activities. As the results of the cross-sectional survey during the second activity in Indonesia (May to Sep. 2007), there are discrepancies of the elevation values between the previous DKI map with a scale of 1: 5,000 and the survey carried out by the Project. Considering this situation, the elevation survey by the GPS was planned as the additional survey. The GPS elevation survey consists of field works to get the raw data and the office works to analyze the raw data to the elevation data. The field works of the GPS elevation survey was done by the subletting to the survey consultant in the period of the third activity. The analysis is scheduled to be done in the succeeding period. Objective area of the GPS elevation survey is shown in Figure-2.4.3.

#### 3) Review of Comprehensive Flood Analysis Model and Estimation of Flow Capacity [5-3]

The comprehensive flood analysis model consists of the following models:

- ◆ Runoff analysis model
- One –dimensional flow model
- Two-dimensional inundation model

Each model was reviewed based on the careful examination of the data collected during the second activity and the close inspection of the sites during the third activity. As the results of the review, the comprehensive flood analysis model for the present land use became in operation. The analysis model will be calibrated and fully operated after getting the elevation data from the GPS elevation survey in the next (fourth) activity in Indonesia.



Figure- 2.4 Objective Area of GPS Elevation Survey

#### (3) Activity for [Capacity Development of Flood Information System] (for Project Output - 3)

Activities in this category consist of the following items:

- Flood Inundation Survey
  - Preparation of post flood survey manual on flood inundation condition (draft) and workshop
     Implementation of Inundation Survey
- Additional Collection of Data and Information

#### 1) Flood Inundation Survey

#### Preparation of Post Flood Survey Manual on Flood Inundation Condition (Draft) and Workshop

According to the information from DPU-DKI, there are 78 flood prone areas in DKI Jakarta as shown in Figure-2.5.



Figure-2.5 Revised Flood Prone Area in DKI Jakarta (revised by the Project)

In order to mitigate the flood damage, it is required for the agencies concerned to grasp the present condition of the inundation/flood and to clarify the causes of flood/inundation damages. At present, the agencies concerned carry out the inundation/flood survey after the big flood. However, those results are kept as the records and evaluation of flood damages including clarification of the causes of flood damages are not implemented.

Yachiyo Engineering Co., Ltd

In order to improve the present inundation survey of the agencies concerned, the JICA Experts prepared the outline of the post flood survey manual on inundation condition and discussed it with C/Ps.

The workshop on the draft manuals was planned on Dec. 2007. However, the workshop was postponed.

In addition, one staff gauge was installed to the flood prone area in Kampung Melayu along the Ciliwung River by the Project under the discussion with the Lurah (chief of village), in order to facilitate the flood warning and the inundation survey by the Kelurahan (village). The installed staff-gauge elevation was also surveyed by use of the BM network by the Project. The installed staff gauge was functioned during the post flood survey on 01/Feb/2008 flood.



Photo -2.3 Staff Gauge installed in Kampung Melayu

#### **Implementation of Flood Inundation Survey**

The post flood survey and study were carried out on 01/Feb/2008 flood.

#### 2) Additional Collection of Data and Information [not specified]

Hydrological observation stations in JABODETABEK are presented in Figure-2.4.5. There are many water level stations distributed in JABODETABEK. However, there are few automatic rainfall stations, which can get the hourly rainfall records. Among the automatic rainfall station, the stations by BMG have the records with long periods.

In order to analyze the flood phenomena, it is important to grasp the characteristics of rainfall in the area.

In this context, the JICA Experts and C/Ps have been trying to collect the hourly rainfall records from the stations of BMG. However, the records could not be collected up to now. The JICA Experts and C/P will continue the efforts to collect the records from the stations of BMG in next (forth) activity in Indonesia.

In addition, field inspection of the hydrological observation stations was carried out during this period in order to grasp and evaluate the present condition of stations. Based on the inspection results, some recommendations on the stations were made and discussed with the agencies concerned.



