Ministry of Public Works
The Republic of Indonesia

Special Assistance for Project Formation (SAPROF)
for
Urban Flood Control System Improvement
in Selected Cities

FINAL REPORT

January 2009

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

IDEA CONSULTANTS, INC.

Ministry of Public Works
The Republic of Indonesia

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December 2008

SAPROF Study Team
for
Japan International Cooperation Agency (JICA)

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Background of Project

Situation/Problem

Regional urban cities suffer from flood disaster frequently.

Flood is an obstacle to regional economic development and mitigation of the economic disparity.

Solution

Improvement of flood control system especially in the regional urban area is necessary.

2

Objectives of Project

Increasing the safety level against flood disaster supposed to be accelerated by climate change in the regional urban cities

(a) Enhance regional development,

(b) Solve the economic disparity

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Objectives of SAPROF

Based on the Implementation Program prepared by DGWR;

- To formulate selection criteria
- To prepare for Long List
- To prepare for Short List
- To review of Scope of Work for Short-listed Sub-projects
  - construction cost,
  - economical/environmental evaluation,
  - implementation program
- To examine adaptation of climate change
- To review overall implementation program

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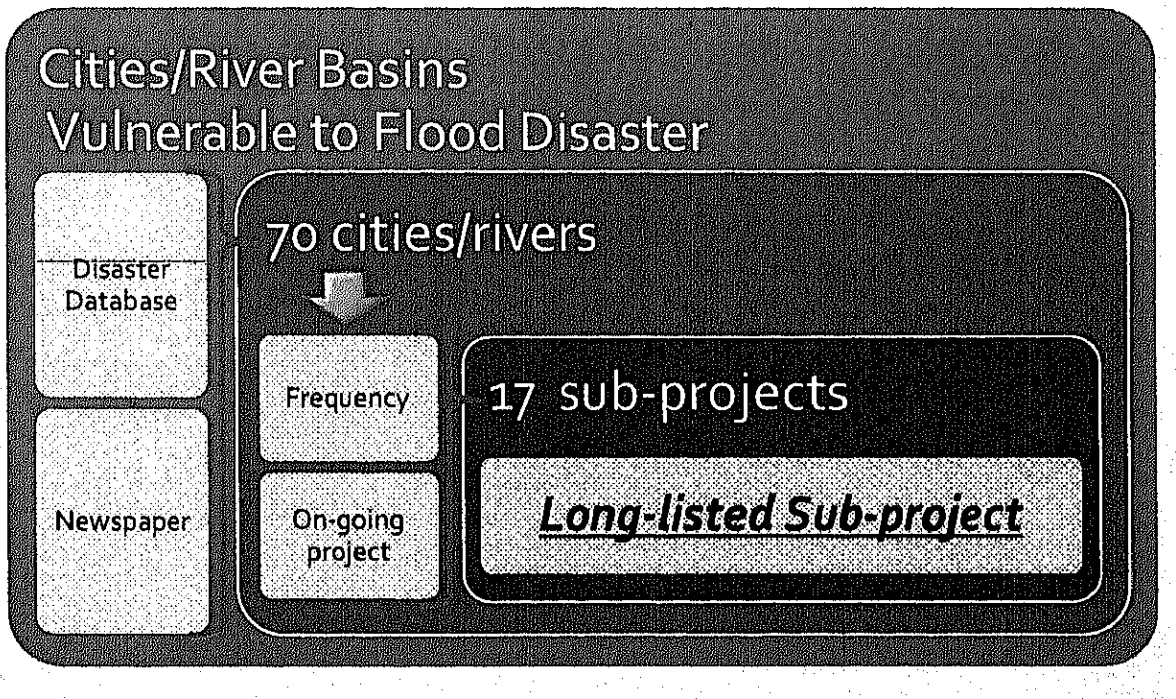
Long-listed Sub-projects



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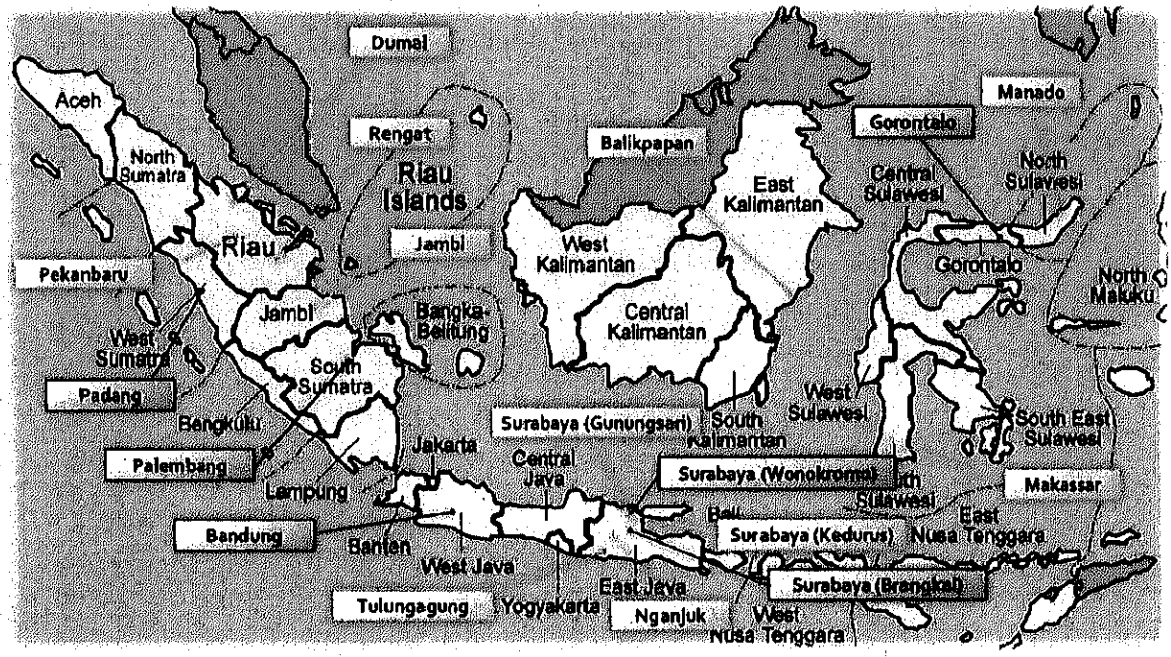
Long-listed Sub-projects



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Short-Listed Sub-projects

Priority

- Direct/Indirect Flood Damage
- Frequency of Flood
- Economic Disparity
- Important Public Infrastructure
- Existing Flood Control Facilities

Readiness

- Study and Design
- Environmental and Social Consideration
  - EIA
  - Natural Environment
  - Land Acquisition & Resettlement

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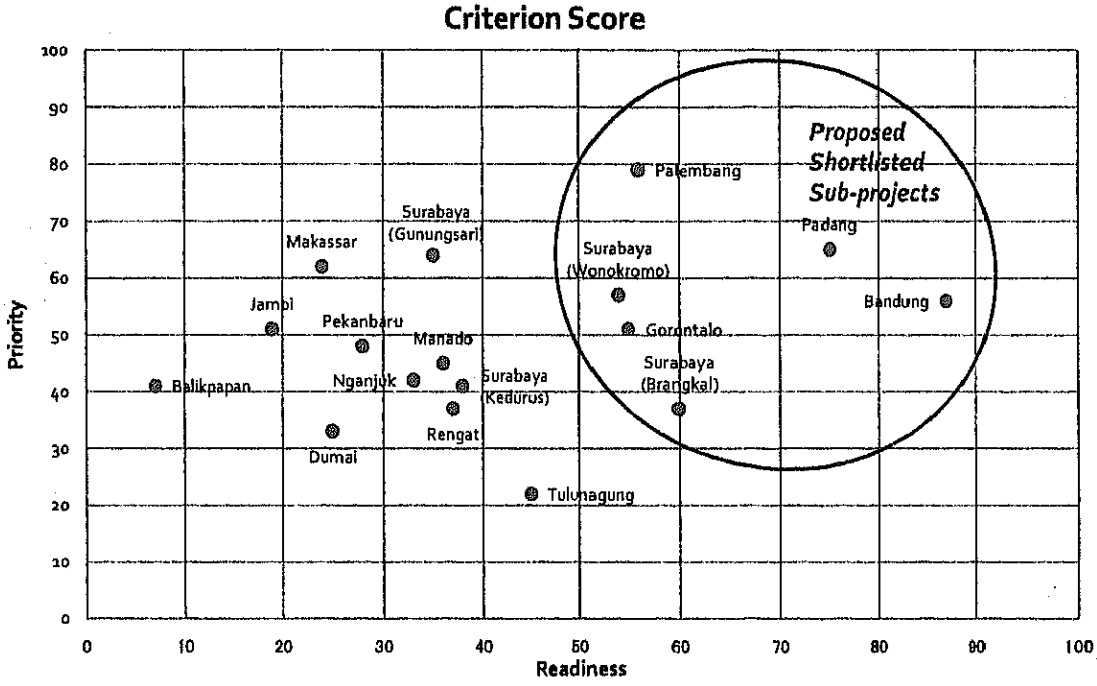
Short-Listed Sub-projects



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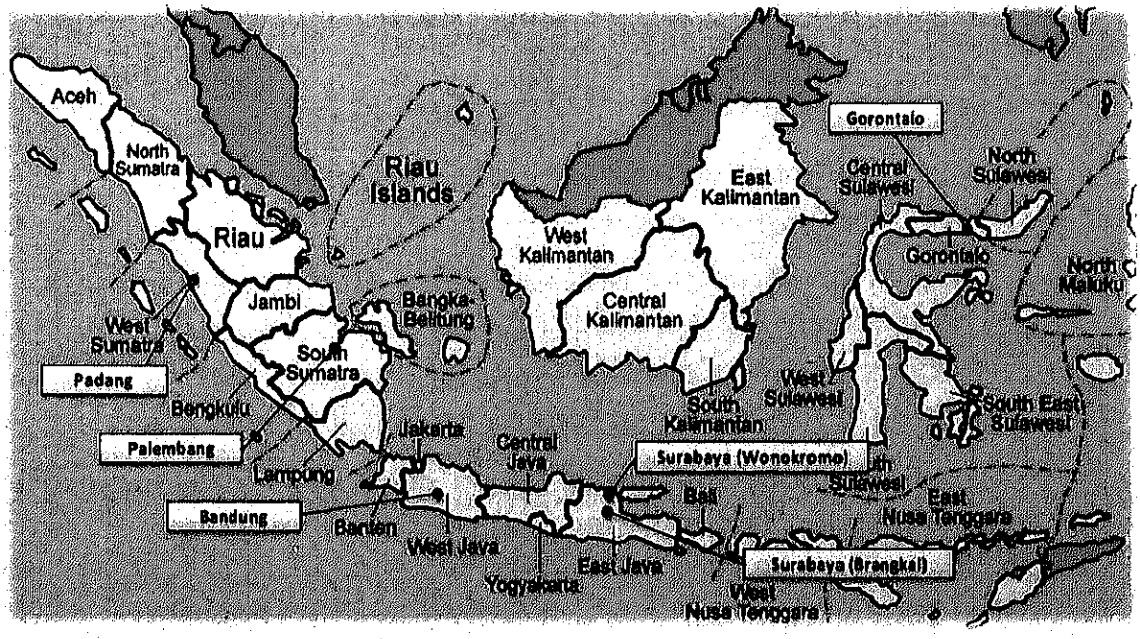
Short-Listed Sub-projects



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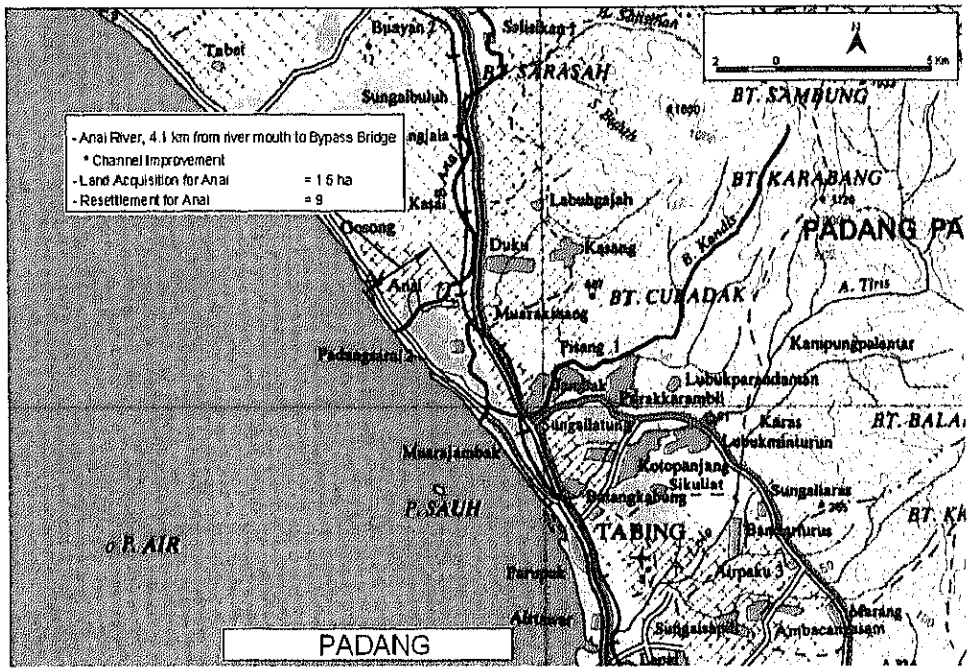
Padang Sub-project



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Padang Sub-project

- Anai River, 4.1 km from river mouth to Bypass Bridge
  - Channel excavation : 1,060,000 m3
  - Closing dyke : 4 site
  - Bank protection (wet masonry) : 950m
  - Drainage culvert : 5 nos.
  - Non-structure Measures for Adaptation of Climate Change
- Construction Cost
  = Rp. 173.9 billion in August 2008 price level
- Land Acquisition for Anai = 1.5 ha
- Resettlement for Anai = 9 households
- Review of PKL & RPL : to be approved in Aug. 2009
- Preparation of LARAP : scheduled in 2009 (Rp.297 million)
- Budget for land/house in 2009: Rp.10 billion (20 ha)

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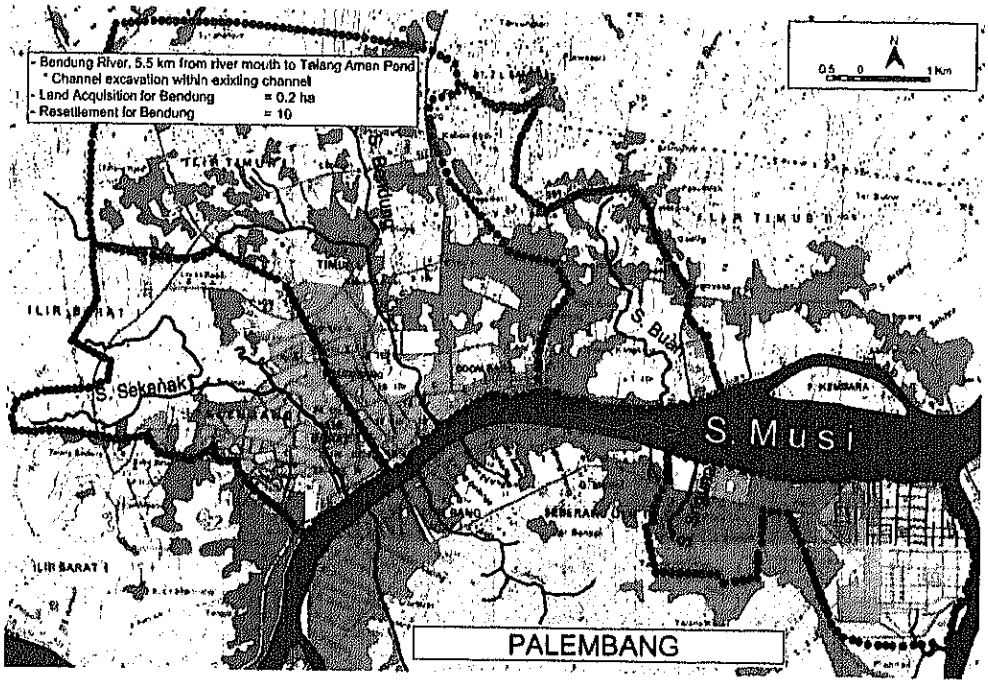
Palembang Sub-project



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Palembang Sub-project

- **Bendung River, 5.5 km from river mouth to Talang Aman Pond**
  - **Channel excavation 110,000m3 within existing channel**
  - **Non-structure Measures for Adaptation of Climate Change**
- **Construction Cost**
  = Rp. 41.7 billion in August 2008 price level
- **Land Acquisition for Bendung = 0.2 ha**
- **Resettlement for Bendung = 10 households**
- **AMDAL study : to be approved in Jan. 2010**
- **Preparation of LARAP : scheduled in 2009 (Rp. 200 million)**
- **Budget for land/house in 2009: Rp.1.5 billion (15 ha)**

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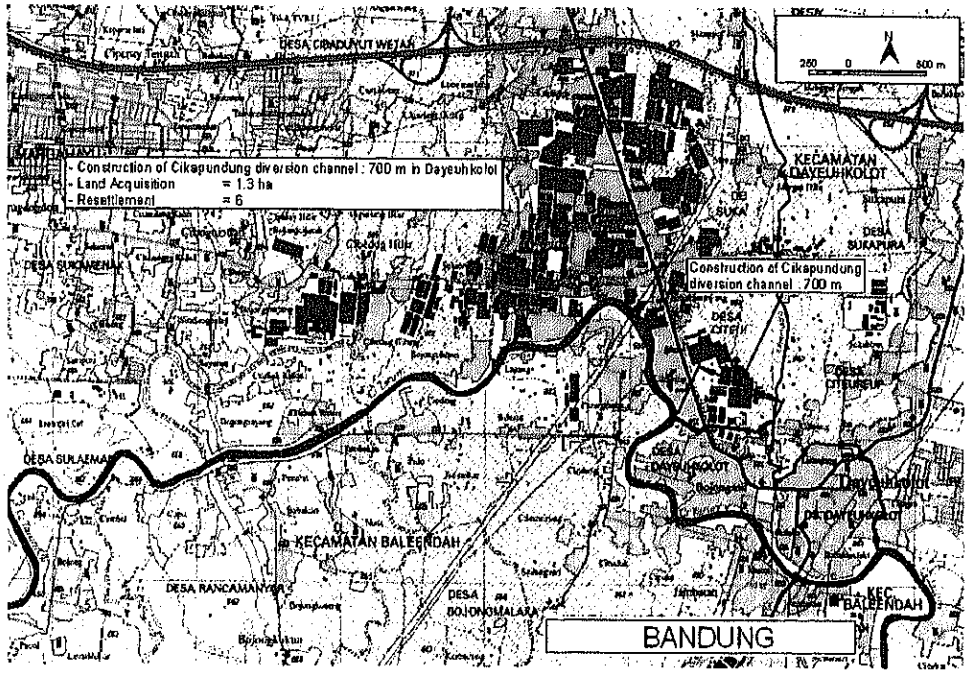
Bandung Sub-project



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Bandung Sub-project

- Construction of Cikapundung Diversion Channel (700 m) in Dayeuhkolot
  - Construction of Moh Toha Road Bridge
  - Non-structure Measures for Adaptation of Climate Change
- Construction Cost
  = Rp. 20.0 billion in August 2008 price level
- Land Acquisition = 1.3 ha
- Resettlement = 6 households
- AMDAL study : approved in 2007 (still available)
- Preparation of LARAP : scheduled in 2009
- Budget for land/house in 2009: to be requested

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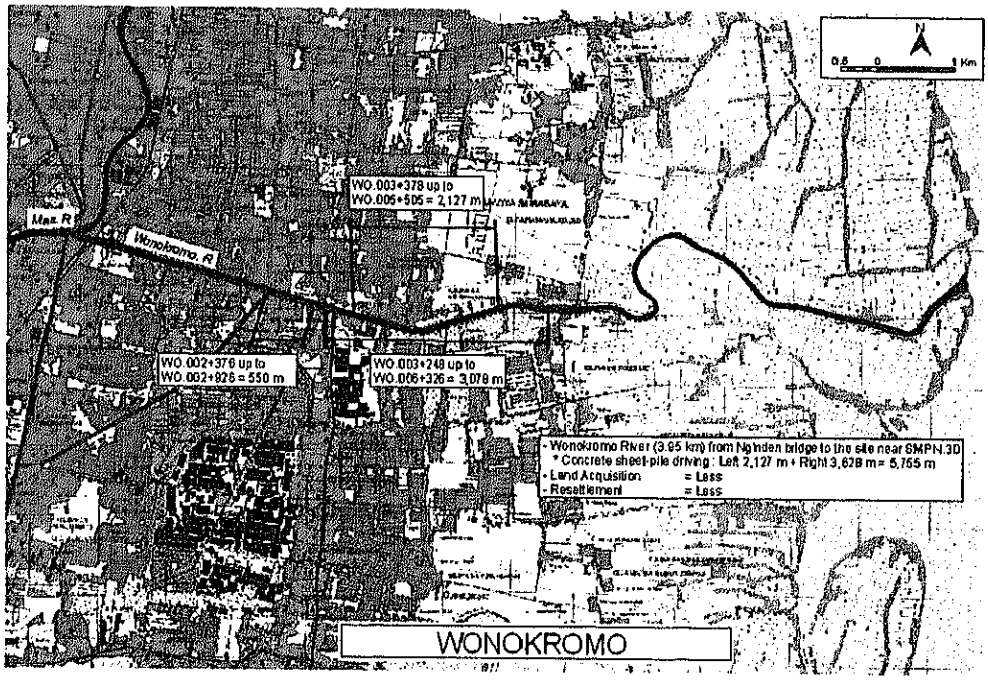
Surabaya (Wonokromo) Sub-project



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Surabaya (Wonokromo) Sub-project

- **Wonokromo River (3.95 km) from Nginden bridge to the site near SMPN30**
  - **Concrete sheet-pile driving : 5,755 m**
  - **Channel excavation : 4,500 m³**
  - **Non-structure Measures for Adaptation of Climate Change**
- **Construction Cost**
  = Rp. 126.5 billion in August 2008 price level
- **Land Acquisition = None**
- **Resettlement = None**
- **AMDAL study : to be approved in Jan. 2009 (on-going)**

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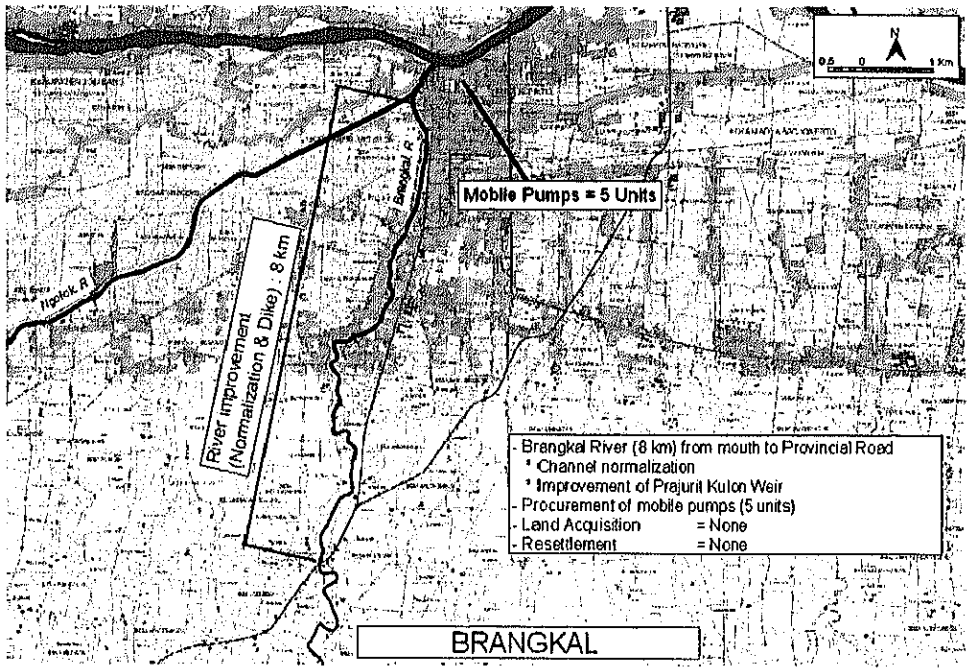
Surabaya (Brangkal) Sub-project

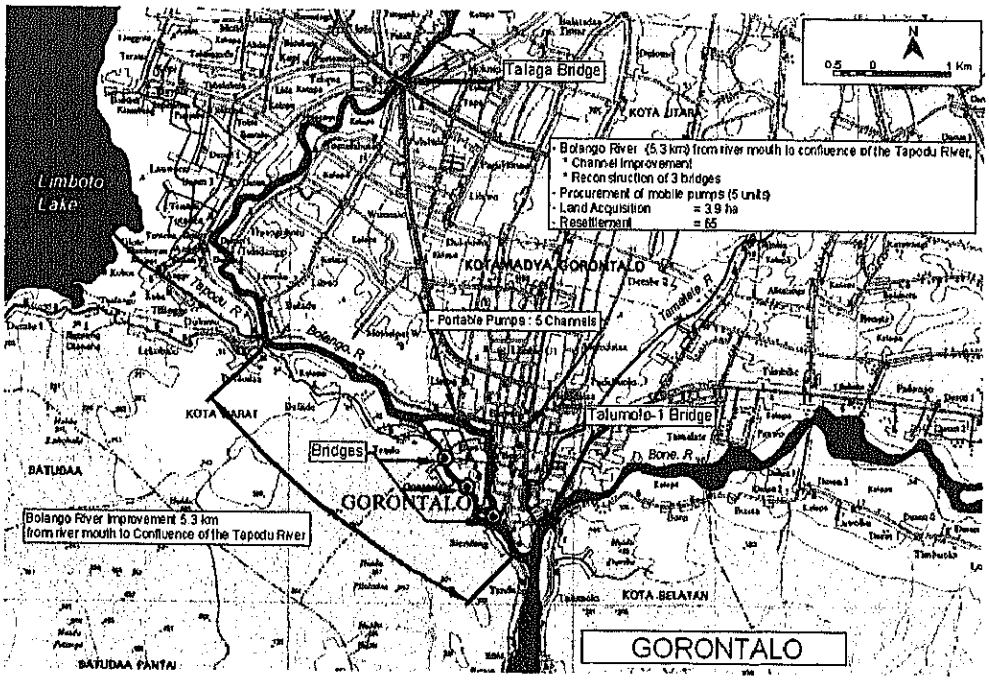


Surabaya (Brangkal) Sub-project

- **Brangkal River (8 km) from mouth to Provincial Road Bridge**
  - **Channel normalization**
  - **Improvement of Prajurit Kulon Weir**
  - **Procurement of mobile pumps (5 units)**
  - **Non-structure Measures for Adaptation of Climate Change**
- **Construction Cost**

  = Rp. 32.3 billion in August 2008 price level
- **Land Acquisition = None**
- **Resettlement = None**
- **AMDAL study : to be approved in Jan. 2010**

Gorontalo Sub-project



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Gorontalo Sub-project

- Bolango River (5.3 km) from mouth to confluence of the Tapadu River
  - Channel improvement
  - Reconsruction of 3 bridges
  - Procurement of mobile pumps (5 units)
  - Non-structure Measures for Adaptation of Climate Change
- Construction Cost
  = Rp. 38.1 billion in August 2008 price level
- Land Acquisition = 3.9 ha
- Resettlement = 65 households
- AMDAL study : to be approved in Jan. 2009 (on-going)
- Preparation of LARAP : scheduled in 2009

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Packaging

Package No.	Sub-project	Procurement	Construction Period
Package 1	Padang	ICB with P/Q	30 months
Package 2	Palembang	LCB post P/Q	24 months
Package 3	Bandung	LCB post P/Q	24 months
Package 4	Surabaya (Wonokromo)	ICB with P/Q	24 months
Package 5	Surabaya (Brangkal)	LCB post P/Q	24 months
Package 6	Gorontalo	LCB post P/Q	24 months

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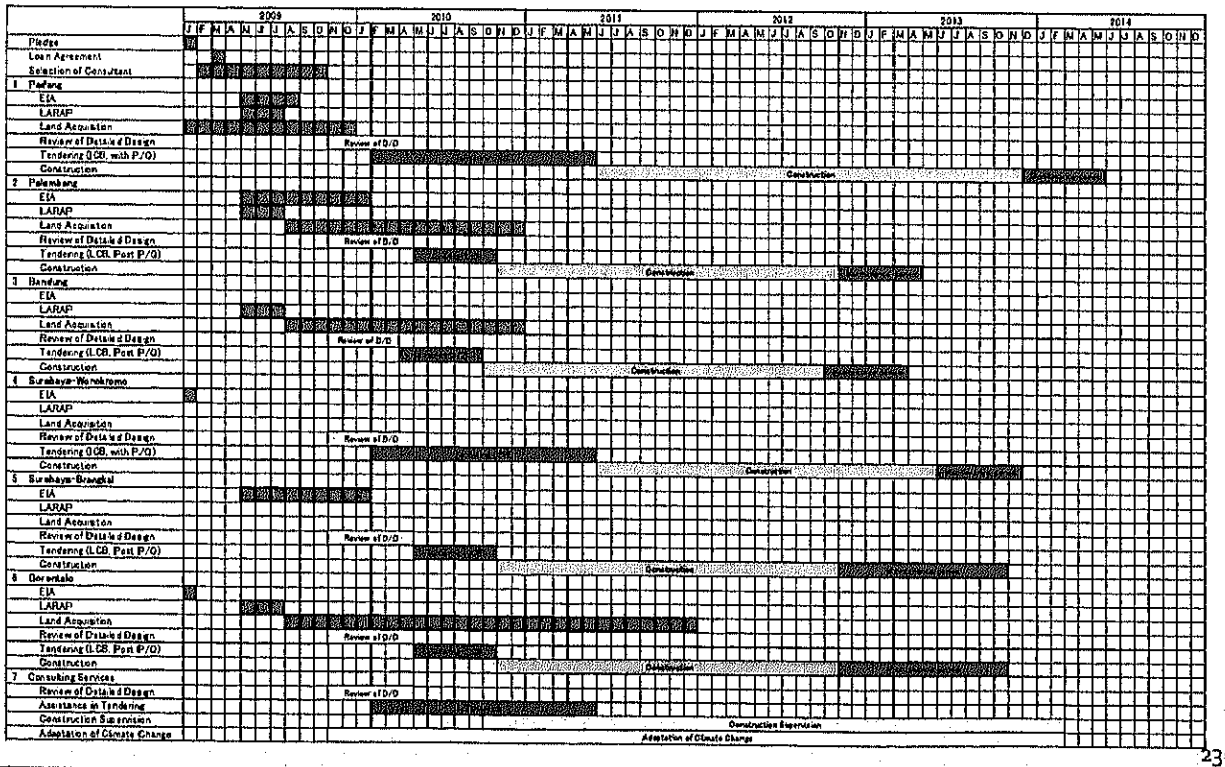
Overall Schedule



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Project Cost

(million Yen)

Breakdown of Cost	Total		
	Loan Portion	Others	Total
Padang Sub-project	2,000	0	2,000
Palembang Sub-project	479	0	479
Bandung Sub-project	230	0	230
Surabaya (Wonokromo) Sub-project	1,454	0	1,454
Surabaya (Brangkal) Sub-project	371	0	371
Gorontalo Sub-project	438	0	438
Sub total	4,973	0	4,973
Price Escalation	1,065	0	1,065
Physical Contingency	302	0	302
Ordinary Consulting Services	873	0	873
Adaptation of Climate Change	277	0	277
Land Acquisition	0	196	196
Administration Cost	0	384	384
VAT	0	769	769
Total	7,490	1,349	8,839

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PREFACE

This Final Report for the Special Assistance for Project Formation (SAPROF) on Urban Flood Control System Improvement in Selected Cities is prepared compiling the all study results during the study period conducted by the International Consultant employed by Japan International Cooperation Agency (JICA) to formulate "Urban Flood Control System Improvement in Selected Cities" based on "Implementation Program: Urban Flood Control System Improvement in Selected Cities" conducted by Directorate General of Water Resources, Ministry of Public Works.

Objectives and scope of the SAPROF Study are described in Chapter I. Background of the Project and present condition of cities/river basins vulnerable to flood disaster are presented in Chapter II. Selection criteria and preparation of long list and short list are mentioned in Chapter III and Chapter IV, respectively.

In Chapter V, details of selected short-listed subprojects are explained presenting (i) background, objective and project area, (ii) outline of sub-project and adaptation of climate change, (iii) cost estimate, (iv) economic evaluation and environmental consideration, and (v) implementation program of the sub-project. Overall project implementation program is proposed in Chapter VI. Finally, conclusion obtained through the SAPROF study and the recommendations for project implementation are mentioned in Chapter VII.

Detailed data are annexed in the separate volume of ANNEX.

SPECIAL ASSISTANCE FOR PROJECT FORMATION (SAPROF)

ON

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT IN SELECTED CITIES

FINAL REPORT

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LIST OF FIGURES

ABBREVIATIONS

(1) Organization and Regional Administration

ADB	Asian Development Bank
BAKORNAS PB = *Badan Koordinasi Nasional Penanganan Bencana*	National Coordination Disaster Handling Agency
BAKOSURTANAL = *Badan Koordinasi Survey dan Pemetaan Nasional*	National Coordination Agency for Survey and Mapping
Balai Kota	City Hall
BAPPEDA = *Badan Perencanaan Pembangunan Daerah*	Regional Development Planning Agency
BAPEDAL = *Badan Pengendalian Dampak Lingkungan*	Environmental Impact Management Agency
BAPEDALDA = *Badan Pengendalian Dampak Lingkungan Daerah*	The Environmental Impact Management Board in Province
BAPPENAS = *Badan Perencanaan Pembangunan Nasional*	National Development Planning Agency
BBWS = *Balai Besar Wilayah Sungai*	Large Bureau of River Basin
BNPB = *Badan Nasional Penanggulangan Bencana*	National Disaster Management Agency
BPLHD = *Badan Perencanaan Lingkungan Hidup Daerah*	The Regional Living Environment Control
BPS = *Badan Pusat Statistik*	Central Statistics Agency
BPN = *Badan Pertanahan Nasional*	National Land Agency Institute
Bupati	Regent
BWS = *Balai Wilayah Sungai*	Bureau of River Basin
Camat	Head of District
CCF	Community Consultation Forum
CRED	Center of Research Epidemiology Disaster
Dekel = *Dewan Kelurahan*	Community Association
DGWR	Directorate General of Water Resources, Ministry of Public Works
DI Yogyakarta = *Daerah Istimewa Yogyakarta*	

	Yogyakarta Special Province
DKI Jakarta = *Daerah Khusus Ibukota Jakarta*	
	Jakarta Metropolis or Jakarta Provincial Government
DPRD = *Dewan Perwakilan rakyat Daerah:*	Council
DPU = *Dinas Pekerjaan Umum*	Public Works Services (or Agency)
GOI	Government of the Republic of Indonesia
GOJ	Government of Japan
IBRD	International Bank for Reconstruction and Development (World Bank)
JBIC	Japan Bank International Cooperation
JICA	Japan International Cooperation Agency
Kab. = Kabupaten	Regency
KAI = *Kereta Api Indonesia*	Indonesia Railway Authority
Kec. = *Kecamatan*	District
Kel = *Kelurahan*	Sub-district in urban area or semi-urban area
KIMPRASWIL = *Departemen Permukiman dan Prasarana Wilayah*:	
	Ministry of Settlement and Regional Infrastructure (previous name of Ministry of Public Works)
Komnas HAM	National Commission on Human Rights
Kota or *Kotamadya*	City
LP3ES = *Lembaga Penelitian Pengkajian Pengembangan*	
Masalah Ekonomi dan Sosial	Association of Investigation, Dissemination and Development far Economy and Social
MSRI	Ministry of Settlement and Regional Infrastructure (former name of Ministry of Public Works)
NDA	Nanggroe Aceh Darussalam
NEDECO	Netherlands Engineering Consultants
OECF	Overseas Economic Cooperation Fund, Japan
OFDA	Organization of Foreign Disaster Assistance
Perumnas = *Perumahan Nasional*	National Housing Agency
PMI = *Palang Merah Indonesia*	Indonesian Red Cross
Provinsi	Province
PU = *Dapartmen Pekerjaan Umum*	Ministry of Public Works
Satkorlak PB = *Satuan Koordinasi Pelaksanaan Penanganan Bencana*	
	Coordinating Unit of executing agency
Satlak PB = *Satuan Pelaksanaan Penanganan Bencana*	

	Unit of Executing Agency
RT = *Rukun Tetangga*	Smallest Community Unit under RW
RW = *Rukun Warga*	Community Unit
UPT = *Unit Pelaksana Teknik*	Technical Implementation Units
Walikota	Mayor

(2) Terminology and Geographic Name

AMDAL/ EIA = *Analisa Mengenai Dampak Lingkungan*	Environmental Impact Assessment System
APBD = *Anggaran Perencanaan dan Belanja Daerah*	Scheduled Utilizing Local Government Budget
APBN =*Anggaran Perencanaan dan Belanja Negara*	Scheduled Utilizing National Government Budget
B/C	Benefit-Cost Ratio
Bendungan	Weir, Dam
BHN	Basic Human Needs
Bopunjur	Bogor – Puncak – Cianjur
EBC	Eastern Banjir Canal (= Eastern Floodway)
DD, D/D	Detailed Design
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
F I	Environment Category Classified by JBIC
FS, F/S	Feasibility Study
FY	Fiscal Year
GDP	Gross Domestic Product
Gerbangkertosusila	Gresik-Bangkalan-Mojokerto-Surabaya-Sidarjo-Lamongan
GIS	Geographic Information System
Gn = *Gunung*	Mountain
GRDP = *Produk Domestik Regional Bruto*	Gross Regional Domestic Product
GSM	Global Systems for Mobile Communications
HHW	High High Water
HWL	High Water Level

Jabodetabek	Jakarta – Bogor – Depok – Tangerang – Bekasi
JPY	Japanese Yen
JUDP-II	Jakarta Urban Development Project (II)
Kp. = *Kampung*	Village
KTP = *Kartu Tanda Penduduk*	ID card
LARAP	Preliminary Land Acquisition and Resettlement Action Plan
Mamminasata	Makassar-Maros-Sungguminasa-Takalar
M/D, MoD	Minutes of Discussion
MP, M/P	Master Plan
MSL	Mean Sea Level
NGO	Non Governmental Organization
NPV	Net Present Value
NWL	Normal Water Level
ODA	Official Development Assistance
OJT	On-the-Job Training
O/M, O&M	Operation and Maintenance
PAP	Project Affected People
PCR	Project Completion Report
PERPRESS = *Peraturan Presiden*	Presidential Regulation
P/M	Project Memorandum
P.P = *Priok Peil*	Elevation above Datum of Tanjung Priok Harbor (0.6 m lower than MSL)
P/R	Progress Report
P/Q	Pre-qualification
Rp. = *Rupiah*	Indonesian Rupiah
Ps = *Pasar*	Market
PSR	Project Status Report
RKL = *Rencana Pengelolaan Lingkungan*	Environmental Management Plan
RPJM = *Rencana Pembangunan Jangka Menengah*	The Mid-term National Development Plan
RPL = *Rencana Pemantauan Lingkungan*	Environment Monitoring Plan
SAPI	Special Assistance for Project Implementation
SAPROF	Special Assistance for Project Formation

SIJORI	Singapore-Johor-Riau
Situ situ	Small Lake or Pond
TPA = *Tempat Pembuangan Akhir*	Final Disposal Site
TPS = *Tempat Pembuangan Sementara*	Temporary Disposal Site
TOR	Terms of Reference
TTG = *Titik Tinggi Geodesi*	Elevation above Mean Sea Level (MSL)
UKL/UPL	Environmental Management and Monitoring Procedures
USD	United Stated Dollar
VAT	Value Added Tax
WBC	West Banjir Canal (= Western Floodway)
WJEMP	Western Java Environmental Management Project

I. INTRODUCTION

1.1 General

According to the database on International Disaster (OFDA/CRED), number of flood damage arose forty (47) including 2,592 of death toll, 3,023,310 of affected person and US$ 1,613 million in Indonesia during recent 10 years from 1998 to the end of 2007. These flood damage causes not only direct physical loss of infrastructure/buildings but also indirect economical/social loss due to suspension of economic activities and/or increase of the poor, which is one adverse factor of sustainable economic development in Indonesia. In addition, flood menace caused by the future climate change will worsen the situation of flood management so that the further strengthening of countermeasures against flood and improvement of related infrastructures are necessary.

Under the above circumstances, the Government of the Republic of Indonesia (GOI) stipulates the Mid-term National Development Plan (RPJM) 2004-2009 describing that the mitigation of flood damage under the comprehensive water resources management is one of the important strategy program with promotion of construction/improvement of flood mitigation infrastructures and disaster mitigation activities through public involvement. Based on the Law on Water Resources (U.U. No.7, 2004), improvement of water management system is conducted drafting the regulations on water resources committee.

With such background, the Japan Bank for International Cooperation (JBIC; current Japan International Cooperation Agency: JICA), the Directorate General of Water Resources (DGWR), Ministry of Public Works and the Directorate for Water Resources and Irrigation, National Development Planning Agency (BAPPENAS) have agreed upon the implementation of Special Assistance for Project Formation (SAPROF) for the "Flood Control Sector Program Loan on Urban Flood Control System Improvement in Selected Cities" (the Project).

1.2 Objectives of SAPROF Study

In order to formulate the Project, DGWR, BAPPENAS and JBIC agree to dispatch Study Team of Special Assistance for Project Formation (SAPROF). The major objective of the Study is to review the Implementation Program covering the review of technical, economical and financial feasibilities as well as cost estimate for construction/ improvement of flood control (or mitigation) facilities and soft component to respond to climate change.

1.3 Scope of the SAPROF Study

The SAPROF Study is executed under the following Terms of Reference.

TOR 1 Confirmation of the Necessity and Background of the Project

1-1 Verification of the current situation and the challenges of the flood control sector, including the government budgetary situation.

1-2 Comprehension of watersheds and cities vulnerable to flood risks and the review of flood forecast including discussion with Indonesia relevant agencies.

TOR 2 Examination and Proposal of Sub-project selection Criteria

2-1 Examination and proposal of sub-project selection criteria, in terms of priority (e.g. GRDP, expected areas and population affected by flood, frequency of flood, EIRR, etc.).

2-2 Examination and proposal of sub-project selection criteria, in terms of maturity of project preparation (readiness criteria) (e.g. the conduct of environmental and social impact assessment, consultation with stakeholders, land acquisition and resettlement, environmental and social safeguard category, local budget, etc.)

TOR 3 Selection of Sub-projects and Verification of the Scope of the Project

3-1 Selection of candidate sub-projects: to develop a list of (1) sub-projects included in the Implementation Program "Urban Flood Control System Improvement in Selected Cities" and (2) additional sub-projects selected based on TOR-1.

3.2 Selection of high priority sub-projects (long-list): to develop a list of about sixteen (16) sub-projects that meet the priority criteria described in TOR 2-1

3-3 Selection of sub-projects that can be implemented immediately (short list): to develop a list of sub-projects that meet the readiness criteria described in TOR 2-2 and can be implemented immediately, out of the long-listed sub-projects.

3-4 Review of the scope of each short-listed sub-projects.

3-4-1 Review of the scope of each short-listed sub-project (including additional components that are related to measures to respond to climate change. For instance, proposal of an operation and maintenance framework of river structure, assistance to develop a local disaster management plans, enhancement of meteorological and hydrologic monitoring systems, introduction of early warning systems, capacity building of Balai and Balai-Besar and awareness raising among communities, assistance to develop a watershed management plans, among others.)

3-4-2 Review of other project scope of each sub-project (such as review of total project cost and Japanese ODA Loan amount (including financing and spending plan), construction schedule, procurement methods (including packaging), construction methods, operation and maintenance frameworks, environmental and social safeguards (including executing agency's capacity to enforce environmental and social safeguards) among others.)

TOR 4 Review of the Overall Project Scope and Proposal of Project Effect Indicators

4-1 Proposal of the overall project scope, composing of (1) implementation of short-listed sub-projects, (2) development, selection and implementation of long-listed sub-projects, referring to the project scope of short-listed sub-projects, and (3) overall

4-2 Examination and proposal of project effect indicators: proposal of operation effect indicators, compilation of baseline data for the indicators proposed for short-listed sub-projects, and review of quantitative and qualitative project effects.

4-3 Preparation of draft project status report (PSR).

1.4 Study Organization

1.4.1 SAPROF Study Team

The SAPROF Team is headed by the Team Leader who is responsible for maintaining a close liaison with the BAPPENAS, DGWR, JICA and agencies concerned. He is also responsible for planning activities and monitoring the progress of the entire study for ensuring its timely and effective completion.

The SAPROF Team comprises four (4) members consisting of the team leader and three (3) experts as enumerated below:

	Designation/Work Assignment	Name
(1)	Watershed Management (Team Leader)	K. TAKEBAYASHI
(2)	Flood Control Planning	Hideki ARAKI
(3)	Disaster Management	Makoto KODAMA
(4)	Environmental and Social Safeguard	Kyoko MISHIMA

1.4.2 Related Agencies in Indonesia

The Directorate General of Water Resources (DGWR), Ministry of Public Works will be the executing agency for this project and will act as the lead counterpart body to the SAPROF Team as well as the coordinating body in relation to other governmental organizations of the Republic of Indonesia as follows:

Executing Agency: Directorate General of Water Resources (DGWR)
including River Basin Management Office
(Balai and Balai-Besar)

Related Agencies: - National Development Planning Agency

II. PRESENT SITUATION AND ISSUES OF FLOOD CONTROL SECTOR

2.1 Background of the Project

Indonesia, of which population is 225 million, has been accomplished stable economic development after the economic crisis in late 1990s. However, economic stagnation can be seen in the regional major cities in Indonesia due to flood damage. These flood damage causes not only direct physical loss of infrastructure/buildings but also indirect economical/social loss due to suspension of economic activities and/or increase of the poor, which is one adverse factor of sustainable economic development in Indonesia. In addition, flood menace caused by the future climate change will worsen the situation of flood management so that the further strengthening of countermeasures against flood and improvement of related infrastructures are necessary.

Under the above circumstances, the Government of the Republic of Indonesia (GOI) stipulates the Mid-term National Development Plan (RPJM) 2004-2009. The basic targets of RPJM are;

- to realize safe and peaceful society,
- to realize fair and democratic society, and
- to enhance the prosperity of Indonesian people.

In order to achieve the national targets, it is necessary to improve the flood control system in regional major cities within the framework of Law on Water Resources (U.U. No.7, 2004). Following the Law, nineteen (19) Balai and eleven (11) Balai-besar were established in 2006 for the river basin management in accordance with the Minister's Regulations No.12/PRT/M/2006 for major river basins (Balai-besar) and No. 13/PRT/M/2006 for other river basins (Balai). Both Balai-besar and Balai are the technical implementation units (*Unit Pelaksana Teknik*: UPT) in the field for water resources management at the river basin level. Duty of Balai-besar and Balai is to implement the water resources management in a river basin under the control of the Directorate General of Water Resources. Water resources management includes the fields of i) conservation of water resources, ii) development of water resources, iii) enforcement of efficiency of water resources, and iv) control of water induced disaster. List of Balai and Balai-Besar is presented in Table 2. 1.

2.2 Cities/River Basins Vulnerable to Flood Disaster

Cities/river basins vulnerable to flood disaster are examined. Objective cities/river basins are selected through the records of past flood. Recent floods are listed in Table 2. 2 based on the

report in newspapers of the Jakarta Post, the *Kompas* and others while these are published in Jakarta. Disaster List in EM-DAT: Emergency Events Database (http://www.emdat.be/Database/terms.html) and Dartmouth Flood Observatory Database (http://www.dartmouth.edu/~floods/index.html) are also referred to. Flood records are confirmed in 70 cities/river basins during recent 10 years since 1998.

III. SELECTION CRITERIA FOR SUB-PROJECTS

3.1 Criteria for the Long-list (Priority Sub-projects)

3.1.1 Screening

Screening (or pass-fail) method and scoring method are applied for the long-list criteria. Seventy (70) candidates listed in Table 2.2 are examined; (i) whether the city suffers from floods three (3) times or more during recent ten (10) years since 1998 and (ii) whether the city/sub-project is financed or scheduled to be financed by loan from foreign donors. After passing this screen, candidates become the long-list sub-project.

3.1.2 Scoring

Criteria for priority sub-project are presented hereunder. The priority was examined in terms of the following.

(a) Direct affected flood damage:	35 points
(b) Flood frequency:	10 points
(c) Indirect affected flood damage:	25 points
(d) Economic disparity:	10 points
(e) Important infrastructure:	10 points
(f) Existing flood control facilities:	10 points
(g) Total:	100 points

Detailed allocation is presented in Table 3. 1.

(1) Direct Affected Flood Damage

High score (35 points in maximum) is given to the existing direct flood damage consists of population in flood prone area (10 points), household (5 points), flooding/inundation area (10 points) and GRDP (10 points). Considering the future climate change, the item of "flooding/inundation area" is included because flood damage might occur in the area to be developed in the lowland along river channels. Population and number of household affected by flood damage are estimated in proportion to those in city/regency published by statistical data.

(2) Flood Frequency

Flood frequency is the factor of urgency. Based on the database in websites and flood reports in newspapers, numbers of floods are counted for respective sub-projects in recent 10 years since

1998 considering the availability of information/data. Ten (10) points are given to this item in maximum.

(3) Indirect Affected Flood Damage

Even flood inundation occurs in limited area, social and economic damage expands not only to the direct-related city/regency but also to the surrounding area. Twenty-five (25) points are given to the indirect affected flood damage consists of population (5 points), household (5 points), total GRDP in the area (10 points) and ratio of GRDP in the province (5 points). Each item is further divided into two (2), direct-related city/ regency and surrounding area.

(4) Economic Disparity

Flood control system improvement will contribute the decrease of economic disparity. Using the items of "percentage of poverty in province" (5 points) and "per capita GRDP" (5 points), degree of decrease is expressed (10 points in maximum). Per capita GRDP is further divided into two (2), direct-related city/regency (3 points) and surrounding area (2 points).

(5) Important Infrastructure

Flooding/inundation causes standstill of administrative activities and transportation. Existence of major infrastructures are counted for the importance of cities/regencies with score of ten (10) points in maximum consists of government office (3 points), airport (3 points), harbor (2 points) and railway station/track (2 points).