Figure-2.6 Major Hydrological Observation Stations in JABODETABEK

#### (4) Activity for [Capacity Development for Runoff Control Measures] (for Project Output - 4)

There is no scheduled activity in this category. However, the following activities were commenced in order to facilitate the activities in the next period:

- Study on legal and organizational structure for land use control in JABODETABEK.
- Study on incentive to runoff control measures in the other countries.

These activities will be continued in the next period and the guideline on the runoff control measures in JABODETABEK will be compiled.

#### 2.4.3 4th and 5th Activities in Indonesia

#### (1) Summary

#### 1) Activities Results regarding the Target Outputs in this Term

#### Activity for [Capacity Development of Operation and Maintenance for River and Drainage Facilities] (for Project Output - 1) and for [Capacity Development of Data Collection and Analysis for Flood] (for Project Output - 2)

- To prepare the inventory of river and drainage system, gates and weirs installed in the Ciliwung River and WBC (West Banjir Canal) were surveyed and the elevation of each facility was obtained. Also the reservoir of Pluit Pump Station was surveyed to estimate the reservoir volume.
- "Inventory on River and Drainage System" was prepared by compiling all the data and information collected so far on river and drainage system and facility. And the Manual for Rivers and River Structures (Draft) covering Inventory, Maintenance and Facility Evaluation was prepared also. These outputs were confirmed among the counterparts and the experts.
- Discharge measurements at the Depok Station (Design Reference Point for Flood Alert) were carried out by the expert together with the Counterparts.
- The existing pump stations and gated were surveyed by the experts together with the Counterparts. Operation manual on Pump and Gate (Draft) was confirmed among the counterparts and the experts, and prepared in Draft-Level.
- The presentations on these manuals were done by the Counterparts at the Steering Committee Meeting on March 13 at the meeting room of DGWR.

#### Activity for [Capacity Development of Flood Information System] (for Project Output - 3)

- Maximum Inundation Map and Flood Risk Map for probability year 1/5, 1/20, 1/30. 1/50 and 1/100 were prepared as the first trial version by using the Flood Inundation Analysis Model [JYECA-FLOW 2D] which was established for this Project.
- The outline of the model and results of simulation were introduced and presented by the expert at the Steering Committee Meeting mentioned above.

#### Activity for [Capacity Development for Runoff Control Measures] (for Project Output - 4)

There is no scheduled activity in this category.

#### Main Achievement

- ✓ Inventory of Rivers and River Structures and Situ-Situ
- ✓ River Survey in Ciliwung, WBC and Pesanggrahan River Systems
- ✓ Digital Map Analysis
- ✓ Land Use Analysis
- ✓ Inspection for Current Conditions of Pluit, Cideng and Melati Pump Stations
- ✓ Inspection for Gate Stations in Lowland Ares
- ✓ Analysis of Flow Capacity in Pluit Drainage Area
- ✓ Inundation Analysis in Ciliwung and WBC Rivers Basin

#### 2) Counterpart Training

- Counterpart training was implemented through the OJT and the Counterpart Training in Japan.
- Two counterparts were sent to Japan for the topic of the training is "Comprehensive Flood Mitigation in Japan" in September 2008.

#### 3) Seminar

- On December 4, 2008 the Seminar sponsored by DPU and co-sponsored by JICA was held to exchange information, to introduce and encourage comprehensive measures, and to confirm the coordination mechanism for flood management in JABODETABEC.
- Main outputs are: 1) Policy direction for flood mitigation measures, and 2) Inter-coordination framework among the related agencies on planning and implementing flood mitigation measures.

#### (2) Activity for [Capacity Development of Operation and Maintenance for River and Drainage Facilities] (for Project Output - 1) and for [Capacity Development of Data Collection and Analysis for Flood] (for Project Output - 2)

Activities in this category consist of the following items:

- Preparation of Inventory Database
- Post Flood Survey
- Flood Survey of Pluit Pump Station and Reservoir on 14/Jan/2009
- Piping at Pluit Pump Station on 18/Feb/2009 and 22/Feb/2009
- Study on Maintenance Problems of Rivers and Structures and Preparation of Maintenance Manual (Draft)
- Additional Survey of River and Drainage
- Data Collection and Analysis on Flood
- Improvement of Operation and Maintenance Manual for River and Drainage Facilities
- Survey for Drainage Pump and Gate

#### 1) Preparation of Inventory Database

Inventory of rivers and river structures are drawing up in the Manual for River and River Structures. Database in the manual are categorized as flows,

- Rivers and Situ-Situ
- ♦ Gates
- Pump Stations
- Revetments

#### **Administration of River**

River is categorized three types according to the responsibility of owners, namely Macro, Sub-Macro and Micro.

- Macro river is administrated by BBWS Chiliwung Cisadane
- Sub-Macro river is administrated by DPU DKI Jakarta (Agency pf PU DKI Jakarta)
- Micro river is administrated by SUK DINAS (SUB-Agency of PU)

River is naturally one of components involving water cycle on earth. Primary functions of it are to flow out rainfall into sea or lakes and convey sediment generated by erosive action. Human being try to utilize river and natural behaviors of the river are given various actions to human life. River has multipurpose functions for human life such as Flood conveyance, water utilization, river use, and water amenity and environment.

#### **Classification of River Course**

In Indonesia, river courses and channels in the same basin are classified into order1, order2 order3, which are numbered from a main river to tributaries and sub-tributaries.

Order		Category of Ri	ver Structure
Order	Order	Category	Administration
Order Order	1	Macro	BBWS
	2	Sub- Macro	DKI
	3	Micro	SKDINAS
Sea or			

Figure-2.7 Classification of River Course and River Structure

#### Categories and Types of River Structures in the Ciliwung River

River infrastructures in the river Ciliwung River Basin are classified into 10 categories to apply the methodology of maintenance work. Categories and type of river structures are shown in Table-2.13.

Tuble 2.15 Category of River Structure							
No.	Category and Type	No.	Category and Type				
1	Dike	6	Sluice Way				
2	Parapet Wall	7	Flap Gate				
3	Revetment	8	Pumping Facility				
4	Weir	9	Siphon (Siphon over type and Siphon under type)				
5	Gate (Flow Control Gate, Tidal Gate)	10	Flood Retention Pond (Farm pond)				

 Table-2.13
 Category of River Structure

#### 2) Post Flood Survey

#### (2-1) Flood Survey of Pluit Pump Station and Reservoir on 14/Jan/2009

#### <Purpose>

The Pluit Pump Station and Reservoir are the trunk facilities of the drainage in the center of the Jakarta. In order to mitigate the flood damage, it is important to grasp the present condition of these facilities.

The JABODETABEK area has intermittent rainfalls from 12/Jan/2009. In the morning of 14/Jan/2009, the Project received the information that the water level of the Pluit Reservoir became – 20 cm at the installed staff gauge, although the rainfalls during this period were not heavy compared with the past major floods. Therefore, the urgent inspection of the Pluit Pump Station and Reservoir was carried out in the afternoon of 14/Jan/2009. During the urgent inspection, the Project Team found the following problems:

- Decrease of workable pump units of the Pluit Pump Station
- Sea water intrusion due to the spring high tide and high wave.
- Flow obstruction at the Pluit Siphon.



Figure-2.8 Location Map of Pluit Pump Station and Reservoir

#### <Condition of Pump Operation>

According to the information of the pump operators, the condition of the pump operation as follows:

Tuble 2.14 Condition of 1 dinp Operation ds of 14/5dil/2007						
Pump House	Pump No.	Capacity (m <sup>3</sup> /s)	Condition as of 14/Jan/2009	Condition as of 18/Nov/2008		
Timur	1	3.2	Replacement of rachet just finished.	Under repairing		
Pump	2	3.2	Motor is damaged.	Motor is damaged.		
House	3	3.2	Pump is damaged by garbage. Pump is damaged by garbage			
	4	3.7	Operation	Operation		
Tengah	1	4.0	Operation	Operation		
Pump	2	4.0	Under repairing of trash screen.	Under repairing of trash screen.		
House	3	4.0	Operation	Operation		
	4	4.0	Gear box is damaged.	Gear box is damaged.		
Barat	1	6.0	Operation	Operation		
Pump	2	6.0	Operation	Under repairing of shaft.		
House	3	6.0	Under replacing of a timer. (It will be	Operation		
			finished soon.)			