(6) Flood Control Facilities

In case that flood control facilities are provided and maintained well, low priority is given to the sub-project. Ten (10) and eight (8) points are given to no facility and poor condition respectively, while three (3) and one (1) points are counted for faire and good conditions respectively.

3.2 Criteria for the Short-list (Readiness Sub-projects)

3.2.1 General

Criteria for maturity (or readiness) of sub-project are presented hereunder. The readiness was examined in terms of the following.

(a) Study and design:	40 points
(b) Environmental and Social consideration:	60 points
(c) Total	100 points

Detailed allocation is presented in Table 3. 2.

3.2.2 Study and Design

Preparation of detailed design after master plan and feasibility study is an important factor to express the readiness. Forty (40) points in maximum is given to the sub-project with accumulation of preliminary study (1 point), master plan (4 points), feasibility study/basic design (10 points) and detailed design (25 points). Regarding detailed design, 10 points and 5 points are scored to the on-going and scheduled (in 2009) ones, respectively.

3.2.3 Environmental and Social Consideration

(1) General

The JBIC (current JICA) notices the considerations on social environment including land acquisition and resettlement are the most important factor for immediate implementation of the Project. Sixty (60) points in maximum is given to the environmental and social impact assessment consisting preparation of EIA study (25 points), natural environmental consideration (5 points), and land acquisition and resettlement (30 points).

(2) EIA Study

Study on environmental assessment is classified into six (6); "Approved," "Conducted," "On-going," "Scheduled," "Preliminary Study" and "No Schedule." Even though the sub-project was approved by the authority, the efficiency is limited to three (3) years. In this case, subsequent environmental management plan (PKL) and environmental monitoring plan (RPL) are required for the implementation of the sub-project. Considering the above conditions, following scoring is given on the EIA study.

- Approved within recent 3 years:	25 points (full mark)
- Conducted recently and waiting for approval:	20 points
- Previously approved after 3 years passing	
(on-going PKL and RPL):	15 points
(scheduled PKL and RPL in 2009):	10 points
- New EIA study	
(on-going):	10 points
(scheduled in 2009):	5 points
- Preliminary study (UKL/UPL):	2 points
- No schedule:	0 point

(3) Natural Environmental Consideration

For the natural environmental consideration, degree of influence to protective area (1 point), ecological valuable habits/endangered species habits (2 points) and saline water intrusion (2 points) is examined through this criteria.

(4) Land Acquisition and Resettlement

Land acquisition and resettlement are unavoidable issue. Thirty (30) points in maximum is given to this item consisting Land Acquisition and Resettlement Action Plan (LARAP) (5 points), commitment letter on sharing cost (5 points), number of resettlement households (5 points), required acquisition area (5 points), preparation of local counter budget (5 points) and environmental and social safeguard category (5 points).

IV. SELECTION OF SUB-PROJECTS

4.1 Candidate for Long-listed Sub-projects

The DGWR listed following fifteen (15) cities/river basins for the candidate sub-projects in the Implementation Program in July 2008 (I/P in July 2008).

- Dumai (Riua Province)
- Pekanbaru (Riau Province)
- Rengat (Riau Province)
- Padang (West Sumatra Province)
- Jambi (Jambi Province)
- Palembang (South Sumatra Province)
- Bandung (West Java Province)
- Surabaya-Wonokromo (East Java Province)
- Surabaya-Kedurus (East Java Province)
- Surabaya-Brangkal (Mojokerto, East Java Province)
- Nganjuk (East Java Province)
- Tulungagung (East Java Province)
- Makassar (South Sulawesi Province)
- Gorontalo (Gorontalo Province)
- Manado (North Sulawesi Province)

Other than the above, candidates for long-listed sub-project are selected among 70 cities listed in Section 2.2. The cities/river basins, which suffer from floods three (3) times or more during recent ten (10) years since 1998, will be the candidates for long-listed sub-projects. According to this definition, following nine (9) cities/river basins are selected except the cities/river basins listed in the I/P in July 2008.

- Medan (Deli River, North Sumatra Province)
- Tangerang (Cisadane River, Banten Province)
- Jakarta (Ciliwung and other Rivers, DKI Jakarta Province)
- Bogor (Ciliwung and Cisadane Rivers, West Java Province)
- Bekasi (Bekasi River, West Java Province)
- Semarang (Garang River, Central Java Province)
- Bojonegoro (Bengawan Solo River, East Java Province)
- Surabaya (Gunungsari Canal, East Java Province)
- Balikpapan (East Kalimantan Province)

Therefore these nine (9) cities/river basins and fifteen (15) cities/river basins listed in the I/P in July 2008, that is, 24 sub-projects in total become the candidates for long-list sub-projects.

4.2 Selection of Long-listed Sub-projects

4.2.1 Screening for Long-listed Sub-project

The above 24 sub-projects are screened omitting sub-projects which are under implementation or going to implement under the financial assistance of foreign donors. Following seven (7) cities/river basins fail to pass.

- Medan (JBIC, IP-459)
- JABODETABEK area including Tangerang, Jakarta, Bogor and Bekasi (Jakarta Urgent Flood Mitigation Project, IBRD)
- Semarang (JBIC, IP-534)
- Bojonegoro (JBIC, IP-522)

4.2.2 Long-listed Sub-projects

Seventeen (17) sub-projects pass through the above screening. Location of these long-listed sub-projects is plotted in Figure 4.1. Flood reports in database and newspapers are tabulated in Table 4.1. Priority ranking is given to these 17 sub-projects using the ranking criteria described in Section 3.1. By use of the statistical data published by Central Bureau of Statistics (*BPS: Badan Pusat Statistik*), social and economical conditions are estimated for respective sub-projects as tabulated in Table 4.2. In this table, flood frequency is estimated based on Table 4.1. The scoring for priority ranking is presented in Table 4.3 and summarized below.

Rank	City/Regency	Province	Total Score
1	Palembang	South Sumatra	79
2	Padang	West Sumatra	65
3	Surabaya (Gunungsari)	East Java	64
4	Makassar	South Sulawesi	62
5	Surabaya (Wonokromo)	East Java	57
6	Bandung	West Java	56
7	Gorontalo	Gorontalo	51
7	Jambi	Jambi	51
9	Pekanbaru	Riau	48
10	Manado	North Sulawesi	45

Rank	City/Regency	Province	Total Score
11	Nganjuk	East Java	42
12	Balikpapan	East Kalimantan	41
13	Surabaya (Kedurus)	East Java	41
14	Rengat	Riau	37
15	Surabaya (Brangkal)	East Java	37
16	Dumai	Riau	33
17	Tulunagung	East Java	22

Details of these long-listed sub-projects are presented in ANNEX 1 except short-listed subprojects, and the outlines of sub-projects are described hereunder based on the I/P in July 2008..

(1) Palembang (South Sumatra Province)

(a) Scope of Works: Improvement of tributaries of the Musi River (25-year return period)

- Channel improvement of Bendung River (2.8 km) with pumping station (18 m^3/s)
- Channel improvement of Sekanak River (3.55 km) with drainage pumping station
- Channel improvement of Buah River (2.86 km) with floodway (785 m)
- Channel improvement of Sriguna River (1.5 km)

(b) Total Construction Cost: Rp. 99,995 million (2008 price level)

(2) Padang (West Sumatra Province)

(a) Scope of Works:

- Channel improvement of Anai River (4,100 m) with river structures (25-year)
- Channel improvement of Kandis River (1,380 m) with river structures (10-year)

(b) Total Construction Cost: Rp. 173,043 million (2008 price level)

(3) Surabaya-Gunungsari (East Java Province), quoted to BBWS Brantas

(a) Scope of Works (5-year return period):

- Improvement of the Gunungsari Channel and Margomulyo Channel (14.86 km)
- Improvement of the Balong River with a part of Gunungsari Channel (6.75 km)
- Improvement of the Kandangan River with a part of Gunungsari Channel (6.75 km)
- Improvement of the Semimi River with a part of Gunungsari Channel (7.60 km)

(b) Total Construction Cost: Rp. 426,283 million (2006 February price level)

(4) Makassar (South Sulawesi Province)

(a) Scope of Works:

- Construction of retarding basin at Nipa-Nipa: 84 ha (with gated facilities)
- Channel improvement of Tallo River: 14.5 km (normalization with dyke)
- Construction of drainage pumping station: 5 locations
- Drainage improvement in Area V: 5 channels

(b) Total Construction Cost: Rp. 141,300 million (2004 price level)

(5) Surabaya-Wonokromo (East Java Province)

(a) Scope of Works: River channel improvement by concrete wall and embankment (11,000 m)

(b) Total Construction Cost: Rp. 200,160 million (2008 price level)

(6) Bandung (West Java Province)

(a) Scope of Works:

- Channel widening of the Citarum Main River: 3.0 km around Curug Jompong
- Construction of Cikapundung diversion channel in Dayeukolot: 700 m

(b) Total Construction Cost: Rp. 74,800 million (2008 price level)

(7) Gorontalo (Gorontalo Province)

(a) Scope of Works:

- Bolango River improvement (11.2 km from mouth to Talaga bridge)
- Bone River improvement (750 m of right bank by dyke heightening)
- Procurement of mobile pumps (5 sets)
- Improvement of 5 primary drainage channels

(b) Total Construction Cost: Rp. 67,798 million (2008 price level)

(8) Jambi (Jambi Province)

(a) Scope of Works: drainage improvement works

- Asem River: channel improvement (1,000 m) and construction of pump station (2.5 m^3/s)
- Tombeku River: construction of pump station (2.5 m^3/s)
- Lubuk Raman River: construction of pump station (2.5 m^3/s)

(b) Total Construction Cost: Rp. 39,050 million (2004 price level)

(9) Pekanbaru (Riau Province)

(a) Scope of Works:

- Dyke construction on left bank of Siak River (for Sector IV): 6.5 km
- Screw type drainage pumping station (for Sector III): 2 units
- Construction of gate (for Sector III): 2 units
- Channel improvement of tributary in Sector III: 2.0 km
- River bank protection: 5.6 km

(b) Total Construction Cost: Rp. 77,425 million (2005 price level)

(10) Manado (North Sulawesi Province)

(a) Scope of Works:

- Improvement of Tondano River: 6,780 m
- Improvement of Sario River: 1,520 m
- Improvement of Malalayang River: 1,150 m
- Procurement of Mobile Pumps: 5 units

(b) Total Construction Cost: Rp. 60,520 million (2002 price level)

(11) Nganjuk (East Java Province)

(a) Scope of Works:

- River improvement of the Kuncir River providing revetment: 10.3 km
- River improvement of the Ulo River providing revetment: 3.3 km

(b) Total Construction Cost: Rp. 89,560 million (2006 price level)

(12) Surabaya-Kedurus (East Java Province)

(a) Scope of Works:

- Channel improvement (excavation and dyke construction): 9,860 m
- Construction of 4 retarding ponds with pump facility
- Reconstruction of existing bridges

(b) Total Construction Cost: Rp. 102,250 million (2006 price level)

(13) Balikpapan (East Kalimantan Province)

(a) Scope of Works:

- Improvement of the Klandasan Besar River with retarding ponds: 2,200 m
- Improvement of the Klandasan Kecil River: 2,150 m

(b) Total Construction Cost: newly proposed without cost estimate.

(14) Surabaya-Brangkal (Mojokerto, East Java Province)

(a) Scope of Works:

- Channel normalization: 3 km (river mouth to Jl. KH. Usman bridge)
- Procurement of mobile pump: 5 sets (0.25 m^3/s per each)

(b) Total Construction Cost: Rp. 79,200 million (2008 price level)

(15) Rengkat (Riau Province)

(a) Scope of Works:

- Ring dike construction: 24 km (Earth) and 1.4 km (Concrete)
- Pump station at the lower end of ring dike: 1 unit

(b) Total Construction Cost: Rp. 119,250 million (2002 price level)

(16) Dumai (Riau Province)

(a) Scope of Works: Channel improvement of the Dumai River

- Dyke construction: 30.7 km
- Channel normalization: 26.6 km
- Installation of drainage pumping station: 3 units
- Construction of flap gate: 8 units

(b) Total Construction Cost: Rp. 54,680 million (2005 price level)

(17) Tulungagung (East Java Province)

(a) Scope of Works: Channel Improvement of the Ngasinan River

- Dyke heightening 712,600 m^3
- Construction of groin
- Revetment works

(b) Total Construction Cost: Rp. 71,300 million (2006 price level)

4.3 Short-listed Sub-projects

Readiness for immediate implementation is examined for all sub-projects in long-list using the ranking criteria mentioned in Section 3.2. Scoring results are shown in Table 4.4 and summarized below.

Rank	City/Regency	Province	Study/ Design	Environ-mental and Social Consid-eration	Total Score	Priority Rank
1	Bandung	West Java	40	47	87	6
2	Padang	West Sumatra	40	35	75	2
3	Surabaya (Brangkal)	East Java	29	31	60	14
4	Palembang	South Sumatra	29	27	56	1
5	Gorontalo	Gorontalo	29	26	55	7
6	Surabaya (Wonokromo)	East Java	29	25	54	5
7	Tulungagung	East Java	29	16	45	17
8	Surabaya (Kedurus)	East Java	29	9	38	12
9	Rengat	Riau	29	8	37	14
10	Manado	South Sulawesi	20	16	36	10
11	Surabaya (Gunungsari)	East Java	29	6	35	3

Rank	City/Regency	Province	Study/ Design	Environ-mental and Social Consid-eration	Total Score	Priority Rank
12	Nganjuk	East Java	24	9	33	11
13	Pekanbaru	Riau	15	13	28	9
14	Dumai	Riau	15	10	25	16
15	Makassar	South Sulawesi	16	8	24	4
16	Jambi	Jambi	10	9	19	7
17	Balikpapan	East Kalimantan	0	7	7	12

Together with the priority ranking, position of sub-projects in readiness ranking is plotted in Figure 4.2. Based on this figure, following are selected as short-listed sub-projects expected to implement immediately.

- Padang
- Palembang
- Bandung
- Surabaya (Wonokromo)
- Surabaya (Brangkal-Mojokert)
- Gorontalo

Even though the sub-projects of Surabaya-Gunungsari and Makassar have high scores in priority, these ones are excluded due to low score of readiness.

V. REVIEW OF IMPLEMENTATION PROGRAM FOR SHORT-LISTED SUB-PROJECTS

5.1 General

In this chapter, outline of selected short-listed sub-project is described hereinafter. Background and objective of sub-project and its project area is presented in "General Description." Scope of works, adaptation of climate change and consulting services are mentioned in "Outline of the Sub-project." Following the above, cost estimate, economic evaluation, environmental and social consideration, and the implementation program are also described.

Adverse impacts of climate change are already expanding worldwide, and this presents unavoidable risks in the coming decades. Even though the mitigation of emission volume of carbon dioxide would be possible, climate change cannot be stopped in a short time. Climate change causes unexpected climatic phenomena such as frequent heavy storm, flooding by extreme high tide, etc. It may be inevitable that these phenomena reduce the safety level of river facilities even if there are sufficient infrastructures against these natural disasters.

It is a matter of course that the structural measures should be implemented securely by the government, and it is also important for the inhabitants to take proper actions against such disasters. Therefore the adaptation of climate change preparing disaster management plan and execution of countermeasures by the inhabitants against extraordinary floods is an important role for the area to be implemented in the Project. Conceivable items are listed in each sub-project based on the local conditions. Major items of soft component for adaptation of climate change are listed up as follows:

- Assessment on vulnerabilities and risks regarding the impact of climate change
- Strengthen of Disaster Prevention and Preparedness (DPP) for community and local government
- Enhancement of Operation and Maintenance (O/M) for flood control facilities
- Capacity strengthen of meteorological/hydrological observation
- Enhancement of early warning system
- Improvement of regional DPP plan
- Improvement of watershed management plan

Above works and activities will contribute the capacity building of BBWS and BWS staff. Each item is further divided into several actions. These items are the standard for selection of appropriate soft component for adaptation of soft component. For these objectives, some concrete measures are tabulated below.

General Soft Component of Adaptation to Climate Change

General Soft Component	Description
1. Understanding of Flood Disaster Mechanism	
(1) Meteorological Phenomenon	- Rainfall can be measured quantitatively. - Relationship between rainfall and water level.
(2) Flood Occurrence Mechanism	- Determination of rainfall depth or water level which respond to flooding for respective sites.
(3) Principle of Disaster Prevention	- Flood damage can be mitigated by community's effort. - Human beings cannot overcome the natural disaster. - Human beings shall recognize to live together with regional disaster risk.
2. Hydrological Observation	
(1) Rainfall	- Adequate and simple measurement using a bucket or a glass.
(2) Water Level	- Water level observer at upstream section.
(3) Monitoring/Evaluation by Regional Government	- Evaluation and praise/award of observation activities - Monthly inspection/monitoring, data collection, maintenance of equipment, keeping communication with community - Hydrological analysis by government and feedback of information to community.
3. Countermeasures	
(1) Establishment of Community Disaster Prevention Organization	- Establishment of community-driven flood fighting organization to work against floods such as dissemination of flood information, construction of temporary flood wall, pilotage of evacuee to flood evacuation shelter, etc. - Organizing and training for community leader and persons in charge of watching, information and evacuation.
(2) Preparation of Flood Risk Map	- Specifying weak point of flood control facilities and expected damaged area on flood risk map. - Public information on evacuation center, evacuation route, etc.
(3) Establishment of Disaster Information Network	- Information system on flood alert in community level and governmental level. - Operational training.
(4) Strengthening of Disaster Mitigation Capacity (Self/Mutual-Help)	- Training for preparation and piling up sandbags, installation of water-stop board, and so on. - Training for individual and community (Gotongroyong) activities.
(5) Community Disaster Prevention Plan	- Preparation of gate operation manual against extraordinary flood, if gate-controlled weir or floodgate exists. - Establishment of River Basin Committee which organizes strategies of water use, flood mitigation basin management and so on, and consists of various stakeholders to correspond to the abovementioned disaster management activities. - Preparation of flood disaster management plan.

5.2 Sub-project (1) : Padang Sub-project

5.2.1 General Description

(1) Background of the Sub-project

Padang City is the largest cities located at west coast of Sumatra Island, and is the capital of West Sumatra Province and is the principal gateway to Minang highlands.

In Padang City, intensive river improvement works have been conducted by an application of JBIC loan and safety against flood disaster has drastically improved. However, the lower area of the Anai and Kandis river basin, which is an alluvial plain with the area of 60 km^2, is suffers from frequent flood damages caused by over bank flow due to insufficient discharge capacity. Flood damages in recent years are summarized below.

Flood Damage in Padang

Month/Year	Inundation Area (ha)	Dead	Affected (houses)	Damage Cost (Rp. billion)
Nov. 2000	6,500	2	300	5
Apr. 2004	600	n.a.	25	2
Oct. 2005	800	1	20	2
Oct. 2006	565	-	35	3.5
Jan. 2007	1,500	n.a.	15	1.5

Recently, the urban area of Padang is expanding rapidly and new settlements are developed mainly northwards. Besides, Padang new international airport located in the lower area of the Anai and Kandis river basin was completed in 2005 accelerating urbanization in the basin.

Under the above circumstances, the government of Indonesia (GOI) decided to implement the Anai-Kandis River Improvement Project as a part of Padang Area Flood Control Project. In this connection, the GOI prepared the detailed design of the Anai-Kandis River Improvement by additional consulting services of the second stage of the Padang Area Flood Control Project in the period from October 2000 to October 2001.

(2) Objective of the Sub-project

The objective of this project is to prevent frequent flood damage in the lower area of the Anai and Kandis Rivers by means of the river channel improvement of the Anai, Kandis and tributaries.

After completion of river improvement works, the lower area of around 60 km^2, which is the objective area of the improvement, becomes free from the menace of flooding and the development potential for the intensive commercial activities and agricultural production of this area will be

increase.

(3) Project Area

The Project area is the lower area of the Anai and Kandis Rivers with an area of around 60 km^2, which is located around 15 km north of Padang City, West Sumatra Province. The Anai River flows down through residential area and farmlands in the Project area. At present the Kandis River is a tributary of the Anai River joining near the river mouth. Location map Padang sub-project is presented in Figure 5.1.

5.2.2 Outline of the Sub-project

(1) Proposed Scope of the Sub-project

Proposed scope of this sub-project is summarized below.

(a) Rivers to be improved

Anai River channel improvement from river mouth to the section around 50m upstream of the Bypass Bridge with the river length of 4,100m, and construction of river structures (Muaro Bungo Bridge and Sasak Ubi Sluice are excluded)

(b) Design scale and design discharge

Design discharge: 1,300 m^3/s for whole stretches (25-year return period)

(c) Channel dimensions

- Longitudinal slope:	1/1,950
- Water depth:	6.5 m
- Velocity in design flood:	2.67 m/s
- Channel width at design high-water level:	144 m
- Bank slope of channel:	1 : 2
- Required width of channel:	172 m

(d) Work quantity

- Temporary coffering by SSP:	2,445 m
- Chanel excavation:	1,059,447 m^3
- Embankment:	112,778 m^3
- Closing dike:	4 sites
- Bank protection by wet masonry:	945 m
- Inspection road with side drain:	6,891 m
- Access road:	20 units
- Box culvert:	5 nos.

- Pipe culvert: 20 nos.

Design channel alignment of the Anai River and location of facilities are presented in Figure 5.2, and the longitudinal and cross-sectional profiles are illustrated in Figures 5.3 and 5.4, respectively.

In the I/P in July 2008, channel improvement works of the Lower Anai River (4.1 km) and the Upper Kandis River (1.4 km) are proposed. Comparing with these two (2) components, the Anai River has larger beneficial area including Minangkabau International Airport than the Kandis River. Therefore, the above scope of works is proposed. Details on change of scope are presented in ANNEX 2.

(2) Adaptation of Climate Change

Local conditions and basin characteristics of Padang sub-project are considered such as;

i) Stage I and II works were completed with preparation of O/M manuals for river facilities,

ii) Padang Pariaman Regency is the pilot area for JICA's Technical Cooperation Project on "Study on National Disaster Management in Indonesi," and

iii) Existence of Padang Minangkabau International Airport in the flood prone area.

Conceivable items are listed up in Table 5.1 and the contents are explained as below.

(a) Study on hydrological characteristics using the available rainfall and water level data mainly managed by the provincial government.

(b) Installation of adequate and simple hydrological observation equipment in cooperation with inhabitants. Number and location will be determined based on the above study on hydrological characteristics. Exercise or demonstration of sandbag construction method will be done at the time of above installation to understand simple and easy measures to prevent or reduce flood water damage.

(c) Compilation of hydrological data observed by inhabitants together with BWS staff.

(d) Determination of accumulated rainfall amount and/or water levels for flood warning, based on the hydrological analyses using collected data, such as rainfall-water level relationship, which gives river water warning level at the downstream point by measuring on site rainfall amount in the upstream basin, and water level-water level relationship, which also gives river water warning level at the downstream point by measuring upstream river water level.

(e) Transfer of knowledge to the inhabitants on the Flood Early Warning Procedures (FEWP) based on the understanding of the above (b) and (d).

(f) Proposal on flood disaster management plan as adaptation of climate change.

(3) Consulting Services

Detailed design for Anai-Kandis River Improvement in Padang Area Flood Control Project (III) was prepared in 2001. As the channel condition has changed remarkably due to APBN improvement works and sand mining, review of detailed design is necessary including subletting of channel survey. Unit construction cost will also be reviewed. Subsequently, the consultant will carry out the services of assistance in tendering and construction supervision. In parallel with these services, engineering services on adaptation of climate change listed in the above (3) will be conducted with participants from BWS Sumatra V and inhabitants.

5.2.3 Cost Estimate

(1) Basic Condition

The costs are estimated for each work item by multiplying the work quantity and unit cost. During the detailed design in 2001, unit cost estimation was developed based on the anticipated construction method and cost data such as labor cost, material cost, equipment cost and contractor's indirect cost. These unit costs are reviewed for the price level of August 2008. Following assumptions are employed for estimation.

(a) Price level: August 2008
(b) Exchange rate: US$1 = Rp. 9,291 = ¥ 107, ¥ 1 = Rp. 86.957
(c) Currency: - Local currency portion
- Foreign currency portion

(2) Estimated Direct Construction Cost

Breakdown of the direct construction cost is presented in Table 5.2 and summarized below.

(a) Local currency portion: **Rp. 125,206 million**
(b) Foreign currency portion: **¥ 560 million**
(c) Equivalent total: **Rp. 173,911 million = ¥ 2,000 million**

(3) Land Acquisition and Compensation Cost

In order to implement the proposed scope of works, an area of 1.5 ha shall be acquired and 9 houses shall be relocated. Required costs for each item are as follows:

(a) Land acquisition:	15,000 m^2 x Rp.100,000/m^2	= Rp.1,500,000,000
(b) House compensation:	9 houses x Rp.50,000,000/house	= Rp. 450,000,000
(c) Total		Rp.1,950,000,000

5.2.4 Evaluation of the Sub-project

(1) Economic Evaluation

Expected annual flood damage is estimated for two (2) cases; "Without Project" and "With Project" with the following equation.

$$D = SUM\ [\ (L_{m-1} - L_m) / 2 \quad x \quad (N_{m-1} - N_m)\ ]$$

where, D : Annual Flood Damage in monetary value,

L : Damage Potential corresponding to Probability of Flood in monetary value,

N : Probability of Flood such as 1/1.25, 1/2, 1/5, 1/10, 1/25 and

m : ordinal number.

Detailed explanation on damage potential (asset value and damage ratio, etc.) can be found in ANNEX 3. Expected annual benefit of the project works is estimated at Rp.28.311 billion modifying the previous study results.

The project cost consists of;

- Direct construction cost,
- Land acquisition and house compensation cost,
- Government administration cost,
- Consulting service cost,
- Physical contingency,
- Price escalation, and
- Value added tax (VAT).

Among the above, Land acquisition/House compensation Cost, Price escalation and Value Added Tax are excluded from the economic cost. Considering the opportunity cost, economic cost is estimated deducted 10 % from the local portion of financial cost. Cost for the consulting services is assumed to be allocated from the services for whole Project in proportion to the direct construction cost of Padang sub-project. Cost for adaptation of climate change is not included in the economic cost of consulting services.

- Direct construction cost : Rp. 169.46 billion
- Government administration cost : Rp. 9.72 billion
- Consulting service cost : Rp. 24.99 billion
- Total Economic Cost : Rp. 204.17 billion

In addition to this base cost, the annual operation and maintenance (O/M) cost is necessary to evaluate the economic efficiency of the project. The O/M cost is assumed at 0.5 % of economic direct construction cost, i.e. Rp. 0.85 billion/annum. Replacement cost is not considered for this

sub-project. Total project life is assumed at 50 years.

The economic viability is evaluated by factors of investment efficiency such as Net Present Value (NPV), Benefit-Cost ratio (B/C) and Economic Internal Rate of Return (EIRR). Table 5.3 shows the annual flow of economic cost and benefit.

- Economic Internal Rate of Return (EIRR) : **12.01 %**
- Benefit-Cost ratio (B/C) : **1.00**
- Net Present Value (NPV) at discount rate of 12 % : **Rp. 0.11 billion**

(2) Environmental Consideration

(a) Preparation of EIA

The AMDAL (EIA: Environmental Impact Assessment) has been executed for the Padang Area Flood Control Project (III) on Anai-Kandis River based on the Law No.23/1997. The results of AMDAL were summarized in the reports of KA-ANDAL, ANDAL, RKL and RPL issued in 2001, and approved by the governor of West Sumatra Province on February 12, 2002.

In reply to the request of BWS Sumatra V, the Environmental Impact Management Board in Province (BAPEDALDA) suggests revising PKL and RPL. BWS Sumatra V is requesting the budget of Rp. 200 million for the study, and the PKL and RPL will be approved by the end of 2009. Public consultation has been held with the following participants.

- BWS Sumatra V,
- Provincial government of West Sumatra,
- Padang City (Bappeda),
- Head of district (Camat),
- Head of town (Lurah) and
- Representatives of community

(b) Natural Environmental Consideration

The project area is not designated as any environmental protected areas and no endangered species have been found in the area. As the channel excavation works will be carried out at the river mouth, a phenomenon of saline-water intrusion might occur. According to the previous AMDAL study, this phenomenon can be negligible referring to the similar works in Stage I and Stage II projects in Padang.

(c) Social Environmental Consideration

In order to implement the proposed scope of works, an area of 1.5 ha shall be acquired

and 9 houses shall be relocated. According to the letter from governor of West Sumatra No. 614/603/PSDA-IX/2005 issued on September 26, 2005 presented in ANNEX 4, allocation of cost for land acquisition and house compensation will be aloocated as below.

- Central Government: 50.0 %
- West Sumatra Province: 25.0 %
- Padang City: 12.5 %
- Padang Pariaman Regency: 12.5 %

DGWR is requesting 2009 budget of Rp.10 billion for land acquisition/house compensation of 20 ha of the land including that for APBN works. Also, provincial government and city government are requesting Rp.7 billion and Rp.3 billion respectively to acquire another 20ha in 2009. It is expected that both land acquisition and house relocation will be completed in 2009.

For Land Acquisition and Resettlement Action Plan (LARAP) study, BWS Sumatra V is requesting Rp.297 million in 2009. The study will be conducted based on the existing data on (i) definition of acquisition area and houses to be relocated, (ii) baseline survey for resettlement, (iii) compensation and assistance method, etc.

5.2.5 Implementation Program

(1) Project Operation

Implementation of the construction works will be administrated by BWS Sumatra V, DGWR, Ministry of Public Works. The BWS Sumatra V operates field works such as modification of design and supervision for implementation of the sub-project. The Head of BWS Sumatra V will be appointed by the Ministry to take all the responsibilities to the Ministry for implementing the sub-project properly. The site manager is appointed to take charge of the execution of works. The staffs will support the Head of BWS in execution of survey and investigation, modification of design and preparation of tender calling for the works and supervision of the execution of the works. In addition, the foreign and local consultants are to be employed to assist the implementation of the sub-project in modification of design and construction supervision. Organization of the BWS Sumatra V is shown in Figure 5.5.

The BWS Sumatra V consists of 41 engineers, 42 technician, 58 administration staff and the other 16 staffs (total 157 persons). BWS Sumatra V was established in 2007 originating Padang Area Flood Control and Coast Protection Project Office, and the office conducted two (2) stages of the OECF/JBIC project. Even total number of staff in flood control and water resources conservation

sections is 31, other engineers of swamp development (16 persons) and irrigation (67 persons) sections can be assigned for the sub-project holding two (2) posts. Annual expenditure in 2007 budget for this BWS was Rp.104.6 billion and budget in 2008 is Rp.184.6 billion.

After completion of the project works, the operation and maintenance of the flood control facilities will be entrusted to the Provincial Government of West Sumatra.

(2) Implementation Schedule

Implementation of the sub-project is largely divided into two (2) stages of pre-construction and construction. Activities in pre-construction stage are (i) selection of one contractor, (ii) land acquisition and compensation, and (iii) review of the detailed design. Activities in construction stage are (i) construction of improvement works and (ii) maintenance of construction works. Considering the work volume and construction cost of this sub-project, construction period of 30 months is proposed with procurement method of International Competitive Bidding (ICB). Maintenance period or Defect Liability Period is determined at six (6) months considering the work contents. The implementation of Padang sub-project including construction works is scheduled as follows:

-	Land Acquisition and House Resettlement:	Jan. 2009 – Dec. 2009	(12 months)
-	Review of Detailed Design:	Nov. 2009 – Apr. 2010	(6 months)
-	P/Q for Contractors:	Feb. 2010 – Apr. 2010	(3 months)
-	Tendering:	May 2010 – May. 2011	(13 months)
-	Construction Works:	Jun. 2011 – Nov. 2013	(30 months)
-	Maintenance Period:	Dec. 2013 – May 2014	(6 months)

5.3 Sub-project (2) : Palembang Sub-project

5.3.1 General Description

(1) Background of the Sub-project

Palembang City, the capital of South Sumatra Province has an area of 401 km^2 and mostly half area of Palembang City is ex-swampy land with elevation range from 2 m to 4 m above mean sea water level. Location map of the Palembang sub-project is shown in Figure 5.6. Some parts of that area are really lower than high tide level of the Musi River. Therefore, the city extends in the flood prone areas of the Musi River. Flood prone area is estimated as 1,191 ha in 2007. Major floods in recent years are summarized bellow, while damage by small scale inundation frequently

occurs. In 2006, 40 times of flood damages were recorded.

Flood Damage in Palembang

Month/Year	Area	Dead	Affected
Nov. 2003	n.a.	n.a.	1,200 houses
Dec. 2003	n.a.	n.a.	20,000 houses
Jan. 2005	n.a.	n.a.	300 houses

Although there is no available data, floods occurred in February and April 2005, and January 2006.

Palembang City is located along the Musi River approximately at 85 km inland from the sea. The storm water from the city area is finally drained to the Musi River through 19 drainage systems. To mitigate the inundation damages, drainage improvement works have been carried out by improving drainage channels and constructing detention pond.

However, the urban center and main roads of Palembang City are still suffering from inundations, since existing capacities of these facilities are still far from the required level. Political, economical and social activities of the city have been interrupted due to these frequent inundations. In addition, the inundation also seriously aggravates living environments and cases sanitary problems to the residents of the city. Typical inundation of Palembang is shown Figure 5.7.

The inundation issues of Palembang City are summarized as follows:

- Shortage of the drainage facilities such as drainage channels and detention ponds, and devastation of existing facilities.
- Lack of continuous and periodic maintenance activities of the drainage facilities and networks.
- Lack of society's participants to keep the living environment clean, especially in relation with sediment and garbage disposal.

Under the above circumstances, JICA conducted the Study on Comprehensive Water Management of Musi River Basin in September 2003 under the request of GOI. Among nineteen (19) drainage areas, two (2) drainages namely Bengung and Buah Rivers were selected and drainage plans/basic designs with design scale of 15-year return period were proposed. Following JICA's master plan and feasibility study, detailed design for several drainages was conducted in 2003 and 2004.

(2) Objective of the Sub-project

The objective of this sub-project is to mitigate flood/inundation damage in Palembang City with population of 1.4 million, the capital of South Sumatra Province.

After the completion of project works, inundation condition of the center of Palembang City will be improved and traffic jam in the city will be reduced, and this will also contribute the economic development of the City and its surrounding area.

(3) Project Area

The project area expands the center of Palembang City, the capital of South Sumatra Province. The Buah, Bendung and Sekanak Rivers enter into the Musi River from the left, while the Sriguna River joins the Musi from the right at just upstream of the confluence of the Komering River.

5.3.2 Outline of Sub-project

(1) Proposed Scope of the Sub-project

Proposed scope of this sub-project is summarized below.

(a) Rivers to be improved

Bendung River (19,186 km^2 of catchment area) for 5.5 km from the confluence with the Musi River to Talang Aman Pond

(b) Design scale and design discharge

45.5 m^3/s at the mouth to 14.2 m^3/s at the outlet of Talang Aman Pond with 15-year return period

(c) Channel dimensions

- Channel width:	10 to 15 m (existing channel width)
- Channel excavation:	1.0 m in average.
- Longitudinal bed slope:	1/5,500
- Bank slope:	existing with protection works

(d) Work quantity

- Channel bed excavation (including hauling and disposal):	110,000 m^3
- Protection of existing revetment:	32,400 m^3
- Inspection Road	2,100 m

Drainage system of the Bendung River is schematically illustrated in Figure 5.8. Planned longitudinal and cross-sectional profiles are plotted in Figure 5.9.

Among four (4) drainages of the Bendung, Sekanak, Buah and Sriguna Rivers in the I/P in July 2008, BWS Sumatra VIII gives the high priority to the Bendung River (19.186 km^2) and Sekanak River (11.395 km^2) as these river basins occupy the central part of Palembang city. The I/P in July

2008 proposes pump drainage for the Bendung and Sekanak Rivers, while the JICA Study in September 2003 proposed gravity drainage for the Bendung River. Comparing with the two (2) alternatives of pump drainage and gravity drainage, gravity drainage scheme is more feasible than the pump drainage scheme to achieve same benefit considering the construction cost of drainage pumping stations and gated facilities, and also the operation and maintenance for these facilities. Therefore, gravity drainage scheme is proposed for the Bendung River. Even though the detailed design for the Sekanak River proposed pump drainage, runoff from this river might be drained by gravity because of the topographic conditions.

Considering the beneficial area and also comparing the number of resettlement for the improvement of these rivers, the Bendung River is selected as a proposed river to be improved in the sub-project. Details on change of scope are presented in ANNEX 2.

(2) Adaptation of Climate Change

Using the same items as Padang sub-project, conceivable items are listed up in Table 5.1. Local conditions and basin characteristics of Palembang sub-project are considered such as;

i) Study on Comprehensive Water Management of Musi River Basin was conducted by JICA in September 2003,

ii) Warning system of upper basin of the Musi River using GSM has been installed, and

iii) There are many retarding ponds in and around Palembang City, but some of them have been reclaimed in recent years.

Following will be included as soft component to respond to climate change.

(a) Inventory survey of existing ponds through topographic survey.

(b) Flood runoff analysis with existing ponds and without existing ponds.

(c) Estimation of storm- water detention/retention volume in the basin required for the condition of "without flood" in several probabilities, i.e. difference between runoff discharge and existing channel capacity. Excess runoff over the channel capacity flows into adjacent terrain as flooding. If these volumes could be stored in detention/retention pond or reservoir, no flooding will occur.

(d) Proposal on stormwater detention/retention facilities with their location, area and volume: "Basin Runoff Control." Under such conditions as densely built area along the channel, channel widening cannot be expected for flood mitigation. Based on the above study (c), conceivable sites for stormwater detention/retention facilities will be proposed.

(e) Auger boring and permeability test for proposed pilot site of stormwater detention/retention facilities. The pilot site will be selected at the appropriate location for demonstration of effectiveness of stormwater storage/infiltration.

(f) Construction of infiltration well at the pilot site of stormwater detention/retention facilities together with BWS staff.

(g) Demonstration of infiltration exercise.

(h) Proposal on flood disaster management plan as adaptation of climate change.

(3) Consulting Services

Detailed design for the Bendung River was prepared in December 2003 by ITB (Institute of Technology of Bandung) based on the drainage plan with pump drainage. On the other hand, JICA Feasibility Study proposed gravity drainage in September 2003. Therefore during the review of detailed design, the drainage plan for the Bendung River will be examined together with channel profile survey by subletting for quantity estimate. Unit construction cost will also be reviewed. Subsequently, the consultant will carry out the services of assistance in tendering and construction supervision. In parallel with these services, engineering services on adaptation of climate change listed in the above (3) will be conducted with participants from BWS Sumatra VIII and inhabitants.

5.3.3 Cost Estimate

(1) Basic Condition

The costs are estimated for each work item by multiplying the work quantity and unit cost. Following assumptions are employed for estimation.

(a) Price level: August 2008

(b) Exchange rate: US$1 = Rp. 9,291 = ¥ 107, ¥ 1 = Rp. 86.957

(c) Currency: - Local currency portion

- Foreign currency portion

(2) Estimated Direct Construction Cost

Breakdown of the direct construction cost is presented in Table 5.4 and summarized below.

(a) Local currency portion: **Rp. 39,144 million**

(b) Foreign currency portion: **¥ 29 million**

(c) Equivalent total: **Rp. 41,680 million = ¥ 479 million**

(3) Land Acquisition and Compensation Cost

In order to implement the proposed scope of works, an area of 0.2 ha shall be acquired and ten (10) houses shall be relocated. Required costs for each item are as follows:

(a) Land acquisition: 2,000 m^2 x Rp.150,000/m^2 = Rp. 300,000,000

(b) House compensation: 10 houses x Rp.100,000,000/house = Rp.1,000,000,000

(c) Total Rp.1,300,000,000

5.3.4 Evaluation of the Sub-project

(1) Economic Evaluation

Expected annual flood damage is estimated for two (2) cases; "Without Project" and "With Project" with the following equation.

$$D = SUM [(L_{m-1} - L_m) / 2 \quad x \quad (N_{m-1} - N_m)]$$

where, D : Annual Flood Damage in monetary value,

L : Damage Potential corresponding to Probability of Flood in monetary value,

N : Probability of Flood such as 1/2, 1/3, 1/5, 1/10, 1/15 and

m : ordinal number.

Expected annual benefit of the project works is estimated at Rp.6.870 billion, 207 % escalated from JICA study results. Details of the economic evaluation are presented in ANNEX 3.

The project cost consists of;

- Direct construction cost,
- Land acquisition and house compensation cost,
- Government administration cost,
- Consulting service cost,
- Physical contingency,
- Price escalation, and
- Value added tax (VAT).

Among the above, Land acquisition/House compensation Cost, Price Escalation and Value Added Tax are excluded from the economic cost. Considering the opportunity cost, economic cost is estimated deducted 10 % from the local portion of financial cost. Cost for the consulting services is assumed to be allocated from the services for whole Project in proportion to the direct construction cost of Palembang sub-project. Cost for adaptation of climate change is not included in the economic cost of consulting services.

- Direct construction cost : Rp. 39.65 billion
- Government administration cost : Rp. 2.28 billion
- Consulting service cost : Rp. 5.99 billion
- Total Economic Cost : Rp. 47.92 billion

In addition to this base cost, the annual operation and maintenance (O/M) cost is necessary to

evaluate the economic efficiency of the project. The O/M cost is assumed at 0.5 % of economic direct construction cost, i.e. Rp. 0.20 billion/annum. Replacement cost is not considered for this sub-project. Total project life is assumed at 50 years.

The economic viability is evaluated by factors of investment efficiency such as Net Present Value (NPV), Benefit-Cost ratio (B/C) and Economic Internal Rate of Return (EIRR). Table 5.5 shows the annual flow of economic cost and benefit.

- Economic Internal Rate of Return (EIRR) : **12.04 %**
- Benefit-Cost ratio (B/C) : **1.00**
- Net Present Value (NPV) at discount rate of 12 % : **Rp. 0.13 billion**

(2) Environmental Consideration

(a) Preparation of EIA

The BWS Sumatra VIII is requesting the budget of Rp.700 million in 2009 for the AMDAL study on flood control of Palembang City. The study is expected to be approved by the mayor of Palembang around the end of 2009.

(b) Natural Environmental Consideration

No occurrence of significant impact is expected to natural environment. Detailed impacts will be studied by the AMDAL study in 2009. The channel excavation works will be carried out at the confluence with the Musi River where tidal fluctuation can be seen, so that a phenomenon of saline-water intrusion might occur.

(c) Social Environmental Consideration

In order to implement the proposed scope of works, an area of 0.2 ha shall be acquired and 10 houses shall be relocated.

Inventory survey for land acquisition/house relocation has been conducted by BWS Sumatra VIII for the original scope of works.

- Bendung River (2.8 km):	118 houses,	1.0 ha
- Sekanak River (3.55 km):	48 houses,	0.8 ha
- Buah River (2.86 km):	24 houses,	0.9 ha
- Sriguna River (1.5 km):	not clear,	not clear
- Total (except Sriguna R.):	190 houses,	2.7 ha

BWS Sumatra VIII will carry out 15 ha land acquisition/house relocation using the budget from central government with amount of Rp.1.5 billion in 2009. After the review of scope of works including its drainage plan, the component of Bendung River with channel excavation is selected for sub-project in Palembang. Required number of

resettlement can be reduced to ten (10) and the land acquisition area becomes 0.2 ha. Therefore, the budget might be sufficient for the land acquisition and house relocation. Budget for LARAP study is requesting to the central government with an amount of Rp.200 million.

5.3.5 Implementation Program

(1) Project Operation

Implementation of the construction works will be administrated by BWS Sumatra VIII, DGWR, Ministry of Public Works. The BWS Sumatra VIII operates field works such as modification of design and supervision for implementation of the sub-project. The Head of BWS Sumatra VIII will be appointed by the Ministry to take all the responsibilities to the Ministry for implementing the sub-project properly. The site manager is appointed to take charge of the execution of works. The staffs will support the Head of BWS in execution of survey and investigation, modification of design and preparation of tender calling for the works and supervision of the execution of the works. In addition, the foreign and local consultants are to be employed to assist the implementation of the sub-project in modification of design and construction supervision. Organization of the BWS Sumatra VIII is shown in Figure 5.10.

The BWS Sumatra VIII consists of 35 engineers, 41 technician, 34 administration staff and the other 39 staffs (total 149 persons). Annual expenditure for this BWS was drastically increased from Rp.58.2 billion in 2005 to Rp.106.5 billion. in 2006 and Rp.276.3 billion. in 2008.

After completion of the project works, the operation and maintenance of the flood control facilities will be entrusted to the Public Work Services of Palembang City Hall.

(2) Implementation Schedule

Implementation of the sub-project is largely divided into two (2) stages of pre-construction and construction. Activities in pre-construction stage are (i) selection of one contractor, (ii) land acquisition and compensation, and (iii) review of the detailed design. Activities in construction stage are (i) construction of improvement works and (ii) maintenance of construction works. Considering the work volume and construction cost of this sub-project, construction period of 24 months is proposed with procurement method of Local Competitive Bidding (LCB). Maintenance period or Defect Liability Period is determined at six (6) months considering the work contents. The implementation of Palembang sub-project including construction works is scheduled as follows:

- . Land Acquisition and House Resettlement: Aug. 2009 – Dec. 2010 (17 months)
- Review of Detailed Design: Nov. 2009 – Apr. 2010 (6 months)
- Tendering with Post P/Q: May 2010 – Oct. 2010 (6 months)
- Construction Works: Nov. 2010 – Oct. 2012 (24 months)
- Maintenance Period: Nov. 2012 – Apr. 2013 (6 months)

5.4 Sub-project (3) : Bandung Sub-project

5.4.1 General Description

(1) Background of the Sub-project

The south Bandung Plateau suffers from recurrent flooding of the Citarum River. Location map of Bandung sub-project is presented in Figure 5.11. The largest flood in recent decades occurred in 1986 which inundated 7,450 ha and affected 112,250 persons. Flood control in the Upper Citarum River basin started in 1987 after the flood disaster in 1986 and the two (2) stages of project funded by JBIC has been conducted in addition to Indonesian governmental fund's projects. Although the safety against flood disaster along the Citarum River has drastically increased by the projects, upper areas of the basin are still suffering from seasonal flood damages. In February and April 2005, large floods occurred of which inundation area was 4,700 ha with the depth of 0.5 m to 2.0 m causing extensive damages to 55,670 houses, public facilities and rice fields. Another large flood is recorded in March 2007 with the inundation area of 1,400 ha.

Based on the hydrological analysis conducted during Stage II of Upper Citarum Basin Urgent Flood Control Project, scale of floods in 1986 and 2005 were estimated at approximately 2-year return period. The factors of recent flood damages are considered as follows:

- Low discharge capacity of the Citarum River and its tributaries including the Cikapundung, Cikapundung Kolot and Citeureup Rivers in Dayeuhkolot area
- Land development causing the increase of silt loads and flood peak discharge
- Population growth resulting in urban sprawl into flood prone area

Besides, Dayeuhklot District which located at middle stream of the Citarum River suffered from the serous damage in 2005 flood disaster because of the land subsidence due overexploitation of groundwater.

Flood Damage in Bandung

Month/Year	Area (ha)	Evacuated (persons)	Affected	Damage Cost (Bp. billion)
Mar. 1986	7,450	n.a.	112,250 persons	n.a.
Feb. 2003	n.a.	n.a.	4,300 persons	n.a.
Mar. 2004	n.a.	n.a.	8,000 persons (1 toll of life)	n.a.
Feb. & Apr. 2005	4,700	14,000	55,700 houses	371.3
Feb. & Mar.2007	1,400	n.a.	900 houses	n.a
Apr. 2008	880	n.a.	n.a.	n.a.

Note: Although there is no available data, large flood occurred in 1988.

(2) Objective of the Sub-project

Even the Citarum Main River had been improved by Stage I and II works of the Upper Citarum Urgent Flood Control Project, the Upper Citarum basin still suffers from flooding especially in Dayeuhkolot area on the right (or north). As the river channel of the Cikapundung (or Cigede) makes a detour of about 4 km from the nearest point to the Citarum Main River, backwater of the Citarum causes the overflow flooding of the Cikapundung River. In order to mitigate flood damage in these areas, construction of a diversion channel of the Cikapundung River is proposed. However, construction of Cikapundung diversion channel will be effective under the condition that the flood water level of the Citarum Main River does not exceed the design water level.

After the construction of the diversion channel, local flooding from the Cikapundung River will be mitigated. The economic activities mainly led by textile industry will be further developed in Bandung Regency.

(3) Project Area

The Cikapundung River (or Cigede River) is the right tributary of the Citarum Main River joining at about 200 m downstream of Bale Endah Bridge. The river basin has a catchment area of 144.3 km^2 including the Cikapundung Kolot basin (27.5 km^2, left tributary) and Citeureup (or Cipalasari) basin (8.3 km^2, right tributary) as shown in Figure 5.12. This river originates in the northern mountains of Bandung and flows through the central part of the city. Near the confluence with the Citarum Main in Dayeuhkolot, the channel makes a detour to the Citarum Main River. Water level of the Cikapundung River is raised due to backwater during high stage of the mainstream, and the area along the channel is easily inundated. Land subsidence is also the reason of habitual inundation.

5.4.2 Outline of the Sub-project

(1) Proposed Scope of the sub-project

Proposed scope of the sub-project is summarized below.

(a) Construction of Cikapundung Diversion Channel

(b) Design scale and design discharge: 60 m^3/s (5-year return period)

(c) Channel dimensions:

- improvement length: 715 m
- channel width: 8.0 m
- water depth: 3.0 m
- longitudinal slope 1/1,000

(d) Work quantity:

- excavation: 57,500 m^3
- wet stone masonry 2,760 m^3
- Moh Toha Road bridge 1 nos.
- I/M road bridge at outlet 1 nos.
- diversion structure at inlet 1 nos.

Proposed alignment of the diversion channel and longitudinal and cross-sectional profiles are shown in Figures 5.13 to 5.15.

The I/P in July 2008 proposed the following two (2) components.

- Channel widening of the Citarum Main River for 3.0 km from Curug Jompong to Ciharuman (30m existing bottom width to 55m)
- Construction of Cikapundung diversion channel (715 m) with Jl. Moh Toha Road bridge

After the preparation of the I/P in July 2008, BBWS Citarum examined the effect of channel widening around Curug Jompong, the lower end of Upper Citarum River. As the result, channel widening contributes less effect to Dayeuhkolot area. Therefore BBWS Citarum withdraws the scheme of channel widening.

(2) Adaptation of Climate Change

Using the same items as Padang and Palembang sub-projects, conceivable items are listed up in Table 5.1. Local conditions and basin characteristics of Bandung sub-project are considered such as;

i) Stage I and II works were completed with preparation of O/M manuals for river facilities,

ii) Land subsidence around Dayeuhkolot area is remarkable in recent years due to extraction of groundwater by textile factories,

iii) Flood forecasting and warning system (FFWS) was installed in 1999, but does not function,

iv) Flood plain management plan and hazard map have been prepared,

v) GIS has been installed with general basin information, and

vi) Watershed conservation plan for the Upper Citarik River basin has been formulated.

Following will be included as soft component to respond to climate change.

(a) Channel profile survey for the Cikapundung River and Citarum Main River including inventory survey on existing 3 drainage pumping stations along the Citarum Main River.

(b) Estimation of existing channel capacities of the above two rivers by non-uniform flow.

(c) Assessment of flood risks in Dayeuhkolot area based on the existing channel capacities, past flood/inundation records and forecast flooding/inundation condition by extraordinary floods brought by future climate change.

(d) Evaluation on operation and maintenance plan for river facilities, watershed management plan, flood plain management plan, and telemetering plan.

(e) Proposal on flood disaster management plan as adaptation of climate change.

(3) Consulting Services

Detailed design for the Cikapundung Diversion Channel was prepared in March 2008. Review of detailed design will be carried out concentrating the review of unit construction cost. Subsequently, the consultant will carry out the services of assistance in tendering and construction supervision. In parallel with these services, engineering services on adaptation of climate change listed in the above (3) will be conducted with participants from BBWS Citarum and inhabitants.

5.4.3 Cost Estimate

(1) Basic Condition

The costs are estimated for each work item by multiplying the work quantity and unit cost. During the detailed design in 2007, unit cost estimation was developed based on the anticipated construction method and cost data such as labor cost, material cost, equipment cost and contractor's indirect cost. These unit costs are reviewed for the price level of August 2008 dividing local and foreign currency portions. Following assumptions are employed for estimation.

(a) Price level: August 2008

(b) Exchange rate: US$1 = Rp. 9,291 = ¥ 107, ¥ 1 = Rp. 86.957

(c) Currency: - Local currency portion

- Foreign currency portion

(2) Estimated Direct Construction Cost

Breakdown of the direct construction cost is presented in Table 5.6 and summarized below.

(a) Local currency portion: **Rp. 17,875 million**

(b) Foreign currency portion: **¥ 24 million**

(c) Equivalent total: **Rp. 19,999 million = ¥ 230 million**

(3) Land Acquisition and Compensation Cost

In order to implement the proposed scope of works, an area of 12,720 m^2 shall be acquired and six (6) houses shall be relocated. Required costs for each item are as follows:

(a)	Land acquisition:	12,720 m^2 x Rp. 150,000/m^2	= Rp.1,908,000,000
(b)	House compensation:	6 houses x Rp.100,000,000/house	= Rp. 600,000,000
(c)	Total		Rp.2,508,000,000

5.4.4 Evaluation of the Sub-project

(1) Economic Evaluation

Expected annual flood damage is estimated for two (2) cases; "Without Project" and "With Project" with the following equation.

$$D = SUM [(L_{m-1} - L_m) / 2 \times (N_{m-1} - N_m)]$$

where, D : Annual Flood Damage in monetary value,

L : Damage Potential corresponding to Probability of Flood in monetary value,

N : Probability of Flood such as 1/1.1, 1/1.5, 1/1.7, 1/5, 1/10, 1/20, 1/50 and

m : ordinal number.

Expected annual benefit of the project works is estimated at Rp. 3.39 billion using the price escalation. Details of the economic evaluation are presented in ANNEX 3.

The project cost consists of;

- Direct construction cost,
- Land acquisition and house compensation cost,
- Government administration cost,
- Consulting service cost,
- Physical contingency,
- Price escalation, and
- Value added tax (VAT).

Among the above, Land acquisition/House compensation Cost, Price Escalation and Value Added Tax are excluded from the economic cost. Considering the opportunity cost, economic cost is estimated deducted 10 % from the local portion of financial cost. Cost for the consulting services is assumed to be allocated from the services for whole Project in proportion to the direct construction cost of Bandung sub-project. Cost for adaptation of climate change is not included in the economic cost of consulting services.

- Direct construction cost : Rp. 19.12 billion
- Government administration cost : Rp. 1.10 billion
- Consulting service cost : Rp. 2.84 billion
- Total Economic Cost : Rp. 23.10 billion

In addition to this base cost, the annual operation and maintenance (O/M) cost is necessary to evaluate the economic efficiency of the project. The O/M cost is assumed at 0.5 % of economic direct construction cost, i.e. Rp. 0.10 billion/annum. Replacement cost is not considered for this sub-project. Total project life is assumed at 50 years.

The economic viability is evaluated by factors of investment efficiency such as Net Present Value (NPV), Benefit-Cost ratio (B/C) and Economic Internal Rate of Return (EIRR). Table 5.7 shows the annual flow of economic cost and benefit.

- Economic Internal Rate of Return (EIRR) : **13.27 %**
- Benefit-Cost ratio (B/C) : **1.11**
- Net Present Value (NPV) at discount rate of 12 % : **Rp. 1.81 billion**

(2) Environmental Consideration

(a) Preparation of EIA

Stage I and Stage II works of the Upper Citarum River Basin Urgent Flood Control Project were implemented after the approval in 1993 of AMDAL study. During the preparation of detailed design for stage III project works, an AMDAL Evaluation Commission meeting was held in 2006. Based on the meeting results, the Regional Living Environment Control Institute (BPLHD) issued the letter deciding that the RKL (environmental management plan) and RPL (environment monitoring plan) in AMDAL 1993 would be revised in accordance with the further technical engineering designing. The revised RKL-RPL report was issued in 2007 and approved by the authority. Even though the Cikapundung diversion channel is not included in those AMDAL report, it is judged that no further study is required for the sub-project due to the scale of project works (channel length = 715 m and excavation volume = 57,500 m^3), according to the Decree of Ministry of Environment No.11/2006. The Decree stipulates that AMDAL study is required for the following river improvement and normalization works including

construction of flood diversion channel.

- Channel length: equal or more than 5 km in big city and 10 km in medium city
- Excavation/dredging volume: equal or more than 500,000 m^3

Channel widening in Curug Jompong is also proposed in the I/P in July 2008. But no consideration is taken to the channel widening because BBWS Citarum withdraws the scheme of channel widening.

(b) Natural Environmental Consideration

No ecologically valuable habitats and endangered species habitats exist in the area; therefore, it is assumed that significant impacts to natural environment are unable to occur. Channel bed of the Citarum Main River contains high concentration of heavy metal, but the proposed alignment of Cikapundung diversion channel is less related to the mainstream of the Upper Citarum River.

(c) Social Environmental Consideration

According to the BBWS Citarum, required area for land acquisition is 12,720 m^2 and six (6) houses will be resettled. BBWS Citarum expects the land acquisition and resettlement will be completed in 2009 using the budget of central government. According to the information of Directorate of River, Lake and Reservoir and also BBWS Citarum, required cost for land acquisition and house compensation has been disbursed from the central government for the Upper Citarum Basin Urgent Flood Control Project (II) and Jatigede Dam Construction Project.

5.4.5 Implementation Program

(1) Project Operation

Implementation of the construction works will be administrated by BBWS Citarum, DGWR, Ministry of Public Works. The BBWS Citarum operates field works such as modification of design and supervision for implementation of the sub-project. The Head of BBWS Citarum will be appointed by the Ministry to take all the responsibilities to the Ministry for implementing the sub-project properly. The site manager is appointed to take charge of the execution of works. The staffs will support the Head of BBWS in execution of survey and investigation, modification of design and preparation of tender calling for the works and supervision of the execution of the works. In addition, the foreign and local consultants are to be employed to assist the implementation of the sub-project in modification of design and construction supervision. Organization of the BBWS

Citarum is shown in Figure 5.16.

The BBWS Citarum consists of 33 engineers, 110 technician, 104 administration staff and the other 306 staffs (total 553 persons). Annual expenditure for this BBWS was Rp. 220.32 billion in 2007 and Rp. 227.55 billion in 2008, respectively.

After completion of the project works, the operation and maintenance of the flood control facilities will be entrusted to the Public Work Services of West Java Province.

(2) Implementation Schedule

Implementation of the sub-project is largely divided into two (2) stages of pre-construction and construction. Activities in pre-construction stage are (i) selection of one contractor, (ii) land acquisition and compensation, and (iii) review of the detailed design. Activities in construction stage are (i) construction of improvement works and (ii) maintenance of construction works. Considering the work volume and construction cost of this sub-project, construction period of 24 months is proposed with procurement method of Local Competitive Bidding (LCB). Maintenance period or Defect Liability Period is determined at six (6) months considering the work contents. The implementation of Bandung sub-project including construction works is scheduled as follows:

- Land Acquisition and House Resettlement:	Aug. 2009 – Dec. 2010	(17 months)
- Review of Detailed Design:	Nov. 2009 – Mar. 2010	(5 months)
- Tendering with Post P/Q:	Apr. 2010 – Sep. 2010	(6 months)
- Construction Works:	Oct. 2010 – Sep 2012	(24 months)
- Maintenance Period:	Oct. 2012 – Mar. 2013	(6 months)

5.5 Sub-project (4) : Wonokromo Sub-project in Surabaya

5.5.1 General Description

(1) Background of the Sub-project

Surabaya City, the second largest city in Indonesia extends in swampy lowland facing Madura straight and floods occur every year. Due to the geographic feature and uncontrolled urbanization process of the Metropolitan area, Surabaya City suffers from annual flood disaster in broad area. Although the inundation area scattered in large area of eastern part of the city, most severe damage in terms of inundation height occurred in the area along the Gunungsari River, the Kedurus River and the Wonokromo River. These three (3) river basins are all listed in the long-list sub-projects

and the Wonokromo sub-project is selected in the short-listed sub-projects as described in Chapter IV. Location map of the Wonokromo River is presented in Figure 5.17.

(2) Objective of the Sub-project

The Wonokromo River is the artificial diversion channel of the Surabaya River which branches from the Brantas River. The improvement of the channel will increase the flow capacity of the Wonokromo and mitigate flood damage in the eastern part of Surabaya City, the second largest city in Indonesia with population of 2.6 million. After the increase of flow capacity of the Wonokromo, flood discharge to the Mas River, which is diverted from the Surabaya River at Jagir and flows in the central part of Surabaya, can be reduced.

Increase of flow capacity and decrease of flood discharge by the improvement works will contribute to develop the economic activities and to promote public welfare.

(3) Project Area

The project area expands eastern part of Surabaya City. Both banks in the upstream area are occupied densely by residential houses and commercial buildings, while the downstream area near the mouth is used for fish ponds. Housing area invades fish ponds gradually in recent years.

5.5.2 Outline of the Sub-project

(1) Proposed Scope of the sub-project

Proposed scope of the sub-project is summarized below.

(a) Design scale and design discharge: 420 m^3/s (25-year return period)

(b) Channel improvement (3,950 m stretch)
by concrete sheet-pile driving with earth embankment

- Left bank
  WO.003 + 378 ~ WO.005 + 505 : 2,127 m
- Right bank
  WO.002 + 376 ~ WO.002 + 926 : 550 m
  WO.003 + 248 ~ WO.006 + 326 : 3,078 m
  Sub-total : 3,628 m
- Total 5,755 m

(c) Channel width: 60 m in the upstream reaches to
70 m in the lower reaches (existing width)

(d) Work Quantity

- channel excavation: 4,489 m^3
- embankment: 6,446 m^3
- driving length of concrete sheet pile: 149,630 m in total

Considering the bank stability on the soft ground, concrete sheet-pile driving with earth embankment is proposed for the abovementioned stretches as same manner as other stretches. Plan, longitudinal profile and cross-sectional profiles are illustrated in Figures 5.18 to 5.20.

As mentioned in I/P in July 2008, there are many houses on the left bank just upstream of Semolo Waru I drainage pumping station located at section WO.006 + 775. About 100 houses are counted on the "Google Earth." Considering the design high-water levels which are almost same as the existing left bank elevations in these stretches, and the difficulty of land acquisition and house relocation, downstream stretches from WO.005 + 906 are proposed to be excluded from this sub-project. Details on change of scope are presented in ANNEX 2.

(2) Adaptation of Climate Change

Using the same items as before-mentioned sub-projects, conceivable items are listed up in Table 5.1. Local conditions and basin characteristics of Surabaya-Wonokromo sub-project are considered such as;

i) The Wonokromo River plays a role as a floodway of the Surabaya River, and
ii) Discharges are controlled at Jagir weir on the Wonokromo River and Wonokromo Sluice at the Kalimas River.

Following will be included as soft component to respond to climate change.

(a) Topographic survey on ground elevation around the Wonokromo River as the basic data for flood flow analysis mentioned below.
(b) Flood flow analysis using unsteady flow simulation.
(c) Preparation of flood risk map based on the field survey and simulation results.
(d) Proposal on flood disaster management plan as adaptation of climate change.
(e) Evaluation of existing functions of Jagir Weir on the Wonokromo River and Wonokromo Sluice on the Mas River clarifying (i) their dimensions, (ii) operation and maintenance manuals, and (iii) confirmation of operation manual against extraordinary flood event and emergency.
(f) Proposal on operation and maintenance plan for Jagir Weir including the operation for extraordinary flood events.

(3) Consulting Services

Detailed design for the Wonokromo River was prepared in 2005. But the revision of structure design might be necessary considering the geological condition along the channel. Channel profile survey and detailed soil-mechanical investigation will be conducted by subletting. Subsequently, the consultant will carry out the services of assistance in tendering and construction supervision. In parallel with these services, engineering services on adaptation of climate change listed in the above (3) will be conducted with participants from BBWS Brantas and inhabitants.

5.5.3 Cost Estimate

(1) Basic Condition

The costs are estimated for each work item by multiplying the work quantity and unit cost. Following assumptions are employed for estimation.

(a) Price level: August 2008

(b) Exchange rate: US$1 = Rp. 9,291 = ¥ 107, ¥ 1 = Rp. 86.957

(c) Currency: - Local currency portion

- Foreign currency portion

(2) Estimated Direct Construction Cost

Breakdown of the direct construction cost is presented in Table 5.8 and summarized below.

(a) Local currency portion: **Rp.114,150 million**

(b) Foreign currency portion: **¥ 141 million**

(c) Equivalent total: **Rp.126,451 million = ¥ 1,454 million**

(3) Land Acquisition and Compensation Cost

No land acquisition or house compensation is scheduled in principle.

5.5.4 Evaluation of the Sub-project

(1) Economic Evaluation

Detailed information cannot be obtained on economic evaluation for Wonokromo sub-project except statistical data. Therefore annual benefit for this sub-project is estimated using specific annual benefit per km^2. Based on the statistic data of Surabaya City, population density and household density in inundation damage area of 2.5 km2 are estimated at 7,870 person/km^2 and 2,390 households/km^2, respectively. These values are close to those in central part of Palembang

City, and annual benefit of Wonokromo sub-project is estimated at Rp. 20.850 billion (= Rp. 8.340 billion/km^2 x 2.50 km^2). Details are mentioned in ANNEX 3.

The project cost consists of;

- Direct construction cost,
- Land acquisition and house compensation cost,
- Government administration cost,
- Consulting service cost,
- Physical contingency,
- Price escalation, and
- Value added tax (VAT).

Among the above, Land acquisition/House compensation Cost, Price Escalation and Value Added Tax are excluded from the economic cost. Considering the opportunity cost, economic cost is estimated deducted 10 % from the local portion of financial cost. Cost for the consulting services is assumed to be allocated from the services for whole Project in proportion to the direct construction cost of Wonokromo sub-project. Cost for adaptation of climate change is not included in the economic cost of consulting services.

- Direct construction cost : Rp. 120.79 billion
- Government administration cost : Rp. 6.95 billion
- Consulting service cost : Rp. 18.17 billion
- Total Economic Cost : Rp. 145.90 billion

In addition to this base cost, the annual operation and maintenance (O/M) cost is necessary to evaluate the economic efficiency of the project. The O/M cost is assumed at 0.5 % of economic direct construction cost, i.e. Rp. 0.60 billion/annum. Replacement cost is not considered for this sub-project. Total project life is assumed at 50 years.

The economic viability is evaluated by factors of investment efficiency such as Net Present Value (NPV), Benefit-Cost ratio (B/C) and Economic Internal Rate of Return (EIRR). Table 5.9 shows the annual flow of economic cost and benefit.

- Economic Internal Rate of Return (EIRR) : **12.81 %**
- Benefit-Cost ratio (B/C) : **1.07**
- Net Present Value (NPV) at discount rate of 12 % : **Rp. 6.82 billion**

(2) Environmental Consideration

(a) Preparation of EIA

The AMDAL study has been conducted since June 2008 on the river improvement works. As of October 2008, the Draft KA-ANDAL report (Draft TOR for ANDAL) has been

completed and the ANDAL, RKL and RPL reports are scheduled to be finalized in the end of November, 2008. The AMDAL study will be approved around in January 2009 by mayor of Surabaya City.

(b) Natural Environmental Consideration

The project area and the surroundings are not designated as environmental protected area by law; however, mangrove is formed near the mouth of the Wonokromo River scattering for the 6.0 km stretches from the estuary. The mangrove area is included in the AMDAL study area; therefore, it is expected that proper consideration will be applied to conserve the mangrove in conformity with the results of the AMDAL study. In addition to this issue saline-water intrusion should be considered caused by the channel excavation, because whole stretches of the Wonokromo River are affected by tidal fluctuation.

(c) Social Environmental Consideration

Neither land acquisition nor house relocation is scheduled in this sub-project.

The DGWR originally proposed in I/P in July 2008 to improve the channel for 11 km stretches. In this case, about 100 houses shall be relocated on the left bank just upstream of Semolo Waru I drainage pumping station. As describe in (1) of Section 5.5.2, downstream stretches of these sections are excluded from the scope of works.

5.5.5 Implementation Program

(1) Project Operation

Implementation of the construction works will be administrated by BBWS Brantas, DGWR, Ministry of Public Works. The BBWS Brantas operates field works such as modification of design and supervision for implementation of the sub-project. The Head of BBWS Brantas will be appointed by the Ministry to take all the responsibilities to the Ministry for implementing the sub-project properly. The site manager is appointed to take charge of the execution of works. The staffs will support the Head of BBWS in execution of survey and investigation, modification of design and preparation of tender calling for the works and supervision of the execution of the works. In addition, the foreign and local consultants are to be employed to assist the implementation of the sub-project in modification of design and construction supervision. Organization of the BBWS Brantas is shown in Figure 5.21.

The BBWS Brantas consists of 81 engineers, 307 technicians, 337 administration staff and the

other 323 staffs (total 1,048 persons). The BBWS Brantas has sufficient experiences on project implementation under Japanese OECF/JBIC loans. Annual expenditure in 2007 budget for this BBWS was Rp. 489.12 billion and budget in 2008 is Rp. 429,30 billion.

After completion of the project works, the operation and maintenance of the flood control facilities will be carried out continuously by BBWS Brantas.

(2) Implementation Schedule

Implementation of the sub-project is largely divided into two (2) stages of pre-construction and construction. Activities in pre-construction stage are (i) selection of one contractor, (ii) land acquisition and compensation, and (iii) review of the detailed design. Activities in construction stage are (i) construction of improvement works and (ii) maintenance of construction works. Considering the work volume and construction cost of this sub-project, construction period of 24 months is proposed with International Competitive Bidding (ICB). Maintenance period or Defect Liability Period is determined at six (6) months considering the work contents. The implementation of Wonokromo sub-project including construction works is scheduled as follows:

- Review of Detailed Design: Nov. 2009 – Apr. 2010 (6 months)
- P/Q for Contractors: Feb. 2010 – Apr. 2010 (3 months)
- Tendering: May 2010 – May 2011 (13 months)
- Construction Works: Jun. 2011 – May 2013 (24 months)
- Maintenance Period: Jun. 2013 – Nov. 2013 (6 months)

5.6 Sub-project (5) : Brangkal Sub-project in Surabaya-Mojokerto

5.6.1 General Description

(1) Background of the Sub-project

Mojokerto City is located at about 49 km from Surabaya City and comprises GERBANKERTO-SUSILA Metropolitan Area. The City occupies gently flat slope area positioned at altitude around 12.0 m above mean sea water level. There are many natural rivers in and around Mojokerto City, where the biggest river is the Brangkal River with the length of 46 km and basin area of 252 km^2. Mojokerto City suffers from flood disaster caused by overflow of Brangkal River, and a big flood is recorded on February 2, 2004. The main causes of flood disaster are considered as follows.

- Current flow capacity of the Brabkal River is estimated at 125 m^3/s equivalent to 2-year return period flood (Target discharge is 275 m^3/s with 25-year return period). Since the Brangkal River connects to the Brantas River through the Ngotok River

with only 580 m distance, backwater of the Brantas decreases the channel capacity.

- Especially in the upstream of the Brangkal River, excess water overtops the banks and flows down to Mojokerto City through the Subentoro, Ketintang and Ngayung Rivers, and finally pours into the Sadar River. As the Sadar River has a gentle longitudinal slope, the channel of the Sadar cannot convey the discharge from these rivers, then the stagnant water inundates in Mojokerto City.
- Rapid sedimentation also decreases the flow capacity. Insufficient vegetation cover in the upstream basin increases the sediment yield and transports abundant sediment loads.

(2) Objective of the Sub-project

This sub-project aims to mitigate inundation in Mojokerto City with population of 120,000 by normalization of the Brangkal River. As appropriate sites for drainage pumping station cannot be found along the Brantas, Ngotok and Brangkal Rivers, procurement of mobile pumps is effective measures against flood inundation

After the improvement works, overflow flooding from the Brangkal River will decrease and the inundation by local storm can be drained faster than the present situation. This will contribute not only to secure land transportation between Surabaya and cities in Centran Java province but also to develop the economic activities in Mojokerto and its surrounding area.

(3) Project Area

The Brangkal River originates in the northern slopes of Mt. Welirang (EL. 3158 m) and Mt. Anjasmoro (EL. 2282 m), and flows north. The channel slope is very steep as 1/500 around Sooko bridge of trunk road connecting Mojokerto and Jombang. But after entering the city area, channel slope changes to almost level. The Brangkal River has catchment area of 252.46 km^2 with total channel length of 46 km as shown in Figure 5.22.

5.6.2 Outline of the Sub-project

(1) Proposed Scope of the Sub-project

Following are proposed scope of works for the Brangkal sub-project.

(a) Target scale and target discharge: 420 m^3/s (25-year return period)

(b) Proposed works

- Channel normalization: 7,950 m from confluence with Ngotok River to Provincial Road Bridge within existing channel

	width
- Improvement of Weir:	1 nos. (Prajurit Kulon Weir)
- Procurement of mobile pump:	5 sets (0.25 m^3/s per each)

Plan of the Brangkal River is presented in Figure 5.23 and standard section of bank protection is illustrated in Figure 5.24.

Based on the detailed design for the conservation of the Brangkal River basin, the I/P in July 2008 proposes river improvement for 3 km stretches and procurement of 5 sets of mobile pumps. Considering the densely built houses along the channel from the river mouth to the bridge of provincial road which connects Surabaya and Jombang and is located at 7.95 km from the mouth, these stretches are proposed to be included in the sub-project to increase the beneficiary area of project works.

(2) Adaptation of Climate Change

Using the same items as before-mentioned sub-projects, conceivable items are listed up in Table 5.1. Local conditions and basin characteristics of Brangkal sub-project are considered such as;

i) Watershed management plan has been prepared for the upstream basin of the Brankal River, and

ii) The Brankal River has less residual catchment area in the downstream reaches from Dinoyo, about 18 km from the mouth.

Following will be included as soft component to respond to climate change.

(a) Study on hydrological characteristics using the available rainfall and water level data.

(b) Installation of adequate and simple hydrological observation equipment in cooperation with inhabitants. Number and location will be determined based on the above study on hydrological characteristics. Exercise or demonstration of sandbag construction method will be done at the time of above installation to understand simple and easy measures to prevent or reduce flood water damage.

(c) Compilation of hydrological data observed by inhabitants together with BBWS staff.

(d) Determination of accumulated rainfall amount and/or water levels for flood warning, based on the hydrological analyses using collected data, such as relationship of rainfall-water level and water level-water level.

(e) Transfer of knowledge to the inhabitants on the Flood Early Warning Procedures (FEWP) based on the understanding of the above (b) and (d).

(f) Topographic survey on ground elevation in the center of Mojokerto as the basic data for flood flow analysis mentioned below.

(g) Flood flow analysis using unsteady flow simulation.

(h) Preparation of flood risk map.

(i) Formulation of operation plan of mobile pumps utilizing the above flood risk map and FEWP.

(j) Proposal on flood disaster management plan as adaptation of climate change.

(3) Consulting Services

Detailed design for the Brangkal River Basin was prepared in 2005 for the basin conservation. It is judged the current detailed design is insufficient for the proposed project works. Channel profile survey will be conducted by subletting for channel design and quantity estimate. Subsequently, the consultant will carry out the services of assistance in tendering and construction supervision. In parallel with these services, engineering services on adaptation of climate change listed in the above (3) will be conducted with participants from BBWS Brantas and inhabitants.

5.6.3 Cost Estimate

(1) Basic Condition

The costs are estimated for each work item by multiplying the work quantity and unit cost. Following assumptions are employed for estimation.

(a) Price level: August 2008

(b) Exchange rate: US$1 = Rp. 9,291 = ¥ 107, ¥ 1 = Rp. 86.957

(c) Currency: - Local currency portion

- Foreign currency portion

(2) Estimated Direct Construction Cost

Breakdown of the direct construction cost is presented in Table 5.10 and summarized below.

(a) Local currency portion: **Rp.26,838 million**

(b) Foreign currency portion: **¥ 63 million**

(c) Equivalent total: **Rp.32,292 million = ¥ 371 million**

(3) Land Acquisition and Compensation Cost

No land acquisition or house compensation is scheduled in principal.

5.6.4 Evaluation of the Sub-project

(1) Economic Evaluation

Detailed information cannot be obtained on economic evaluation for Brangkal sub-project except statistical data. Therefore annual benefit for this sub-project is estimated using specific annual benefit per km^2. According to the statistic data of Mojokerto City population density is 6,833 person/km^2, and this value is about 70 % of that of Dayeuhkolot in Bandung sub-project. As the specific annual benefit of Dayeuhkolot is Rp. 4.235 billion/km^2, specific annual benefit of Brangkal sub-project is estimated at Rp. 2.965 billion/km^2 (=Rp. 4.235 billion/km^2 x 0.7). Then the expected annual benefit by implementation of Brangkal sub-project becomes Rp. 5.334 billion. Details are mentioned in ANNEX 3.

The project cost consists of;

- Direct construction cost,
- Land acquisition and house compensation cost,
- Government administration cost,
- Consulting service cost,
- Physical contingency,
- Price escalation and
- Value added tax (VAT).

Among the above, Land acquisition/House compensation Cost, Price Escalation and Value Added Tax are excluded from the economic cost. Considering the opportunity cost, economic cost is estimated deducted 10 % from the local portion of financial cost. Cost for the consulting services is assumed to be allocated from the services for whole Project in proportion to the direct construction cost of Brangkal sub-project. Cost for adaptation of climate change is not included in the economic cost of consulting services.

- Direct construction cost : Rp. 31.09 billion
- Government administration cost : Rp. 1.79 billion
- Consulting service cost : Rp. 4.64 billion
- Total Economic Cost : Rp. 37.52 billion

In addition to this base cost, the annual operation and maintenance (O/M) cost is necessary to evaluate the economic efficiency of the project. The O/M cost is assumed at 0.5 % of economic direct construction cost, i.e. Rp. 0.16 billion/annum. Replacement cost (Rp. 4.2 billion/time) is also considered for mobile pumps with life time of 10 years. Total project life is assumed at 50 years.

The economic viability is evaluated by factors of investment efficiency such as Net Present Value

(NPV), Benefit-Cost ratio (B/C) and Economic Internal Rate of Return (EIRR). Table 5.11shows the annual flow of economic cost and benefit.

- Economic Internal Rate of Return (EIRR) : **12.32 %**
- Benefit-Cost ratio (B/C) : **1.03**
- Net Present Value (NPV) at discount rate of 12 % : **Rp. 0.71 billion**

(2) Environmental Consideration

(a) Preparation of EIA

According to BBWS Brantas, AMDAL study is scheduled to be implemented in 2009 on watershed conservation project in the Brankal River basin. The study will be started in June or July in 2009 according to BBWS Brantas; therefore, it is estimated that the AMDAL will be approved around in January 2010 by governor of East Java Province.

(b) Natural Environmental Consideration

The Brangkal River is running through Mojokerto City. It flows into the Brantas River after joining to Ngotok River. The project area is located in the downstream of the Brangkal River, which both sides are well developed urban area. No ecologically valuable habitats or endangered species habitats has been reported from the project area and its surroundings. Therefore, it is assumed that significant impacts to natural environment are unable to occur. The detail of the impact assessment will be studied through the AMDAL process.

(c) Social Environmental Consideration

Most of the civil works will be carried out within the river course. Therefore, no land acquisition or house relocation is required. The other social environmental considerations shall be discussed in the AMDAL study. BBWS Brantas held a consultation on project implementation with related authorities in October 2008.

5.6.5 Implementation Program

(1) Project Operation

Implementation of the construction works will be administrated by BBWS Brantas, DGWR, Ministry of Public Works. The BBWS Brantas operates field works such as modification of design and supervision for implementation of the sub-project. The Head of BBWS Brantas will be appointed by the Ministry to take all the responsibilities to the Ministry for implementing the sub-project properly. The site manager is appointed to take charge of the execution of works.

The staffs will support the Head of BBWS in execution of survey and investigation, modification of design and preparation of tender calling for the works and supervision of the execution of the works. In addition, the foreign and local consultants are to be employed to assist the implementation of the sub-project in modification of design and construction supervision. Organization of the BBWS Brantas is shown in Figure 5.21.

The BBWS Brantas consists of 81 engineers, 307 technicians, 337 administration staff and the other 323 staffs (total 1,048 persons). The BBWS Brantas has sufficient experiences on project implementation under Japanese OECF/JBIC loans. Annual expenditure in 2007 budget for this BBWS was Rp. 489,12 billion and budget in 2008 is Rp. 429,30 billion.

After completion of the project works, the operation and maintenance of the flood control facilities will be carried out continuously by BBWS Brantas.

(2) Implementation Schedule

Implementation of the sub-project is largely divided into two (2) stages of pre-construction and construction. Activities in pre-construction stage are (i) selection of one contractor, (ii) land acquisition and compensation, and (iii) review of the detailed design. Activities in construction stage are (i) construction of improvement works and (ii) maintenance of construction works. Considering the work volume and construction cost of this sub-project, construction period of 24 months is proposed with procurement method of Local Competitive Bidding (LCB). Maintenance period or Defect Liability Period is determined at twelve (12) months as the procurement of pumps is included in the scope. The implementation of Brangkal sub-project including construction works is scheduled as follows:

- Review of Detailed Design:	Nov. 2009 – Apr. 2010	(6 months)
- Tendering with Post P/Q:	May 2010 – Oct. 2010	(6 months)
- Construction Works:	Nov. 2010 – Oct. 2012	(24 months)
- Maintenance Period:	Nov. 2012 – Oct. 2013	(12 months)

5.7 Sub-project (6) : Golontalo Sub-project

5.7.1 General Description

(1) Background of the Sub-project

Gorontalo City is the capital of the Gorontalo Province which was established in 2000 after splitting from North Sulawesi Province under the decentralization policy of Government of

Indonesia. The city lies on the plain area with altitude at several meters higher than mean sea water level. The mountainous hilly land surrounds the city on the northern, eastern and southern parts so that topographical condition makes the city situated a depression zone. Three major rivers flow into the city. The basins of Lake Limboto and the Bolango River are located in the western part of the city and the Bone River basin occupies the eastern half. All rivers flow into the central plain and finally empty into the Tomini Bay. Location map of Gorontalo sub-project is shown in Figure 5.25. Gorontalo City and areas around Lake Limboto have suffered from frequent floods, since these area are located on the flood plain formed by flood flows of the rivers. The flood damage constrains the economic activities of the region. Especially in the southern part of Gorontalo City near the confluence of the Bone and Bolango Rivers, flood damage is more serious associated with its low-lying flat topography. Major floods are summarized below.

Flood Damage in Gorontalo

Month/Year	Area (ha)	Dead (person)	Affected	Damage Cost (Rp. billion)
2000	901	n.a.	n.a.	n.a.
Jun. 2001	150	3	n.a.	35.6
May 2002	235	n.a.	More than 2,000 houses	28.0
Dec. 2003	225	n.a.	n.a.	57.4
Jun. 2006	350	3	n.a.	74.6
Jun. & Jul. 2007	217	4	60,000 persons	43.0

Note: Although there is no available data, floods occurred in 1995, 1996 and 1997.

The specific ground conditions of depression and hollow made the duration long in the past flood. The flood in the Tamalate River is still severe because of runoff increasing and retarding function loss due to change of land use from paddy field to residential land. Middle stretch of the Bolango River has natural retarding function against the flood. The flood water from the stretch of Talaga Bridge to Lomaya Gate flowed into the town, passing paddy field and existing irrigation canal.

The Master Plan Study and Feasibility Study on Flood Control and Water Management in Limboto-Bolango-Bone Basin were conducted by JICA in 2002. The GOI requested some part of river improvement works as a Grant Aid Project to GOJ. JICA dispatched the study team in response to the request, but the implementation of the Grant Aid Project is not realized yet.

Provincial Public Works Office conducted the construction of flood wall for a part of the Bone River. In addition to this, construction of Tamalate Floodway is scheduled utilizing national government budget (*APBN*) due to its urgency.

(2) Objective of the Sub-project

The sub-project aims to mitigate flood damages in the central part of Gorontalo City with

population of 160,000 providing flood control facilities as structural measures and soft component to respond to climate change as nonstructural measures.

After the completion of project works, inundation condition of Gorontalo City will be improved and this will contribute the regional development of the city and surrounding area.

(3) Project Area

The Project area is located in the center of Gorontalo City. The Bolango River runs from north and turn to the east after join with the Tapodu River flown from Limboto Lake, while the Bone River flows from the east.

5.7.2 Outline of the Sub-project

(1) Proposed Scope of the Sub-project

Proposed scope of this sub-project is summarized below.

(a) Rivers to be improved

Bolango River channel improvement from river mouth to the confluence with the Tapadu River for 5,344 m (mainstream) and the Left Bolango River with 2,069 m length (7,413 m in total), and construction of river structures.

(b) Design scale and design discharge (under master plan)

200 m3/s for whole stretches with return period of 20-year

(125 m3/s for mainstream and 75 m3/s for the Left Bolango River)

(c) Channel dimensions

Mainstream (5,344 m)

- Longitudinal slope:	1/1,200
- Water depth:	4.17 m to 3.20 m
- Velocity in design flood:	2.67 m/s
- Channel width at design high-water level:	32.6 m
- Bank slope of channel:	1 : 2 to 1 : 0.5
- Required width of channel:	about 50 m
- Construction of cutoff channel:	3 sites in Sindeng

Left Bolango River (2,069 m)

- Longitudinal slope:	1/1,760
- Water depth:	3.20 m
- Velocity in design flood:	1.07 to 1.66 m/s

- Channel width at design high-water level: 15.7 to 25.1 m
- Bank slope of channel: 1 : 2 to 1 : 0.5
- Required width of channel: 30 to 35 m
- Construction of cutoff channel: 1 site in Gunung Agung

(d) Construction of Gunung Agung raod bridge over cutoff channel in Left Bolango River: 1 bridge

(e) Reconstruction of existing road bridge: 2 bridges

(f) Other miscellaneous work such as

(g) Procurement of mobile pump (0.25 m3/s per each): 5 sets

Design plan of the improvement works of the Bolango River is presented Figure 5.26 with standard cross sections, and the longitudinal profile is shown in Figure 5.27.

The BWS Sulawesi II proposes the following works in the I/P in July 2008.

- Bolango River improvement (11.2 km from mouth to Talaga bridge)
- Bone River improvement (750 m of right bank by dyke heightening)
- Procurement of mobile pumps (5 sets)
- Improvement of 5 primary drainage channels

As the total project cost is limited to US$ 70 million, proposed works in Gorontalo sub-project are selected from the above four (4) components. BWS Sulawesi II gives the top priority to the Bone River including downstream portion of the Tamalate River, and the second priority to the Bolango River because the center of Golontaro city lies between these two (2) rivers near their confluence. Dyke heightening of the Bone River is proposed in the detailed design with bank slope of 1 : 1 and about 4 m height dyke. Considering stability of the dyke, bank slope of 1 : 1 is not acceptable for 4 m height dyke. Bank slope 1 : 3 or 1 : 2 with berm is proposed for the dyke stability, and this change of design requires wider space for bank foundation. Total number of resettlement might increase two (2) or three (3) times of the present number of 85. Therefore, the Bolango River is selected as a proposed river to be improved in the sub-project.

(2) Adaptation of Climate Change

Using the same items as before-mentioned sub-projects, conceivable items are listed up in Table 5.1. Local conditions and basin characteristics of Gorontalo sub-project are considered such as;

i) Study on Flood Control and Water Management in Limboto-Bolango-Bone Basin was conducted by JICA in December 2002,
ii) Water stage warning system has been installed using GSM, and
iii) Tsunami hazard map has been prepared.

Following will be included as soft component to respond to climate change.

(a) Study on hydrological characteristics using the available rainfall and water level data including the review of master plan study by JICA in 2002.

(b) Installation of adequate and simple hydrological observation equipment in cooperation with inhabitants. Number and location will be determined based on the above study on hydrological characteristics. Exercise or demonstration of sandbag construction method will be done at the time of above installation to understand simple and easy measures to prevent or reduce flood water damage.

(c) Compilation of hydrological data observed by inhabitants together with BWS staff.

(d) Determination of accumulated rainfall amount and/or water levels for flood warning, based on the hydrological analyses using collected data, such as relationship of rainfall-water level and water level-water level.

(e) Transfer of knowledge to the inhabitants on the Flood Early Warning Procedures (FEWP) based on the understanding of the above (b) and (d).

(f) Topographic survey on ground elevation in the center of Gorontalo as the basic data for flood flow analysis mentioned below.

(g) Flood flow analysis using unsteady flow simulation.

(h) Preparation of flood risk map expanding existing Tsunami hazard map.

(i) Formulation of operation plan of mobile pumps utilizing the above flood risk map and FEWP.

(j) Proposal on flood disaster management plan as adaptation of climate change.

(3) Consulting Services

Detailed design for the Bolango River was prepared in 2007. Channel profile survey will be conducted by subletting for channel design and quantity estimate. Subsequently, the consultant will carry out the services of assistance in tendering and construction supervision. In parallel with these services, engineering services on adaptation of climate change listed in the above (3) will be conducted with participants from BWS Sulawesi II and inhabitants.

5.7.3 Cost Estimate

(1) Basic Condition

The costs are estimated for each work item by multiplying the work quantity and unit cost. Following assumptions are employed for estimation.

(a) Price level: August 2008

(b) Exchange rate: US$1 = Rp. 9,291 = ¥ 107, ¥ 1 = Rp. 86.957

(c) Currency: - Local currency portion
- Foreign currency portion

(2) Estimated Direct Construction Cost

Breakdown of the direct construction cost is presented in Table 5.12 and summarized below.

(a) Local currency portion: **Rp. 24,350 million**

(b) Foreign currency portion: **¥ 158 million**

(c) Equivalent total: **Rp. 38,091 million = ¥ 438 million**

(3) Land Acquisition and Compensation Cost

In order to implement the proposed scope of works, an area of 3.9 ha shall be acquired and 65 houses shall be relocated. Required costs for each item are as follows:

(a) Land acquisition:	39,000 m^2 x Rp.100,000/m^2	= Rp.3,900,000,000
(b) House compensation:	65 houses x Rp.75,000,000/house	= Rp.4,875,000,000
(c) Total		Rp.8,775,000,000

5.7.4 Evaluation of the Sub-project

(1) Economic Evaluation

Expected annual flood damage is estimated for two (2) cases; "Without Project" and "With Project" with the following equation.

$$D = SUM [(L_{m-1} - L_m) / 2 \quad x \quad (N_{m-1} - N_m)]$$

where, D : Annual Flood Damage in monetary value,

L : Damage Potential corresponding to Probability of Flood in monetary value,

N : Probability of Flood such as 1/2, 1/5, 1/10, 1/20, 1/50 and

m : ordinal number.

Expected annual benefit of the project works is estimated at Rp. 7.19 billion based on the previous study results by JICA in December 2002. Detailed explanation on economic evaluation can be found in ANNEX 3.

The project cost consists of;

- Direct construction cost,
- Land acquisition and house compensation cost,
- Government administration cost,
- Consulting service cost,

- Physical contingency,
- Price escalation, and
- Value added tax (VAT).

Among the above, Land acquisition/House compensation Cost, Price Escalation and Value Added Tax are excluded from the economic cost. Considering the opportunity cost, economic cost is estimated deducted 10 % from the local portion of financial cost. Cost for the consulting services is assumed to be allocated from the services for whole Project in proportion to the direct construction cost of Gorontalo sub-project. Cost for adaptation of climate change is not included in the economic cost of consulting services.

- Direct construction cost : Rp. 37.44 billion
- Government administration cost : Rp. 2.15 billion
- Consulting service cost : Rp. 5.47 billion
- Total Economic Cost : Rp. 45.06 billion

In addition to this base cost, the annual operation and maintenance (O/M) cost is necessary to evaluate the economic efficiency of the project. The O/M cost is assumed at 0.5 % of economic direct construction cost, i.e. Rp. 0.19 billion/annum. Replacement cost (Rp. 4.2 billion/time) is also considered for mobile pumps with life time of 10 years. Total project life is assumed at 50 years.

The economic viability is evaluated by factors of investment efficiency such as Net Present Value (NPV), Benefit-Cost ratio (B/C) and Economic Internal Rate of Return (EIRR). Table 5.13 shows the annual flow of economic cost and benefit.

- Economic Internal Rate of Return (EIRR) : **12.13 %**
- Benefit-Cost ratio (B/C) : **1.01**
- Net Present Value (NPV) at discount rate of 12 % : **Rp. 0.37 billion**

(2) Environmental Consideration

(a) Preparation of EIA

The AMDAL study has been conducted since May 2008. As of October 2008, Draft ANDAL report is being prepared. It is scheduled that all reports of AMDAL study will be finalized in November, 2008. The AMDAL is expected to be approved by governor of Gorontalo Province by January, 2009.

(b) Natural Environmental Consideration

The Bolango and Bone Rivers are running through west and east parts of Gorontalo City. They flow into Tomini Bay after meet together at the south part of the city. The surroundings of the project sites are well developed urban area, being not designated as

any environmental protected area neither is the downstream area. No ecologically valuable habitats or endangered species habitats has been reported from those areas. Therefore, it is assumed that significant impacts to natural environment are unable to occur. But only one (1) item should be considered for the natural environment, that is, the channel excavation near the confluence of the Bone River where tidal fluctuation is observed. Details of the impact assessment are being studied through the AMDAL process.

(c) Social Environmental Consideration

In order to implement the proposed scope of works (Bolango River, 5.3 km), an area of 3.9 ha shall be acquired and 65 houses shall be relocated.

The BBWS Sulawesi II explained the number of houses to be relocated for each component as shown below, while land acquisition area is still reviewing.

- Bolango River		
0.0 km ~ 5.3 km:	65 houses	3.9 ha
5.3 km ~ 11.2 km:	35 houses	
- Bone River		
Proposed Talalate Floodway:	75 houses	
Upstream of Talumolo I bridge (right):	35 houses	
Downstream of Talumolo I bridge (right):	50 houses	
Proposed drainage pumping station:	1 house	
- Mobile pump (5 sets):	0 house	
- Primary drainage channels (5 drainages):	0 house	
- Total:	261 houses	

However, those numbers are being revised in accordance with reviewing of the detail design to minimize the resettlement.

As described in (1) of Section 5.7.2, the improvement works of downstream reaches of the Bolango River are selected as Gorontalo sub-project considering the economic efficiency and less number of resettlement among the above components. According to the letter from Gorontalo governor presented in ANNEX 4, the provincial government has responsibility on the land acquisition by preparing alternative land in Gorontalo City and Bone Bolango Regency.

5.7.5 Implementation Program

(1) Project Operation

Implementation of the construction works will be administrated by BWS Sulawesi II, DGWR,

Ministry of Public Works. The BWS Sulawesi II operates field works such as modification of design and supervision for implementation of the sub-project. The Head of BWS Sulawesi II will be appointed by the Ministry to take all the responsibilities to the Ministry for implementing the sub-project properly. The site manager is appointed to take charge of the execution of works. The staffs will support the Head of BWS in execution of survey and investigation, modification of design and preparation of tender calling for the works and supervision of the execution of the works. In addition, the foreign and local consultants are to be employed to assist the implementation of the sub-project in modification of design and construction supervision. Organization of the BWS Sulawesi II is shown in Figure 5.28.

The BWS Sulawesi II consists of 21 engineers, 38 technician, 28 administration staff and the other 76 staffs (total 163 persons). Annual expenditure in 2008 budget for this BWS was Rp. 145.56 billion.

After completion of the project works, the operation and maintenance of the flood control facilities will be entrusted to the Public Work Services of Gorontalo Province.

(2) Implementation Schedule

Implementation of the sub-project is largely divided into two (2) stages of pre-construction and construction. Activities in pre-construction stage are (i) selection of one contractor, (ii) land acquisition and compensation, and (iii) review of the detailed design. Activities in construction stage are (i) construction of improvement works and (ii) maintenance of construction works. Considering the work volume and construction cost of this sub-project, construction period of 24 months is proposed with procurement method of Local Competitive Bidding (LCB). Maintenance period or Defect Liability Period is determined at twelve (12) months as the procurement of pumps is included in the scope. The implementation of Gorontalo sub-project including construction works is scheduled as follows:

- Land Acquisition and House Resettlement: Aug. 2009 – Dec. 2011 (29 months)
- Review of Detailed Design: Nov. 2009 – Apr. 2010 (6 months)
- Tendering with Post P/Q: May 2010 – Oct. 2010 (6 months)
- Construction Works: Nov. 2010 – Oct. 2012 (24 months)
- Maintenance Period: Nov. 2012 – Oct. 2013 (12 months)

VI. OVERALL PROJECT

6.1 Overall Implementation Program

6.1.1 General Description

(1) Project Objective

The objective of the Project is to mitigate flood damage in important urban cities vulnerable against flood damage by improving flood control infrastructure, assisting developing integrated river basin plans, upgrading administrative capacity of river basin management offices, and strengthening flood early warning systems, and thereby contribute to economic and industrial development in urban cities in Indonesia.

(2) Necessity and Priority of the Project

(a) National Development Plan

According to the Mid-term National Development Plan 2004-2009 (Rencana Pembangunan Jangka Menengah Nasional, RPJM), the mitigation of flood damage through comprehensive water resource management is one of the important strategy programs.

(b) Water Resources Law

Water Resources Law (UU No.7 Tahun 2004 tentang Sumber Daya Air) describes as follows:

- To cope with unbalance between decreasing water availability and increasing demands for water, water resources must be managed by considering social, environmental and economic functions in a harmonious way.
- Water resource management shall mean the efforts of planning, implementing, monitoring, and evaluating the conservation and utilization of water resources as well as the control of the destructing power of water.

(c) Circumstances Surrounding Flood Control

According to the database on International Disaster (OFDA/CRED), the number of flood damage arose forty seven (47) including 2,592 of death toll, 3,023,310 of affected person and US$ 1,613 million in Indonesia. Such flood damage causes not only direct physical loss of infrastructure/buildings but also indirect economical/social loss due to suspension of economic activities and/or increase of the poor, which is one adverse factor of sustainable economic development in Indonesia. In addition, flood menace caused by the future climate change will worsen the situation of flood management so that the further strengthening of countermeasures against flood and improvement of related infrastructures are necessary.

(3) Scope of the Project

Five (5) cities in five (5) provinces nationwide are the targets of this Project. The screening of the target cities is conducted by using two-stage selection criteria: "priority" and "readiness". Firstly, long-listed sub-projects are selected in terms of immediate priority, such as the volume of direct and indirect flood damage, the frequency of flood, and the existence of economic disparity, important infrastructure and existing flood control facilities; therefore, 17 sub-projects in 14 cities are in the list as of this moment. Secondly, short-listed sub-projects are selected from the said long-list in terms of the maturity of project preparation, namely, readiness, i.e. the status of project design preparation, such as the existence of preliminary studies, master plans, feasibility studies, and detailed designs, and the status of environmental and social safeguard consideration, such as EIA and LARAP preparation and the scale of land acquisition and resettlements.

In this Project, physical construction works to reduce flood damage and consulting services to respond to climate change will be conducted for each short-listed sub-project.

At this moment, the GOI expects that the short-listed 6 sub-projects in 5 cities, listed below, are of the immediate priority. However, these sub-projects are replaceable in consideration of changing circumstances in Indonesia as far as sub-projects are listed in the long-list and can be covered within the total cost of the loan amount as stated in Section 6.1.2. The GOI shall submit the Implementation Plan to justify the necessity and readiness of each sub-project and obtain JICA's review and concurrence prior to commencement of sub-projects.

1) Padang Sub-project

Proposed works in Padang sub-project are selected from two (2) components of the Anai River and the Kandis River. Comparing with these two (2) components, the Anai River has larger beneficial area including Minangkabau International Airport than the Kandis River. Finally proposed scope of this sub-project is summarized below.

(a) Rivers to be improved

Anai River channel improvement from river mouth to the section around 50m upstream of the Bypass Bridge with the river length of 4,100m, and construction of river structures (Muaro Bungo Bridge and Sasak Ubi Gate are excluded)

(b) Design scale and design discharge

Design discharge: 1,300 m^3/s for whole stretches (25-year return period)

(c) Channel dimensions

- Longitudinal slope: 1/1,950
- Water depth: 6.5 m
- Velocity in design flood: 2.67 m/s

- Channel width at design high-water level: 144 m
- Bank slope of channel: 1 : 2
- Required width of channel: 172 m

(d) Work quantity (to be Revised)

- Temporary coffering by SSP: 2,445 m
- Chanel excavation: 1,050,000 m^3
- Embankment: 110,000 m^3
- Closing dike: 4 sites
- Bank protection by wet masonry: 945 m
- Inspection road with side drain: 6,891 m
- Access road: 20 units
- Box culvert: 5 nos.
- Pipe culvert: 20 nos.