#### Table-2.14 Condition of Pump Operation as of 14/Jan/2009

\* Note: The craine system for maintenance works in the Timur Pump House is under replacing. Therefore, it is difficult to implement the maintenance works.

Installed and workable pump units and capacities are summarized below:

Table-2.15 Summary of Condition of Pumps						
Condition	Pump Units (nos)	Capacity (m <sup>3</sup> /s)				
Installed Pumps	11	47.3				
Workable Pumps as of 18/Nov/2009	5	23.7 (50.1%)				
Workable Pumps as of 14/Jan/2009	5	23.7 (50.1 %)				
Condition at the end of Jan/2009	7	32.7 (69.1 5)				

## Table 215 Summary of Condition of Dumna

As shown in the above tables, the present capacity of pump is about 50 % of the installed capacity and it is almost same as the condition at the previous inspection on 18/Nov/2009.

During the inspection, the water level in the reservoir rose to + 0.05 m at the installed staff gauge (around 3 O'clock in the afternoon) as shown in the following photographs:



**Staff Gauge at Inlet of Pump Station** 

View of Reservoir around Inlet of Pump Station

It seems that the workable pump condition is one of the causes of the water level rising in the reservoir.

The Pluit drainage area with an area of 34.2 km<sup>2</sup> is the low-lying land. Therefore, rain water cannot be drained into the sea gravitationally. The pump operation is the only way to drain rainwater in the area. Therefore, it is strongly recommended to accelerate the repairing/maintenance activities of the pump units in order to mitigate the flood damage during the coming heavy rain season.

#### <Sea-Water Leakage to Pluit Reservoir>

Other cause of the water level rising in the reservoir is the sea water intrusion from the eastern side of the reservoir. From 11/Jan/2009, the Java Sea had the spring high tide and high waves. As the result, the sea levee around the coal harbor in Muara Baru was damaged and sea water intruded to the Pluit Reservoir. During the inspection, the sea water still intruded to the reservoir and the Project Team could not pass through the Jl. Muara Baru. The condition of Jl. Muara Baru is shown in the photograph below.

Sea water intrusion like this has happened repeatedly during the spring high tide periods. Although there are some private property's problems for the sea levee, it is expected to take the drastic measures for the sea levee in order to prevent the sea water intrusion.

#### <Flow Obstruction at Pluit Siphon>

The Pluit Siphon is located at the inlet of the reservoir as the end of drain. At this site, the water level of the drain side was higher than that of the reservoir with height of about 20 cm measured by eye. The causes of this backwater are seemed to be the obstruction of flow by the accumulated garbage around the siphon and by the siphon itself. It is strongly recommended not only to remove the garbage around the siphon but also to remove or replace the siphon considering the original function of the installed siphon.



#### southern direction

#### (2-2) Piping at Pluit Pump Station on 18/Feb/2009 and 22/Feb/2009

On 17/Feb/2009, staff members of the Project received the information from DPU-DKI for piping (leakage of sea water) around the Pluit Pump Station. The Pluit Pump station is a trunk facility of the drainage in the center of Jakarta. Therefore, urgent inspection of the Pluit pump Station was carried out in the morning of 18/Feb/2009.

#### <Present Condition of Piping at Pluit Pump Station>



Photo-2.8 Pluit Pump Station

The Pluit Pump Station consists of 3 pump houses, that is, Timur (East), Tengah (Center) and Barat (West). Piping occurs at the East pump house as shown in Figure below:



Figure-2.9 Location of Piping at East Pump House (on 18/Feb/2009)

Piping (leakage of water) occurs at the following three sites at the East pump house:

- No.1: Left side of outlet. (large quantity of water leakage)
- No.2: Just upstream point of the inlet of Pump 1. (large quantity of water leakage)
- No.3: Just upstream point of the inlet of Pump 3. (little water leakage)

Leakage route is from the outlet channel to No.1 and from No1 to No.2 and No.3. Condition of the leakage is as show in the following photographs.