2) Palembang Sub-project

The I/P in July 2008 proposes pump drainage for the Bendung and Sekanak Rivers, while the JICA Study in September 2003 proposed gravity drainage for the Bendung River. Considering the construction cost of drainage pumping stations and gated facilities, and also the operation and maintenance for these facilities, gravity drainage system is adopted.

(a) Rivers to be improved

Bendung River for 5.5 km from the confluence with the Musi River to Talang Aman Pond

(b) Design scale and design discharge

45.5 m3/s at the mouth to 14.2 m3/s at the outlet of Talang Aman Pond with 15-year return period

(c) Channel dimensions

- Channel width: 10 to 15 m (existing channel width)
- Channel excavation: 1.0 m in average.
- Longitudinal bed slope: 1/5,500
- Bank slope: existing with protection works

(d) Work quantity

- Channel bed excavation (including hauling and disposal): 110,000 m^3
- Protection of existing revetment: 32,400 m^3
- Inspection Road: 2,100 m

3) Bandung Sub-project

After the preparation of the I/P in July 2008, BBWS Citarum examined the effect of channel widening around Curug Jompong, the lower end of Upper Citarum River. As the result, channel widening contributes less effect to Dayeuhkolot area. Therefore BBWS Citarum withdraws the scheme of channel widening. Proposed scope of the sub-project is summarized below.

(a) Construction of Cikapundung Diversion Channel

(b) Design scale and design discharge: 60 m^3/s (5-year return period)

(c) Channel dimensions:

- channel width: 8.0 m
- water depth: 3.0 m
- longitudinal slope 1/1,000

(d) Work quantity:

- excavation: 57,500 m3
- wet stone masonry 2,760 m3
- Moh Toha Road bridge 1 nos.
- I/M road bridge at outlet 1 nos.
- diversion structure at inlet 1 nos.

4) Surabaya (Wonokromo River) Sub-project

As mentioned in I/P in July 2008, there are many houses on the left bank just upstream of Semolo Waru 1 drainage pumping station located at section WO.006 + 775. About 100 houses are counted on the "Google Earth." Considering total cost for the whole Project and the difficulty of land acquisition and house relocation, downstream stretches from WO.005 + 906 are proposed to be excluded from this sub-project. Therefore, concrete sheet-pile driving with earth embankment is proposed for the following stretches.

(a) Design scale and design discharge: 420 m^3/s (25-year return period)

(b) Channel improvement (3,950 m stretch)

- Left bank

  WO.003 + 378 ~ WO.005 + 505 : 2,127 m

- Right bank

  WO.002 + 376 ~ WO.002 + 926 : 550 m

  WO.003 + 248 ~ WO.006 + 326 : 3,078 m

  Sub-total : 3,628 m

- Total 5,755 m

(c) Channel width: 60 m in the upstream reaches to
70 m in the lower reaches (existing width)

(d) Work Quantity

- channel excavation: 4,489 m^3
- embankment: 6,446 m^3
- driving length of concrete sheet pile: 149,630 m in total

5) Surabaya (Brangkal River) Sub-project

Based on the detailed design for the conservation of the Brangkal River basin, the I/P in July 2008 proposes river improvement for 3 km stretches and procurement of 5 sets of mobile pumps. Following are proposed finally through the survey in the field.

(a) Target scale and target discharge: 420 m^3/s (25-year return period)

(b) Proposed works

- Channel normalization: 7,950 m from confluence with Ngotok River to Provincial Road Bridge within existing channel width
- Improvement of Weir: 1 nos. (Prajurit Kulon Weir)
- Procurement of mobile pump: 5 sets (0.25 m^3/s per each)

6) Gorontalo Sub-project

Through the study, proposed scope of this sub-project is summarized below.

(a) Rivers to be improved

Bolango River channel improvement from river mouth to the confluence with the Tapadu River for 5.3 km and construction of river structures including reconstruction of 3 bridges.

(b) Design scale and design discharge

200 m^3/s for whole stretches with return period of 20-year (under master plan)

(c) Channel dimensions

- Longitudinal slope: 1/1,200
- Water depth: 4.0 m
- Velocity in design flood: 2.67 m/s
- Channel width at design high-water level: 32.6 m
- Bank slope of channel: 1 : 2
- Required width of channel: about 50 m

(d) Procurement of mobile pump: 5 sets

6.1.2 Cost Estimate for Implementation of Short-listed Sub-projects

(1) Basic Condition

The costs are estimated for each work item by multiplying the work quantity and unit cost. Following assumptions are employed for estimation.

(a) Price level: August 2008

(b) Exchange rate: US$1 = Rp. 9,291 = ¥ 107, ¥ 1 = Rp. 86.957

(c) Currency: - Local currency portion

- Foreign currency portion

(2) Cost Items

Project cost consists of the following:

- Direct construction cost
- Land acquisition and house compensation cost
- Government administration cost
- Consulting service cost
- Physical contingency
- Price escalation
- Value added tax (VAT)
- Interest during construction
- Commitment charge

(a) Direct Construction Cost

The direct construction cost for the contract packages consists of cost for preparatory works, main civil works, mechanical and electrical works and miscellaneous. The direct construction cost for the contract packages are estimated by adopting the unit cost basis that was multiplied by the corresponding work quantity.

- Material cost: All the unit prices include transition fee to the project site. These prices are counted into the local currency component and the foreign currency component, taking into consideration their usage of imported raw material, cost of production facilities and its imported amount as an indirect foreign currency.
- Labour cost: The labour cost was computed into the local currency component. The rates of labour wages include the labour's all fringe benefits such as vacation and sick leaves, charges of insurance, medical care, living allowance etc.
- Equipment cost: The equipment cost consists of the depreciation cost, repairing cost and administration cost, which are calculated using a rate of delivered cost in Indonesia and the Indonesian standard economical life and repairing rate. With regard to the

operation cost of equipment, the cost of operator and the cost of petroleum, oil, lubricant and consumables are counted into the each unit cost. The currency of the equipment cost is assumed as follows:

Description	Currency component	
	F / C	L / C
Depreciation cost	100 %	-
Repair cost	80%	20%
Management Cost	-	100 %

- Contractor's indirect cost: The contractor's expenses are counted in every unit cost proportionally. These expenses are assumed to be 25 % of direct cost to cover the following costs:
  - Field administration and supervision
  - Corporate overhead and profit
  - Assistance and back support from head office
  - Material handling
  - Insurances
  - Bond and taxes
  - Other incidentals

(b) Cost for Land Acquisition and Compensation

The cost is estimated in local currency portion based on the required area and unit cost estimated for each land and housing condition.

(c) Administration Cost

The cost is estimated at 5 % of the sum of local currency portion of direct construction cost and land acquisition and compensation cost.

(d) Consulting Service Cost

The cost is estimated on man-month basis with direct cost according to the proposed assignment schedule.

(e) Physical Contingency

Physical Contingency is estimated at 5.0 % of the direct cost.

(f) Price Escalation

Price Escalation is estimated at 5.8 % per annum for L / C and 2.6 % per annum for F / C, as price escalation.

(g) Government Tax

Value added tax (VAT) is estimated at 10 % of the sum of total cost, in terms of equivalent Indonesian Rupiah.

(h) Interest during Construction

Interest during Construction is estimated at 1.40 % for construction works and 0.01 % for the consulting services.

(i) Commitment Charge

The commitment charge is estimated multiplying 0.1 % of remaining loan amount at the end of fiscal year.

(3) Project Implementation

The Project is classified as Program Loan. For each sub-project selected in this SAPROF study, the implementation program shall be prepared and submitted to JICA for his approval. The sub-project can be implemented after the approval of JICA. The implementation program shall include the following.

- Reviewed detailed design
- Analysis of technical feasibility
- Assessment and monitoring of natural and social environmental impact (Approved AMDAL (EIA) and LARAP if necessary)
- Procurement plan including packaging
- Project cost, schedule, disbursement plan
- Project implementation, O&M Plan
- Operation and Effect Indicator

From the viewpoint of environmental consideration, the Project is categorized as "FI" in environmental and social safeguard category according to the JBIC's guideline. The classification is shown in the following.

- Category A: Serious adverse impact will be expected. This category includes projects in sensitive sectors or with sensitive characteristics such as large-scale involuntary resettlement and projects located in or near sensitive areas..

- Category B: Considerable adverse impact will be expected. If potential adverse environmental impact is less adverse than that of Category A projects, proposed project will be classified as Category B.
- Category C: Less adverse impact will be expected such as i) the JBIC's share is not above SDR 10 million (equivalent to US$ 16 to 17 million), ii) human resources development, support for international balance of payments, iii) export/import or lease of items of machinery or equipment.
- Category FI: The selection and assessment of the actual sub-projects is substantially undertaken by such institution only after JICA's approval of the funding and therefore the sub-projects cannot be specified prior to JICA's approval of funding (or assessment of the project) and those sub-projects are expected to have potential impact on the environment.

Detailed implementation schedule is described in Section 6.1.4.

(4) Project Cost

The costs of construction, consulting services, land acquisition and administration are estimated as follows:

	F.C (Yen million)	L.C (Rp. million)	Equivalent (Yen million)	Equivalent (Rp. million)
1) Civil Works	**1,132.09**	**452,799.9**	**6,339.29**	**549,242.8**
Padang	560.11	125,205.6	1,999.97	173,910.8
Palembang	29.16	39,144.0	479.32	41,679.6
Bandung	24.43	17,875.3	229.99	19,999.3
Wonokromo	141.46	114,150.4	1,454.19	126,451.1
Brangkal	62.72	26,837.9	371.36	32,292.0
Gorontalo	158.02	24,349.6	438.04	38,090.8
Sub-total	**975.90**	**347,562.7**	**4,972.87**	**432,423.7**
Price Escalation	102.28	83,675.3	1,064.55	92,569.4
Physical Contingency	53.91	21,561.9	301.87	26,249.7
2) Consulting Services	**419.03**	**63,632.9**	**1,150.81**	**100,070.3**
DD & Supervision	315.49	48,513.3	873.39	75,946.8
Climate Change	103.54	15,119.6	277.42	24,123.5
I) Eligible portion (1 + 2)	**1,551.12**	**516,432.8**	**7,490.10**	**651,313.1**
a) Land Acquisition Cost	0.00	17,033.3	195.88	17,033.3
b) Administration Cost	0.00	33,417.3	384.30	33,417.3
c) Value Added Tax (VAT)	0.00	66,834.7	768.60	66,834.7
II) Non Eligible portion (a+b+c)	**0.00**	**117,285.3**	**1,348.78**	**117,285.3**
Total (I + II)	**1,551.12**	**633.718.1**	**8,838.88**	**768,598.4**

In the above table, consulting services, land acquisition cost and administration cost include price escalation and physical contingency, respectively. Breakdown of consulting services is presented

in Table 6.1 and land acquisition/compensation cost is shown in Table 6.2.

6.1.3 Evaluation of Project

Among the project cost, Land acquisition/House compensation Cost, Price Escalation and Value Added Tax are excluded from the economic cost. Considering the opportunity cost, economic cost is estimated deducted 10 % from the local portion of financial cost. Cost for adaptation of climate change is not included in the economic cost of consulting services.

- Direct construction cost : Rp.417.55 billion
- Government administration cost : Rp. 23.98 billion
- Consulting service cost : Rp. 62.13 billion
- Total Economic Cost : Rp.503.66 billion

In addition to this base cost, the annual operation and maintenance (O/M) cost is necessary to evaluate the economic efficiency of the project. The O/M cost is assumed at 0.5 % of economic direct construction cost, i.e. Rp. 2.09 billion/annum. Replacement cost is also considered for mobile pumps with life time of 10 years. Total project life is assumed at 50 years.

The economic viability is evaluated by factors of investment efficiency such as Net Present Value (NPV), Benefit-Cost ratio (B/C) and Economic Internal Rate of Return (EIRR) for the Project. Cost for consulting services on adaptation of climate change is not in the economic cost.

- Total Economic Cost : **Rp.503.66 billion**
- Total Annual Economic Benefit : **Rp. 71.94 billion**

Table 6.3 shows the annual flow of economic cost and benefit.

- Economic Internal Rate of Return (EIRR) : **12.26 %**
- Benefit-Cost ratio (B/C) : **1.02**
- Net Present Value (NPV) at discount rate of 12 % : **Rp. 7.83 billion**

6.1.4 Project Implementation Program for Short-listed Sub-projects

(1) Procurement of Consultant and Contractor

In order to review of detailed design, assistance in tendering, construction supervision and assistance in adaptation of climate change, an international consultant will be employed through Japan-tied Short List Method in accordance with the "Guideline for Consultants under JBIC ODA Loans" dated October 1999, and valid and relevant law and regulations of the Government of

Indonesia as long as contradicted with JBIC Guidelines. The number of contract package is one (1). Tentative/draft Terms of Reference (TOR), cost breakdown and manning schedule of Consulting Services are attached in APPENDIX.

Goods and Services shall be procured in accordance with the "Guidelines for Procurement under JBIC ODA Loans" dated October 1999, and valid and relevant law and regulations of the Government of Indonesia as long as not contradicted with JBIC Guideline. Both International Competitive Bidding (ICB) with Pre-Qualification and Local Competitive Bidding (LCB) with Post-Qualification will be applied for the procurement of contractors. There will be six (6) packages.

- Package – 1: Padang Sub-project (ICB)
- Package – 2: Palembang Sub-project (LCB)
- Package – 3: Bandung Sub-project (LCB)
- Package – 4: Wonokromo Sub-project (ICB)
- Package – 5: Brangkal Sub-project (LCB)
- Package – 6: Gorontalo Sub-project (LCB)

(2) Project Organization

For the implementation of the Project, the National Steering Committee will be established composing BAPPENAS, Ministry of Public Works and Ministry of Finance with the same manner as other loan projects as stipulated in BAPPENAS Ministerial Decree No.KEP.289/M.PPN/9/2006 dated September 14, 2006. Deputy for Infrastructure in BAPPENAS will chair the committee. Directorate General of Water Resources, Ministry of Public Works becomes the Executing Agency. Under the Executing Agency, National Project Management Unit (NPMU) will be organized chaired by the Director of River, Lake and Reservoir. These three (3) organizations in Jakarta will manage the field project management offices.

Implementation of the construction works will be administrated by respective Balai and Balai-Besar, DGWR, Ministry of Public Works. The Balai/Balai-Besar operates field works such as modification of design and supervision for implementation of sub-projects. The Head of Balai/Balai-Besar will be appointed by the Ministry to take all the responsibilities to the Ministry for implementing the sub-projects properly. The site manager is appointed to take charge of the execution of works. The staffs will support the Head of Balai/Balai-Besar in execution of survey and investigation, modification of design and preparation of tender calling for the works and supervision of the execution of the works. In addition, the foreign and local consultants are to be employed to assist the implementation of the sub-project in modification of design and construction supervision. Organizational structure for the Project is shown in Figure 6.1.

(3) Overall Implementation Schedule

Following are assumed for project implementation.

(a) Loan Pledge: January 2009
Signing of Loan Agreement: March 2009

(b) Selection of Consultant 9 months
(including concurrence by JICA): (from February 2009 to October 2009)

(c) Review of Detailed Design (including topographic survey, soil-mechanical investigation, and preparation of B/Q and bidding documents):

- Padang, Palembang, Wonokromo, Brangkal and Gorontalo Sub-projects: 6 months starting from November 2009
- Bandung Sub-project: 5 months starting from November 2009

(d) Prequalification (from announcement till concurrence by JICA) for ICB Sub-projects of Padang and Wonokromo: 3 months from February 2010

(e) Tendering for ICB Sub-projects (13 months starting from May 2010):

- Concurrence of Tender Documents by JICA: 1 month
- Tendering period: 3 months
- Tender evaluation: 5 months
- Concurrence by JICA: 1 month
- Contract negotiation: 1.5 months
- Concurrence by JICA on contract: 0.5 month
- L/C open and issuance of L/Com: 1 month

(f) Prequalification and Tendering for LCB Sub-projects (6 months after completion of review of detailed design):

- Bandung Sub-project: starting from April 2010
- Palembang, Brangkal and Gorontalo Sub-projects: starting from May 2010

(g) Construction

- Padang Sub-project (ICB): 2.5 years starting from June 2011
- Palembang Sub-project (LCB): 2.0 years staring from November 2010
- Bandung Sub-project (LCB): 2.0 years starting from October 2010
- Wonokromo Sub-project (ICB): 2.0 years stating from June 2011
- Brangkal Sub-project (LCB): 2.0 years starting from November 2010
- Gorontalo Sub-projects: 2.0 years starting from November 2010

(h) Maintenance Period (Defect Liability Period)

- Padang, Palembang, Bandung and Wonokromo sub-projects: 6 months
- Brangkal and Gorontalo sub-projects (with pumps): 12 months

Overall implementation schedule is presented in Figure 6.2.

(4) Fund Requirement

Required fund for execution of the Project is estimated at equivalent Rp. 795,374 million or equivalent Yen 9,147 million including the Interest during Construction and Commitment Charge, and consisting of;

- Foreign currency : **Yen 1,859 million**
- Local currency : **Rp.633,718 million**

Summary of the required fund is presented in Table 6.4.

(5) Disbursement Schedule

Disbursement schedule of the required fund with price escalation is shown in Table. 6.5.

(6) Loan Application

Financial assistance is required to implement the Project. The amount of loan is proposed at Japanese **Yen 7,490 million** (Rp. 651,313 million).

6.2 Operation and Effect Indicators

After completion of the project, the executing agencies are requested to measure and record the actual performance of "operation" and "effect" indicators for the mid-term review, ex-post evaluation and ex-post monitoring after the seventh year after the project completion. Operation indicator and effect indicator are defined as below.

Operation Indicator:	An indicator to measure, quantitatively, the operational status of a project.
Effect Indicator:	An indicator to measure, quantitatively, the effects generated by a project.

In this section operation and effect indicators for each short-listed sub-projects are proposed, and baseline data, which is current value for each indicator, is proposed, too.

Following operation and effect indicators will evaluate the Project benefits and effectiveness.

City	Item	Indicator	Original (Yr 2008)	Target (Yr 2015)
Padang (Anai River)	Operation	- Maximum channel capacity	1,000m^3/s (average)	1,300m^3/s (Design Discharge: Q25)
	Effect	- Flood inundation area	7.5 km^2 (25-year return period)	0 km^2 (25-year return period)
		- Number of inundated houses by flooding	1,530 houses (25-year return period)	0 nos. (25-year return period)
Palembang (Bendung River)	Operation	- Maximum channel capacity at the mouth	20m^3/s (average)	45.5m^3/s (Design Discharge: Q15)
		- Maximum channel capacity at the outlet of Talang Amam Pond	N.A.	14.2m^3/s (Design Discharge: Q15)
	Effect	- Flood inundation area	82.378 ha (15-year return period)	0 ha (15-year return period)
		- Number of inundated houses by flooding	1,830 houses (15-year return period)	0 nos. (15-year return period)
Bandung (New Diversion)	Operation	- Maximum channel capacity	0m^3/s (No channel)	60m^3/s (Design Discharge: Q5)
	Effect	- Flood inundation area	2.67 km^2 (Feb. 2005)	0 km^2 (5-year return period)
		- Number of inundated houses by flooding	4,549 houses (Feb. 2005)	0 nos. (5-year return period)
Surabaya (Wonokromo)	Operation	- Maximum channel capacity	330m^3/s (average)	420m^3/s (Design Discharge: Q25)
	Effect	- Flood inundation area	2.5 km^2 (25-year return period)	0 km^2 (25-year return period)
		- Number of inundated households by flooding	5,980 households (25-year return period)	0 nos. (25-year return period)
Surabaya (Brangkal)	Operation	- Maximum channel capacity	125m^3/s (average)	275m^3/s (Design Discharge: Q25)
		- Frequency of mobile pump drainage operation	No operation	More than 1 time/year for each unit
	Effect	- Flood inundation area	6.0 km^2 (25-year return period)	0 km^2 (25-year return period)
		- Number of inundated households by flooding	10,800 households (25-year return period)	0 nos. (25-year return period)
Gorontalo (Bolango River)	Operation	- Maximum channel capacity at the upstream of Tenda Bridge	65m^3/s (average)	200m^3/s (Design Discharge: Q20)
		- Maximum channel capacity at the Siendeng-2 Bridge (Stretch II_R)	40m^3/s (average)	125m^3/s (Design Discharge: Q20)
		- Frequency of mobile pump drainage operation	No operation	More than 1 time/year for each unit
	Effect	- Flood inundation area	2.75 km^2 (20-year return period)	0 ha (20-year return period)
		- Number of inundated houses by flooding	637 houses (20-year return period)	0 (20-year return period)

Note)
Maximum channel capacity: Improved channel capacity of objective river stretch can be evaluated by using cross-section profile ("Mutual Check 100") after the completion of improvement works at each location. However,

critical locations/channel-sections, which have variation of Design discharge distribution in Palembang and especially low channel capacity in Gorontalo, are specified in the above table.

6.3 Project Status Report (PSR)

Draft Project Status Report (PSR) is filed in ANNEX 5.

VII. CONCLUSION AND RECOMMENDATION

7.1 Conclusion

(1) Background

Most of the major cities in Indonesia have suffered from floods annually. These flood damage causes not only direct physical loss of infrastructure/buildings but also indirect economical/social loss due to suspension of economic activities and/or increase of the poor, which is one adverse factor of sustainable economic development in Indonesia. In addition, flood menace caused by the future climate change will worsen the situation of flood management so that the further strengthening of countermeasures against flood and improvement of related infrastructures are necessary.

(2) Cities/River Basins Vulnerable to Flood Disaster

According to various database on flood disaster and flood reports on newspapers, flood records are confirmed in 70 cities/river basins during recent 10 years since 1998. These cities/river basins are vulnerable to flood disaster.

(3) Long-listed Sub-projects

Considering the flood frequency in sub-project and present/scheduled extension of foreign loans for sub-project, following 17 sub-projects in 14 cities are selected as the "Long-listed Sub-projects."

1. Dumai (Riua Province)
2. Pekanbaru (Riau Province)
3. Rengat (Riau Province)
4. Padang (West Sumatra Province)
5. Jambi (Jambi Province)
6. Palembang (South Sumatra Province)
7. Bandung (West Java Province)
8. Surabaya-Wonokromo (East Java Province)
9. Surabaya-Gunungsari (East Java Province)
10. Surabaya-Kedurus (East Java Province)
11. Surabaya-Brangkal (Mojokerto, East Java Province)
12. Nganjuk (East Java Province)
13. Tulungagung (East Java Province)
14. Balikpapan (East Kalimantan Province)
15. Makassar (South Sulawesi Province)
16. Gorontalo (Gorontalo Province)

17. Manado (North Sulawesi Province)

(4) Priority of Long-listed Sub-projects

Based on the social and economical conditions quoted to the statistical data, priority ranking is given to the long-listed sub-projects. Direct and indirect flood damages, flood frequency, economic disparity, existence of important public infrastructures and grade of flood control facilities are the factors for priority ranking. Following are the ranking up to the 10^{th}.

Rank	City/Regency	Province	Total Score
1	Palembang	South Sumatra	79
2	Padang	West Sumatra	65
3	Surabaya (Gunungsari)	East Java	64
4	Makassar	South Sulawesi	62
5	Surabaya (Wonokromo)	East Java	57
6	Bandung	West Java	56
7	Gorontalo	Gorontalo	51
7	Jambi	Jambi	51
9	Pekanbaru	Riau	48
10	Manado	North Sulawesi	45
11	Nganjuk	East Java	42
12	Balikpapan	East Kalimantan	41
13	Surabaya (Kedurus)	East Java	41
14	Rengat	Riau	37
15	Surabaya (Brangkal)	East Java	37
16	Dumai	Riau	33
17	Tulunagung	East Java	22

(5) Readiness of Long-listed Sub-projects

Maturity or readiness is examined for the long-listed sub-projects in terms of (i) completion of study and detailed design, and (ii) environmental and social consideration. Environmental and social consideration is further classified into three, progress/approval of EIA, natural environmental consideration and scale of land acquisition and resettlement. Based on these examinations, readiness ranking is given to the long-listed sub-projects as below.

Rank	City/Regency	Province	Study/ Design	Environ-mental and Social Consid-eration	Total Score	Priority Rank
1	Bandung	West Java	40	47	87	6
2	Padang	West Sumatra	40	35	75	2
3	Surabaya (Brangkal)	East Java	29	31	60	14

Rank	City/Regency	Province	Study/ Design	Environ-mental and Social Consid-eration	Total Score	Priority Rank
4	Palembang	South Sumatra	29	27	56	1
5	Gorontalo	Gorontalo	29	26	55	7
6	Surabaya (Wonokromo)	East Java	29	25	54	5
7	Tulungagung	East Java	29	16	45	17
8	Surabaya (Kedurus)	East Java	29	9	38	12
9	Rengat	Riau	29	8	37	14
10	Manado	South Sulawesi	20	16	36	10
11	Surabaya (Gunungsari)	East Java	29	6	35	3
12	Nganjuk	East Java	24	9	33	11
13	Pekanbaru	Riau	15	13	28	9
14	Dumai	Riau	15	10	25	16
15	Makassar	South Sulawesi	16	8	24	4
16	Jambi	Jambi	10	9	19	7
17	Balikpapan	East Kalimantan	0	7	7	12

(6) Short-listed Sub-projects

Finally following six (6) sub-projects are included into the "Short-listed Sub-projects."

1. Padang
2. Palembang
3. Bandung
4. Surabaya-Wonokromo
5. Surabaya-Brangkal
6. Gorontalo

(7) Outline of Short-listed Sub-projects

Sub-project	Scope of Works	Construction Cost (Rp. million)	EIRR (%)
Padang (West Sumatra)	- Channel improvement of Anai River(4.1 km) - Adaptation of climate change as soft component	173,911	12.01
Palembang (South Sumatra)	- Channel improvement of Bendung River (5.5 km) - Adaptation of climate change as soft component	41,680	12.04
Bandung (West Java)	- Construction of Cikapundung Diversion Channel (0.7 km) - Adaptation of climate change as soft component	19,999	13.27
Surabaya-Wonokromo (East Java)	- Channel improvement of Wonokromo River (4.0 km) - Adaptation of climate change as soft component	126,451	12.81
Surabaya-Brangkal (East Java)	- Channel improvement of Brangkal River (8.0 km) - Procurement of mobile pump (5 units) - Adaptation of climate change as soft component	32.292	12.32

Sub-project	Scope of Works	Construction Cost (Rp. million)	EIRR (%)
Gorontalo (Gorontalo)	- Channel improvement of Bolango River (7.4 km) - Procurement of mobile pump (5 units) - Adaptation of climate change as soft component	38,091	12.13

As the flood menace caused by future climate change will worsen the situation of flood management, adaptation of climate change is necessary to include into the scope of works for respective sub-projects as soft component based on the local conditions.

(8) Overall Project Implementation

Selected 6 sub-projects are technically sound and economically feasible. Economic Internal Rate of Return (EIRR) for the overall project is calculated at 12.26 %. Therefore the Project is proposed to consist of;

(a) Implementation of 6 sub-projects,

(b) Adaptation of climate change for respective sub-projects as soft component, and

(c) Consulting services for the above.

In order to review of detailed design, assistance in tendering, construction supervision and assistance in adaptation of climate change, an international consultant will be employed through Japan-tied Short List Method

Both International Competitive Bidding (ICB) with Pre-Qualification and Local Competitive Bidding (LCB) with Post-Qualification will be applied for the procurement of contractors. There will be six (6) packages.

- Package – 1: Padang Sub-project (ICB, 30 months)
- Package – 2: Palembang Sub-project (LCB, 24 months)
- Package – 3: Bandung Sub-project (LCB, 24 months)
- Package – 4: Wonokromo Sub-project (ICB, 24 months)
- Package – 5: Brangkal Sub-project (LCB, 24 months)
- Package – 6: Gorontalo Sub-project (LCB, 24 months)

Following implementation schedule is proposed.

(a) Review of detailed design: Nov. 2009 – Apr. 2010

(b) Bidding and contracting: Apr. 2010 – May 2011

(c) Construction works: Oct. 2010 – Nov. 2013

(9) Project Cost and Loan Application

The costs of construction, consulting services, land acquisition and administration are estimated as follows:

	F.C (Yen million)	L.C (Rp. million)	Equivalent (Yen million)	Equivalent (Rp. million)
Civil Works	**1,132.09**	**452,799.9**	**6,339.29**	**549,242.8**
Padang	560.11	125,205.6	1,999.97	173,910.8
Palembang	29.16	39,144.0	479.32	41,679.6
Bandung	24.43	17,875.3	229.99	19,999.3
Wonokromo	141.46	114,150.4	1,454.19	126,451.1
Brangkal	62.72	26,837.9	371.36	32,292.0
Gorontalo	158.02	24,349.6	438.04	38,090.8
Sub-total	**975.90**	**347,562.7**	**4,972.87**	**432,423.7**
Price Escalation	102.28	83,675.3	1,064.55	92,569.4
Physical Contingency	53.91	21,561.9	301.87	26,249.7
Consulting Services	**419.03**	**63,632.9**	**1,150.81**	**100,070.3**
DD & Supervision	315.49	48,513.3	873.39	75,946.8
Climate Change	103.54	15,119.6	277.42	24,123.5
Land Acquisition Cost	0.00	17,033.3	195.88	17,033.3
Administration Cost	0.00	33,417.3	384.30	33,417.3
Value Added Tax (VAT)	0.00	66,834.7	768.60	66,834.7
Total	**1,551.12**	**633,718.1**	**8,838.88**	**768,598.4**

In the above table, consulting services, land acquisition cost and administration cost include price escalation and physical contingency, respectively.

Financial assistance is required to implement the Project. The amount of loan for civil works and consulting services is proposed at Japanese **Yen 7,490 million** (or equivalent to Rp. 651,313 million).

7.2 Recommendation

Following are the recommendations to implement the Project.

(1) The Urban Flood Control System Improvement in Selected Cities Project is categorized as FI. The selection and assessment of the actual sub-projects is substantially undertaken by such institution only after JICA's approval of the funding and therefore the sub-projects cannot be specified prior to JICA's approval of funding (or assessment of the project). Therefore, Balai/Balai Besar and DGWR should duly understand that the approval of EIA and preparation of LARAP are the minimum requirement to implement respective sub-projects.

(2) At present, six (6) sub-projects are included in the candidates of project implementation.

However, Balai/Balai Besar and DGWR should duly understand that these sub-projects have the possibility of dropout from the shortlist if the progress/approval of EIA or LARAP is behind the schedule. On the other hand, long-listed sub-projects other than the short-listed sub-projects have the opportunity to be included in the short-listed sub-projects if their design, EIA and LARAP progress well.

(3) After the approval of EIA for respective sub-projects, the RKL and RPL shall be reported to BAPEDALDA periodically.

(4) Procedure for land acquisition and resettlement shall follow JBIC's Guidelines for Confirmation of Environmental and Social Considerations prepared by JBIC in April 2002. If BWS/BBWS fails to follow the guidelines, there is a possibility to omit the sub-project from the shortlist.

(5) For the smooth implementation of the Project, the DGWR as the executing agency is recommended to monitor the activities and give appropriate suggestions to BWS/BBWS as the implementing agency on procedure/progress of EIA and land acquisition/resettlement.

(6) In order to implement the Project promptly, it is recommendable to commence the selection procedure of the consultant immediately after making the pledge for project.

(7) The Project contains the adaptation of climate change, so that BBWS/BWS is recommended to recognize the importance of it and to prepare the public involvement.

TABLES

Table 2. 1 List of Balai and Balai-Besar in DGWR

	Island	Balai/Balai-Besar	Province	Major Cities
1	Sumatra	B. Sumatera I	N.A.D	Banda Aceh
2	Sumatra	B. Sumatera II	North Sumatra	Medan
3	Sumatra	B. Sumatera III	Riau	Pekan Baru
4	Sumatra	B. Sumatera IV	Riau Islands	Tanjung Pinang
5	Sumatra	B. Sumatera V	West Sumatra	Padang
6	Sumatra	B. Sumatera VI	Jambi	Jambi
7	Sumatra	B. Sumatera VII	Bengkulu	Bengkulu
8	Sumatra	B. Sumatera VIII	South Sumatra	Palembang
			Bangka Belitung	Pangkal Pinang
9	Sumatra	B.B Mesuji-Sekampung	Lampung	Bandar Lampung
10	Jawa	B.B Cidanau-Ciujung-Cidrian	Banten	Serang
11	Jawa	B.B Ciliwung-Cisadane	DKI Jakarta	Jakarta
12	Jawa	B.B Citarum	West Jave	Bandung
13	Jawa	B.B Cimanuk-Cisanggarung	West Jave	Cirebon
14	Jawa	B.B Citanduy	West Jave	Banjar
15	Jawa	B.B Prima-Juana	Central Java	Semarang
16	Jawa	B.B Selayu-Opak	D.I. Yogyakarta	Yogyakarta
17	Jawa	B.B Bengawan Solo	Central Java	Surakarta
			East Java	Bojonegoro
18	Jawa	B.B Brantas	East Java	Surabaya
19	Bali	B. Bali	Bali	Denpasar
20	Kalimantan	B. Kalimantan I	South Kalimantan	Banjarmasin
			East Kalimantan	Samarinda
21	Kalimantan	B. Kalimantan II	Central Kalimantan	Parangkajaya
22	Kalimantan	B. Kalimantan III	West Kalimantan	Pontianak
23	Sulawesi	B.B Ponpengan-Jeneberan	South Sulawesi	Makassar
			Southeast Sulawesi	Kendari
			West Sulawesi	Mamuju
24	Sulawesi	B. Sulawesi I	North Sulawesi	Manado
25	Sulawesi	B. Sulawesi II	Gorontalo	Gorontalo
26	Sulawesi	B. Sulawesi III	Central Sulawesi	Palu
27	Lombok	B. Nusa Tenggara I	West Nusa Tenggara	Matram
28	Timor	B. Nusa Tenggara II	East Nusa Tenggara	Kupang
29	Ambon	B. Maluku	Maluku	Ambon
			North Maluku	Rabuha
30	Papua	B. Papua	West Papua	Sorong
			Papua	Jayapura
31	-	*B. Bendungan*	-	-

Note, B.B :Balai-Besar
B :Balai
Balai Bendungan functions to give technical advices for weirs and dams.

Table 2. 2 Flood Reports in Database and Newspaper (1999 - 2008)

No.	Province		City/Regency	Flood Occurrence								
1	NAD	1	Banda Aceh	Dec. 2000	Feb. 2001							
		2	Lhok Seumawe	Nov. 2000	Dec. 2006							
2	North Sumatra	3	Langkat	Jan. 2005								
		4	Medan	Jan. 2002	Sep. 2003	Dec. 2003	Apr. 2006	Oct. 2007				
			Tanjun Balai	-								
		5	Gunungsitoli (Nias)	Nov. 2002								
3	Riau	6	Dumai	Nov. 2007								
		7	Pekanbaru	Dec. 2000	Dec. 2003	Nov. 2004	Dec. 2005	Dec. 2006	Nov. 2007	Mar. 2008		
		8	Rengat (Indragiri Hilir)	Dec. 2002	Jan. 2003	Dec. 2003	Dec. 2004	Dec. 2005	Dec. 2006	Nov. 2007	Mar. 2008	
4	Riau Islands		-									
5	West Sumatra	9	Padang	Nov. 2000	Jan. 2004	Mar. 2004	Apr. 2004	Mar. 2005	Oct. 2005	Oct. 2006	Jan. 2007	Mar. 2007
				Dec. 2007	Feb. 2008							
		10	Padang Pariaman	Feb. 2008								
		11	Payakumbuh	Apr. 2008								
6	Jambi	12	Jmbi	Jan. 2001	Dec. 2002	Feb. 2003	Apr. 2003	May 2003	Dec. 2003	Jan. 2004	Mar. 2005	Apr. 2005
				Feb. 2006								
		13	Jambi Timur	Apr. 2005								
		14	Tanalaipura	Jan. 2005								
7	Bengkulu		-									
8	South Sumatra	15	Palembang	Nov. 2003	Dec. 2003	Oct. 2004	Jan. 2005	Feb. 2005	Apr. 2005	Jan. 2006		
		16	Ogan Komering Ilir	Jan. 2005	Jan. 2006							
9	Bangka Belitung Islands		-									
10	Lampung	17	Bandar Lampung	Jan. 2005								
11	Banten	18	Serang	Apr. 2004								
		19	Pandegelang	Dec. 2002	Dec. 2003							
		20	Tanggerang	Jan. 2004	Feb. 2004	Mar. 2004	Jan. 2005	Apr. 2005	June 2005	Jan. 2006	Feb. 2007	Jun. 2007
				Dec. 2007	Jan. 2008	Feb. 2008	May 2008	June 2008				
12	DKI Jakarta	21	Jakarta	Jan. 2002	Feb. 2002	Feb. 2003	Dec. 2003	Jan. 2004	Feb. 2004	Apr. 2004	Jan. 2005	Mar. 2005
				Jan. 2006	Feb. 2006	Mar. 2006	Apr. 2006	Jan. 2007	Jun. 2007	Oct. 2007	Nov. 2007	Dec. 2007
				Feb. 2008	Mar. 2008	Apr. 2008	June 2008	July 2008				
13	West Java	22	Bogor	Feb. 2004	Feb. 2007	Apr. 2008						
		23	Bekasi	Jan. 2004	Feb. 2004	Apr. 2004	Jan. 2005	Mar. 2005	Apr. 2005	Jan. 2006	Feb. 2007	Dec. 2007
				Feb. 2008								
		24	Karawang	Feb. 2008								
		25	Bandung	Dec. 2002	Feb. 2003	Mar. 2004	Feb. 2005	Apr. 2005	Nov. 2005	Feb. 2007	Mar. 2007	Apr. 2008
		26	Indramayu	Feb. 2004	Feb. 2006							
		27	Subang	Jan. 2004								
		28	Cirebon	Jan. 2004	Jan. 2005							
14	Central Java	29	Tegal	Jan. 2004	Feb. 2004							
		30	Kendal	Jan. 2004	Feb. 2004							
		31	Semarang	Jan. 2004	Feb. 2004	Jan. 2006						
		32	Kudus	Feb. 2006								
		33	Kubemen	Nov. 2004								
		34	Solo	Mar. 2005								
15	DI Yogyakarta		-									
16	East Java	35	Bojonegoro	Feb. 2001	Feb. 2002	Apr. 2007	Dec. 2007	Feb. 2008				
		36	Tuban	Feb. 2008	Mar. 2008							
		37	Lamongan	Jan. 2008	Feb. 2008							
		38	Gresik	Mar. 2004	Jan. 2008							
		39	Sidoarjo	Feb. 2002	Feb. 2008							
		40	Surabaya	Feb. 1999	Feb. 2002	Feb. 2006						
		41	Mojokerto	Feb. 2002	Feb. 2003	Feb. 2004						
		42	Jomban/Nganjuk	Jan. 2006	Dec. 2007							
		43	Kediri	Jan. 2006								
		44	Rejoso	Feb. 2004								
		45	Pasuruhan	Feb. 2004								
		46	Probilingo	Feb. 2004								
		47	Malang	Feb. 2004								
		48	Situbondo	Jan. 2006	Mar. 2008							
		49	Trenggalek/Tulungagung	Apr. 2006	Dec. 2007							
		50	Madiun	Dec. 2007								
17	Bali	51	Denpasar	Jan. 2006	Jan. 2008							
18	West Kalimantan		-									
19	Central Kalimantan	52	Pontianak	Feb. 2002								
		53	Kapuas	Feb. 2008								
		54	Muara Tewah	Apr. 2006	Apr. 2008							
20	South Kalimantan	55	Banjarmasin	Jan. 2004								
		56	Tanah Laut	June 2006	June 2008							
21	East Kalimantan	57	Balikpapan	Aug. 1998	Feb. 2004	May 2007	Sep. 2007	July 2008				
		58	Samarinda	May 2001	Jun. 2007							
22	South Sulawesi	59	Makassar	Dec. 1998	Feb. 2000	Dec. 2000	Jan. 2001	Apr. 2001	Dec. 2003	Oct. 2005	Feb. 2006	
23	Southeast Sulawesi	60	Baruga	June 2008								
24	West Sulawesi		-									
25	Central Sulawesi	61	Palu	Dec. 2003	May 2007							
		62	Poso	July 2007	July 2008							
		63	Donggala	July 2008								
		64	Kulawi	Jun. 2007	July 2008							
26	Gorontalo	65	Gorontalo	- 2001	Feb. 2001	Jun. 2001	May 2002	Dec. 2003	June 2006	June 2007	Jul. 2007	Dec. 2007
				Jul. 2008								
27	North Sulawesi	66	Manado	Dec. 2000	Apr. 2001	Nov. 2001	Dec. 2003	Feb. 2004	Mar. 2004	Feb. 2005	Feb. 2006	Jun. 2006
28	West Nusa Tenggara	67	Mataram	Jan. 2004	May 2008							
29	East Nusa Tenggara	68	Kupang	Jan. 2008								
		69	Belu	Jan. 2006								
30	Maluku		Ambon	-								
31	North Maluku		-									
32	West Irian Jaya		-									
33	Papua	70	Jayapura	Apr. 2005								

Source : (1) Disaster List in EM-DAT : Emergency Events Database (http://www.emdat/Database/terms.html)
(2) Dartmouth Flood Observatory Database (http://www.dartmouth.edu/~floods/)
(3) The Jakarta Post, the *Kompas* and other papers since 2003.

Table 3. 1 Scoring Allocation for Selection of Priority Sub-Projects

Scoring Item	Alocated Score			Scoring						
Direct Affected Flood Damage	35									
Population in Flood Prone Area		10		> 40,000	30,000 - 39,999	20,000 - 29,999	10,000 - 19,999	5,000 - 9,999	4,999 >	
				10	8	6	4	2	0	
Household in Flood Prone Area		5		> 10,000	8,000 - 9,999	6,000 - 7,999	3,000 - 5,999	1,000 - 2,999	999 >	
				5	4	3	2	1	0	
Inundation Area (ha)		10		> 25.0	20.0 - 24.9	15.0 - 19.9	10.0 - 14.9	5.0 - 9.9	4.9 >	
				10	8	6	4	2	0	
GRDP (Rp. Billion)		10		> 1,000	800 - 999	600 - 799	400 - 599	100 - 300	99 >	
				10	8	6	4	2	0	
Flood Frequency	10			10 times or more	9 - 8 times	7 - 6 times	5 times	4 times	3 thimes	twice or less
				10	9	8	6	4	2	0
Indirect Affected Flood Damage	25									
Population		5								
Related City/Regency			3	> 400,000	200,000-399,999	100,000-199,999	99,999 >			
				3	2	1	0			
Indirect Area			2	> 1,000,000	500,000-999,999	499,999 >				
				2	1	0				
Household		5								
Related City/Regency			3	> 100,000	40,000 - 99,000	20,000 - 39,999	19,999 >			
				3	2	1	0			
Indirect Area			2	> 200,000	100,000-199,999	99,999 >				
				2	1	0				
GRDP (Rp. Billion)		10								
Related City/Regency			7	> 20,000	10,000 - 19,999	5,000 - 9,999	2,000 - 4,999	1,000 - 1,999	999 >	
				7	5	3	2	1	0	
Indirect Area			3	> 50,000	20,000 - 49,999	5,000 - 19,999	4,999 >			
				3	2	1	0			
Ratio of GRDP in Province		5								
Related City/Regency			3	> 15 %	5.0 % - 14.9 %	1.0 % - 4.9 %	0.9 % >			
				3	2	1	0			
Indirect Area			2	> 30 %	10 % - 29.9 %	9.9 % >				
				2	1	0				
Economic Disparity	10									
Percentage of Poverty in Province		5		> 20 %	15.0 % - 19.9 %	10.0 % - 14.9 %	7.5 % - 9.9 %	5.0 % - 7.4 %	4.9 % >	
				5	4	3	2	1	0	
Per Capita GRDP (Rp. Thousand)		5								
Related City/Regency			3	> 4,999	5,000 - 9,999	10,000 - 19,999	20,000 >			
				3	2	1	0			
Indirect Area			2	> 4,999	5,000 - 19,999	20,000 >				
				2	1	0				
Important Infrastructure	10									
Government Office		3		Province		City/Regency		District		
				Inside	fringe	Inside	fringe	Inside	fringe	
				3	2	2	1	1	0	
Airport		3		International		Domestic		None		
				Inside	fringe	Inside	fringe			
				3	1	2	1	0		
Harbor		2		Inside	fringe	None				
				2	1	0				
Railway		2		Inside	fringe	None				
				2	1	0				
Flood Control Facilities	10			None	Poor	Faire	Good	Excellent		
				10	8	3	1	0		
Total	100									

Table 3. 2 Scoring Allocation for Selection of Readiness Sub-Projects

Scoring Item	Allocated Score	Scoring							
Study and Design	**40**								
Preliminary Study	1	Conducted	Ongoing	Scheduled	Not Yet				
		1	0	0	0				
Master Plan	4	Conducted	Ongoing	Scheduled	Not Yet				
		4	2	1	0				
F/S or Basic Design	10	Conducted		Ongoing	Scheduled	Not Yet			
		Sufficient	Insufficient						
		10	8	5	1	0			
Detailed Design	25	Conducted		Ongoing	Scheduled	Not Yet			
		Sufficient	Insufficient						
		25	15	10	5	0			
Social Consideration	**60**								
EIA Study including Public Consultation	25	Approved by Authorities	Conducted	Ongoing		Scheduled in 2009		Preliminary Study (UKL/UPL)	No Schedule
				Review	New Study	Review	New Study		
		25	20	15	10	10	5	2	0
Natural Consideration	5								
Protective Area	1	No	Included						
		1	0						
Ecological ly Valuable habits	2	No Influence	Less Influence	Some Influence					
		2	1	0					
Saline Water Intrusion	2	No Influence	Less Influence	Some Influence					
		2	1	0					
Land Acquisition & Resettlement	30								
Preparation of LARAP	5	Completed	Ongoing	Scheduled	Not Yet				
		5	4	3	0				
Commitment Letter	5	Completed	Ongoing	Imperfect	Scheduled	Not Yet			
		5	4	3	1	0			
Number of Resettlement	5	None	Less	5 - 19	20 - 49	50 - 199	> 200		
		5	4	3	2	1	0		
Acquisition Area (ha)	5	None	Less	5 - 19	20 - 49	50 - 99	> 100		
		5	4	3	2	1	0		
Budget in 2009	5	Sufficient for All	50% of Remaining	A part of Remaining	No Schedule				
		5	3	1	0				
Category of Project	5	C	B	A					
		5	3	1					
TOTAL	**100**								

Table 4. 1 Flood Reports in Database and Newspaper (1998 - 2008)

City/Regency	Province	Date	Source	Number Killed	Number Total Affected	Inundation Area (ha)	Houses Affected	Facilities Affected	Estimated Damage (bill. Rp.)
Dumai	Riau	Nov. 2007	J-Post						
Pekanbaru	Riau	Dec. 2000	IP, EMDAT						
		Dec. 2003	I/P						
		Nov. 2004	I/P			510			
		Dec. 2005	I/P			350			
		Dec. 2006	I/P	1		510	5,001		
		Nov. 2007	J-Post				3,646		
		Mar. 2008	J-Post			1,850			
Rengat (Indragiri Hilir)	Riau	Dec. 2002	I/P			5,000			
		Jan. 2003	Dartmouth, J-Post	3	20,000				
		Dec. 2003	EMDAT						
		Dec. 2004	I/P	1		20,345	3,117		3.15
		Dec. 2005	I/P			8,345			
		Dec. 2006	I/P, Dartmouth						
		Nov. 2007	J-Post						
		Mar. 2008	J-Post			900			
Padang	West Sumatra	Nov. 2000	I/P	2			300		5
		Jan. 2004	Dartmouth						
		Mar. 2004	J-Post						
		Apr. 2004	I/P			600	25		2
		Mar. 2005	J-Post						
		Oct. 2005	I/P	1		800	20		2
		Oct. 2006	I/P	-		565	35		3.5
		Jan. 2007	I/P			1,500	15		1.5
		Mar. 2007	BWS-Sumatra V						
		Dec. 2007	Dartmouth, J-Post						
		Feb. 2008	BWS-Sumatra V						
Jmbi	Jambi	Jan. 2001	I/P			608	4,300		
		Dec. 2002	I/P						
		Feb. 2003	I/P				300		
		Apr. 2003	I/P			10,300			
		May 2003	I/P, EMDAT,Dartmouth	4	2,000	11,000			
		Dec. 2003	I/P, EMDAT	6	58,512		11,496		8.7
		Jan. 2004	I/P, Dartmouth, J-Post						
		Mar. 2005	J-Post						
		Apr. 2005	I/P, J-Post						
		Feb. 2006	I/P, J-Post						
Palembang	South Sumatra	Nov. 2003	I/P				1,200		
		Dec. 2003	I/P, Dartmouth				20,000		
		Oct. 2004	J-Post						
		Jan. 2005	Dartmouth, J-Post				300		
		Feb. 2005	I/P						
		Apr. 2005	I/P						
		Jan. 2006	I/P						
Bandung	West Java	Dec. 2002	Dartmouth						
		Feb. 2003	Dartmouth		4,300				
		Mar. 2004	Dartmouth, J-Post	1	8,000		2,000		
		Feb. 2005	I/P, Dartmouth, J-post		50,000	24,000	3,000		
		Apr. 2005	I/P, J-post		23,898	4,700	55,700		371.3
		Nov. 2005	J-Post						
		Feb. 2007	J-Post		11,381		3,065		
		Mar. 2007	I/P			1,400			
		Apr. 2008	J-Post			500	900		
Surabaya	East Java	Feb. 1999	BBWS Brantas			880			
		Feb. 2002	EMDAT						
		Feb. 2006	J-Post						
Mojokerto	East Java	Feb. 2002	EMDAT						
		Feb. 2003	J-Post	1	150				
		Feb. 2004	Dartmouth, J-Post	4	2,400				
Jombang/Nganjuk	East Java	Jan. 2006	I/P						
		Dec. 2007	I/P						
Trenggalek/Tulungagung	East Java	Apr. 2006	I/P, Dartmouth, J-Post	13	240				
		Dec. 2007	EMDAT						
Balikpapan	East Kalimantan	Aug. 1998	EMDAT	4	100,000				
		Feb. 2004	J-post						
		May 2007	EMDAT	4	60,000				
		Sep. 2007	EMDAT, Dartmouth, J-Post	4	1,000				
		July 2008	J-post	3			1,200		
Makassar	South Sulawesi	Dec. 1998	I/P	3			1,400	102	
		Feb. 2000	I/P	6			1,400	42	
		Dec. 2000	I/P	25		900	7,000		
		Jan. 2001	I/P						
		Apr. 2001	I/P	11					
		Dec. 2003	J-post						
		Oct. 2005	I/P				4,454		200
		Feb. 2006	I/P	22					
Gorontalo	Gorontalo	- 2000	I/P			901			
		Feb. 2001	JICA Report						
		Jun. 2001	I/P	3		150			35.6
		May 2002	I/P, JICA Report			235	2,000		28
		Dec. 2003	I/P			225			57.4
		June 2006	I/P, Dartmouth, J-Post, Kompas	3	30,000	350			74.6
		June 2007	Dartmouth	4	60,000				
		July 2007	I/P			217			43
		Dec. 2007	Dartmouth		4,500				
		July 2008	Media-1						
Manado	North Sulawesi	Dec. 2000	EMDAT, I/P	27		8,500	2,686		300
		Apr. 2001	I/P			200	40		
		Nov. 2001	I/P	11					
		Dec. 2003	I/P, Dartmouth						
		Feb. 2004	I/P	28		400	2,000		
		Mar. 2004	I/P				3,000		
		May 2004	Dartmas						
		Feb. 2005	J-Post				200		
		Feb. 2006	I/P, EMDAT, Dartmouth, J-Post	39	17,539				180
		Jun. 2006	EMDAT		5,000				

Source : (1) Disaster List in EM-DAT : Emergency Events Database (http://www.emdat/DatabaseItems.html)
(2) Dartmouth Flood Observatory Database (http://www.dartmouth.edu/~floods/)
(3) The Jakarta Post, the *Kompas* and other papers since 2003.

Table 4. 2 Social and Economical Figures in Long-listed Sub-Projects

No.	City/ Regency	Flood Prone Area				Flood Fre-	Pupulation		Number of Household		GRDP (Rp.billion)		Ratio in Province		Percent of	Per Capita GRDP (Rp. Thousand)		Statistic
		Area (km2)	Affected Population	House- hold	GRDP (Rp. bil)	quency	(Direct)	(Indirect)	(Direct)	(Indirect)	(Direct)	(Indirect)	(Direct)	(Indirect)	Poverty	(Direct)	(Indirect)	Data
1	Dumai	15.0	1,274	283	75	0	173,188	693,429	38,518	154,633	7,648	30,624	0.036	0.146	6.44	44,163	44,163	2007
2	Pekanbaru	7.0	6,474	1,583	760	8	585,440	1,032,597	143,189	249,783	25,855	45,603	0.123	0.217	6.44	44,163	44,163	2007
3	Rengat	15.0	12,365	2,689	241	5	53,109	247,306	11,550	59,378	1,037	4,829	0.005	0.023	6.44	19,525	19,525	2004
4	**Padang**	32.0	15,254	3,528	256	9	196,695	1,204,458	45,497	287,648	3,298	19,188	0.062	0.362	12.28	16,766	15,931	2006
5	Jambi	5.0	10,776	2,500	126	11	443,370	738,689	102,870	178,207	4,307	7,175	0.165	0.275	17.34	9,713	9,713	2006
6	**Palembang**	12.0	43,929	9,310	949	6	1,369,239	1,853,484	290,176	403,582	29,590	36,322	0.308	0.379	20.13	21,610	19,597	2006
7	**Bandung**	7.2	38,727	9,844	283	9	282,766	6,739,752	71,878	1,800,232	2,067	66,954	0.004	0.141	11.21	7,311	9,934	2005
8	**Surabaya (Wonokromo)**	8.0	45,749	14,068	1,365	3	287,588	2,599,796	88,435	709,991	8,583	77,594	0.018	0.165	14.62	29,846	29,846	2005
9	Surabaya (Gunungsari)	8.8	61,275	16,728	1,829	3	607,524	2,599,796	165,856	709,991	18,132	77,594	0.039	0.165	14.62	29,846	29,846	2005
10	Surabaya (Kedurus)	5.0	17,328	4,574	517	3	201,592	2,599,796	53,212	709,991	6,017	77,594	0.013	0.165	14.62	29,846	29,846	2005
11	**Surabaya (Brangkal)**	5.0	35,985	9,006	209	3	118,464	4,197,877	29,647	1,050,568	858	21,628	0.002	0.046	14.62	7,245	5,152	2004
12	Nganjuk	15.0	28,180	7,566	168	1	108,927	1,065,459	29,245	267,816	649	6,347	0.001	0.013	14.62	5,957	5,957	2006
13	Tulunagung	7.0	5,854	1,666	18	2	47,804	1,672,246	13,603	458,122	148	5,190	0.000	0.011	14.62	3,104	3,104	2005
14	Balikpapan	2.0	9,621	2,251	514	4	283,909	515,529	66,438	120,640	15,171	27,549	0.078	0.141	11.57	53,438	53,438	2007
15	Makassar	9.0	50,179	11,003	538	11	433,546	1,254,147	95,067	256,379	4,652	13,456	0.077	0.221	6.11	10,729	10,729	2006
16	**Gorontalo**	6.0	14,660	4,217	78	6	158,302	713,675	45,540	187,943	847	3,243	0.208	0.798	18.63	5,350	4,545	2006
17	Manado	3.0	7,968	2,099	296	7	417,700	417,700	110,016	110,016	5,169	5,169	0.240	0.240	4.37	12,376	12,376	2006
	Note	(*1)	(*2)	(*3)	(*4)	(*5)	(*6)	(*7)	(*6)	(*7)	(*4)	(*4)	(*5)	(*6)	(*8)	(*9)	(*9)	(*10)

(*1) Consultant's estimate.
(*2) Estimated by population density in respective cities/regencies.
(*3) Estimated by housekold density in respective cities/regencies.
(*4) Estimated by Per Capita GRDP in respective area.
(*5) Quoted from Table 2. 2
(*6) "Direct" means the administrative cities/regencies include flood prone area.
(*7) "Indirect" means surrounding cities/regencies including "Direct" area.
(*8) Quoted from Statistical Yearbook of Indonesia 2007 published by BPS.
(*9) Quoted from respective statistical data published by BPS.
(*10) Source : Statistic Data in Respective Provinces/Cities/Regencies published by BPS

Table 4. 3 Scoring for Prioty in Long-listed Sub-Projects

No.	City/ Regency	Actual Flood Damage					Flood Frequency	Indirectly Affected Factors									Poverty Alleviation				Important Infrastructure					Flood Control Facilities	TOTAL SCORE	Rank
		Flood Prone Area						Pupulation		Number of Household		GRDP (Rp.billion)		Ratio in Province		Sub-Total	Percent of Poverty	Per Capita GRDP (Rp. Thousand)		Sub-Total	Government Office	Air-port	Har-bor	Rail-way	Sub-Total			
		Popu-lation	House-hold	Area (km2)	GRDP (Rp.b)	Sub-Total		Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect			Direct	Indirect									
		10	5	10	10	35	10	3	2	3	2	7	3	3	2	25	5	3	2	10	3	3	2	2	10	10	100	
1	Dumai	0	0	6	0	6	0	1	1	1	1	3	2	1	1	11	1	0	0	1	2	1	2	0	5	10	33	16
2	Pekanbaru	2	1	2	6	11	8	3	2	3	2	7	2	2	1	22	1	0	0	1	2	1	0	0	3	3	48	9
3	Rengat	4	1	6	2	13	9	0	0	0	0	1	0	0	0	1	1	1	1	3	2	1	0	0	3	8	37	14
4	**Padang**	4	2	10	2	18	10	1	2	2	2	2	1	2	2	14	3	1	1	5	2	3	1	2	8	10	65	2
5	Jambi	4	1	2	2	9	10	3	1	3	1	2	1	3	2	16	4	2	1	7	3	1	2	0	6	3	51	7
6	**Palembang**	10	4	4	8	26	8	3	2	3	2	7	2	3	2	24	5	0	1	6	3	1	2	1	7	8	79	1
7	**Bandung**	8	4	2	2	16	9	2	2	2	2	2	3	0	1	14	3	2	1	6	1	1	0	1	3	8	56	6
8	**Surabaya (Wonokromo)**	10	5	2	10	27	2	2	2	2	2	3	3	1	1	16	3	0	0	3	2	1	1	2	6	3	57	5
9	Surabaya (Gunungsari)	10	5	2	10	27	2	3	2	3	2	5	3	1	1	20	3	0	0	3	1	0	1	2	4	8	64	3
10	Surabaya (Kedurus)	4	2	2	4	12	2	2	2	2	2	3	3	1	1	16	3	0	0	3	0	0	0	0	0	8	41	12
11	**Surabaya (Brangkal)**	8	4	2	2	16	2	1	2	1	2	0	2	0	0	8	3	2	1	6	2	0	0	2	4	1	37	14
12	Nganjuk	6	3	6	2	17	0	1	2	1	2	0	1	0	0	7	3	2	1	6	2	0	0	2	4	8	42	11
13	Tulunagung	2	1	2	0	5	0	0	2	0	2	0	1	0	0	5	3	3	2	8	0	0	0	1	1	3	22	17
14	Balikpapan	2	1	0	4	7	6	2	1	2	1	5	2	2	1	16	3	0	0	3	2	2	2	0	6	3	41	12
15	Makassar	10	5	2	4	21	9	3	2	2	2	2	1	2	1	15	1	1	1	3	2	1	1	0	4	10	62	4
16	**Gorontalo**	4	2	2	0	8	10	1	1	2	1	0	0	3	2	10	4	2	2	8	2	1	2	0	5	10	51	7
17	Manado	2	1	0	2	5	9	3	0	3	1	3	1	3	1	15	0	1	1	2	3	1	2	0	6	8	45	10

Table 4. 4 Scoring for Readiness in Long-listed Sub-Projects

No.	City/ Regency	Study and Design					Environmental and Social Consideration														TOTAL SCORE	Rank
							Progress of EIA	Natural Consideration				Land Acquisition & Resettlement								Total of Social Consid.		
		Pre-Study	M/P	F/S, B/D	D/D	Total of Study		Protective Area	Ecological Valuales	Saline Water Intrusion	Score	LARAP	Commitment Letter	Number of Resettlement	Acquisition Area	Budget in 2009	Project Category		Sub-Total			
		1	4	10	25	40	25	1	2	2	5	5	5	5	5	5	(※)	5	30	60	100	
1	Dumai	0	0	0	15	15	0	1	2	1	4	0	0	2	3	0	A	1	6	10	25	14
2	Pekanbaru	0	0	0	15	15	0	1	2	2	5	0	3	1	3	0	A	1	8	13	28	13
3	Rengat	0	4	10	15	29	2	1	2	2	5	0	0	0	0	0	A	1	1	8	37	9
4	**Padang**	1	4	10	25	40	10	1	2	1	4	3	5	2	3	5	B	3	21	35	75	2
5	Jambi	0	4	1	5	10	0	1	2	2	5	0	0	1	2	0	A	1	4	9	19	16
6	**Palembang**	0	4	10	15	29	10	1	2	1	4	3	4	1	3	1	A	1	13	27	56	4
7	**Bandung**	1	4	10	25	40	25	1	2	2	5	3	1	3	4	3	B	3	17	47	87	1
8	**Surabaya (Wonokromo)**	0	4	10	15	29	10	1	2	1	4	3	1	1	4	1	A	1	11	25	54	6
9	Surabaya (Gunungsari)	0	4	10	15	29	0	1	2	2	5	0	0	0	0	0	A	1	1	6	35	11
10	Surabaya (Kedurus)	0	4	10	15	29	0	1	2	2	5	0	0	2	1	0	A	1	4	9	38	8
11	**Surabaya (Brangkal)**	0	4	10	15	29	5	1	2	2	5	3	1	5	4	5	B	3	21	31	60	3
12	Nganjuk	0	4	10	10	24	0	1	2	2	5	0	0	1	2	0	A	1	4	9	33	12
13	Tulunagung	0	4	10	15	29	0	1	2	2	5	0	0	4	4	0	B	3	11	16	45	7
14	Balikpapan	0	0	0	0	0	0	1	2	1	4	0	0	1	1	0	A	1	3	7	7	17
15	Makassar	1	0	0	15	16	0	1	2	1	4	0	1	2	0	0	A	1	4	8	24	15
16	**Gorontalo**	0	4	10	15	29	10	1	2	1	4	3	4	0	3	1	A	1	12	26	55	5
17	Manado	1	4	0	15	20	0	1	2	1	4	0	1	4	4	0	B	3	12	16	36	10

(※) Uncertain sub-projects are categorized as "A" tentatively.

Table 5.1 Summary of Soft Components Applicability for Adaptation to Climate Change (1/8)

Ref. No.	Description of Component	Applicability						
		Indonesia	BWS Sumatra V Padang	BWS Sumatra VIII Palembang	BBWS Citarum Bandung	BBWS Brantas Surabaya (Wonokromo)	BBWS Brantas Surabaya (Brangkal)	BWS Sulawesi II Gorontalo
			• Stage I&II were completed. (O/M manual was prepared) • Pilot area for JICA Disaster Management Plan • A new airport was constructed by JBIC Loan	• JICA M/P study was conducted. • Warning system of Musi River using GSM has been installed. • There are many retarding ponds but some of them have been reclaimed recently.	• Stage I&II were completed. (O/M manual was prepared) • EWS installed already does not function. • Flood plain management and flood hazard map were prepared. • Upper Citarik watershed conservation plan exists. • GIS was installed.	• Wonokromo River plays a role as a flood way of Surabaya River • The discharges are controlled at Jagir Weir and onokromo Sluice.	• Watershed Management Plan exists.	• JICA M/P and F/S were conducted. • Water stage warning system using GSM exists. • Tsunami hazard map was prepared.
	Assessment on vulnerabilities and risks regarding the impact of climate change							
1	• Formulation of regional plans on addressing climate change • Enhancement and execution of basic programs to address climate change	• Not yet (Current condition)	• Effective • Overall goal of the study	• Effective • Overall goal of the study	• Effective • Overall goal of the study	• Effective • Overall goal of the study	• Effective • Overall goal of the study	• Effective • Overall goal of the study
2	• Assessments on vulnerabilities and risks regarding the impact of climate change on flood control sector • Execution of Flood Disaster Risk Impact Assessment	• Not yet (Current condition) • Basic data of each adaptation	• Effective • The very minimum study items	• Effective • The very minimum study items	• Effective • The very minimum study items	• Effective • The very minimum study items	• Effective • The very minimum study items	• Effective • The very minimum study items
3	• Survey and analysis for observation, projection, and impact assessment on climate change	• Though it's important, it's possible to study/analyze after data accumulation.	• Though it's important, it's possible to study/analyze after data accumulation.	• Though it's important, it's possible to study/analyze after data accumulation.	• Though it's important, it's possible to study/analyze after data accumulation.	• Though it's important, it's possible to study/analyze after data accumulation.	• Though it's important, it's possible to study/analyze after data accumulation.	• Though it's important, it's possible to study/analyze after data accumulation.
	Capacity building of BBWS and BWS							
4	• Collaboration with JICA's Technical Cooperation Project on "Capacity Development Project for River basin organizations"	•	•	•	•	•	•	•
5	• Participation in NARBO (Network of Asian River Basin Organizations)	• 18 members in Indonesia out of all 65 members	•	•	•	•	•	•
6	• Utilization of JICA's Training program (e.g. "Integrated Water Resources Management")	•	•	•	•	•	•	•
	Strengthening of DRP (Disaster Prevention and Preparedness) for community and local government							
7	• Community participatory countermeasures	• Gotongroyong: Application of ideas of neighborhood organizations is expected.	•	•	•	•	•	•
8	• Community strengthening (e.g., warning systems, disaster prevention training)	•	•	•	•	•	•	•
9	• Preparation of disaster-response master plans and damage scenarios that take climate change risks into account.	•	•	•	•	•	•	•

Table 5.1 Summary of Soft Components Applicability for Adaptation to Climate Change (2/8)

Ref. No.	Description of Component	Applicability						
		Indonesia	BWS Sumatra V Padang	BWS Sumatra VIII Palembang	BBWS Citarum Bandung	BBWS Brantas Surabaya (Wonokromo)	BBWS Brantas Surabaya (Brangkal)	BWS Sulawesi II Gorontalo
			• Stage I&II were completed. (O/M manual was prepared) • Pilot area for JICA Disaster Management Plan • A new airport was constructed by JBIC Loan	• JICA M/P study was conducted. • Warning system of Musi River using GSM has been installed. • There are many retarding ponds but some of them have been reclaimed recently.	• Stage I&II were completed. (O/M manual was prepared) • EWS installed already does not function. • Flood plain management and flood hazard map were prepared. • Upper Citarik watershed conservation plan exists. • GIS was installed.	• Wonokromo River plays a role as a flood way of Surabaya River • The discharges are controlled at Jagir Weir and onokromo Sluice.	• Watershed Management Plan exists.	• JICA M/P and F/S were conducted. • Water stage warning system using GSM exists. • Tsunami hazard map was prepared.
10	• Development of community based DPP plan • Clarification and enhancement of self/mutual/public activities for DPP	• Appointment of responsibilities among related organizations is not clarified.	-	-	-	-	-	-
11	• Disaster Risk Assessment by using GIS	• Directorate of Planning and Programming of DGRW has a standard GIS platform. • GIS is useful though there is an accuracy gap among the regions.	-	-	• Basic information of river basin was prepared.	-	-	-
12	• Dissemination and education of DPP	• Enlightening through Musyawarah (small discussion) in community is effective. • It is effective regardless of current status of disaster prevention and preparedness scheme.	-	• School education for garbage matter obstructing the flood flow is effective in awareness building of disaster prevention.	• Campaign for dumping prevention against garbage matter obstructing the flood flow is effective.	-	• River clean campaign of ridding water Lilly obstructing the flood flow is effective.	• Campaign for dumping prevention against garbage matter obstructing the flood flow is effective.
13	• DPP drill	• It is effective if disaster prevention and preparedness plan is established. • Assistance for preparation of DPP drill plan	• DPP plan should be prepared by priority.	• DPP plan should be prepared by priority.	• DPP plan should be prepared by priority.	• DPP plan should be prepared by priority.	• DPP plan should be prepared by priority.	• DPP plan should be prepared by priority.
14	• Enhancement of the disaster resistance of private houses	-	-	• Piloti type houses and bounty for it are proposed against Musi River flood.	-	-	-	-

Table 5.1 Summary of Soft Components Applicability for Adaptation to Climate Change (3/8)

Ref. No.	Description of Component	Applicability						
		Indonesia	BWS Sumatra V Padang	BWS Sumatra VIII Palembang	BBWS Citarum Bandung	BBWS Brantas Surabaya (Wonokromo)	BBWS Brantas Surabaya (Brangkal)	BWS Sulawesi II Gorontalo
			• Stage I&II were completed. (O/M manual was prepared) • Pilot area for JICA Disaster Management Plan • A new airport was constructed by JBIC Loan	• JICA M/P study was conducted. • Warning system of Musi River using GSM has been installed. • There are many retarding ponds but some of them have been reclaimed recently.	• Stage I&II were completed. (O/M manual was prepared) • EWS installed already does not function. • Flood plain management and flood hazard map were prepared. • Upper Citarik watershed conservation plan exists. • GIS was installed.	• Wonokromo River plays a role as a flood way of Surabaya River • The discharges are controlled at Jagir Weir and onokromo Sluice.	• Watershed Management Plan exists.	• JICA M/P and F/S were conducted. • Water stage warning system using GSM exists. • Tsunami hazard map was prepared.
15	• Development and practical use of Flood Hazard Map (Coordination with Indonesian ex-trainees of JICA's "Flood Hazard Mapping" training course)	• Flood Hazard Maps (FHM) have been developed in many regions as the needs of FHM have been understood.	•	•	• Flood hazard map was prepared based on the past flood in 1986 and flood analysis result. • Upgrade and dissemination are needed.	•	•	• Comprehensive hazard map, which adds flood inundation information to existing tsunami hazard map, is effective.
16	• Approach by referring to results of JICA's "Study on Natural Disaster Management in Indonesia" (on going)	• National/regional DPP plans are being prepared in the JICA's study.	• Padang Pariaman Regency is selected as pilot area.	•	•	•	•	•
17	• Utilization of JICA's Training program (e.g. "Flood Hazard Mapping")	•	•	•	•	•	•	•
	Enhancement of O/M for flood control facilities							
18	• Inventory of flood control facilities and evaluation of safety level	• It is an important basic study for evaluation of safety level of facilities. • Any BBWS/BWS don't prepare for the inventory. • Making inventory by GIS is effective.	• Effective	• Effective	• Effective	• Effective • Evaluation of capacity of Jagir Weir is effective in study of safety level.	• Effective	• Effective
19	• Development and improvement of O/M manual	• There are some gaps of current situation of preparation for the manual.	• Effective • It is effective for adequate O/M to improve O/M manual prepared in Stage I & II.	• Preparation of O/M manual for outlet of Talang Aman pond, which is effective in basin storage, is proposed.	• Preparation of operation manual for drainage facilities around Daycuhkolot e.g. pumping station, gates and so on is proposed.	• It is needed to prepare integrated operation manual for Jagir Weir, Wonokromo Sluice and Gunungsari Weir based on fail safe.	• Preparation of O/M manual for Prajurit Weir is effective against flood flow. • It is needed to prioritizing installation sites of mobile pump and to prepare O/M manual for effective use.	• It is needed to prioritizing installation sites of mobile pump and to prepare O/M manual for effective use.
20	• Approach by referring to results of JICA's Technical Cooperation Project on "Institutional Revitalization Project for Flood Management in JABODETABEK"	•	•	•	•	•	•	•

Table 5.1 Summary of Soft Components Applicability for Adaptation to Climate Change (4/8)

Ref. No.	Description of Component	Applicability					
		Indonesia	BWS Sumatra V Padang	BWS Sumatra VIII Palembang	BBWS Citarum Bandung	BBWS Brantas Surabaya (Wonokromo)	BBWS Brantas Surabaya (Brangkal)	BWS Sulawesi II Gorontalo
			• Stage I&II were completed. (O/M manual was prepared) • Pilot area for JICA Disaster Management Plan • A new airport was constructed by JBIC Loan	• JICA M/P study was conducted. • Warning system of Musi River using GSM has been installed. • There are many retarding ponds but some of them have been reclaimed recently.	• Stage I&II were completed. (O/M manual was prepared) • EWS installed already does not function. • Flood plain management and flood hazard map were prepared. • Upper Citarik watershed conservation plan exists. • GIS was installed.	• Wonokromo River plays a role as a flood way of Surabaya River • The discharges are controlled at Jagir Weir and onokromo Sluice.	• Watershed Management Plan exists.	• JICA M/P and F/S were conducted. • Water stage warning system using GSM exists. • Tsunami hazard map was prepared.
	Capacity strengthening of meteorological/hydrological observation							
21	• Development and improvement of meteo-hydrological observation network plan based on the regional meteo-hydrological conditions • Installation and expansion of meteo-hydrological observation facilities • Development and improvement of meteo-hydrological observation manual	• Almost all meteorological data belong to BMG. Free information sharing among BNG, PLN, and provincial Dinas is needed. • Regarding other hydrological data, adequate record, store and use for review of watershed management is needed.	• Effective • Current situation: Prompt establishment of hydrological observation scheme is required. • Effectiveness: It is useful for planning or EWS.	•	• Effective • Current situation: BBWS does not have own rainfall station. Observation system using real-time rainfall data maintained by PLN Saguling dam office is required. • Effectiveness: Accurate flood warning system is expected.	•	•	•
22	• Development risk assessment method by using observed meteo-hydrological data	•	•	•	• O/M for water gauging station is needed in order to solve the gap of standard height due to land subsidence.	•	•	•
23	• Utilization of satellite-based rainfall data	• Trial introduction of "Integrated Flood Analysis System"	•	•	•	•	•	•
24	• Development and improvement flood warning system by using GSM's SMS function	• DGWR instructed BBWS/BWS to examine the installation of it. • Some BBWS/BWS have installed it by expanding existing facilities.	•	• Current situation: EWS using GSM was installed in upper Musi River basin. • It is needed to study about utilization of hydrological information in upper basin for Palembang City.	• Current situation: Under examination of adoption. (D/D for system was conducted.)	•	• Effective • Current situation: It has not installed • Effectiveness: Accurate EWS is expected because of no confluence in middle and lower Brankal River.	• Effective • Current situation: Basic system was installed. • Effectiveness: Effective flood mitigation is expected by expanding current system and improvement of warning accuracy.
25	• Utilization of JICA's Training program	•	•	•	•	•	•	•

Table 5.1 Summary of Soft Components Applicability for Adaptation to Climate Change (5/8)

Ref. No.	Description of Component	Applicability						
		Indonesia	BWS Sumatra V Padang	BWS Sumatra VIII Palembang	BBWS Citarum Bandung	BBWS Brantas Surabaya (Wonokromo)	BBWS Brantas Surabaya (Brangkal)	BWS Sulawesi II Gorontalo
			• Stage I&II were completed. (O/M manual was prepared) • Pilot area for JICA Disaster Management Plan • A new airport was constructed by JBIC Loan	• JICA M/P study was conducted. • Warning system of Musi River using GSM has been installed. • There are many retarding ponds but some of them have been reclaimed recently.	• Stage I&II were completed. (O/M manual was prepared) • EWS installed already does not function. • Flood plain management and flood hazard map were prepared. • Upper Citarik watershed conservation plan exists. • GIS was installed.	• Wonokromo River plays a role as a flood way of Surabaya River • The discharges are controlled at Jagir Weir and onokromo Sluice.	• Watershed Management Plan exists.	• JICA M/P and F/S were conducted. • Water stage warning system using GSM exists. • Tsunami hazard map was prepared.
	Enhancement of Early Warning System							
26	• Enhancement of hydrological observation network (rainfall/water-level station)	•	• Effective • Current situation: Prompt establishment of hydrological observation scheme is required. • Effectiveness: It is useful for planning or EWS.	•	• Effective • Current situation: BBWS does not have own rainfall station. Observation system using real-time rainfall data maintained by PLN Saguling dam office is required. • Effectiveness: Accurate flood warning system is expected.	•	•	•
27	• Development of flood early warning system	• Measures of rainfall prediction should be established. (Enough hydrological data are needed.) • Capability of EWS by stage relation according to the river basin features should be studied. (Enough hydrological data are needed.) • Residents in urban flood prone area make mental preparations for flood.	• Early forecasting & warning is expected if Balai maintain the information of discharge from Singkalak Lake belonging to PLN and water level at upper Anai irrigation weir belonging to provincial Dinas.	• Early warning is expected by combining water level at upper Musi River with tidal level.	• Utilization of current telemeter facilities is effective.	• Comprehensive management of Gunungsari Weri and intake facility on the left bank of Wonokromo River is effective in prompt operation.	• Early warning based on stage relation is expected because of no confluence at downstream from Dinoyo.	•
28	• Development and improvement of operation manual for early warning	•	•	•	• Utilization of current forecasting and warning is effective.	•	•	•
29	• Installation of flood warning siren tower	• Warning using speakers of mosques is worth examining.	•	•	• It was installed.	•	•	•
30	• Development of emergency communication system	•	•	•	•	•	•	•

Table 5.1 Summary of Soft Components Applicability for Adaptation to Climate Change (6/8)

Ref. No.	Description of Component	Applicability						
		Indonesia	BWS Sumatra V Padang	BWS Sumatra VIII Palembang	BBWS Citarum Bandung	BBWS Brantas Surabaya (Wonokromo)	BBWS Brantas Surabaya (Brangkal)	BWS Sulawesi II Gorontalo
			• Stage I&II were completed. (O/M manual was prepared) • Pilot area for JICA Disaster Management Plan • A new airport was constructed by JBIC Loan	• JICA M/P study was conducted. • Warning system of Musi River using GSM has been installed. • There are many retarding ponds but some of them have been reclaimed recently.	• Stage I&II were completed. (O/M manual was prepared) • EWS installed already does not function. • Flood plain management and flood hazard map were prepared. • Upper Citarik watershed conservation plan exists. • GIS was installed.	• Wonokromo River plays a role as a flood way of Surabaya River • The discharges are controlled at Jagir Weir and onokromo Sluice.	• Watershed Management Plan exists.	• JICA M/P and F/S were conducted. • Water stage warning system using GSM exists. • Tsunami hazard map was prepared.
	Improvement of regional DPP (Disaster Prevention and Preparedness) plan							
31	• Development of prevention plans and emergency action plans for flood disasters	• Though related organizations exist at present, budget, dissemination system and so on are not established.	•	•	•	•	•	•
32	• Enhancement of institutional framework for community based DPP activities	•	•	•	•	•	•	•
33	• Approach by referring to results of JICA's "Study on Natural Disaster Management in Indonesia" (on going)	• Disaster management plan of national level and pilot area are being prepared. (Including capacity development and regional disaster management plan)	• Padang Pariaman Regency is sellected as Pilot Area.	•	•	•	•	•
34	• Workshop and seminar	•	• Balai/Dinas is active for workshop and seminar. • Participation in training by Asian Disaster Reduction Center (ADRC)	•	•	•	•	•
35	• Utilization of JICA's Training program	•	•	•	•	•	•	•

Table 5.1 Summary of Soft Components Applicability for Adaptation to Climate Change (7/8)

Ref. No.	Description of Component	Applicability						
		Indonesia	BWS Sumatra V Padang	BWS Sumatra VIII Palembang	BBWS Citarum Bandung	BBWS Brantas Surabaya (Wonokromo)	BBWS Brantas Surabaya (Brangkal)	BWS Sulawesi II Gorontalo
			• Stage I&II were completed. (O/M manual was prepared) • Pilot area for JICA Disaster Management Plan • A new airport was constructed by JBIC Loan	• JICA M/P study was conducted. • Warning system of Musi River using GSM has been installed. • There are many retarding ponds but some of them have been reclaimed recently.	• Stage I&II were completed. (O/M manual was prepared) • EWS installed already does not function. • Flood plain management and flood hazard map were prepared. • Upper Citarik watershed conservation plan exists. • GIS was installed.	• Wonokromo River plays a role as a flood way of Surabaya River • The discharges are controlled at Jagir Weir and onokromo Sluice.	• Watershed Management Plan exists.	• JICA M/P and F/S were conducted. • Water stage warning system using GSM exists. • Tsunami hazard map was prepared.
	Improvement of watershed management plan							
36	• Water resource management on a watershed basis, based on Integrated Water Resource Management (IWRM)	• Conference consisting of Ministry of Forestry and Agriculture, and provinces and so on has been established.	• Control of land use at upper flood plain and development is effective.	-	• Utilization of watershed conservation plan of Citarik River basin at upper Citarum River is effective.	-	• Watershed conservation plan was prepared. After evaluation, preparation of implementation plan is effective.	• Because degradation at watershed is confirmed, preparation of watershed conservation plan and control of development at upper basin is effective in flood mitigation. • Utilization of Printice Pond as flood control measure is studied. • It is needed to clarify the river zone and to order the illegal settlement eviction.
37	• Development of flood plain management plan • Reconsideration of land-use, induction of land use	-	-	• Past/probable flood mark in the city is effective in awareness building of residents against flood.	• Diffusing flood plain management plan prepared in D/D (e.g. Flood marks at flood prone area)	-	-	• Past/probable flood mark in the city is effective in awareness building of residents against flood.
38	• Clarification of the roles of central and local government for DPP and enhancement of DPP activities	-	-	-	-	-	-	-

Table 5.1 Summary of Soft Components Applicability for Adaptation to Climate Change (8/8)

Ref. No.	Description of Component	Applicability						
		Indonesia	BWS Sumatra V Padang	BWS Sumatra VIII Palembang	BBWS Citarum Bandung	BBWS Brantas Surabaya (Wonokromo)	BBWS Brantas Surabaya (Brangkal)	BWS Sulawesi II Gorontalo
			• Stage I&II were completed. (O/M manual was prepared) • Pilot area for JICA Disaster Management Plan • A new airport was constructed by JBIC Loan	• JICA M/P study was conducted. • Warning system of Musi River using GSM has been installed. • There are many retarding ponds but some of them have been reclaimed recently.	• Stage I&II were completed. (O/M manual was prepared) • EWS installed already does not function. • Flood plain management and flood hazard map were prepared. • Upper Citarik watershed conservation plan exists. • GIS was installed.	• Wonokromo River plays a role as a flood way of Surabaya River • The discharges are controlled at Jagir Weir and onokromo Sluice.	• Watershed Management Plan exists.	• JICA M/P and F/S were conducted. • Water stage warning system using GSM exists. • Tsunami hazard map was prepared.
39	• Development of comprehensive (watershed based) flood control plan • Diffusing rain water storage	• No remarkable progress • It is doubtful whether residents accept the comprehensive flood control (e.g., rain water storage at schoolyard) because they recognize 10-20 cm inundation on the road as Banjir (flooding).	•	• There are many retarding ponds but some of them have been reclaimed recently. Therefore basin's storage function has been declined. • Utilization of existing pond is expected.	•	•	•	•
40	• Collaborative planning with flood control and city planning (e.g. road plan, mass residential development, etc.)	•	•	•	•	•	•	•
41	• Collaboration with JICA's Technical Cooperation Project on "Capacity Development Project for River basin organizations"		•	•	•	•	•	•
42	• Utilization of JICA's Training program (e.g. "Integrated Water Resources Management")	•	•	•	•	•	•	•

Table 5.2 Cost Breakdown (Padang Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS
IN PADANG (ANAI RIVER)

Rp. 1.0 = JPY 0.0115

No.	KIND OF WORKS	UNIT	QUANTITY	UNIT COST			AMOUNT			REF. No.
				LCP (Rp.)	FCP (¥)	Total FCP (Rp)	LCP (Rp.)	FCP (¥)	Total FCP (Rp)	
1	**GENERAL**									
	Total (1)	LS	1.00				3,646,765,698.95	16,313,869.16	5,065,363,016.82	
2	**RIVER IMPROVEMENT**									
2.1.	**Earth Work**									
2.1.1	Clearing, Grubbing and Stripping	Sq.m	78,323.00	2,081.42	35.38	5,158.20	163,022,689.33	2,771,306.79	404,005,888.48	
2.1.2	Temporary coffering by SSP,Type I (double)	Lin.m	2,445.00	8,052,327.13	31,527.40	10,793,840.06	19,687,939,821.77	77,084,489.82	26,390,938,936.36	
3.1.3	Channel Excavation/ Micro Dredger	Cu.m	1,059,447.00	40,895.55	366.67	72,780.06	43,326,664,952.11	388,469,412.18	77,106,613,837.56	
2.1.4	Earth fill for Embankment (hauling 5 k m)	Cu.m	112,778.00	64,891.67	65.12	70,554.06	7,318,352,301.61	7,343,827.11	7,956,945,963.26	
2.1.5	Grading of disposal area	Cu.m	649,418.00	18,060.29	18.12	19,636.21	11,728,674,631.68	11,769,501.54	12,752,109,548.54	
	Sub Total (2.1)						82,224,654,396.50	487,438,537.44	124,610,614,174.20	
2.2.	**Closing Dike**									
2.2.1	Structural Excavation common, D = 5 km	Cu.m	18,464.57	31,598.87	525.73	77,314.12	583,459,619.11	9,707,292.42	1,427,572,003.41	
2.2.2	Backfill by excavated material	Cu.m	1,584.00	12,953.88	196.52	30,042.46	20,518,951.01	311,285.44	47,587,249.85	
2.2.3	Earth fill for Embankment (hauling 5 k m)	Cu.m	185,441.14	64,891.67	65.12	70,554.06	12,033,584,694.20	12,075,472.98	13,083,625,823.12	
2.2.4	Gabion Mattress, 0,5 m x 1,0 m x 2,0 m	Cu.m	13,714.00	682,892.44	0.00	682,892.44	9,365,186,933.87	0.00	9,365,186,933.87	
2.2.5	Grading of disposal area	Cu.m	16,880.57	18,060.29	18.12	19,636.21	304,867,943.12	305,929.17	331,470,479.87	
	Sub Total (2.2)						22,307,618,141.32	22,399,980.01	24,255,442,490.13	
2.3	**Bank Protection**									
2.3.1	Structural Excavation common, D = 5 km	Cu.m	12,844.00	31,598.87	525.73	77,314.12	405,855,905.02	6,752,415.80	993,022,496.23	
2.3.2	Backfill by excavated material	Cu.m	3,391.00	12,953.88	196.52	30,042.46	43,926,617.99	666,394.52	101,873,967.33	
2.3.3.	Grading of disposal area	Cu.m	9,453.00	18,060.29	18.12	19,636.21	170,723,880.91	171,318.16	185,621,112.38	
2.3.4	Wooden pile, dia 100 - 150 mm x 3.000 mm	Nos	662.00	198,467.61	541.14	245,523.47	131,385,559.87	358,236.25	162,536,538.51	
2.3.5	Concrete class B (K 225) by concrete pump	Cu.m	552.00	1,013,313.52	343.02	1,043,141.09	559,349,060.86	189,345.45	575,813,882.44	
2.3.6	Lean concrete (K 125) by man power	Cu.m	95.00	492,860.88	1.53	492,993.93	46,821,783.33	145.36	46,834,423.68	
2.3.7	Concrete class C (K 175) by concrete pump	Cu.m	138.00	774,593.86	262.21	797,394.56	106,893,953.13	36,184.71	110,040,449.64	

Table 5.2 Cost Breakdown (Padang Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS
IN PADANG (ANAI RIVER)

Rp. 1.0 = JPY 0.0115

No.	KIND OF WORKS	UNIT	QUANTITY	UNIT COST			AMOUNT			REF. No.
				LCP (Rp.)	FCP (¥)	Total FCP (Rp)	LCP (Rp.)	FCP (¥)	Total FCP (Rp)	
2.3.8	Reinforcement bar, deform	Ton	13.60	18,849,660.20	4,489.09	19,240,015.75	256,355,378.69	61,051.61	261,664,214.17	
2.3.9	Form work, plywood	Sq.m	1,628.00	267,186.00	0.00	267,186.00	434,978,808.00	0.00	434,978,808.00	
2.3.10	Wet Masonry	Cu.m	7,054.00	520,787.95	1.19	520,891.17	3,673,638,186.96	8,373.15	3,674,366,287.28	
2.3.11	Gravel backfill	Cu.m	3,024.00	316,096.86	341.90	345,827.50	955,876,906.23	1,033,912.55	1,045,782,345.03	
2.3.12	Elastic filler, t = 10 mm	Sq.m	700.00	103,796.96	0.00	103,796.96	72,657,872.48	0.00	72,657,872.48	
2.3.13	Asphalt sealing	Cu.m	4.10	6,442,681.23	1,233.31	6,549,925.67	26,414,993.05	5,056.58	26,854,695.24	
2.3.14	Sodding	Sq.m	33,267.00	51,670.02	123.13	62,377.25	1,718,906,391.66	4,096,270.83	2,075,103,855.47	
2.3.15	Riprap of Cobble stone	Cu.m	5,229.00	157,579.00	0.00	157,579.00	823,980,591.00	0.00	823,980,591.00	
	Sub Total (2.3)						**9,427,765,889.17**	**13,378,704.97**	**10,591,131,538.87**	
2.4	**Side Drain**									
2.4.1	Structural Excavation									
	common, D = 5 km	Cu.m	15,314.00	31,598.87	525.73	77,314.12	483,905,117.52	8,050,957.30	1,183,988,360.89	
2.4.2	Grading of Disposal area	Cu.m	15,314.00	18,060.29	18.12	19,636.21	276,575,215.52	277,537.96	300,708,951.13	
2.4.3	Concrete pipe dia 1.0 m, L = 1 m	Cu.m	100.00	817,715.14	0.00	817,715.14	81,771,513.84	0.00	81,771,513.84	
	Sub Total (2.4)						**842,251,846.88**	**8,328,495.26**	**1,566,468,825.86**	
2.5.	**Inspection Road**									
2.5.1.	Subrade	Sq.m	17,301.00	29,663.12	460.35	69,693.13	513,201,650.30	7,964,430.74	1,205,760,845.00	
2.5.2.	Gravel Pavement, t =26 cm	Cu.m	1,350.10	255,867.30	95.79	264,196.78	345,446,446.65	129,324.71	356,692,073.81	
2.5.3.	Asphalt pavement, t = 5 cm	Sq.m	17,301.00	137,921.57	26.40	140,217.40	2,386,181,110.99	456,782.41	2,425,901,320.82	
2.5.4.	Post	Nos	27.00	86,444.83	0.00	86,444.83	2,334,010.37	0.00	2,334,010.37	
	Sub Total (2.5)						**3,247,163,218.32**	**8,550,537.86**	**3,990,688,250.01**	
2.6	**Access road & Turnout**									
2.6.1	Site clearing, grubbing and stripping	Sq.m	264.00	2,081.42	35.38	5,158.20	549,493.64	9,341.13	1,361,765.44	
2.6.2	Earth fill for Embankment (hauling 5 k m)	Cu.m	2,270.00	64,891.67	65.12	70,554.06	147,304,081.69	147,816.84	160,157,719.92	
2.6.3	Subrade	Sq.m	264.00	29,663.12	460.35	69,693.13	7,831,063.85	121,531.11	18,398,986.36	
2.6.4	Gravel Pavement, t =26 cm	Cu.m	69.00	255,867.30	95.79	264,196.78	17,654,843.95	6,609.44	18,229,577.88	
2.6.5	Asphalt pavement, t = 5 cm	Sq.m	264.00	137,921.57	26.40	140,217.40	36,411,294.91	6,970.15	37,017,394.87	
2.6.6	Sodding	Sq.m	200.00	51,670.02	123.13	62,377.25	10,334,003.02	24,626.63	12,475,449.28	

Table 5.2 Cost Breakdown (Padang Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS IN PADANG (ANAI RIVER)

Rp. 1.0 = JPY 0.0115

No.	KIND OF WORKS	UNIT	QUANTITY	UNIT COST			AMOUNT			REF. No.
				LCP (Rp.)	FCP (¥)	Total FCP (Rp)	LCP (Rp.)	FCP (¥)	Total FCP (Rp)	
	Sub Total (2.6)						220,084,781.06	316,895.30	247,640,893.75	
	Sub Total (2)						118,269,538,273.24	540,413,150.85	165,261,986,172.82	
3	**RELATED STRUCTURE**									
3.1	**Drainage Box Culvert / Drainage Pipe Culvert**									
3.1.1	**Drainage Box Culvert, Type II**	Nos	1.00							
3.1.1.1	Structural Excavation									
	common, D = 5 km	Cu.m	196.00	31,598.87	525.73	77,314.12	6,193,378.81	103,042.16	15,153,566.59	
3.1.1.2	Earth fill for Embankment (hauling 5 k m)	Cu.m	14.00	64,891.67	65.12	70,554.06	908,483.32	911.65	987,756.86	
3.1.1.3	Grading of Disposal area	Cu.m	182.00	18,060.29	18.12	19,636.21	3,286,972.00	3,298.41	3,573,790.59	
3.1.1.4	Furnish.& Driving SSP, Type II	m	4.10	563,632.50	2,206.80	755,528.05	2,310,893.24	9,047.88	3,097,665.01	
3.1.1.5	Concrete class B (K 225) by concrete pump	Cu.m	61.00	1,013,313.52	343.02	1,043,141.09	61,812,124.48	20,924.04	63,631,606.57	
3.1.1.6	Lean concrete (K 125) by man power	Cu.m	13.00	492,860.88	1.53	492,993.93	6,407,191.40	19.89	6,408,921.14	
3.1.1.7	Steel Leader (Galvinezized round bar, Ø 19	Kg	16.50	30,284.38	7.21	30,911.53	499,692.22	119.00	510,040.29	
3.1.1.8	Reinforcement bar, deform	Ton	6.10	18,849,660.20	4,489.09	19,240,015.75	114,982,927.21	27,383.44	117,364,096.06	
3.1.1.9	Form work, plywood	Sq.m	225.00	267,186.00	0.00	267,186.00	60,116,850.00	0.00	60,116,850.00	
3.1.1.10	Joint Filler (Elastic filler , t = 10 mm)	Sq.m	2.00	103,796.96	0.00	103,796.96	207,593.92	0.00	207,593.92	
3.1.1.11	Water Stop, w = 300 mm, t = 10 mm	Lin.m	3.90	233,119.33	0.00	233,119.33	909,165.39	0.00	909,165.39	
3.1.1.12	Wet masonry	Cu.m	21.00	520,787.95	1.19	520,891.17	10,936,546.91	24.93	10,938,714.49	
3.1.1.13	Stair railing GSP 40	Lin.m	11.00	345,359.89	82.25	352,511.91	3,798,958.77	904.73	3,877,630.99	
3.1.1.14	Wooden pile, dia 100 - 150 mm x 3.000 mm	Nos	26.00	198,467.61	541.14	245,523.47	5,160,157.94	14,069.70	6,383,610.27	
	Sub Total (3.1.1.)						277,530,935.62	179,745.83	293,161,008.19	
3.1.2	**Drainage Box Culvert, Type III**	Nos	1.00							
3.1.2.1	Structural Excavation									
	common, D = 5 km	Cu.m	722.00	31,598.87	525.73	77,314.12	22,814,385.19	379,573.67	55,820,791.21	
3.1.2.2	Earth fill for Embankment (hauling 5 k m)	Cu.m	92.00	64,891.67	65.12	70,554.06	5,970,033.27	5,990.81	6,490,973.67	
3.1.2.3	Grading of Disposal area	Cu.m	631.00	18,060.29	18.12	19,636.21	11,396,040.29	11,435.71	12,390,449.80	
3.1.2.4	Furnish.& Driving SSP, Type II	m	7.10	563,632.50	2,206.80	755,528.05	4,001,790.73	15,668.27	5,364,249.17	
3.1.2.5	Concrete class B (K 225) by concrete pump	Cu.m	98.00	1,013,313.52	343.02	1,043,141.09	99,304,724.57	33,615.68	102,227,826.95	
3.1.2.6	Lean concrete (K 125) by man power	Cu.m	16.00	492,860.88	1.53	492,993.93	7,885,774.03	24.48	7,887,902.94	
3.1.2.7	Steel Leader (Galvinezized round bar, Ø 19	Kg	20.20	30,284.38	7.21	30,911.53	611,744.42	145.69	624,412.97	
3.1.2.8	Reinforcement bar, deform	Ton	9.00	18,849,660.20	4,489.09	19,240,015.75	169,646,941.78	40,401.80	173,160,141.73	
3.1.2.9	Form work, plywood	Sq.m	291.00	267,186.00	0.00	267,186.00	77,751,126.00	0.00	77,751,126.00	

Table 5.2 Cost Breakdown (Padang Sub-project) (4/5)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS IN PADANG (ANAI RIVER)

Rp. 1.0 = JPY 0.0115

No.	KIND OF WORKS	UNIT	QUANTITY	UNIT COST			AMOUNT			REF. No.
				LCP (Rp.)	FCP (¥)	Total FCP (Rp)	LCP (Rp.)	FCP (¥)	Total FCP (Rp)	
3.1.2.10	Joint Filler (Elastic filler , t = 10 mm)	Sq.m	3.00	103,796.96	0.00	103,796.96	311,390.88	0.00	311,390.88	
3.1.2.11	Water Stop, w = 300 mm, t = 10 mm	Lin.m	8.80	233,119.33	0.00	233,119.33	2,051,450.12	0.00	2,051,450.12	
3.1.2.12	Wet stone masonry	Cu.m	28.00	520,787.95	1.19	520,891.17	14,582,062.55	33.24	14,584,952.66	
3.1.2.13	Stair railing GSP 40	Lin.m	12.70	345,359.89	82.25	352,511.91	4,386,070.58	1,044.55	4,476,901.24	
3.1.2.14	Wooden pile, dia 100 - 150 mm x 4.000 mm	Nos	34.00	198,467.61	541.14	245,523.47	6,747,898.85	18,398.84	8,347,798.05	
	Sub Total (3.1.2)						**427,461,433.27**	**506,332.74**	**471,490,367.37**	
3.1.3	**Drainage Box Culvert, Type IV**	Nos	1.00							
3.1.3.1	Structural Excavation									
	common, D = 5 km	Cu.m	723.00	31,598.87	525.73	77,314.12	22,845,984.06	380,099.39	55,898,105.32	
3.1.3.2	Earth fill for Embankment (hauling 5 k m)	Cu.m	44.00	64,891.67	65.12	70,554.06	2,855,233.30	2,865.17	3,104,378.71	
3.1.3.3	Grading of Disposal area	Cu.m	680.00	18,060.29	18.12	19,636.21	12,280,994.29	12,323.74	13,352,624.19	
3.1.3.4	Furnish.& Driving SSP, Type II	m	10.00	563,632.50		563,632.50	5,636,324.98	0.00	5,636,324.98	
3.1.3.5	Concrete class B (K 225) by concrete pump	Cu.m	141.00	1,013,313.52	343.02	1,043,141.09	142,877,205.76	48,365.41	147,082,893.88	
3.1.3.6	Lean concrete (K 125) by man power	Cu.m	29.00	492,860.88	1.53	492,993.93	14,292,965.44	44.37	14,296,824.07	
3.1.3.7	Steel Leader (Galvinezized round bar, Ø 19	Kg	40.30	30,284.38		30,284.38	1,220,460.40	0.00	1,220,460.40	
3.1.3.8	Reinforcement bar, deform	Ton	13.40	18,849,660.20	4,489.09	19,240,015.75	252,585,446.65	60,153.79	257,816,211.02	
3.1.3.9	Form work, plywood	Sq.m	375.00	267,186.00	0.00	267,186.00	100,194,750.00	0.00	100,194,750.00	
3.1.3.10	Joint Filler (Elastic filler , t = 10 mm)	Sq.m	3.00	103,796.96	0.00	103,796.96	311,390.88	0.00	311,390.88	
3.1.3.11	Water Stop, w = 300 mm, t = 10 mm	Lin.m	7.70	233,119.33		233,119.33	1,795,018.85	0.00	1,795,018.85	
3.1.3.12	Wet masonry	Cu.m	54.00	520,787.95	1.19	520,891.17	28,122,549.21	64.10	28,128,122.98	
3.1.3.13	Stair railing GSP 40	Lin.m	20.50	345,359.89	82.25	352,511.91	7,079,877.71	1,686.09	7,226,494.13	
3.1.3.14	Wooden pile, dia 100 - 150 mm x 4.000 mm	Nos	59.00	198,467.61	541.14	245,523.47	11,709,589.17	31,927.40	14,485,884.85	
	Sub Total (3.1.3.)						**603,807,790.71**	**537,529.48**	**650,549,484.26**	
3.1.4	**Drainage Box Culvert, Type V**	Nos	5.00							
3.1.4.1	Structural Excavation									
	common, D = 5 km	Cu.m	2,000.40	31,598.87	525.73	77,314.12	63,210,382.47	1,051,660.90	154,659,156.14	
3.1.4.2	Earth fill for Embankment (hauling 5 k m)	Cu.m	108.80	64,891.67	65.12	70,554.06	7,060,213.25	7,084.79	7,676,281.91	
3.1.4.3	Grading of Disposal area	Cu.m	1,891.60	18,060.29	18.12	19,636.21	34,162,836.47	34,281.76	37,143,858.69	
3.1.4.4	Furnish.& Driving SSP, Type II	m	27.40	563,632.50	2,206.80	755,528.05	15,443,530.43	60,466.29	20,701,468.63	
3.1.4.5	Concrete class B (K 225) by concrete pump	Cu.m	358.40	1,013,313.52	343.02	1,043,141.09	363,171,564.15	122,937.33	373,861,767.15	
3.1.4.6	Lean concrete (K 125) by man power	Cu.m	76.40	492,860.88	1.53	492,993.93	37,654,571.01	116.90	37,664,736.52	
3.1.4.7	Steel Leader (Galvinezized round bar, Ø 19	Kg	80.60	30,284.38	7.21	30,911.53	2,440,920.80	581.31	2,491,469.56	