Photo-2.9 Situation of Piping Collapse at East Pump Station



Photo-2.10 Inlet of Leakage flow under East Pump Station

Photo-2.11 Blowout of Leakage Water in front of Pump No.1

According to the rough survey by use of the measurement tape, the longitudinal condition of leakage of water (piping) is as shown in the following figure.



Figure-2.10 Image of Piping at East Pump House

The leakage of water flows from the end of floor slab at the outlet to the end of inlet of the pump unit. Leakage volume is measured roughly at the inlet of leakage at No.1 site and estimated at about  $2.5m^3/s$  in maximum. This is a quite huge volume. The creep length of the piping from No.1 to No.3 is estimated about 28 m.

According to the operators in the Pluit Pump Station, the progress of sea water leakage is as follows:

• About 10 days ago during the spring tide, it was found the small leakage water at above three (3) sites.

- The sand bags and gabion mattresses were used at No. 1 site to stop the leakage of water. In addition, a closing works was begun at the end of the outlet channel in order to lower the water level at the outlet channel.
- However, the water leakage progressed bigger and bigger.
- Blowout of water at the No.3 was become smaller in these two (2) days.

#### <Inspection on 22-2-2009>

#### Urgent countermeasures taken by DKI

Inspection of Collapse due to piping was followed up on 22-2-2009. Urgent Countermeasures by DKI has already carried out as follows,

- Outlet at sea side from discharge sump has closed by sand backs to lower water level of sump.
- Water level of Discharge Sump has lowered near the bottom of it.

#### **Condition of the discharge sump**

- However some leakage from sea was still identified.
- Many cracks on the wall of sump were identified not only left side but right side.
- Almost same discharge with leakage from outlet is leaked to piping collapse point of behind left wall.

Leakage point is assumed to be from bottom to middle height of discharge sump wall. Due to the lower of water level of Discharge Sump, about  $4 \text{ tf/m}^2$  Uplift is loaded under the bottom of Discharge Sump due to water level difference between sea water level and that of discharge Sump. This Situation might have possibility to float up the Sump and induce collapse of the bottom of it. When this accident is occurred, sea water flows into the pluit reservoir and suffer huge damage. As soon as possible, fill water in the Sump more than 2 m -4m to prevent collapse of Discharge Sump.

#### Cause of piping and collapse

- From the cracks of wall and bottom of Discharge Sump, leakage has been occurred for long time ago. Water pressure induced piping is same with the difference between sea water level and Pluit reservoir water level.
- ♦ In this case, creep length is shorter than that from the sea. Lengths of creep are about 25m from Dicharge Sump and about 50m from the sea. Short creep length from the discharge sump and cracks of it has induced piping collapse. Piping has been progressed between discharge sump and Pluit reservoir just at the front of pump station.
- So, there are possibility to exist many small piping hole and route under the pump station.
- By interview with the pump station staff, there are no sheet pipes under the pump station to prevent piping. And, no foundation pile under the discharge sump.



Photo-2.12Location closing works of outlet of<br/>discharge sumpPhoto-2.13Situation of Discharge Sump East<br/>(22-2-2009) from sea side



#### **Urgent Countermeasure**

It is difficult to put sheet pipe between discharge sump and pump station because steel pipe form pump station are existed between of them. As urgent countermeasures, below methods are proposed.

- Stop the sea water flow into discharge Sump and empty it. To prevent sea water flow, sheet pile shall be constructed at the front of outlet mouth.
- Check and repair cracks in the Discharge Sump. To repair cracks, cement milk shall be injected and filled up cracks
- Put the seepage control sheet around inside it.
- Put the cut-off sheet pile at the front of sea tide wall to long creep length with high tide dike. When this method is taken, sinking of Discharge Sump shall be carefully measured.
- Otherwise, put the slab on the bottom of Discharge Sump with foundation pile to prevent subsidence.
- Closing works of piping hole shall be carried out. As method of closing the hole, cement milk intrusion is also recommended.



Figure-2.11 Location of Cut-off wall