Table 5.2 Cost Breakdown (Padang Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS IN PADANG (ANAI RIVER)

Rp. 1.0 = JPY 0.0115

No.	KIND OF WORKS	UNIT	QUANTITY	UNIT COST			AMOUNT			REF. No.
				LCP (Rp.)	FCP (¥)	Total FCP (Rp)	LCP (Rp.)	FCP (¥)	Total FCP (Rp)	
3.1.4.8	Reinforcement bar, deform	Ton	33.76	18,849,660.20	4,489.09	19,240,015.75	636,364,528.28	151,551.64	649,542,931.63	
3.1.4.9	Form work, plywood	Sq.m	877.60	267,186.00	0.00	267,186.00	234,482,433.60	0.00	234,482,433.60	
3.1.4.10	Joint Filler (Elastic filler , t = 10 mm)	Sq.m	6.80	103,796.96	0.00	103,796.96	705,819.33	0.00	705,819.33	
3.1.4.11	Water Stop, w = 300 mm, t = 10 mm	Lin.m	21.92	233,119.33	0.00	233,119.33	5,109,975.74	0.00	5,109,975.74	
3.1.4.12	Wet masonry	Cu.m	126.80	520,787.95	1.19	520,891.17	66,035,911.84	150.51	66,048,999.89	
3.1.4.15	Stair railing GSP 40	Lin.m	52.60	345,359.89	82.25	352,511.91	18,165,930.13	4,326.26	18,542,126.39	
3.1.4.16	Wooden pile, dia 100 - 150 mm x 4.000 mm	Nos	168.00	198,467.61	541.14	245,523.47	33,342,559.00	90,911.92	41,247,943.31	
	Sub Total (3.1.4)						**1,517,351,176.51**	**1,524,069.61**	**1,649,878,968.49**	
3.1.5	**Drainage Pipe Culvert, Ø 800 mm**	Nos	20.00							
3.1.5.1	Site clearing, grubbing and stripping	Sq.m	634.00	2,081.42	35.38	5,158.20	1,319,617.29	22,432.86	3,270,300.34	
3.1.5.2	Drain Excavation (common soil)	Cu.m	1,070.00	40,895.55	366.67	72,780.06	43,758,235.66	392,338.90	77,874,661.79	
3.1.5.3	Backfill by excavated material	Cu.m	810.00	12,953.88	196.52	30,042.46	10,492,645.41	159,180.05	24,334,389.13	
3.1.5.4	Grading of Disposal area	Cu.m	260.00	18,060.29	18.12	19,636.21	4,695,674.29	4,712.02	5,105,415.13	
3.1.5.5	Concrete Pipe Ø 800 mm	Nos	160.00	540,978.41	0.00	540,978.41	86,556,545.54	0.00	86,556,545.54	
3.1.5.6	Concrete class C (K 175) by concrete pump	Cu.m	214.00	774,593.86	262.21	797,394.56	165,763,086.74	56,112.52	170,642,436.39	
3.1.5.7	Lean concrete (K 125) by man power	Cu.m	22.00	492,860.88	1.53	492,993.93	10,842,939.30	33.66	10,845,866.54	
3.1.5.8	Form work, plywood	Sq.m	523.00	267,186.00	0.00	267,186.00	139,738,278.00	0.00	139,738,278.00	
	Sub Total (3.1.5)						**463,167,022.22**	**634,810.01**	**518,367,892.85**	
	Sub Total (3.1.)						**3,289,318,358.33**	**3,382,487.67**	**3,583,447,721.16**	
	GRAND TOTAL						**125,205,622,330.51**	**560,109,507.67**	**173,910,796,910.80**	

Table 5.3 Economic Cost and Benefit Cash Flow of Padang

Unit: Rp. million

Year	Padang (Future Land Use in 2003)						Net Cash Flow	Remarks	
		Benefit	Cost						
			Project	O/M	Replace.	Total			
2009		-	2,378	-	-	2,378	-2,378		
2010		-	9,227	-	-	9,227	-9,227		
2011		-	45,879	-	-	45,879	-45,879		
2012		-	77,840	-	-	77,840	-77,840		
2013		2,359	68,532	71	-	68,603	-66,244		
2014		28,311	312	847	-	1,159	27,151		
2015	1	28,311	-	847	-	847	27,463		
2016	2	28,311	-	847	-	847	27,463		
2017	3	28,311	-	847	-	847	27,463		
2018	4	28,311	-	847	-	847	27,463		
2019	5	28,311	-	847	-	847	27,463		
2020	6	28,311	-	847	-	847	27,463		
2021	7	28,311	-	847	-	847	27,463		
2022	8	28,311	-	847	-	847	27,463		
2023	9	28,311	-	847	-	847	27,463		
2024	10	28,311	-	847	-	847	27,463		
2025	11	28,311	-	847	-	847	27,463		
2026	12	28,311	-	847	-	847	27,463		
2027	13	28,311	-	847	-	847	27,463		
2028	14	28,311	-	847	-	847	27,463		
2029	15	28,311	-	847	-	847	27,463		
2030	16	28,311	-	847	-	847	27,463		
2031	17	28,311	-	847	-	847	27,463		
2032	18	28,311	-	847	-	847	27,463		
2033	19	28,311	-	847	-	847	27,463		
2034	20	28,311	-	847	-	847	27,463		
2035	21	28,311	-	847	-	847	27,463		
2036	22	28,311	-	847	-	847	27,463		
2037	23	28,311	-	847	-	847	27,463		
2038	24	28,311	-	847	-	847	27,463		
2039	25	28,311	-	847	-	847	27,463		
2040	26	28,311	-	847	-	847	27,463		
2041	27	28,311	-	847	-	847	27,463		
2042	28	28,311	-	847	-	847	27,463		
2043	29	28,311	-	847	-	847	27,463		
2044	30	28,311	-	847	-	847	27,463		
2045	31	28,311	-	847	-	847	27,463		
2046	32	28,311	-	847	-	847	27,463		
2047	33	28,311	-	847	-	847	27,463		
2048	34	28,311	-	847	-	847	27,463		
2049	35	28,311	-	847	-	847	27,463		
2050	36	28,311	-	847	-	847	27,463		
2051	37	28,311	-	847	-	847	27,463		
2052	38	28,311	-	847	-	847	27,463		
2053	39	28,311	-	847	-	847	27,463		
2054	40	28,311	-	847	-	847	27,463		
2055	41	28,311	-	847	-	847	27,463		
2056	42	28,311	-	847	-	847	27,463		
2057	43	28,311	-	847	-	847	27,463		
2058	44	28,311	-	847	-	847	27,463		
2059	45	28,311	-	847	-	847	27,463		
2060	46	28,311	-	847	-	847	27,463		
2061	47	28,311	-	847	-	847	27,463		
2062	48	28,311	-	847	-	847	27,463		
2063	49	28,311	-	847	-	847	27,463		
2064	50	28,311	-	847	-	847	27,463		
2065									
2066									
2067									
2068									
2069									
2070									
Total		1,446,204	204,169	43,283	-	247,451	1,198,752		B/C
NPV	12.00%	134,794	130,649	4,034	-	134,683	111	EIRR	1.00
NPV	12.01%	134,636	130,607	4,029	-	134,636	-	12.01%	1.00

Table 5.4 Cost Breakdown (Palembang Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS IN PALEMBANG (BENDUNG RIVER)

Rp. 1.0 = JPY 0.0115

No.	KIND OF WORKS	UNIT	QUANTITY	UNIT COST		AMOUNT			REF. No.
				LCP(Rp.)	FCP(Yen)	LCP(Rp.)	FCP(Yen)	Total (Rp.)	
A	GENERAL ITEM								
	Total (1)					1,140,115,679.39	849,313.11	1,213,968,993.42	
A	Bed Excavation Works	Lin. M	5,494.00						
A.1	Site clearing and disposal	Sq.m	66,000.00	589.84	10.03	38,929,465.85	661,782.07	96,475,732.93	
A.2	Excavation by manual (hauling 50 m)	Cu.m	110,000.00	47,128	112	5,184,094,619.68	12,354,050.05	6,258,359,841.24	
A.3	Grading of Disposal	Cu.m	110,000.00	18,060	18	1,986,631,429.19	1,993,546.79	2,159,983,324.05	
	Sub Total (A)					7,209,655,514.73	15,009,378.91	8,514,818,898.23	
B	Protection of Revetment	Lin.m	5,494.00						
B.1	Temporary coffering & dewatering by soil retaining wall	Lin.m	4,510.00	150,972.45	311.09	680,885,739.99	1,402,998.82	802,885,637.29	
B.2	Structural Excavation including disposal, common, D = 3 km	Cu.m	15,941.00	26,950.60	448.39	429,619,562.42	7,147,782.96	1,051,165,906.48	
B.3	Backfill by excavated material	Cu.m	5,314.00	12,953.88	196.52	68,836,935.41	1,044,299.75	159,645,609.66	
B.4	Lean concrete (K 125) by man power	Cu.m	1,443.00	492,860.88	1.53	711,198,245.68	2,208.00	711,390,246.00	
B.5	Concrete class C (K 175) by concrete pump	Cu.m	677.00	774,593.86	262.21	524,400,045.43	177,514.84	539,836,118.87	
B.6	Reinforcement bar, deform	Kg	84,563.00	18,849.66	4.49	1,593,983,815.32	379,610.82	1,626,993,451.65	
B.7	Wet Masonry	Cu.m	26,568.00	520,787.95	1.19	13,836,294,209.12	31,536.43	13,839,036,507.02	
B.8	Form work, plywood	Sq.m	1,353.00	267,186.00	0.00	361,502,658.00	0.00	361,502,658.00	
B.9	Plastering	Sq.m	7,216.00	31,917.26	0.07	230,314,977.25	524.95	230,360,624.75	
B.10	Covering	Sq.m	18,040.00	25,338.71	0.06	457,110,250.69	1,041.87	457,200,848.10	
B.11	Weep hole, dia . 50 x 800 mm	PC	2,255.00	85,659.00	0.00	193,161,045.00	0.00	193,161,045.00	
B.12	Gabion Mattress, 0,5 m x 1,0 m x 2,0 m	Cu.m	13,530.00	682,892.44	0.00	9,239,534,724.76	0.00	9,239,534,724.76	
B.13	Non Woven Geotextile type 155 gr / sq.m	Sq.m	27,060.00	47,490.00	0.00	1,285,079,400.00	0.00	1,285,079,400.00	
	TOTAL (B)					29,611,921,609.06	10,187,518.44	30,497,792,777.59	
C	Inspection Road	Lin.m	2,100.00						
C.1	Subrade	Sq.m	6,300.00	29,663.12	460.35	186,877,660.07	2,900,174.19	439,066,720.05	
C.2	Gravel Pavement, t =26 cm	Cu.m	491.00	255,867.30	95.79	125,630,846.09	47,032.39	129,720,619.39	
C.3	Asphalt pavement, t = 5 cm	Sq.m	6,300.00	137,921.57	26.40	868,905,901.35	166,333.11	883,369,650.38	
C.4	Post	Nos	10.00	86,444.83	0.00	864,448.29	0.00	864,448.29	
	TOTAL (C)					1,182,278,855.80	3,113,539.70	1,453,021,438.10	
	GRAND TOTAL					39,143,971,658.97	29,159,750.16	41,679,602,107.34	

Table 5.5 Economic Cost and Benefit Cash Flow of Palembang

Unit: Rp. million

Year	Palembang (Population in 2020)						Net Cash Flow	Remarks	
		Benefit	Cost						
			Project	O/M	Replace.	Total			
2009		-	570	-	-	570	-570		
2010		-	5,681	-	-	5,681	-5,681		
2011		-	21,863	-	-	21,863	-21,863		
2012		885	18,946	33	-	18,979	-18,095		
2013		5,502	789	198	-	987	4,515		
2014		5,699	75	198	-	273	5,426		
2015	1	5,893	-	198	-	198	5,695		
2016	2	6,088	-	198	-	198	5,890		
2017	3	6,285	-	198	-	198	6,086		
2018	4	6,479	-	198	-	198	6,281		
2019	5	6,676	-	198	-	198	6,477		
2020	6	6,870	-	198	-	198	6,672		
2021	7	6,870	-	198	-	198	6,672		
2022	8	6,870	-	198	-	198	6,672		
2023	9	6,870	-	198	-	198	6,672		
2024	10	6,870	-	198	-	198	6,672		
2025	11	6,870	-	198	-	198	6,672		
2026	12	6,870	-	198	-	198	6,672		
2027	13	6,870	-	198	-	198	6,672		
2028	14	6,870	-	198	-	198	6,672		
2029	15	6,870	-	198	-	198	6,672		
2030	16	6,870	-	198	-	198	6,672		
2031	17	6,870	-	198	-	198	6,672		
2032	18	6,870	-	198	-	198	6,672		
2033	19	6,870	-	198	-	198	6,672		
2034	20	6,870	-	198	-	198	6,672		
2035	21	6,870	-	198	-	198	6,672		
2036	22	6,870	-	198	-	198	6,672		
2037	23	6,870	-	198	-	198	6,672		
2038	24	6,870	-	198	-	198	6,672		
2039	25	6,870	-	198	-	198	6,672		
2040	26	6,870	-	198	-	198	6,672		
2041	27	6,870	-	198	-	198	6,672		
2042	28	6,870	-	198	-	198	6,672		
2043	29	6,870	-	198	-	198	6,672		
2044	30	6,870	-	198	-	198	6,672		
2045	31	6,870	-	198	-	198	6,672		
2046	32	6,870	-	198	-	198	6,672		
2047	33	6,870	-	198	-	198	6,672		
2048	34	6,870	-	198	-	198	6,672		
2049	35	6,870	-	198	-	198	6,672		
2050	36	6,870	-	198	-	198	6,672		
2051	37	6,870	-	198	-	198	6,672		
2052	38	6,870	-	198	-	198	6,672		
2053	39	6,870	-	198	-	198	6,672		
2054	40	6,870	-	198	-	198	6,672		
2055	41	6,870	-	198	-	198	6,672		
2056	42	6,870	-	198	-	198	6,672		
2057	43	6,870	-	198	-	198	6,672		
2058	44	6,870	-	198	-	198	6,672		
2059	45	6,870	-	198	-	198	6,672		
2060	46	6,870	-	198	-	198	6,672		
2061	47	6,870	-	198	-	198	6,672		
2062	48	6,870	-	198	-	198	6,672		
2063	49	6,870	-	198	-	198	6,672		
2064	50	6,870	-	198	-	198	6,672		
2065									
2066									
2067									
2068									
2069									
2070									
Total		352,671	47,924	10,343	-	58,267	294,404		B/C
NPV	12.00%	34,326	33,126	1,068	-	34,194	132	EIRR	1.00
NPV	12.04%	34,147	33,084	1,063	-	34,147	-	12.04%	1.00

Table 5.6 Cost Breakdown (Bandung Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS
IN BANDUNG (CIKAPUNDUNG DIVERSION CHANNEL)

Rp. 1.0 = JPY 0.0115

No.	KIND OF WORKS	UNIT	QUANTITY	UNIT COST			AMOUNT			REF. No.
				LCP (Rp.)	FCP (¥)	Total LCP (Rp.)	LCP (Rp.)	FCP (¥)	Total LCP (Rp.)	
1	**GENERAL ITEM**									
	Total (1)	Ls	1				520,639,527.04	711,449.37	582,504,689.57	
2	**FLOOD WAY**									
2.1.	**Flood Way Channel (720 m)**									
2.1.1	Site clearing	Sq.m	19,800.00	589.84	10.03	1,461.75	11,678,839.75	198,534.62	28,942,719.88	
2.1.2	Excavation including disposal of River Channel, (D = 3 km)	Cu.m	59,400.00	16,809.41	270.38	40,320.46	998,479,181.81	16,060,396.07	2,395,035,362.01	
	Sub Total (2.1)						1,010,158,021.56	16,258,930.69	2,423,978,081.89	
2.2	**Concrete Grid Revetment (2 x 720 m)**									
2.2.1	Temporary coffering & dewatering by s	Lin.m	720.00	150,972.45	311.09	178,023.42	108,700,162.48	223,982.07	128,176,864.49	
	retaining wall									
2.2.2	Structural Excavation including disposal									
	common, D = 3 km	Cu.m	3,801.60	26,950.60	448.39	65,941.03	102,455,412.36	1,704,598.94	250,681,407.07	
2.2.3	Backfill by excavated material	Cu.m	760.32	12,953.88	196.52	30,042.46	9,849,096.49	149,417.01	22,841,879.93	
2.2.4	Lean concrete (K 125) by man power	Cu.m	560.24	492,860.88	1.53	492,993.93	276,119,476.56	857.25	276,194,019.81	
2.2.5	Concrete class C (K 175) by concrete	Cu.m	1,659.04	774,593.86	262.21	797,394.56	1,285,079,370.12	435,012.67	1,322,906,558.93	
2.2.6	Reinforcement bar, deform	Kg	99,541.90	18,849.66	4.49	19,240.02	1,876,330,947.38	446,852.42	1,915,187,679.56	
2.2.7	Wet Masonry	Cu.m	2,834.52	520,787.95	1.19	520,891.17	1,476,185,283.52	3,364.60	1,476,477,857.51	
2.2.8	Gabion Mattress, 0,5 m x 1,0 m x 2,0 m	Cu.m	2,376.00	682,892.44	0.00	682,892.44	1,622,552,439.47	0.00	1,622,552,439.47	
2.2.9	Non Woven Geotextile type 155 gr / sq.	Sq.m	6,098.40	47,490.00	0.00	47,490.00	289,613,016.00	0.00	289,613,016.00	
	Sub Total (2.2)						7,046,885,204.38	2,964,084.96	7,304,631,722.77	
2.3.	**I / M Road (2 x 720 m)**									
2.3.1	Sub-Base Course (Granular Material)	Cu.m	950.40	174,192.98	56.28	179,086.79	165,553,007.44	53,487.43	170,204,088.01	
2.3.2	Base Course	Cu.m	712.80	196,821.00	73.68	203,228.29	140,294,010.80	52,521.84	144,861,127.22	
2.3.3	Asphalt Concrete Surface Course	Kg	418,176.00	1,324.05	0.25	1,346.09	553,684,714.98	105,990.88	562,901,313.39	
2.3.4	Bituminous Prime Coat (MC-70 or RC-	Kg	3,564.00	12,537.02	2.40	12,745.71	44,681,932.22	8,553.38	45,425,704.65	
2.3.5	Bituminous Tack Coat (RC-250)	Kg	831.60	12,537.02	2.40	12,745.71	10,425,784.18	1,995.79	10,599,331.08	
2.3.6	Flush Stone Kerbing (Concrete K-175)	Cu.m	95.04	900,084.93	304.69	926,579.54	85,544,071.30	28,957.55	88,062,119.45	
	Sub Total (2.3.)						1,000,183,520.91	251,506.87	1,022,053,683.81	

Table 5.6 Cost Breakdown (Bandung Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS
IN BANDUNG (CIKAPUNDUNG DIVERSION CHANNEL)

Rp. 1.0 = JPY 0.0115

No.	KIND OF WORKS	UNIT	QUANTITY	UNIT COST			AMOUNT			REF. No.
				LCP (Rp.)	FCP (¥)	Total LCP (Rp.)	LCP (Rp.)	FCP (¥)	Total LCP (Rp.)	
3	BRIDGE									
3.1	Road Bridge (Moh. Toha Street)									
3.1.1	Structural Excavation including disposal									
	common, D = 3 km	Cu.m	436.70	26,950.60	448.39	65,941.03	11,769,328.33	195,811.86	28,796,446.36	
3.1.2	Backfill by excavated material	Cu.m	77.00	12,953.88	196.52	30,042.46	997,449.01	15,131.93	2,313,269.09	
3.1.3	Lean concrete (K 125) by man power	Cu.m	12.54	492,860.88	1.53	492,993.93	6,180,475.40	19.19	6,182,143.93	
3.1.4	Concrete class B (K 175) by concrete	Cu.m	0.63	774,593.86	262.21	797,394.56	485,670.35	164.40	499,966.39	
3.1.5	Concrete class C (K 225) by concrete	Cu.m	327.69	1,013,313.52	343.02	1,043,141.09	332,052,706.08	112,403.28	341,826,904.23	
3.1.6	Furnishing PC Pile, 400 Dia, Type A	Lin.m	2,252.80	252,387.79	320.98	280,298.76	568,579,204.09	723,095.08	631,457,036.95	
3.1.7	Driving PC Pile, 400 Dia, Type A	Lin.m	2,182.40	88,991.08	113.18	98,832.39	194,214,127.38	246,993.35	215,691,809.56	
3.1.8	Pile Test, 400 Dia, Type A	Lin.m	44.00	516,762.21	601.66	569,080.69	22,737,537.29	26,473.15	25,039,550.28	
3.1.9	Wet Masonry	Cu.m	5.94	520,787.95	1.19	520,891.17	3,093,480.41	7.05	3,094,093.53	
3.1.10	Gabion Mattress, 0,5 m x 1,0 m x 2,0 m	Cu.m	61.60	682,892.44	0.00	682,892.44	42,066,174.36	0.00	42,066,174.36	
3.1.11	Non Woven Geotextile type 155 gr / sq.	Sq.m	123.20	47,490.00	0.00	47,490.00	5,850,768.00	0.00	5,850,768.00	
3.1.12	Elastomeric Rubber bearing Pad (Fixed	No	7.00	2,355,751.67	0.00	2,355,751.67	16,490,261.70	0.00	16,490,261.70	
3.1.13	Elastomeric Rubber bearing Pad (Mova	No	7.00	2,442,437.22	0.00	2,442,437.22	17,097,060.52	0.00	17,097,060.52	
3.1.14	Reinforcement bar, round	Kg	4,655.20	16,685.70	3.97	17,031.25	77,675,293.45	18,498.55	79,283,862.60	
3.1.15	Reinforcement bar, deform	Kg	41,800.00	18,849.66	4.49	19,240.02	787,915,796.28	187,643.91	804,232,658.24	
3.1.16	Structural Steel works	Kg	83,600.00	26,107.87	6.22	26,648.54	2,182,618,330.34	519,795.45	2,227,817,934.40	
3.1.17	Safety Railing	Lin.m	55.00	173,176.78	41.24	176,763.08	9,524,723.01	2,268.33	9,721,969.46	
3.1.18	Galvanized handrail, steel pipe, dia. 100 mm,.									
	t = 2.3 mm	Lin.m	39.60	190,619.13	0.00	190,619.13	7,548,517.60	0.00	7,548,517.60	
	Sub Total (3.1.)						**4,286,896,903.60**	**2,048,305.52**	**4,465,010,427.21**	
3.2	I / M Road Bridge and Outlet Structure									
3.2.1	Temporary coffering & dewatering by s	Lin.m	120.00	150,972.45	311.09	178,023.42	18,116,693.75	37,330.35	21,362,810.75	
	retaining wall									
3.2.2	Structural Excavation including disposal									
	common, D = 3 km	Cu.m	1,046.38	26,950.60	448.39	65,941.03	28,200,437.21	469,183.95	68,999,041.80	
3.2.3	Backfill by excavated material	Cu.m	479.22	12,953.88	196.52	30,042.46	6,207,695.15	94,174.65	14,396,795.41	
3.2.4	Lean concrete (K 125) by man power	Cu.m	97.13	492,860.88	1.53	492,993.93	47,871,576.99	148.62	47,884,500.76	
3.2.5	Concrete class B (K 175) by concrete	Cu.m	69.30	774,593.86	262.21	797,394.56	53,679,354.72	18,171.02	55,259,443.19	
3.2.6	Concrete class C (K 225) by concrete	Cu.m	182.60	1,013,313.52	343.02	1,043,141.09	185,031,048.03	62,634.93	190,477,563.28	
3.2.7	Furnishing PC Pile, 400 Dia, Type A	Lin.m	792.00	252,387.79	320.98	280,298.76	199,891,126.44	254,213.11	221,996,614.55	
3.2.8	Driving PC Pile, 400 Dia, Type A	Lin.m	765.60	88,991.08	113.18	98,832.39	68,131,568.88	86,646.86	75,666,078.35	
3.2.9	Pile Test, 400 Dia, Type A	Lin.m	44.00	516,762.21	601.66	569,080.69	22,737,537.29	26,473.15	25,039,550.28	
3.2.10	Wet Masonry	Cu.m	475.86	520,787.95	1.19	520,891.17	247,822,153.05	564.85	247,871,270.41	

Table 5.6 Cost Breakdown (Bandung Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS
IN BANDUNG (CIKAPUNDUNG DIVERSION CHANNEL)

Rp. 1.0 = JPY 0.0115

No.	KIND OF WORKS	UNIT	QUANTITY	UNIT COST			AMOUNT			REF. No.
				LCP (Rp.)	FCP (¥)	Total LCP (Rp.)	LCP (Rp.)	FCP (¥)	Total LCP (Rp.)	
3.2.11	Gabion Mattress, 0.5 m x 1.0 m x 2.0 m	Cu.m	165.00	682,892.44	0.00	682,892.44	112,677,252.74	0.00	112,677,252.74	
3.2.12	Non Woven Geotextile type 155 gr / sq.	Sq.m	660.00	47,490.00	0.00	47,490.00	31,343,400.00	0.00	31,343,400.00	
3.2.13	Elastomeric Rubber bearing Pad (Fixe	No	4.00	2,355,751.67	0.00	2,355,751.67	9,423,006.69	0.00	9,423,006.69	
3.2.14	Elastomeric Rubber bearing Pad (Mov	No	4.00	2,442,437.22	0.00	2,442,437.22	9,769,748.87	0.00	9,769,748.87	
3.2.15	Reinforcement bar, round	Kg	8,316.00	16,685.70	3.97	17,031.25	138,758,321.95	33,045.61	141,631,852.85	
3.2.16	Reinforcement bar, deform	Kg	21,912.00	18,849.66	4.49	19,240.02	413,033,754.26	98,364.91	421,587,225.06	
3.2.17	Structural Steel works	Kg	38,500.00	26,107.87	6.22	26,648.54	1,005,153,178.44	239,379.48	1,025,968,785.58	
3.2.18	Safety Railing	Lin.m	33.00	173,176.78	41.24	176,763.08	5,714,833.81	1,361.00	5,833,181.68	
3.2.19	Galvanized handrail, steel pipe, dia. 100 mm,.						0.00	0.00	0.00	
	t = 2.3 mm	Lin.m	39.60	190,619.13	0.00	190,619.13	7,548,517.60	0.00	7,548,517.60	
	Sub Total (3.3.)						**2,611,111,205.88**	**1,421,692.49**	**2,734,736,639.86**	
	Division Structure									
3.3.1	Structural Excavation including disposal									
	common, D = 3 km	Cu.m	1,448.70	26,950.60	448.39	65,941.03	39,043,338.57	649,582.41	95,528,765.37	
3.3.2	Backfill by excavated material	Cu.m	7.04	12,953.88	196.52	30,042.46	91,195.34	1,383.49	211,498.89	
3.3.3	Lean concrete (K 125) by man power	Cu.m	330.00	492,860.88	1.53	492,993.93	162,644,089.45	504.95	162,687,998.05	
3.3.4	Concrete class B (K 175) by concrete	Cu.m	146.72	774,593.86	262.21	797,394.56	113,646,862.43	38,470.64	116,992,135.43	
3.3.5	Concrete class C (K 225) by concrete	Cu.m	0.00	1,013,313.52	343.02	1,043,141.09	0.00	0.00	0.00	
3.3.6	Wet Masonry	Cu.m	1,247.95	520,787.95	1.19	520,891.17	649,917,320.02	1,481.33	650,046,131.02	
3.3.7	Reinforcement bar, deform	Kg	17,606.16	18,849.66	4.49	19,240.02	331,870,133.39	79,035.62	338,742,795.65	
3.3.8	Gabion Mattress, 0,5 m x 1,0 m x 2,0 m	Cu.m	105.60	682,892.44	0.00	682,892.44	72,113,441.75	0.00	72,113,441.75	
3.3.9	Non Woven Geotextile type 155 gr / sq.	Sq.m	633.60	47,490.00	0.00	47,490.00	30,089,664.00	0.00	30,089,664.00	
	Sub Total (3.3.)						**1,399,416,044.95**	**770,458.43**	**1,466,412,430.16**	
	GRAND TOTAL						**17,875,290,428.33**	**24,426,428.34**	**19,999,327,675.26**	

Table 5.7 Economic Cost and Benefit Cash Flow of Bandung

Unit: Rp. million

Year	Bandung						Net Cash Flow	Remarks
		Benefit	Cost					
			Project	O/M	Replace.	Total		
2009		-	273	-	-	273	-273	
2010		-	3,571	-	-	3,571	-3,571	
2011		-	10,541	-	-	10,541	-10,541	
2012		806	8,296	24	-	8,320	-7,514	
2013		3,392	378	96	-	474	2,918	
2014		3,392	36	96	-	132	3,261	
2015	1	3,392	-	96	-	96	3,296	
2016	2	3,392	-	96	-	96	3,296	
2017	3	3,392	-	96	-	96	3,296	
2018	4	3,392	-	96	-	96	3,296	
2019	5	3,392	-	96	-	96	3,296	
2020	6	3,392	-	96	-	96	3,296	
2021	7	3,392	-	96	-	96	3,296	
2022	8	3,392	-	96	-	96	3,296	
2023	9	3,392	-	96	-	96	3,296	
2024	10	3,392	-	96	-	96	3,296	
2025	11	3,392	-	96	-	96	3,296	
2026	12	3,392	-	96	-	96	3,296	
2027	13	3,392	-	96	-	96	3,296	
2028	14	3,392	-	96	-	96	3,296	
2029	15	3,392	-	96	-	96	3,296	
2030	16	3,392	-	96	-	96	3,296	
2031	17	3,392	-	96	-	96	3,296	
2032	18	3,392	-	96	-	96	3,296	
2033	19	3,392	-	96	-	96	3,296	
2034	20	3,392	-	96	-	96	3,296	
2035	21	3,392	-	96	-	96	3,296	
2036	22	3,392	-	96	-	96	3,296	
2037	23	3,392	-	96	-	96	3,296	
2038	24	3,392	-	96	-	96	3,296	
2039	25	3,392	-	96	-	96	3,296	
2040	26	3,392	-	96	-	96	3,296	
2041	27	3,392	-	96	-	96	3,296	
2042	28	3,392	-	96	-	96	3,296	
2043	29	3,392	-	96	-	96	3,296	
2044	30	3,392	-	96	-	96	3,296	
2045	31	3,392	-	96	-	96	3,296	
2046	32	3,392	-	96	-	96	3,296	
2047	33	3,392	-	96	-	96	3,296	
2048	34	3,392	-	96	-	96	3,296	
2049	35	3,392	-	96	-	96	3,296	
2050	36	3,392	-	96	-	96	3,296	
2051	37	3,392	-	96	-	96	3,296	
2052	38	3,392	-	96	-	96	3,296	
2053	39	3,392	-	96	-	96	3,296	
2054	40	3,392	-	96	-	96	3,296	
2055	41	3,392	-	96	-	96	3,296	
2056	42	3,392	-	96	-	96	3,296	
2057	43	3,392	-	96	-	96	3,296	
2058	44	3,392	-	96	-	96	3,296	
2059	45	3,392	-	96	-	96	3,296	
2060	46	3,392	-	96	-	96	3,296	
2061	47	3,392	-	96	-	96	3,296	
2062	48	3,392	-	96	-	96	3,296	
2063	49	3,392	-	96	-	96	3,296	
2064	50	3,392	-	96	-	96	3,296	
2065								
2066								
2067								
2068								
2069								
2070								
Total		177,190	23,096	4,996	-	28,091	149,099	B/C
NPV	12.00%	18,426	16,099	520	-	16,619	1,807	EIRR 1.11
NPV	13.27%	15,987	15,536	451	-	15,987	-	13.27% 1.00

Table 5.8 Cost Breakdown (Surabaya (Wonokromo) Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS
IN SURABAYA (WONOKROMO RIVER)
(TYPE 1 - L = 5,755 m)

ALTERNATIVE 1 : ALL USED TYPE I (SINGLE SHEET PILE)

Rp. 1.0 = JPY 0.0115

No.		UNIT	QUANTITY	UNIT COST			AMOUNT			REF. No.
				LCP (Rp.)	FCP (¥)	Total (Rp.)	LCP (Rp.)	FCP (¥)	Total LCP (Rp.)	
1	**GENERAL ITEM**	Ls	1.00				3,324,769,352.55	4,120,144.43	3,683,042,781.43	
	Sub Total (1.1)						**3,324,769,352.55**	**4,120,144.43**	**3,683,042,781.43**	
2	**EARTH & MASONRY WORKS**									
2.1.	Site clearing and disposal	Sq.m	34,530.00	589.84	10.03	1,461.75	20,367,188.72	346,232.35	50,474,349.37	
2.2	Channel excavation, common (Hauling = 5 km)	Cu.m	4,488.90	18,085.03	290.90	43,380.27	81,181,904.00	1,305,799.42	194,729,679.28	
2.3	Earth fill for Embankment (hauling = 30 km)	Cu.m	6,445.60	203,365.57	204.07	221,111.09	1,310,813,091.05	1,315,375.96	1,425,193,609.64	
2.4	Backfill (excavated material)	Cu.m	4,431.35	12,953.88	196.52	30,042.46	57,403,190.39	870,842.63	133,128,636.13	
2.5	Sodding	Sq.m	11,049.60	51,670.02	123.13	62,377.25	570,932,998.63	1,360,572.16	689,243,621.65	
	Sub Total (2)						**2,040,698,372.79**	**5,198,822.52**	**2,492,769,896.07**	
3	**STRUCTURE WORKS**									
3.1.	Furnishing CSP 320 x 500 mm	Lin.m	161,140.00	544,756.65	692.80	605,000.00	87,782,086,173.88	111,637,559.00	97,489,700,000.00	
3.2.	Driving CSP 320 x 500 mm	Lin.m	149,630.00	102,632.67	130.52	113,982.57	15,356,926,380.19	19,530,291.99	17,055,212,640.56	
3.3	Reinforcement bar, round	Kg	51,485.38	16,685.70	3.97	17,031.25	859,069,874.04	204,589.42	876,860,258.01	
3.4	Reinforcement bar, deform	Kg	74,088.72	18,849.66	4.49	19,240.02	1,396,547,177.65	332,590.84	1,425,468,120.27	
3.5	Form work, wood	Sq.m	7,596.60	267,186.00	0.00	267,186.00	2,029,705,167.60	0.00	2,029,705,167.60	
3.6	Concrete class B (K 225) by concrete pump	Cu.m	1,266.10	1,013,313.52	343.02	1,043,141.09	1,282,956,242.68	434,293.97	1,320,720,935.79	
3.7	Joint Filler (Elastic filler , t = 10 mm)	Sq.m	748.15	103,796.96	0.00	103,796.96	77,655,696.14	0.00	77,655,696.14	
	Sub Total (3)						**108,784,946,712.17**	**132,139,325.22**	**120,275,322,818.36**	
	GRAND TOTAL						**114,150,414,437.51**	**141,458,292.17**	**126,451,135,495.86**	

Table 5.9 Economic Cost and Benefit Cash Flow of Surabaya (Wonokromo)

Unit: Rp. million

Year		Surabaya (Wonokromo)					Net Cash Flow	Remarks	
		Benefit	Cost						
			Project	O/M	Replace.	Total			
2009		-	1,729	-	-	1,729	-1,729		
2010		-	6,709	-	-	6,709	-6,709		
2011		-	40,163	-	-	40,163	-40,163		
2012		-	68,261	-	-	68,261	-68,261		
2013		12,163	28,815	352	-	29,167	-17,005		
2014		20,850	227	604	-	831	20,019		
2015	1	20,850	-	604	-	604	20,246		
2016	2	20,850	-	604	-	604	20,246		
2017	3	20,850	-	604	-	604	20,246		
2018	4	20,850	-	604	-	604	20,246		
2019	5	20,850	-	604	-	604	20,246		
2020	6	20,850	-	604	-	604	20,246		
2021	7	20,850	-	604	-	604	20,246		
2022	8	20,850	-	604	-	604	20,246		
2023	9	20,850	-	604	-	604	20,246		
2024	10	20,850	-	604	-	604	20,246		
2025	11	20,850	-	604	-	604	20,246		
2026	12	20,850	-	604	-	604	20,246		
2027	13	20,850	-	604	-	604	20,246		
2028	14	20,850	-	604	-	604	20,246		
2029	15	20,850	-	604	-	604	20,246		
2030	16	20,850	-	604	-	604	20,246		
2031	17	20,850	-	604	-	604	20,246		
2032	18	20,850	-	604	-	604	20,246		
2033	19	20,850	-	604	-	604	20,246		
2034	20	20,850	-	604	-	604	20,246		
2035	21	20,850	-	604	-	604	20,246		
2036	22	20,850	-	604	-	604	20,246		
2037	23	20,850	-	604	-	604	20,246		
2038	24	20,850	-	604	-	604	20,246		
2039	25	20,850	-	604	-	604	20,246		
2040	26	20,850	-	604	-	604	20,246		
2041	27	20,850	-	604	-	604	20,246		
2042	28	20,850	-	604	-	604	20,246		
2043	29	20,850	-	604	-	604	20,246		
2044	30	20,850	-	604	-	604	20,246		
2045	31	20,850	-	604	-	604	20,246		
2046	32	20,850	-	604	-	604	20,246		
2047	33	20,850	-	604	-	604	20,246		
2048	34	20,850	-	604	-	604	20,246		
2049	35	20,850	-	604	-	604	20,246		
2050	36	20,850	-	604	-	604	20,246		
2051	37	20,850	-	604	-	604	20,246		
2052	38	20,850	-	604	-	604	20,246		
2053	39	20,850	-	604	-	604	20,246		
2054	40	20,850	-	604	-	604	20,246		
2055	41	20,850	-	604	-	604	20,246		
2056	42	20,850	-	604	-	604	20,246		
2057	43	20,850	-	604	-	604	20,246		
2058	44	20,850	-	604	-	604	20,246		
2059	45	20,850	-	604	-	604	20,246		
2060	46	20,850	-	604	-	604	20,246		
2061	47	20,850	-	604	-	604	20,246		
2062	48	20,850	-	604	-	604	20,246		
2063	49	20,850	-	604	-	604	20,246		
2064	50	20,850	-	604	-	604	20,246		
2065									
2066									
2067									
2068									
2069									
2070									
Total		1,075,513	145,904	31,153	-	177,057	898,456		B/C
NPV	12.00%	105,187	95,326	3,047	-	98,372	6,815	EIRR	1.07
NPV	12.81%	95,589	92,820	2,769	-	95,589	-	12.81%	1.00

Table 5.10 Cost Breakdown (Surabaya (Brangkal) Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS
IN SURABAYA (BRANGKAL RIVER)

Rp. 1.0 = JPY 0.0115

No.	KIND OF WORKS	UNIT	QUANTITY	UNIT COST			AMOUNT			REF. No.
				LCP(Rp.)	FCP(Yen)	Total(Rp.)	LCP(Rp.)	FCP(Yen)	Total (Rp.)	
A	GENERAL ITEM									
	Sub Total (1)	Ls	1.00				1,195,135,981.71	1,557,517.70	1,330,572,303.54	
	TOTAL (A)									
B	RIVER CHANNEL WORK									
B.1	Earth Works									
B.1.1	Site clearing and disposal	sq.m	48,000.00	589.84	10.03	1,461.75	28,312,338.80	481,296.05	70,164,169.41	
B.1.2	Channel excavation, common (Hauling = 1 Km)	cu.m	41,661.24	13,476.34	216.76	32,325.46	561,440,873.65	9,030,696.85	1,346,718,860.61	
B.1.3	Structural Excavation including disposal (hauling = 1 km)	cu.m	10,800.30	23,548.60	391.79	57,617.23	254,331,845.96	4,231,438.68	622,283,035.49	
B.1.4	Earth fill for Embankment (Hauling = 5 Km)	cu.m	20,365.81	64,891.67	65.12	70,554.06	1,321,571,034.57	1,326,171.36	1,436,890,282.86	
B.1.5	Loading and Hauling of Excavated Material									
	common (Hauling = 1 km)	cu.m	21,295.43	33,851.70	33.97	36,805.58	720,886,637.57	723,396.01	783,790,638.17	
B.1.6	Grading of Disposal area	cu.m	41,969.23	18,060.29	18.12	19,636.21	757,976,212.94	760,614.69	824,116,620.69	
	Sub Total (B.1)						3,644,518,943.50	16,553,613.63	5,083,963,607.21	
B.2	Masonry Works									
B.2.1	Wet Stone Masonry	cu.m	21,600.59	520,787.95	1.19	520,891.17	11,249,326,947.10	25,640.07	11,251,556,518.49	
B.2.2.	Plastering	sq.m	1,283.20	31,917.26	0.07	31,923.59	40,956,332.30	93.35	40,964,449.69	
B.2.3.	Covering	sq.m	43,211.86	25,338.71	0.06	25,343.73	1,094,932,718.45	2,495.63	1,095,149,729.71	
B.2.4.	Demolishing of Existing Structure (Masonry)	cu.m	17,323.24	93,627.97	0.00	93,627.97	1,621,939,913.81	0.00	1,621,939,913.81	
C.2.5	Weep hole, dia . 60 x 500 mm	pc	70.00	85,659.00	0.00	85,659.00	5,996,130.00	0.00	5,996,130.00	
	Sub Total (B.2)						14,013,152,041.67	28,229.05	14,015,606,741.70	
B.3	Other Works									
B.3.1.	Sodding	sq.m	117,360.77	51,670.02	123.13	62,377.25	6,064,032,715.93	14,451,002.38	7,320,641,618.16	
	Sub Total (B.3.)						6,064,032,715.93	14,451,002.38	7,320,641,618.16	
	TOTAL (B)						23,721,703,701.09	31,032,845.06	26,420,211,967.07	
C	PRAJURIT KULON WEIR									
C.1	Earth Works									
C.1.1.	Site clearing and disposal	sq.m	180.00	589.84	10.03	1,461.75	106,171.27	1,804.86	263,115.64	
C.1.2.	Channel excavation, common (Hauling = 1 km)	cu.m	360.00	13,476.34	216.76	32,325.46	4,851,481.30	78,035.39	11,637,167.28	

Table 5.10 Cost Breakdown (Surabaya (Brangkal) Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS IN SURABAYA (BRANGKAL RIVER)

Rp. 1.0 = JPY 0.0115

No.	KIND OF WORKS	UNIT	QUANTITY	UNIT COST			AMOUNT			REF. No.
				LCP(Rp.)	FCP(Yen)	Total(Rp.)	LCP(Rp.)	FCP(Yen)	Total (Rp.)	
C.1.3	Structural Excavation including disposal (hauling = 1 km)		9.60	23,548.60	391.79	57,617.23	226,066.58	3,761.18	553,125.37	
C.1.4	Grading of Disposal area	cu.m	320.00	18,060.29	18.12	19,636.21	5,779,291.43	5,799.41	6,283,587.85	
C.1.5	Earth fill for Embankment (Hauling = 5 Km)	cu.m	280.00	64,891.67	65.12	70,554.06	18,169,666.46	18,232.91	19,755,137.26	
C.1.6	Backfill (excavated material)	cu.m	40.00	12,953.88	196.52	30,042.46	518,155.33	7,860.74	1,201,698.23	
	Sub Total (C.1)						**29,650,832.37**	**115,494.49**	**39,693,831.62**	
C.2	**Masonry Works**									
C.2.1	Wet Stone Masonry	cu.m	68.04	520,787.95	1.19	520,891.17	35,434,412.00	80.76	35,441,434.96	
C.2.2.	Plastering	sq.m	46.25	31,917.26	0.07	31,923.59	1,476,173.46	3.36	1,476,466.03	
C.2.3	Covering	sq.m	90.37	25,338.71	0.06	25,343.73	2,289,858.83	5.22	2,290,312.67	
C.2.4	Demolishing of Existing Structure (Masonry)	cu.m	15.00	93,627.97	0.00	93,627.97	1,404,419.50	0.00	1,404,419.50	
C.2.5	Weep hole, dia . 60 x 500 mm	pc	20.00	85,659.00	0.00	85,659.00	1,713,180.00	0.00	1,713,180.00	
	Sub Total (C.2)						**42,318,043.79**	**89.35**	**42,325,813.16**	
C.3	**Concrete Work**									
C.3.1	Lean Concrete	cu.m	0.00	492,860.88	1.53	492,993.93	0.00	0.00	0.00	
C.3.2	Reinforcement Concrete class C (K 175) by Man power	sq.m	0.34	5,177,943.73	675.23	5,236,659.58	1,760,500.87	229.58	1,780,464.26	
	Sub Total (C.3)						**1,760,500.87**	**229.58**	**1,780,464.26**	
C.4	**Other Works**									
C.4.1	Sodding	sq.m	13.77	51,670.02	123.13	62,377.25	711,496.11	1,695.54	858,934.68	
	Sub Total (C.4.)						**711,496.11**	**1,695.54**	**858,934.68**	
C.5	**Gate Works**									
C.5.1	New Gate C2 , b = 1 m, h = 1.3 m, h = 6.2 m	bh	2.00	30,870,109.27	0.00	30,870,109.27	61,740,218.54	0.00	61,740,218.54	
C.5.2	New Gate C2 , b = 2 m, h = 1.3 m, h = 6.2 m	bh	1.00	44,834,841.48	0.00	44,834,841.48	44,834,841.48	0.00	44,834,841.48	
	Sub Total (C.5)						**106,575,060.02**	**0.00**	**106,575,060.02**	
	TOTAL (C)						**181,015,933.15**	**117,508.96**	**191,234,103.74**	
D	**Mobile Pump**	set	5.00	348,000,000.00	6,003,000.00	870,000,000.00	1,740,000,000.00	30,015,000.00	4,350,000,000.00	
	TOTAL (D)						**1,740,000,000.00**	**30,015,000.00**	**4,350,000,000.00**	
	GRAND TOTAL						**26,837,855,615.96**	**62,722,871.72**	**32,292,018,374.36**	

Table 5.11 Economic Cost and Benefit Cash Flow of Surabaya (Brangkal)

Unit: Rp. million

Year	Surabaya (Brangkal)						Net Cash Flow	Remarks	
		Benefit	Cost						
			Project	O/M	Replace.	Total			
2009		-	442	-	-	442	-442		
2010		-	4,433	-	-	4,433	-4,433		
2011		-	17,131	-	-	17,131	-17,131		
2012		889	14,839	26	-	14,865	-13,976		
2013		5,334	611	155	-	766	4,568		
2014		5,334	58	155	-	213	5,121		
2015	1	5,334	-	155	-	155	5,179		
2016	2	5,334	-	155	-	155	5,179		
2017	3	5,334	-	155	-	155	5,179		
2018	4	5,334	-	155	-	155	5,179		
2019	5	5,334	-	155	-	155	5,179		
2020	6	5,334	-	155	-	155	5,179		
2021	7	5,334	-	155	-	155	5,179		
2022	8	5,334	-	155	4,176	4,331	1,003		
2023	9	5,334	-	155	-	155	5,179		
2024	10	5,334	-	155	-	155	5,179		
2025	11	5,334	-	155	-	155	5,179		
2026	12	5,334	-	155	-	155	5,179		
2027	13	5,334	-	155	-	155	5,179		
2028	14	5,334	-	155	-	155	5,179		
2029	15	5,334	-	155	-	155	5,179		
2030	16	5,334	-	155	-	155	5,179		
2031	17	5,334	-	155	-	155	5,179		
2032	18	5,334	-	155	4,176	4,331	1,003		
2033	19	5,334	-	155	-	155	5,179		
2034	20	5,334	-	155	-	155	5,179		
2035	21	5,334	-	155	-	155	5,179		
2036	22	5,334	-	155	-	155	5,179		
2037	23	5,334	-	155	-	155	5,179		
2038	24	5,334	-	155	-	155	5,179		
2039	25	5,334	-	155	-	155	5,179		
2040	26	5,334	-	155	-	155	5,179		
2041	27	5,334	-	155	-	155	5,179		
2042	28	5,334	-	155	4,176	4,331	1,003		
2043	29	5,334	-	155	-	155	5,179		
2044	30	5,334	-	155	-	155	5,179		
2045	31	5,334	-	155	-	155	5,179		
2046	32	5,334	-	155	-	155	5,179		
2047	33	5,334	-	155	-	155	5,179		
2048	34	5,334	-	155	-	155	5,179		
2049	35	5,334	-	155	-	155	5,179		
2050	36	5,334	-	155	-	155	5,179		
2051	37	5,334	-	155	-	155	5,179		
2052	38	5,334	-	155	4,176	4,331	1,003		
2053	39	5,334	-	155	-	155	5,179		
2054	40	5,334	-	155	-	155	5,179		
2055	41	5,334	-	155	-	155	5,179		
2056	42	5,334	-	155	-	155	5,179		
2057	43	5,334	-	155	-	155	5,179		
2058	44	5,334	-	155	-	155	5,179		
2059	45	5,334	-	155	-	155	5,179		
2060	46	5,334	-	155	-	155	5,179		
2061	47	5,334	-	155	-	155	5,179		
2062	48	5,334	-	155	4,176	4,331	1,003		
2063	49	5,334	-	155	-	155	5,179		
2064	50	5,334	-	155	-	155	5,179		
2065									
2066									
2067									
2068									
2069									
2070									
Total		278,257	37,515	8,109	20,880	66,504	211,753		B/C
NPV	12.00%	28,736	25,929	837	1,256	28,022	713	EIRR	1.03
NPV	12.32%	27,687	25,689	807	1,191	27,687	-	12.32%	1.00

Table 5.12 Cost Breakdown (Gorontalo Sub-project)

URBAN FLOOD CONTROL SYSTEM IMPROVEMENT WORKS
IN GORONTALO (BOLANGO RIVER)

Rp. 1.0 = JPY 0.0115

DESCRIPTION						Bolango R. Improvement			
No.	UNIT	UNIT	UNIT COST	RATE			AMOUNT		
			D.C.(Rp.)	F.C.(%)	L.C.(%)	Q'TY	F.C.(Rp.)	L.C.(Rp.)	Total (Rp.)
1	DIRECT COST						11,131,235,572.75	22,609,588,327.22	33,740,823,899.96
1.1	PREPARATORY WORKS			58%	42%		1,011,582,879.34	2,055,417,120.66	3,067,000,000.00
1.2	CHANNEL WORKS						4,820,452,693.40	17,021,371,206.56	21,841,823,899.96
1.2.1	Earth Works						2,404,089,403.14	1,966,982,238.94	4,371,071,642.08
	Excavation	cu.m	32,334.89	55%	45%	100,050.00	1,779,308,117.09	1,455,797,550.35	3,235,105,667.44
	Embankment	cu.m	70,556.89	55%	45%	16,100.00	624,781,286.05	511,184,688.59	1,135,965,974.64
	Sodding	sq.m	17,715.10	0%	100%		0.00	0.00	0.00
1.2.2	Stone Works						156,975,000.00	5,075,525,000.00	5,232,500,000.00
	Bank Protection (Type-1)	m	3,500,000.00	3%	97%	1,495.00	156,975,000.00	5,075,525,000.00	5,232,500,000.00
	Wet Rubble Masonry	cu.m	520,891.22	8%	92%		0.00	0.00	0.00
	Riprap	cu.m	152,118.44	5%	95%		0.00	0.00	0.00
	Gravel Bedding	cu.m	308,054.45	51%	49%		0.00	0.00	0.00
	Gabion Mattress	cu.m	682,892.44	3%	97%		0.00	0.00	0.00
1.2.3	Concrete Works						2,017,888,290.26	9,070,363,967.62	11,088,252,257.88
	Bank Protection (Type-2)	m	3,000,000.00	8%	92%	2,300.00	552,000,000.00	6,348,000,000.00	6,900,000,000.00
	Concrete Dike (Type-3)	sq.m	650,000.00	35%	65%	2,070.00	470,925,000.00	874,575,000.00	1,345,500,000.00
	Concrete	cu.m	797,405.96	35%	65%	3,565.00	994,963,290.26	1,847,788,967.62	2,842,752,257.88
	Reinforcement Bar	ton	19,240,210.93	80%	20%		0.00	0.00	0.00
1.2.4	Sluice, Drainage Sluice Works						241,500,000.00	908,500,000.00	1,150,000,000.00
	U/s. Sluice.	L.S	400,000,000.00	21%	79%		0.00	0.00	0.00
	Drainage sluice str. (2gates x 2m x 1.5m)	L.S	575,000,000.00	21%	79%	2.00	241,500,000.00	908,500,000.00	1,150,000,000.00
	Sluice Gate (2m x 1m)	Pc.	70,000,000.00	21%	79%		0.00	0.00	0.00
	Drainage sluice str. (1m x 1m)	L.S	150,000,000.00	21%	79%		0.00	0.00	0.00
1.3	APPURTENANT WORKS						5,299,200,000.00	3,532,800,000.00	8,832,000,000.00
1.3.1	Bridge Works						5,299,200,000.00	3,532,800,000.00	8,832,000,000.00
	Br. Type-1(W=4.00m)	m	60,000,000.00	60%	40%	129.95	4,678,200,000.00	3,118,800,000.00	7,797,000,000.00
	Br. Type-1(W=7.00m)	m	100,000,000.00	60%	40%		0.00	0.00	0.00
	Heightening of Bridge	L.S	517,500,000.00	60%	40%	2.00	621,000,000.00	414,000,000.00	1,035,000,000.00
1.3.2	Waterway	L.S	2,700,000,000.00	20%	80%		0.00	0.00	0.00
2	Mobile Pump	set	870,000,000.00	60%	40%	5.00	2,610,000,000.00	1,740,000,000.00	4,350,000,000.00
	GRAND TOTAL						13,741,235,572.75	24,349,588,327.22	38,090,823,899.96

Table 5.13 Economic Cost and Benefit Cash Flow of Gorontalo

Unit: Rp. million

Year	Gorontalo (Future Socio-Economic in 2020)						Net Cash Flow	Remarks	
		Benefit	Cost						
			Project	O/M	Replace.	Total			
2009		-	521	-	-	521	-521		
2010		-	5,297	-	-	5,297	-5,297		
2011		-	20,611	-	-	20,611	-20,611		
2012		750	17,840	31	-	17,871	-17,121		
2013		4,775	721	187	-	908	3,867		
2014		5,062	68	187	-	256	4,807		
2015	1	5,369	-	187	-	187	5,181		
2016	2	5,692	-	187	-	187	5,504		
2017	3	6,033	-	187	-	187	5,846		
2018	4	6,396	-	187	-	187	6,209		
2019	5	6,780	-	187	-	187	6,593		
2020	6	7,186	-	187	-	187	6,999		
2021	7	7,186	-	187	-	187	6,999		
2022	8	7,186	-	187	4,176	4,363	2,823		
2023	9	7,186	-	187	-	187	6,999		
2024	10	7,186	-	187	-	187	6,999		
2025	11	7,186	-	187	-	187	6,999		
2026	12	7,186	-	187	-	187	6,999		
2027	13	7,186	-	187	-	187	6,999		
2028	14	7,186	-	187	-	187	6,999		
2029	15	7,186	-	187	-	187	6,999		
2030	16	7,186	-	187	-	187	6,999		
2031	17	7,186	-	187	-	187	6,999		
2032	18	7,186	-	187	4,176	4,363	2,823		
2033	19	7,186	-	187	-	187	6,999		
2034	20	7,186	-	187	-	187	6,999		
2035	21	7,186	-	187	-	187	6,999		
2036	22	7,186	-	187	-	187	6,999		
2037	23	7,186	-	187	-	187	6,999		
2038	24	7,186	-	187	-	187	6,999		
2039	25	7,186	-	187	-	187	6,999		
2040	26	7,186	-	187	-	187	6,999		
2041	27	7,186	-	187	-	187	6,999		
2042	28	7,186	-	187	4,176	4,363	2,823		
2043	29	7,186	-	187	-	187	6,999		
2044	30	7,186	-	187	-	187	6,999		
2045	31	7,186	-	187	-	187	6,999		
2046	32	7,186	-	187	-	187	6,999		
2047	33	7,186	-	187	-	187	6,999		
2048	34	7,186	-	187	-	187	6,999		
2049	35	7,186	-	187	-	187	6,999		
2050	36	7,186	-	187	-	187	6,999		
2051	37	7,186	-	187	-	187	6,999		
2052	38	7,186	-	187	4,176	4,363	2,823		
2053	39	7,186	-	187	-	187	6,999		
2054	40	7,186	-	187	-	187	6,999		
2055	41	7,186	-	187	-	187	6,999		
2056	42	7,186	-	187	-	187	6,999		
2057	43	7,186	-	187	-	187	6,999		
2058	44	7,186	-	187	-	187	6,999		
2059	45	7,186	-	187	-	187	6,999		
2060	46	7,186	-	187	-	187	6,999		
2061	47	7,186	-	187	-	187	6,999		
2062	48	7,186	-	187	4,176	4,363	2,823		
2063	49	7,186	-	187	-	187	6,999		
2064	50	7,186	-	187	-	187	6,999		
2065									
2066									
2067									
2068									
2069									
2070									
Total		364,216	45,057	9,765	20,880	75,702	288,514		B/C
NPV	12.00%	33,772	31,139	1,008	1,256	33,403	369	EIRR	1.01
NPV	12.13%	33,251	31,027	994	1,230	33,251	-	12.13%	1.00

Table 6.1 Consulting Service Cost

Rp. 1.0 = yen 0.0115

	Unit	Qty.	Foreign Portion (Yen) Rate	Foreign Portion (Yen) Amount ('000)	Local Portion Rp. Rate	Local Portion Rp. Amount ('000)	Combined Total ('000) Yen
A Remuneration							
1 Professional (A)	M/M	105	2,500,000	262,500	0	0	262,500
2 Professional (B)	M/M	420	0	0	30,000,000	12,600,000	144,900
3 Supporting Staffs	M/M	2215	0	0	3,360,722	7,444,000	85,606
Subtotal of A				262,500		20,044,000	493,006
							0
B Direct Cost							0
1 International Travel	trip	30	522,000	15,660		0	15,660
2 Inland Travel							0
Prof. A	trip	24		0	2,485,000	59,640	686
Prof. B, Single	trip	84		0	1,940,000	162,960	1,874
Prof. B, Family	trip	100		0	1,610,000	161,000	1,852
3 Duty Trip	trip	303		0	4,105,000	1,243,815	14,304
4 Hotel Charge							0
Prof. A	M/M	37		0	12,000,000	444,000	5,106
Prof. B	M/M	98		0	7,500,000	735,000	8,453
5 Office Supply & Consumable	Office/M	259		0	6,615,000	1,713,285	19,703
6 Printing / Report	L.S.	1		0	648,250,000	648,250	7,455
7 Vehicle Rental	Car/M	109		0	7,250,000	790,250	9,088
8 Housing Allowance							0
Prof. A (Jakarta)	M/M	44		0	13,000,000	572,000	6,578
Prof. A (Others)	M/M	24		0	9,000,000	216,000	2,484
Prof. B	M/M	322		0	4,500,000	1,449,000	16,664
9 International & Domestic Communications	Office/M	259		0	5,690,000	1,473,710	16,948
10 Establishment Allowance	L.S.	1		0	228,000,000	228,000	2,622
11 Office Equipment & Materials	L.S.	1		0	2,752,500,000	2,752,500	31,654
12 Sub-contracting	L.S.	1		0	1,706,100,000	1,706,100	19,620
13 Vehicle Purchase & O/M	Car	7		0	240,000,000	1,680,000	19,320
14 Office Preparation & Running Cost	Office/M	259		0	10,770,000	2,789,430	32,078
Subtotal of B				15,660		18,824,940	232,147
Total (A+B)				278,160		38,868,940	725,153
C Remuneration for Climate Change							
1 Professional (A)	M/M	34	2,500,000	85,000	0	0	85,000
2 Professional (B)	M/M	167	0	0	30,000,000	5,010,000	57,615
3 Supporting Staffs	M/M	378	0	0	4,855,820	1,835,500	21,108
Subtotal of C				85,000		6,845,500	163,723
D Direct Cost for Adaptation of Climate Change							0
1 International Travel	trip	10	519,500	5,195		0	5,195
2 Inland Travel	trip	10		0	400,000	4,000	46
3 Duty Trip	trip	125		0	5,200,000	650,000	7,475
4 Hotel Charge							0
Prof. A	M/M	25		0	12,000,000	300,000	3,450
Prof. B	M/M	0		0	7,500,000	0	0
5 Office Supply & Consumable	Office/M	52		0	6,000,000	312,000	3,588
6 Printing / Report	L.S.	1		0	431,500,000	431,500	4,962
7 Vehicle Rental	Car/M	29		0	7,250,000	210,250	2,418
8 Housing Allowance							0
Prof. A (Jakarta)	M/M	0		0	13,000,000	0	0
Prof. A (Others)	M/M	0		0	9,000,000	0	0
Prof. B	M/M	0		0	4,500,000	0	0
9 International & Domestic Communications	Office/M	52		0	7,500,000	390,000	4,485
10 Establishment Allowance	L.S.	1		0	56,750,000	56,750	653
11 Office Equipment & Materials	L.S.	1		0	587,000,000	587,000	6,751
12 Sub-contracting	L.S.	1		0	486,300,000	486,300	5,592
13 Vehicle Purchase & O/M	Car	1		0	240,000,000	240,000	2,760
14 Office Preparation & Running Cost	Office/M	52		0	14,800,000	769,600	8,850
15 In-country Seminar and Training	time	12		0	45,000,000	540,000	6,210
Subtotal of D				5,195		4,977,400	62,435
Total (C+D)				90,195		11,822,900	226,158
Grand Total				368,355		50,691,840	951,311

Table 6.2 Land Acquisition/Compensation Cost

Sub-Project	Unit Cost		Required Land (ha)	No. of Resettle-ment	Acquisition Cost (Rp.)	Compensation Cost (Rp.)	Total (Rp. million)
	Land (/m2)	House					
Padang	100,000	50,000,000	1.500	9	1,500,000,000	450,000,000	1,950.0
Palembang	150,000	100,000,000	0.200	10	300,000,000	1,000,000,000	1,300.0
Bandung	150,000	100,000,000	1.272	6	1,908,000,000	600,000,000	2,508.0
Wonokromo	-	-					
Brangkal	-	-					
Gorontalo	100,000	75,000,000	3.900	65	3,900,000,000	4,875,000,000	8,775.0
Total					7,608,000,000	6,925,000,000	14,533.0

Table 6.3 Economic Cost and Benefit Cash Flow (Total of 6 Sub-projects)

Unit: Rp. million

Year		Total of 6 Sub-projects						Remarks	
		Benefit	Cost				Net Cash Flow		
			Project	O/M	Replace.	Total			
2009		-	5,913	-	-	5,913	-5,913		
2010		-	34,917	-	-	34,917	-34,917		
2011		-	156,188	-	-	156,188	-156,188		
2012		-	206,023	114	-	206,137	-206,137		
2013		33,525	99,846	1,059	-	100,905	-67,381		
2014		68,648	776	2,088	-	2,864	65,784		
2015	1	69,149	-	2,088	-	2,088	67,061		
2016	2	69,666	-	2,088	-	2,088	67,578		
2017	3	70,205	-	2,088	-	2,088	68,117		
2018	4	70,762	-	2,088	-	2,088	68,674		
2019	5	71,343	-	2,088	-	2,088	69,255		
2020	6	71,943	-	2,088	-	2,088	69,855		
2021	7	71,943	-	2,088	-	2,088	69,855		
2022	8	71,943	-	2,088	8,352	10,440	61,503		
2023	9	71,943	-	2,088	-	2,088	69,855		
2024	10	71,943	-	2,088	-	2,088	69,855		
2025	11	71,943	-	2,088	-	2,088	69,855		
2026	12	71,943	-	2,088	-	2,088	69,855		
2027	13	71,943	-	2,088	-	2,088	69,855		
2028	14	71,943	-	2,088	-	2,088	69,855		
2029	15	71,943	-	2,088	-	2,088	69,855		
2030	16	71,943	-	2,088	-	2,088	69,855		
2031	17	71,943	-	2,088	-	2,088	69,855		
2032	18	71,943	-	2,088	8,352	10,440	61,503		
2033	19	71,943	-	2,088	-	2,088	69,855		
2034	20	71,943	-	2,088	-	2,088	69,855		
2035	21	71,943	-	2,088	-	2,088	69,855		
2036	22	71,943	-	2,088	-	2,088	69,855		
2037	23	71,943	-	2,088	-	2,088	69,855		
2038	24	71,943	-	2,088	-	2,088	69,855		
2039	25	71,943	-	2,088	-	2,088	69,855		
2040	26	71,943	-	2,088	-	2,088	69,855		
2041	27	71,943	-	2,088	-	2,088	69,855		
2042	28	71,943	-	2,088	8,352	10,440	61,503		
2043	29	71,943	-	2,088	-	2,088	69,855		
2044	30	71,943	-	2,088	-	2,088	69,855		
2045	31	71,943	-	2,088	-	2,088	69,855		
2046	32	71,943	-	2,088	-	2,088	69,855		
2047	33	71,943	-	2,088	-	2,088	69,855		
2048	34	71,943	-	2,088	-	2,088	69,855		
2049	35	71,943	-	2,088	-	2,088	69,855		
2050	36	71,943	-	2,088	-	2,088	69,855		
2051	37	71,943	-	2,088	-	2,088	69,855		
2052	38	71,943	-	2,088	8,352	10,440	61,503		
2053	39	71,943	-	2,088	-	2,088	69,855		
2054	40	71,943	-	2,088	-	2,088	69,855		
2055	41	71,943	-	2,088	-	2,088	69,855		
2056	42	71,943	-	2,088	-	2,088	69,855		
2057	43	71,943	-	2,088	-	2,088	69,855		
2058	44	71,943	-	2,088	-	2,088	69,855		
2059	45	71,943	-	2,088	-	2,088	69,855		
2060	46	71,943	-	2,088	-	2,088	69,855		
2061	47	71,943	-	2,088	-	2,088	69,855		
2062	48	71,943	-	2,088	8,352	10,440	61,503		
2063	49	71,943	-	2,088	-	2,088	69,855		
2064	50	71,943	-	2,088	-	2,088	69,855		
2065									
2066									
2067									
2068									
2069									
2070									
Total		3,690,721	503,663	107,649	41,760	653,072	3,037,649		B/C
NPV	12.00%	353,125	332,267	10,515	2,512	345,294	7,831	EIRR	1.02
NPV	12.26%	342,084	329,487	10,191	2,406	342,084	-	12.26%	1.00

Table 6.4 Summary of the Required Fund

Unit: (JPY mil)

Breakdown of Cost	Original								
	Foreign Currency Portion			Local Currency Portion			Total		
	Total	JICA Portion	Others	Total	JICA Portion	Others	Total	JICA Portion	Others
Item	(JPY mil)	(JPY mil)	(JPY mil)	(JPY mil)	(JPY mil)	(JPY mil)	(JPY mil)	(JPY mil)	(JPY mil)
Padang Sub-project	560	560	0	1,440	1,440	0	2,000	2,000	0
Palembang Sub-project	29	29	0	450	450	0	479	479	0
Bandung Sub-project	24	24	0	206	206	0	230	230	0
Surabaya (Wonokromo) Sub-project	141	141	0	1,313	1,313	0	1,454	1,454	0
Surabaya (Brangkal) Sub-project	63	63	0	309	309	0	371	371	0
Gorontalo Sub-project	158	158	0	280	280	0	438	438	0
Price Escalation	102	102	0	962	962	0	1,065	1,065	0
Physical Contingency	54	54	0	248	248	0	302	302	0
Consulting Services	419	419	0	732	732	0	1,151	1,151	0
Ordinary Consulting Services	315	315	0	558	558	0	873	873	0
Policy making for Climate Change	69	69	0	32	32	0	101	101	0
Activities for Adaptation of Climate Change	35	35	0	142	142	0	176	176	0
Land Acquisition	0	0	0	196	0	196	196	0	196
Administration Cost	0	0	0	384	0	384	384	0	384
VAT	0	0	0	769	0	769	769	0	769
Import Tax	0	0	0	0	0	0	0	0	0
Sub-total	**1,551**	**1,551**	**0**	**7,288**	**5,939**	**1,349**	**8,839**	**7,490**	**1,349**
Interest during construction	280	0	280	0	0	0	280	0	280
Commitment Charge	28	0	28	0	0	0	28	0	28
Total	**1,859**	**1,551**	**308**	**7,288**	**5,939**	**1,349**	**9,147**	**7,490**	**1,657**

(Note) Exchange Rate: US$ 1 = IDR 9,291 = ¥ 107 (IDR 1 = ¥ 0.0115)

Assumed rate of Price escalation (including consulting service)

- Foreign currency portion : 2.6%
- Local currency portion : 5.8%

Physical Contingency : 5.0%

Base Year for Cost Estimation: August 2008

Table 6.5 Annual Disbursement Schedule

Financial Project Cost (unit: 1,000,000)

Item	Total				2009				2010				2011				2012				2013				2014			
	FC (JPY)	LC (Rp.)	Total (JPY)	Total (Rp.)	FC (JPY)	LC (Rp.)	Total (JPY)	Total (Rp.)	FC (JPY)	LC (Rp.)	Total (JPY)	Total (Rp.)	FC (JPY)	LC (Rp.)	Total (JPY)	Total (Rp.)	FC (JPY)	LC (Rp.)	Total (JPY)	Total (Rp.)	FC (JPY)	LC (Rp.)	Total (JPY)	Total (Rp.)	FC (JPY)	LC (Rp.)	Total (JPY)	Total (Rp.)
Construction			8,339.29	551,242.78																								
Base cost for JBIC financing	975.90	347,562.74	4,972.87	432,423.70	-	-	-	-	23.88	9,762.03	136.14	11,838.45	309.12	116,611.87	1,650.15	143,491.65	408.06	151,498.78	2,158.30	186,982.32	234.84	69,690.06	1,026.28	90,111.26	-	-	-	-
Price escalation	102.28	83,675.27	1,064.55	92,569.42	-	-	-	-	1.26	1,165.23	14.56	1,274.61	24.74	21,490.06	271.88	23,641.67	44.12	38,325.52	484.87	42,162.24	32.16	22,694.46	293.15	25,490.90	-	-	-	-
Physical contingency	53.91	21,561.90	301.87	26,249.66	-	-	-	-	1.26	546.36	7.54	655.65	16.68	6,905.10	96.18	8,356.67	22.61	9,491.21	131.76	11,457.23	13.35	4,619.23	66.47	5,780.11	-	-	-	-
Ordinary Consulting Services			873.39	75,946.81																								
Base cost	278.16	38,868.94	725.15	63,056.77	31.31	2,934.27	65.06	5,657.10	103.08	13,161.70	254.44	22,125.00	35.18	7,530.04	121.76	10,589.57	61.74	10,741.99	185.27	16,110.30	41.73	4,213.50	90.19	7,842.20	5.12	287.45	8.42	732.60
Price escalation	22.30	7,334.20	106.65	9,273.53	0.81	170.19	2.77	240.98	5.43	1,571.03	23.50	2,043.18	2.82	1,387.69	18.77	1,632.58	6.68	2,717.46	37.93	3,297.92	5.71	1,372.12	21.49	1,869.03	0.85	115.71	2.18	189.83
Physical contingency	15.02	2,310.16	41.59	3,616.51	1.61	155.22	3.39	294.90	5.43	736.64	13.90	1,208.41	1.90	445.89	7.03	611.11	3.42	672.97	11.16	970.41	2.37	279.28	5.58	485.56	0.30	20.16	0.53	46.12
Policy making for Climate Change			101.11	8,792.48																								
Base cost	60.00	2,196.00	85.19	7,407.39	10.00	120.00	11.38	989.57	12.50	600.00	19.40	1,686.96	7.50	420.00	12.33	1,072.17	7.50	420.00	12.33	1,072.17	15.00	510.00	20.87	1,814.35	7.50	120.00	8.88	772.17
Price escalation	5.63	476.61	11.11	966.40	0.26	6.96	0.34	29.57	0.66	71.62	1.48	128.87	0.60	77.40	1.49	129.60	0.81	106.25	2.03	176.77	2.05	166.08	3.96	344.70	1.25	48.30	1.80	156.69
Physical contingency	3.28	133.33	4.81	418.69	0.51	6.35	0.59	50.96	0.66	33.58	1.04	90.79	0.41	24.87	0.69	60.09	0.42	26.31	0.72	62.45	0.85	33.80	1.24	107.95	0.44	8.42	0.53	45.45
Activities for Adaptation of Climate Change			176.31	15,331.04																								
Base cost	30.20	9,632.90	140.97	12,258.55	5.31	405.72	9.96	867.47	3.77	2,311.28	30.35	2,638.80	9.06	2,141.45	30.69	2,668.38	8.16	2,360.50	33.31	2,896.42	6.16	2,117.38	30.51	2,653.29	2.73	296.57	6.14	534.19
Price escalation	2.79	2,100.11	26.94	2,342.44	0.14	23.53	0.41	35.54	0.20	275.88	3.37	293.14	0.49	394.64	5.62	436.82	0.67	597.15	7.53	655.10	0.84	589.52	8.77	762.91	0.45	119.38	1.83	158.94
Physical contingency	1.65	586.65	8.40	730.05	0.27	21.46	0.52	45.15	0.20	129.36	1.69	146.60	0.33	126.50	1.79	155.26	0.34	147.88	2.04	177.58	0.35	140.34	1.96	170.81	0.16	20.80	0.40	34.66
Land Acquisition			196.88	17,033.34																								
Base cost	-	14,533.00	167.13	14,533.00	-	4,582.93	52.70	4,582.93	-	6,319.03	72.67	6,319.03	-	3,631.03	41.76	3,631.03	-	-	-	-	-	-	-	-	-	-	-	-
Price escalation	-	1,689.23	19.43	1,689.23	-	265.81	3.06	265.81	-	754.27	8.67	754.27	-	669.15	7.70	669.15	-	-	-	-	-	-	-	-	-	-	-	-
Physical contingency	-	811.11	9.33	811.11	-	242.44	2.79	242.44	-	353.66	4.07	353.66	-	215.01	2.47	215.01	-	-	-	-	-	-	-	-	-	-	-	-
Administration cost			384.30	33,417.32																								
Base cost	-	26,483.97	304.57	26,483.97	-	604.85	6.96	604.85	-	2,230.41	25.65	2,230.41	-	8,072.64	92.84	8,072.64	-	10,353.06	119.06	10,353.06	-	5,121.06	58.89	5,121.06	-	101.95	1.17	101.95
Price escalation	-	5,342.05	61.43	5,342.05	-	28.59	0.33	28.59	-	224.70	2.58	224.70	-	1,325.49	15.24	1,325.49	-	2,314.60	26.62	2,314.60	-	1,423.38	16.37	1,423.38	-	25.28	0.29	25.28
Physical contingency	-	1,591.30	18.30	1,591.30	-	31.67	0.36	31.67	-	122.76	1.41	122.76	-	459.91	5.40	459.91	-	633.38	7.28	633.38	-	327.22	3.76	327.22	-	6.36	0.07	6.36
VAT	-	66,834.65	768.60	66,834.65	-	1,330.24	15.30	1,330.24	-	5,155.74	59.29	5,155.74	-	19,736.08	226.96	19,736.08	-	26,602.09	305.92	26,602.09	-	13,743.31	158.05	13,743.31	-	257.19	3.07	257.19
Total	1,551.12	633,718.12	8,838.88	768,598.42	50.23	10,930.24	175.92	15,297.77	158.31	45,525.30	681.85	59,291.05	405.83	191,675.13	2,610.10	226,964.90	562.52	257,009.17	3,516.13	305,924.64	355.43	127,140.73	1,817.55	158,048.64	18.80	1,437.56	35.34	3,072.54
Interest during construction	279.83	-	279.83	24,333.38	0.01	-	0.01	0.82	2.26	-	2.26	196.62	30.53	-	30.53	2,655.21	69.30	-	69.30	6,026.18	88.86	-	88.86	7,727.14	88.87	-	88.87	7,727.41
Commitment Charge	28.09	-	28.09	2,442.29	7.49	-	7.49	651.31	7.40	-	7.40	643.10	5.89	-	5.89	598.97	4.87	-	4.87	406.13	1.61	-	1.61	140.10	0.03	-	0.03	2.57
GRAND TOTAL	1,859.04	633,718.12	9,146.80	795,374.09	57.73	10,930.24	183.42	15,949.90	167.96	45,525.30	691.50	60,130.77	443.26	191,675.13	2,647.52	230,219.08	636.49	257,009.17	3,592.10	312,356.35	445.91	127,140.73	1,908.03	165,915.28	107.70	1,437.56	124.23	10,802.71

FIGURES

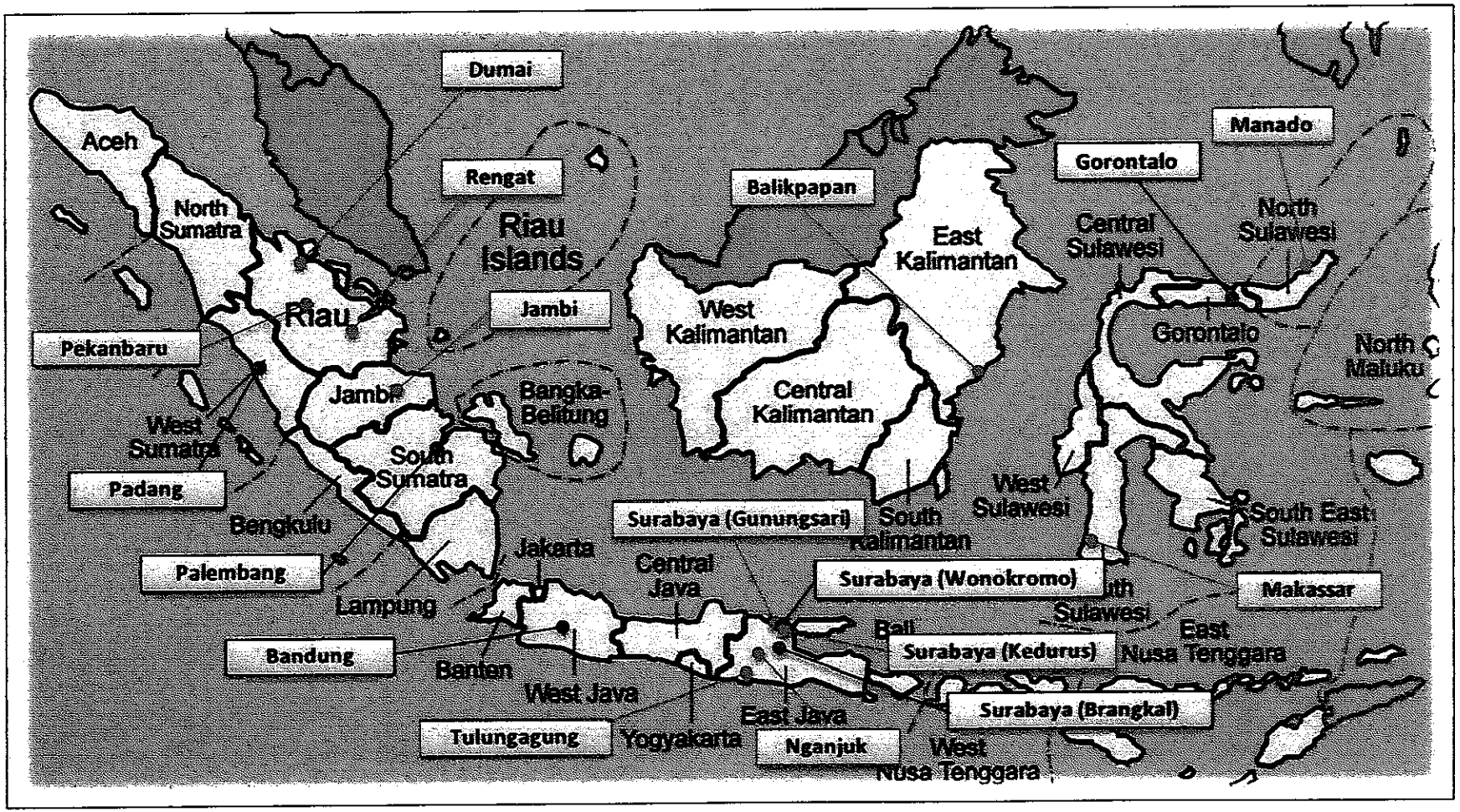


Figure . 4.1 Location Map of Long-listed Sub-projects

No.	City/ Regency	Readiness Score	Priority Score
1	Dumai	25	33
2	Pekanbaru	28	48
3	Rengat	37	37
4	**Padang**	**75**	**65**
5	Jambi	19	51
6	**Palembang**	**56**	**79**
7	**Bandung**	**87**	**56**
8	**Surabaya (Wonokromo)**	**54**	**57**
9	Surabaya (Gunungsari)	35	64
10	Surabaya (Kedurus)	38	41
11	**Surabaya (Brangkal)**	**60**	**37**
12	Nganjuk	33	42
13	Tulunagung	45	22
14	Balikpapan	7	41
15	Makassar	24	62
16	**Gorontalo**	**55**	**51**
17	Manado	36	45

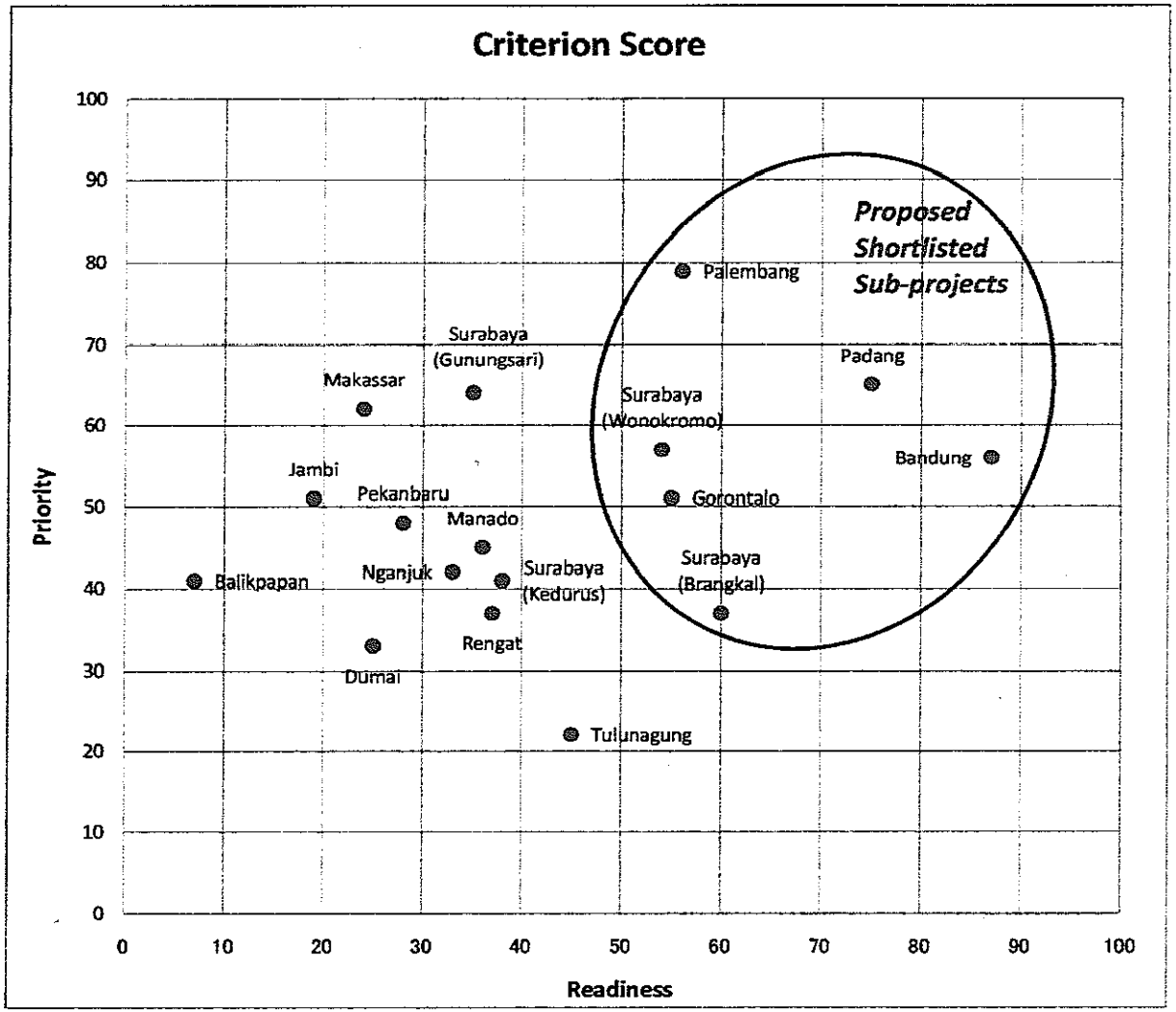
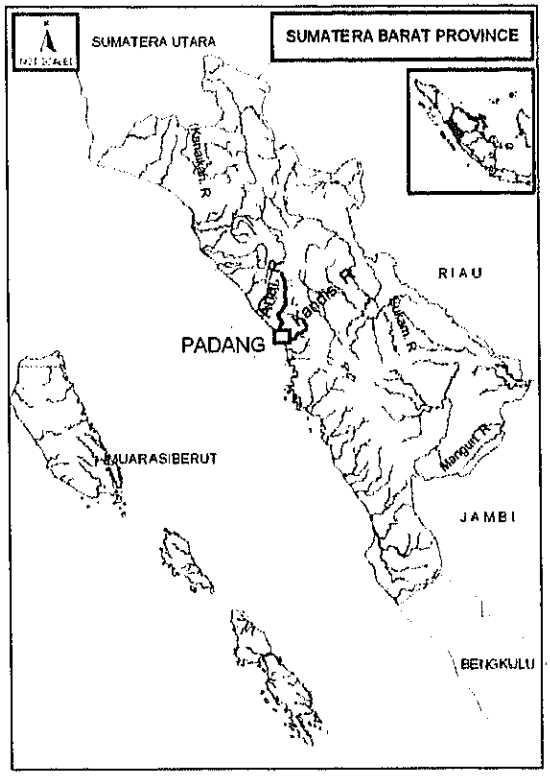
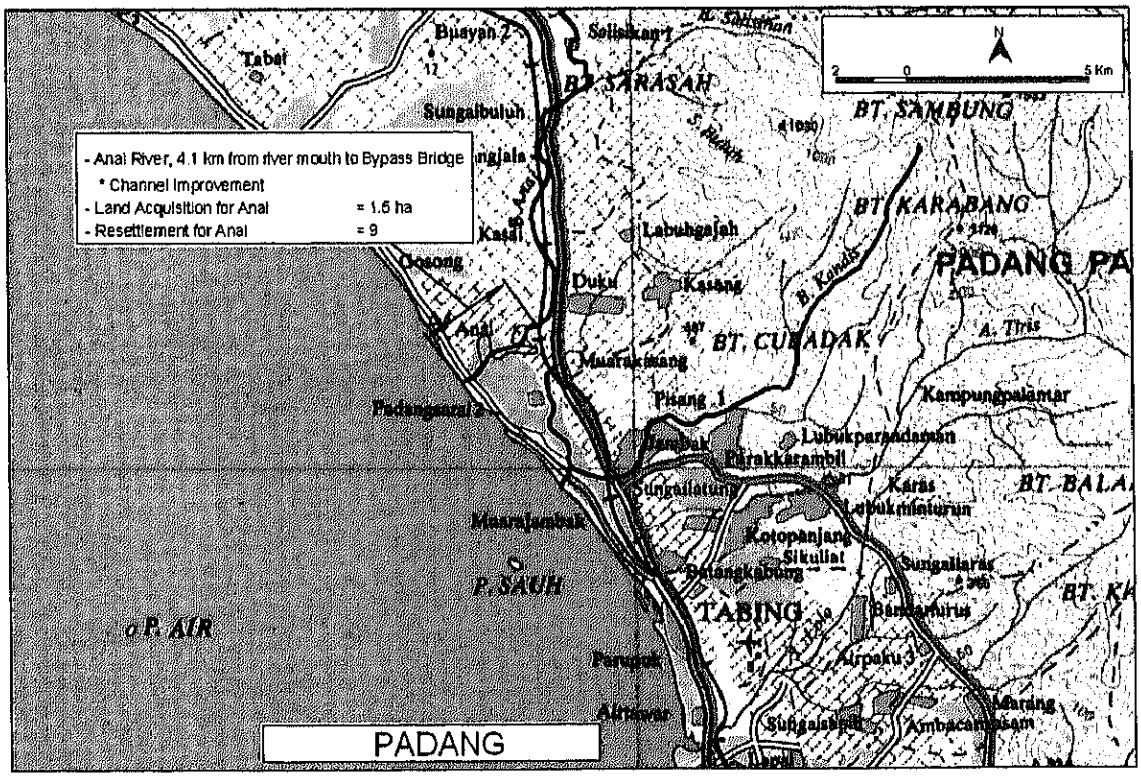


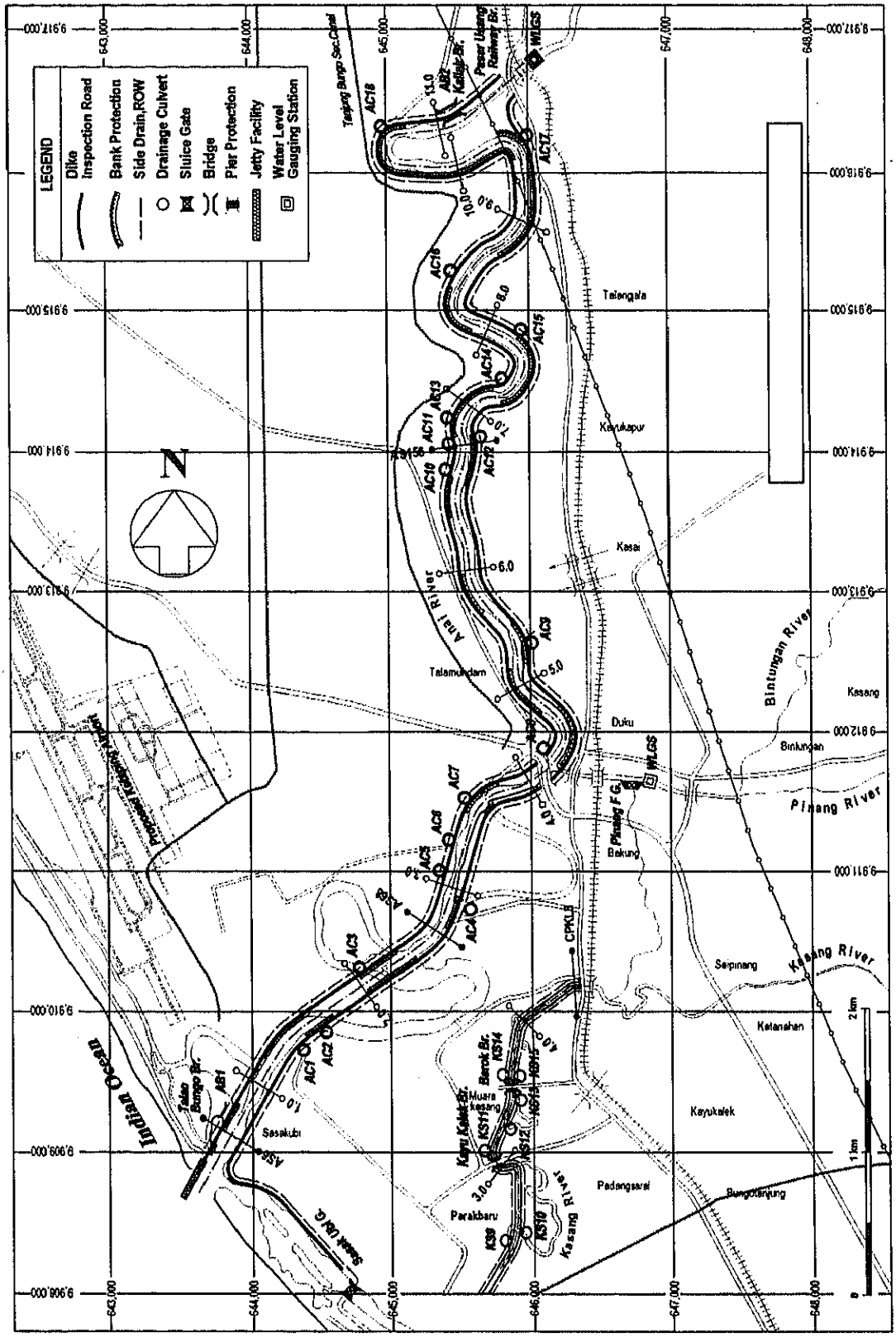
Figure 4.2 Criterion Score of Sub-projects





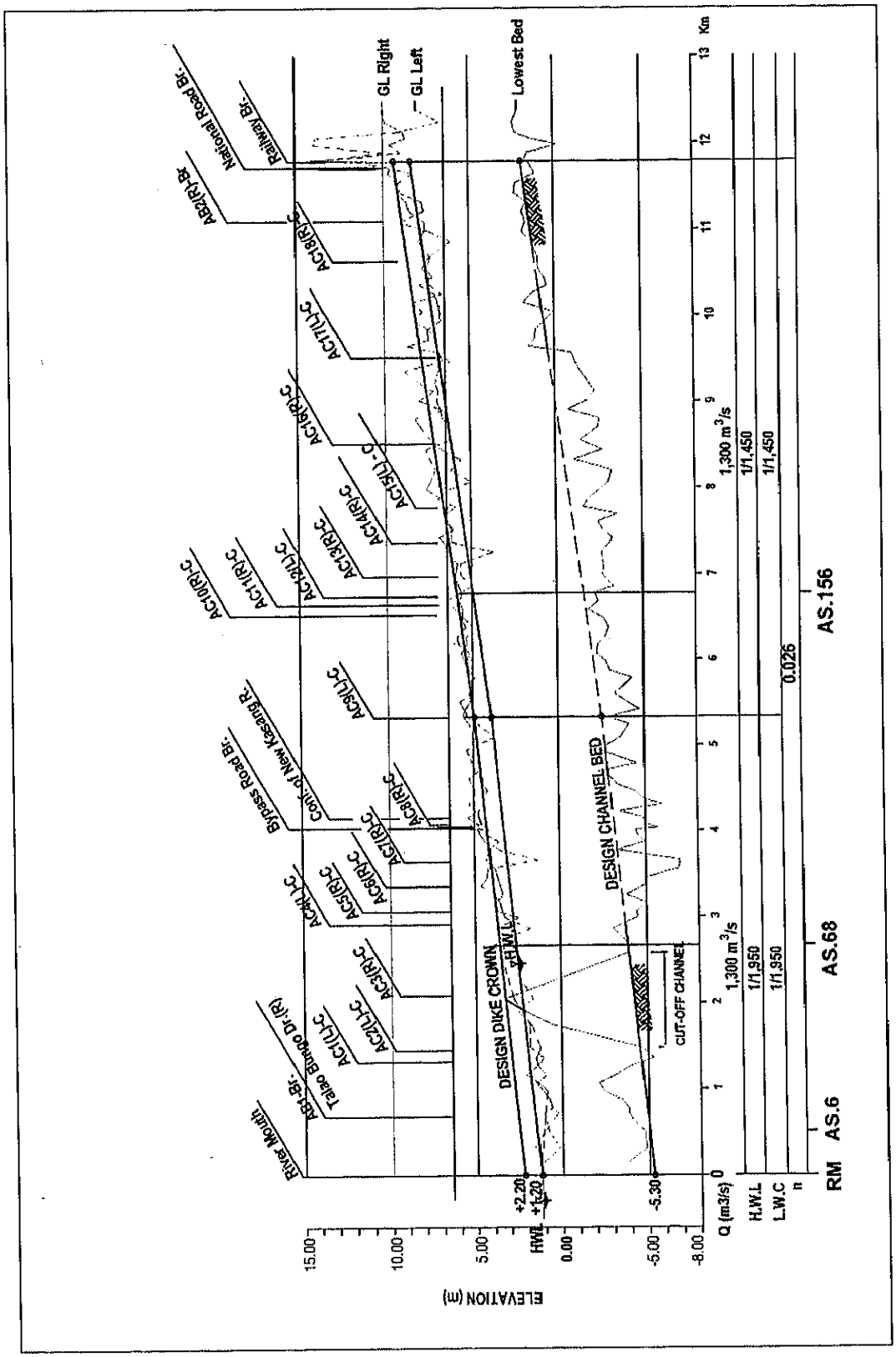
Source: BAKOSURTANAL

Figure 5.1 Location Map of Padang Sub-project



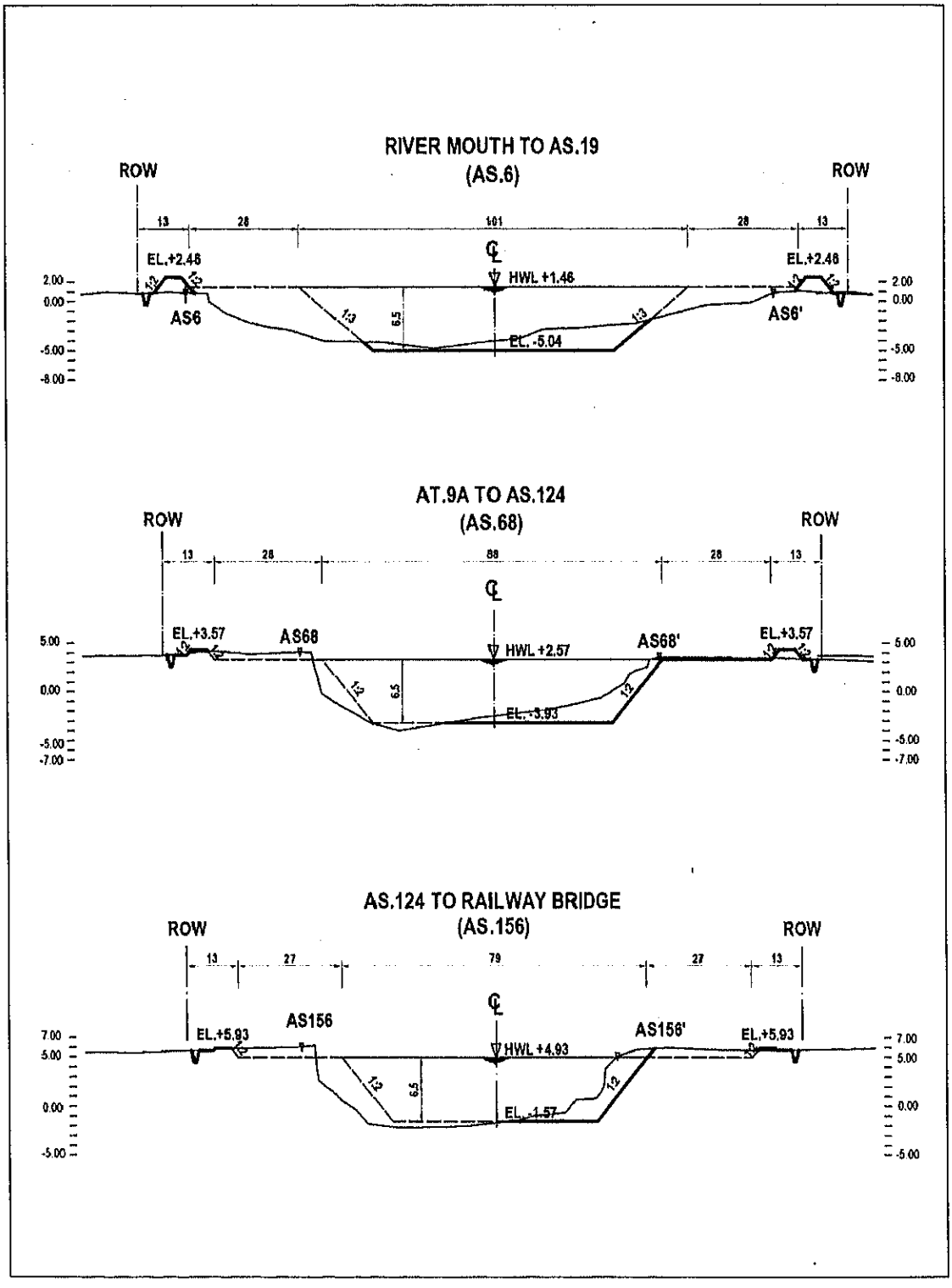
Source: Design Report, Anai-Kandis River Improvement (Oct. 2001)

Figure 5.2 Design Alignment of Anai River



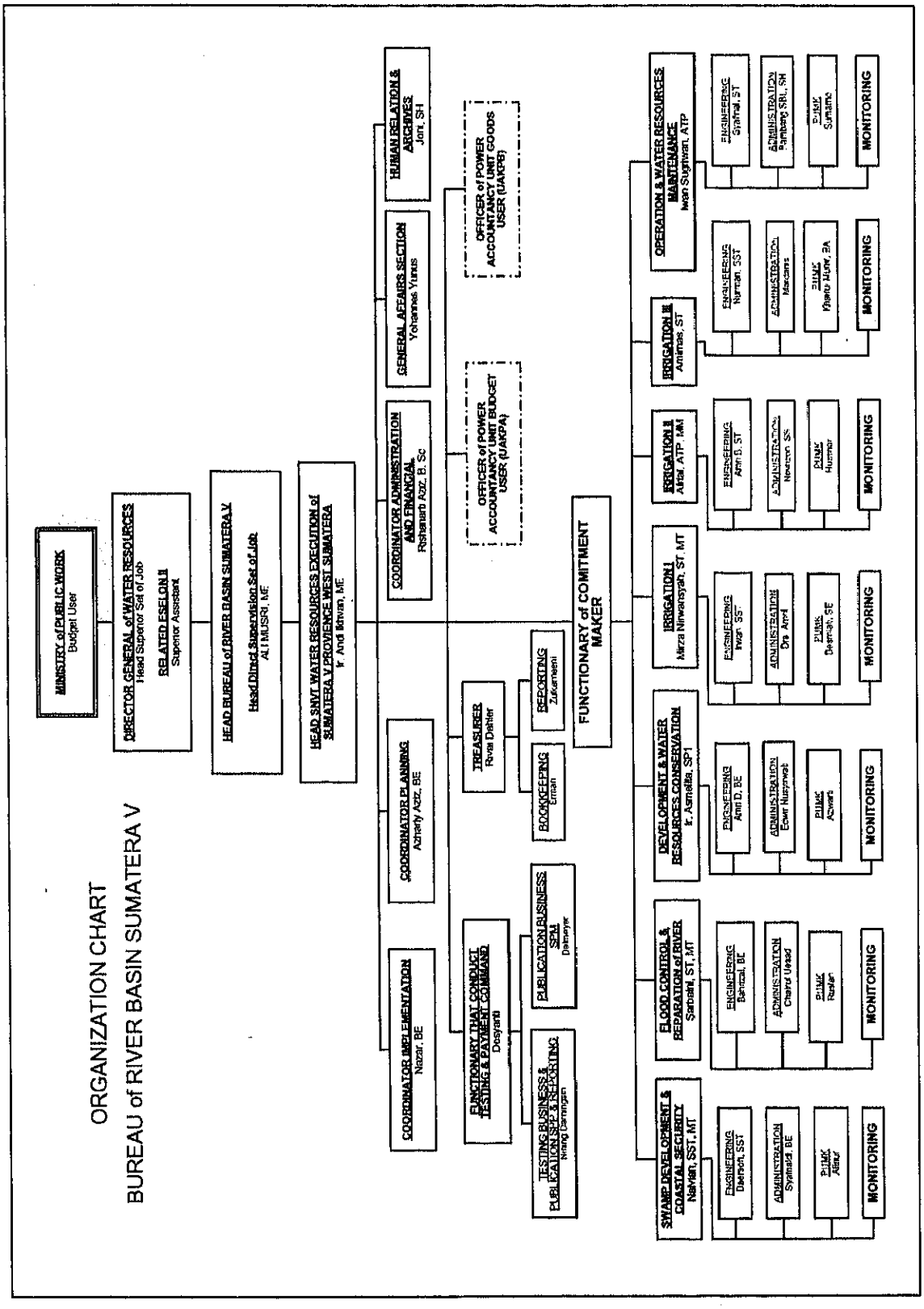
Source: Design Report, Anai-Kandis River Improvement (Oct. 2001)

Figure 5.3 Design Longitudinal Profile of Anai River



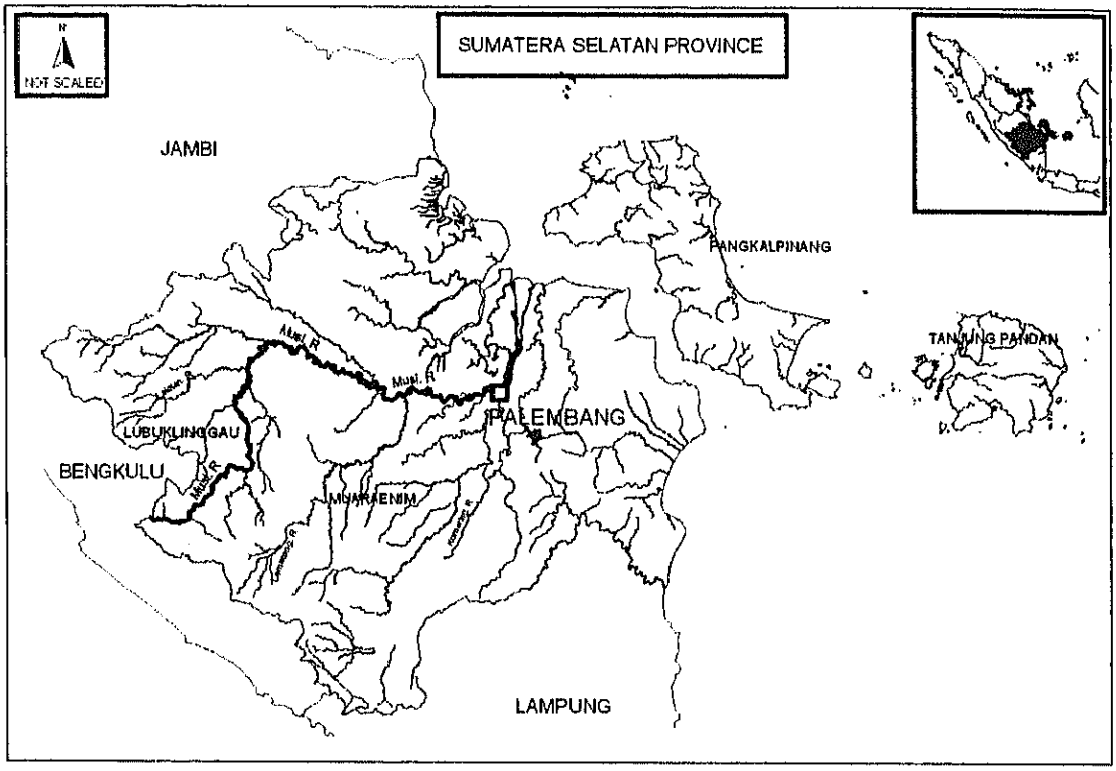
Source: Design Report, Anai-Kandis River Improvement (Oct. 2001)

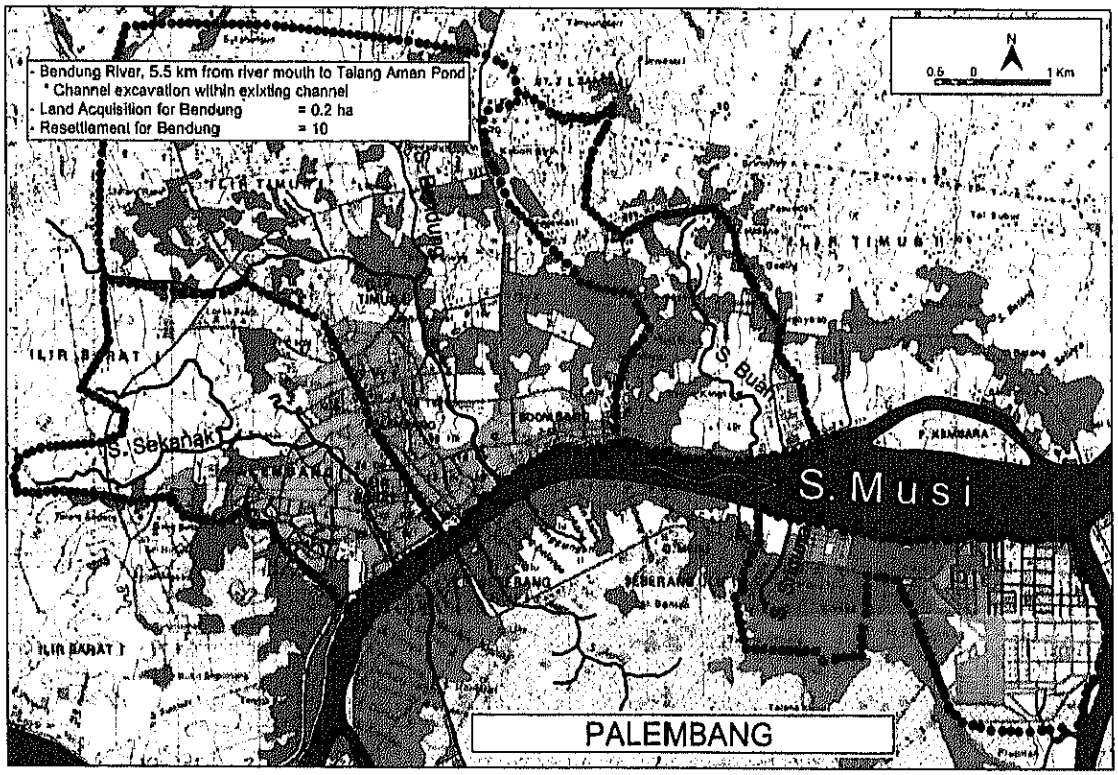
Figure 5.4 Typical Design Cross-Section of Anai River



Source: BWS Sumatra V-Padang

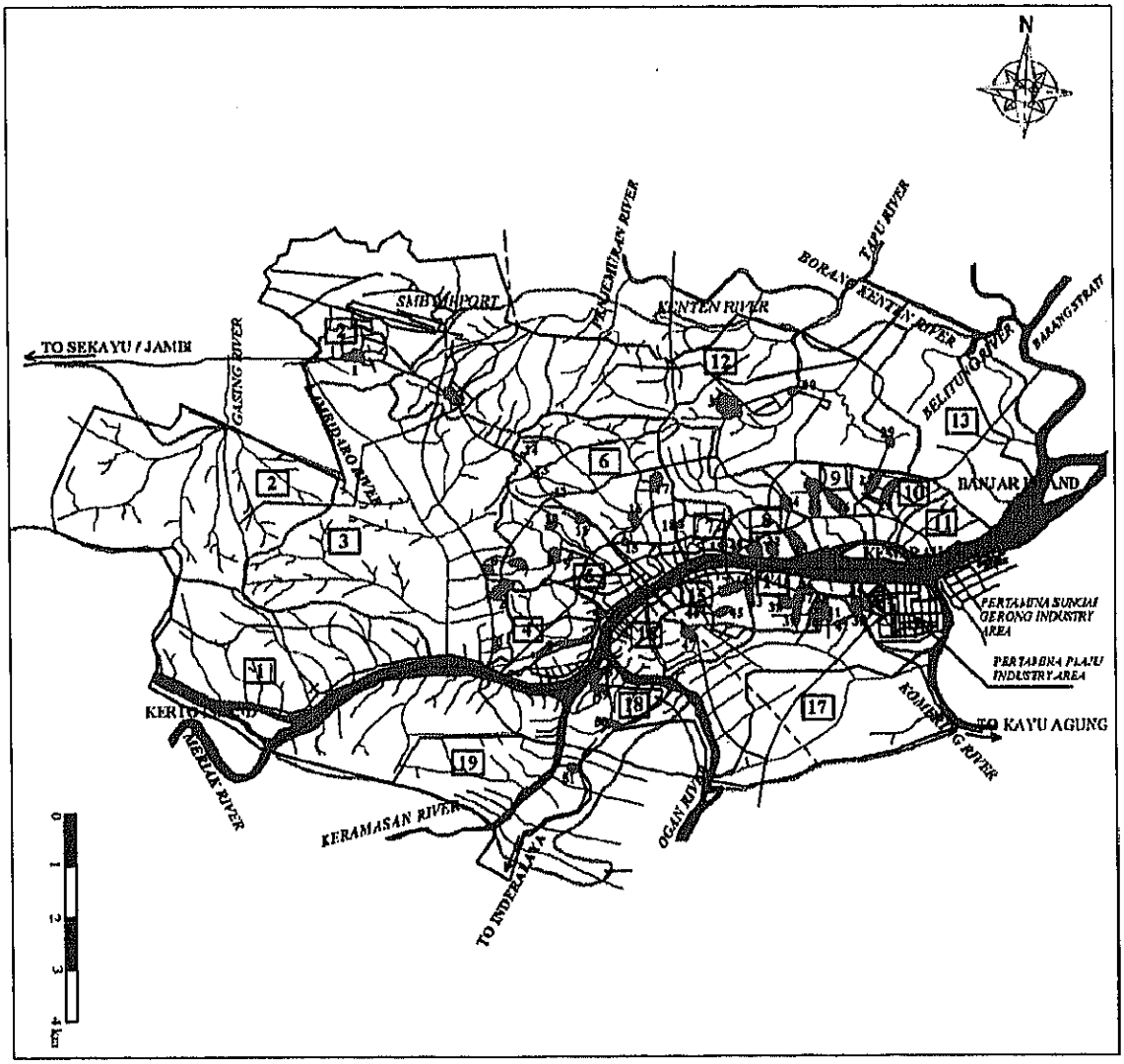
Figure 5.5 Organization Chart of BWS Sumatra V





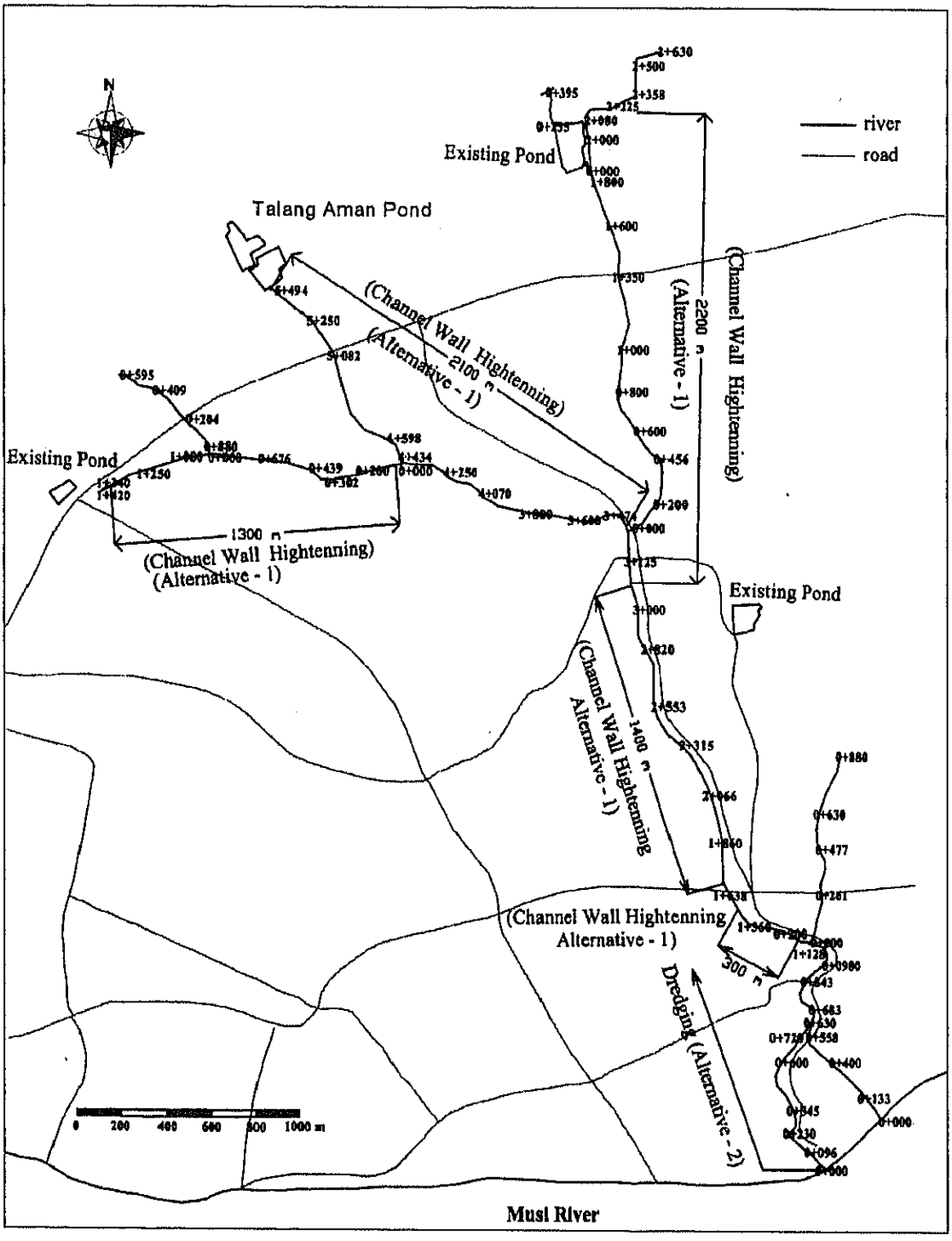
Source: BAKOSURTANAL

Figure 5.6 Location Map of Palembang Sub-project



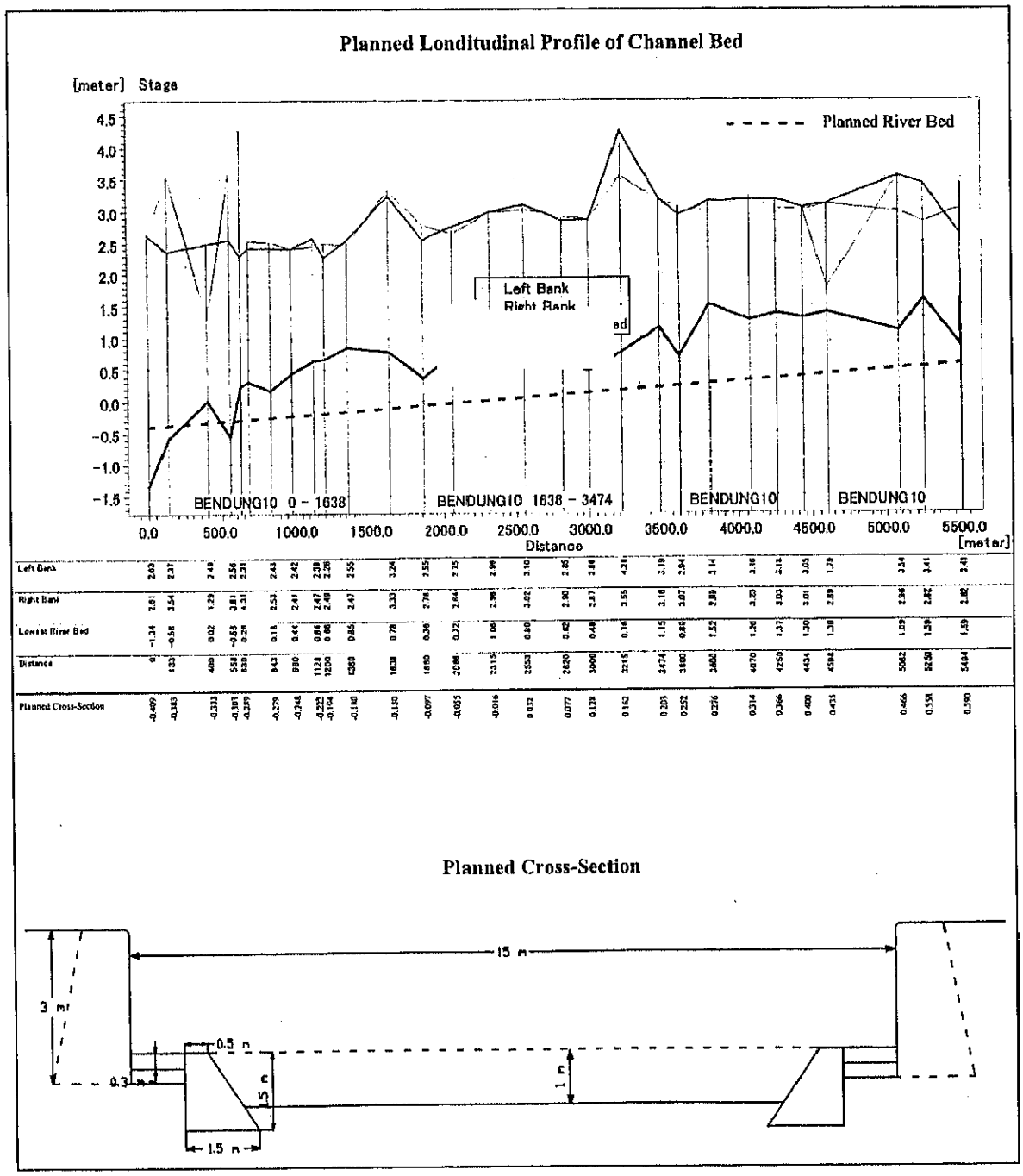
Source: Study on Comprehensive Water Management of Musi River Basin (JICA, Sep. 2003)

Figure 5.7 Typical Inundation Area in Palembang



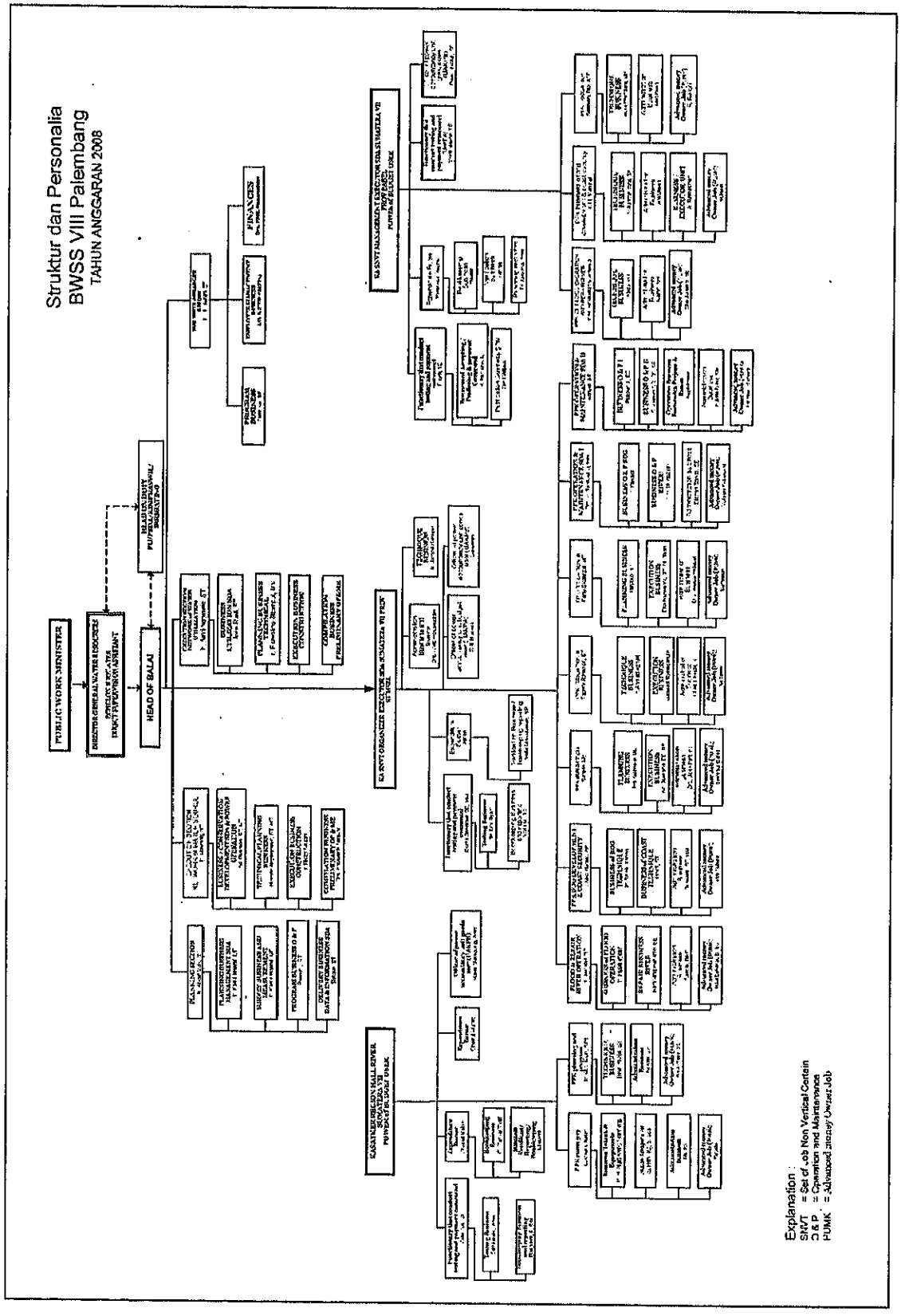
Source: Study on Comprehensive Water Management of Musi River Basin (JICA, Sep. 2003)

Figure 5.8 Bendung Drainage System



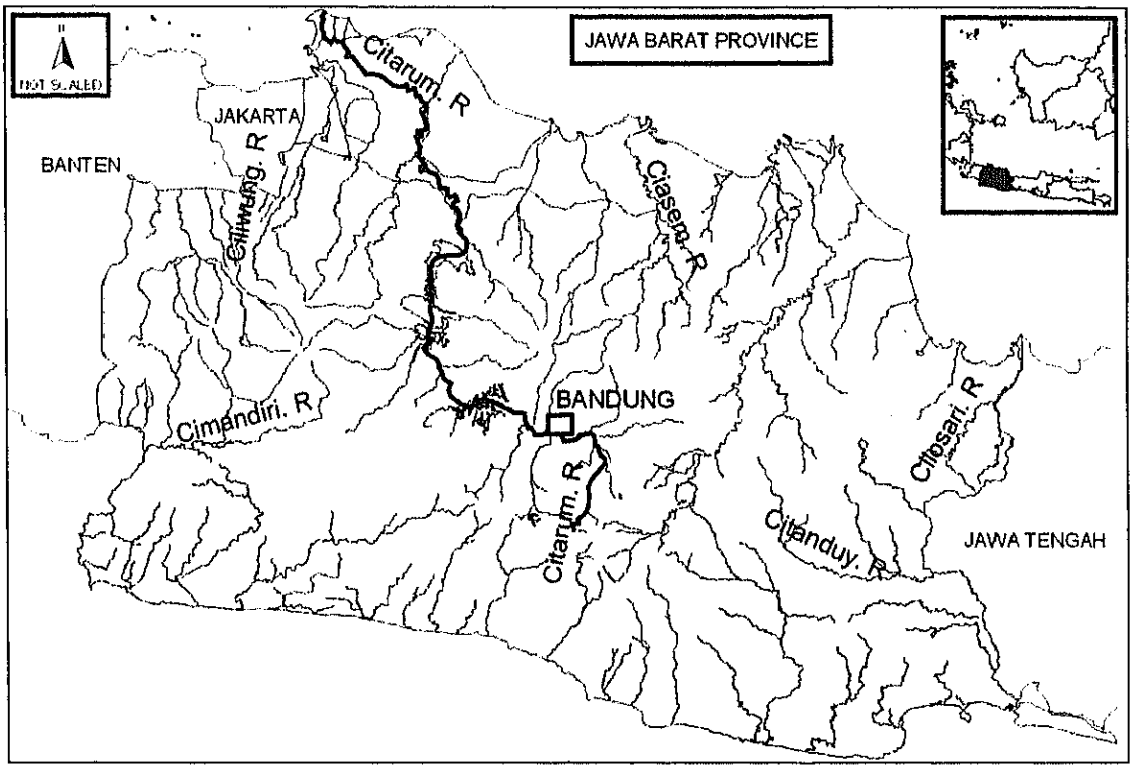
Source: Study on Comprehensive Water Management of Musi River Basin (JICA, Sep. 2003)

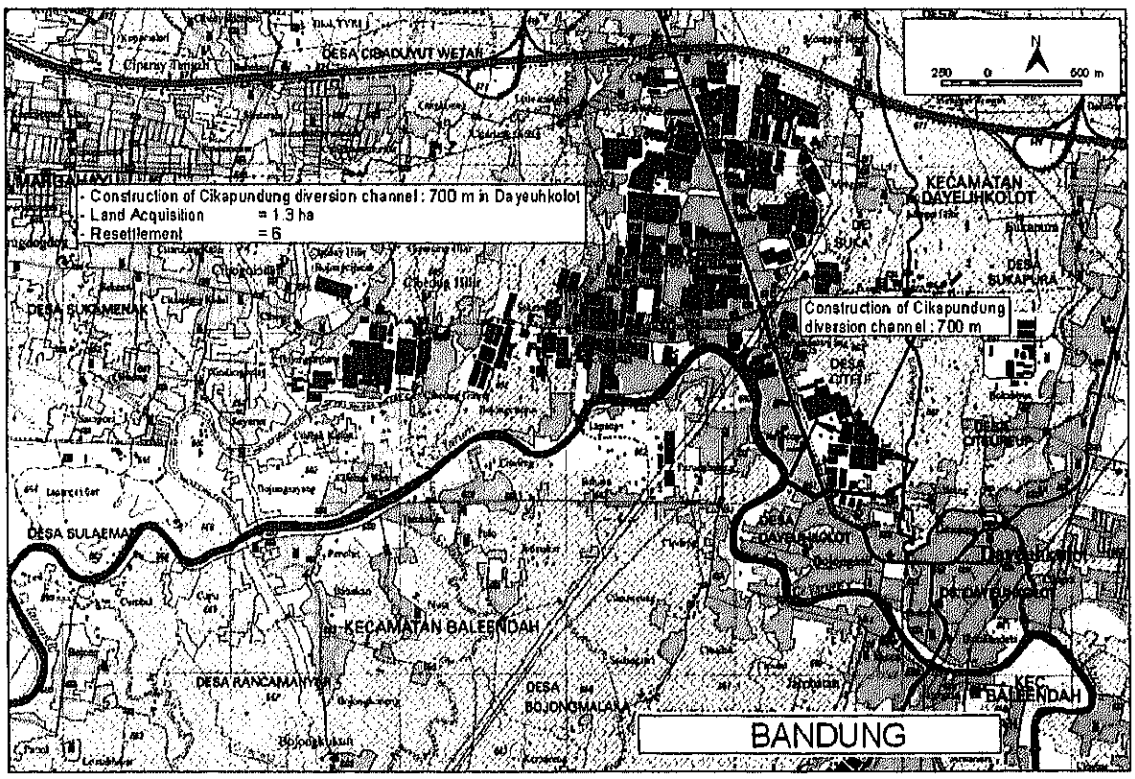
Figure 5.9 Design Features of Bendung River



Source: BWS Sumatra VIII - Palembang

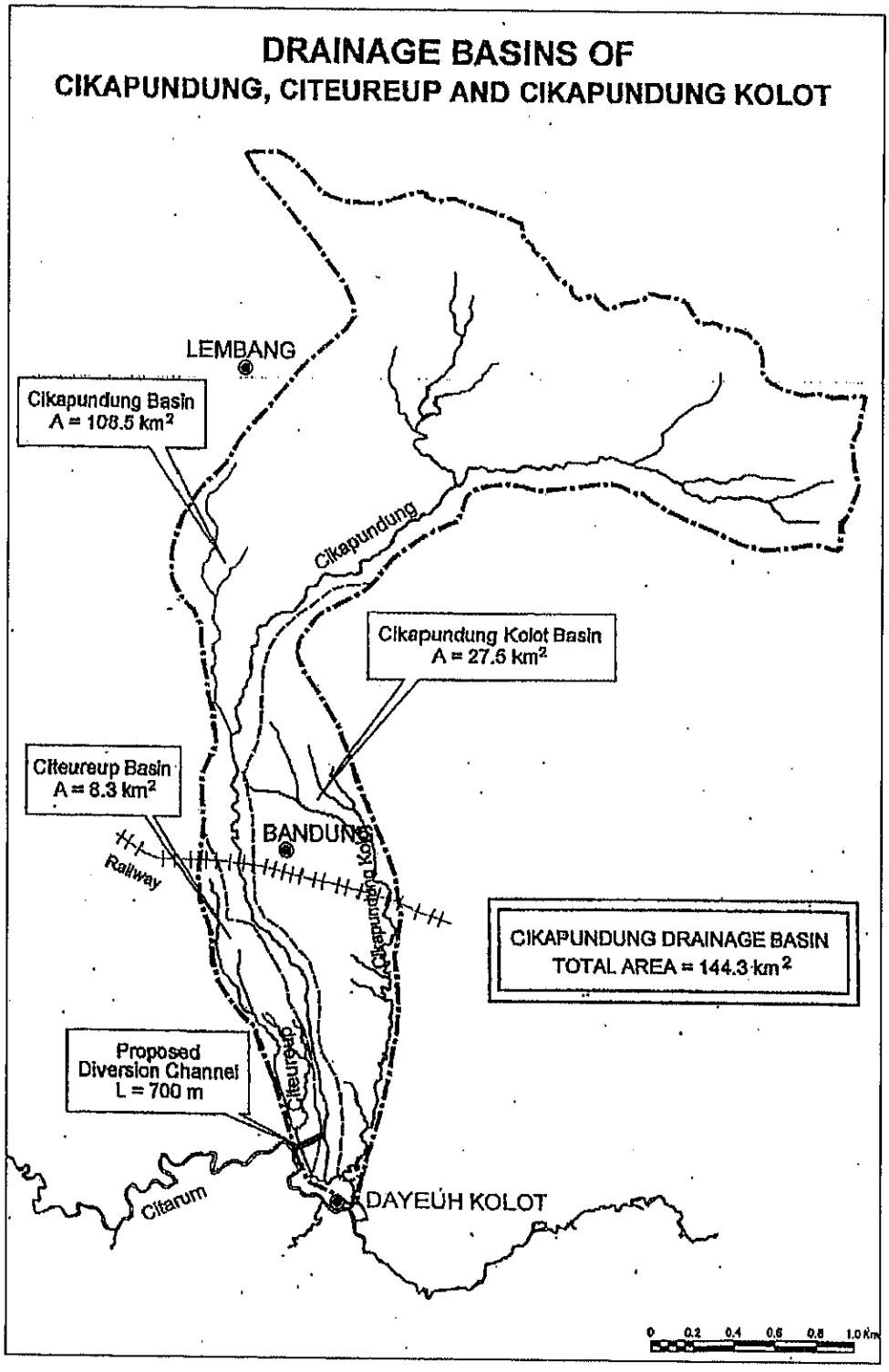
Figure 5.10 Organization Chart of BWS Sumatra VIII





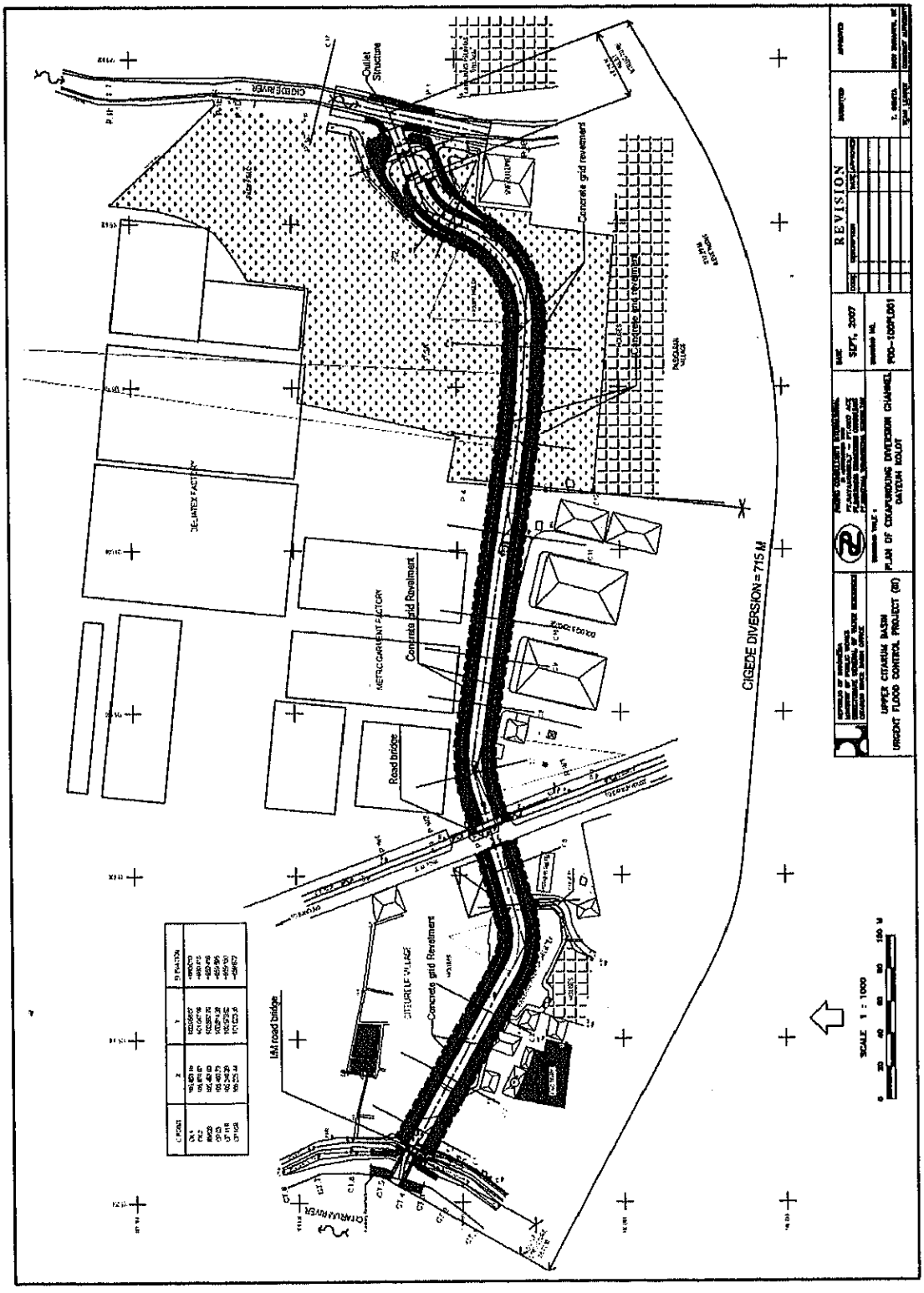
Source: BAKOSURTANAL

Figure 5.11 Location Map of Bandung Sub-project



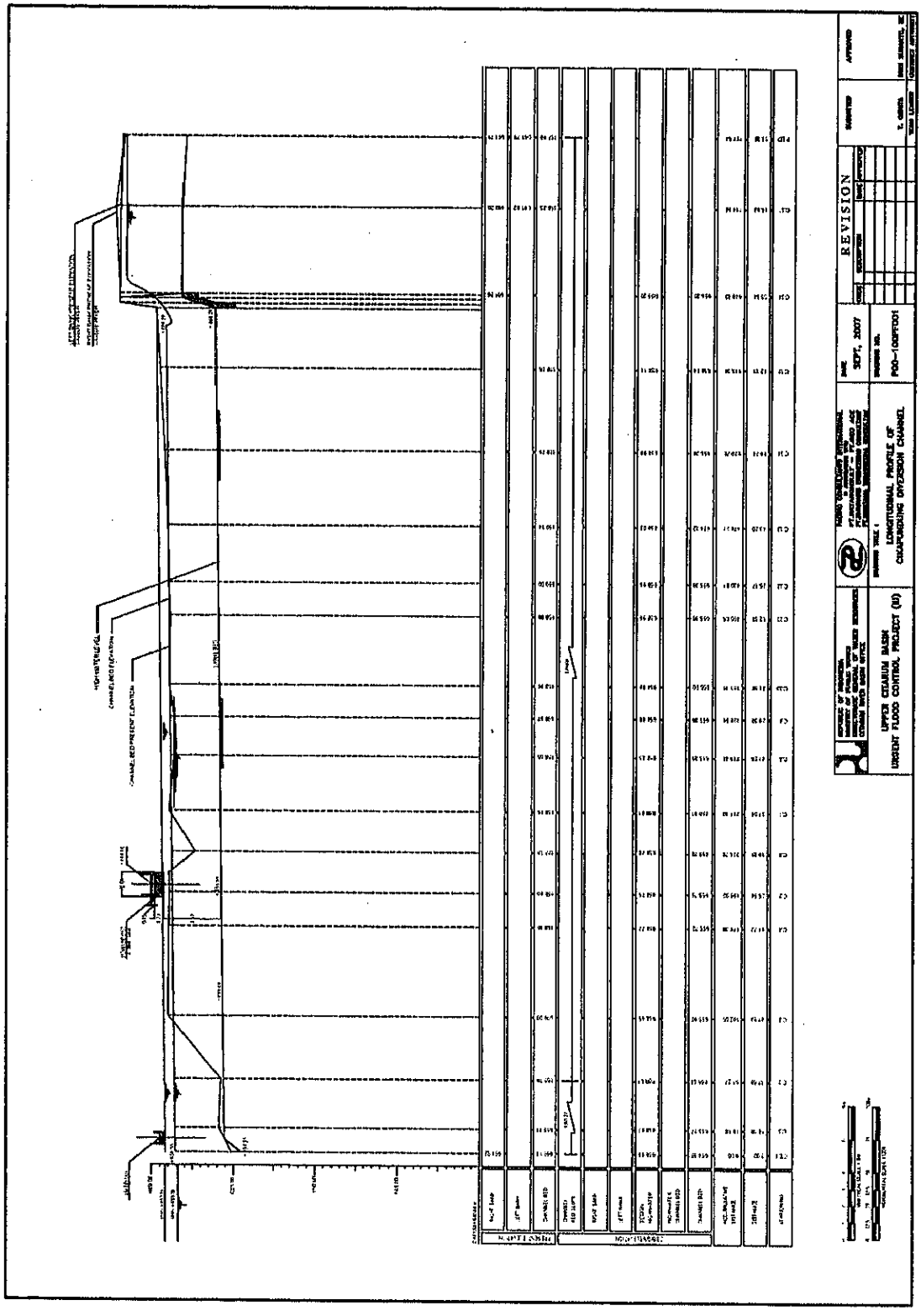
Source: Materi Dalam Rangka Penanganan Banjir di Cekungan Bandung (BBWS Citarum, Jul. 2008)

Figure 5.12 Cikapundung Drainage Basin



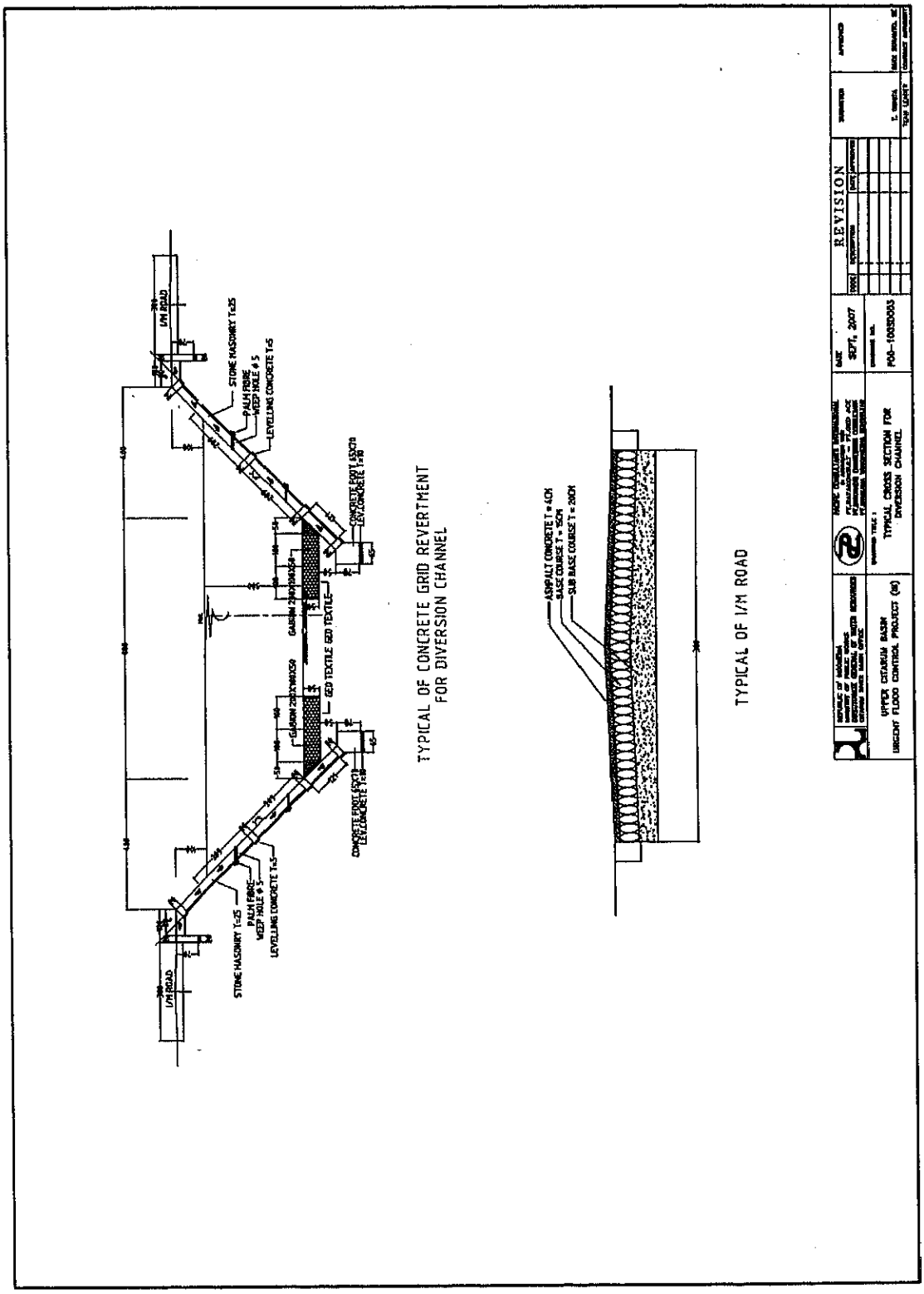
Source: Engineering Report, Upper Citarum Basin Urgent Flood Control Project (Sep. 2007)

Figure 5.13 Plan of Cikapundung Diversion Channel



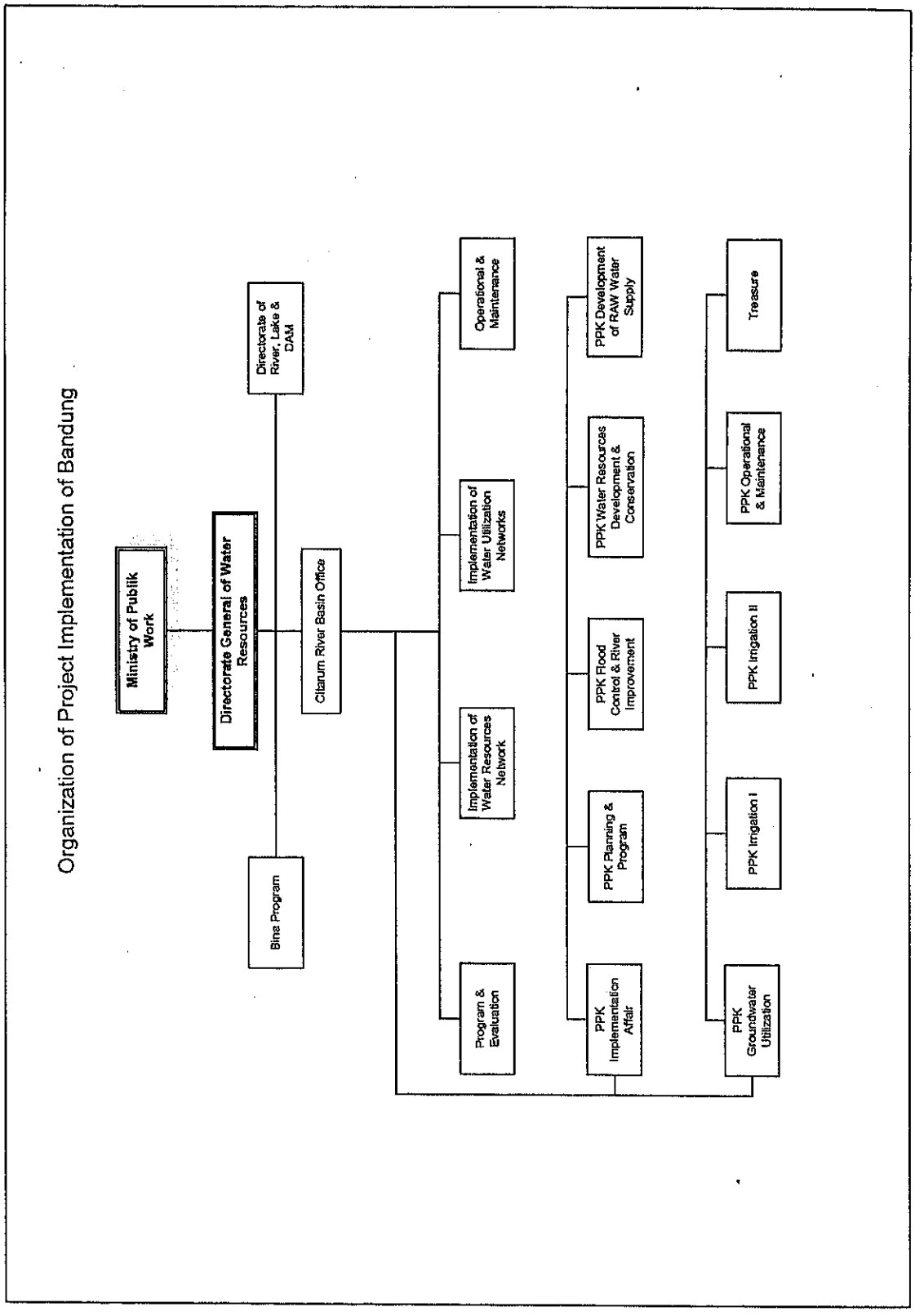
Source: Engineering Report, Upper Citarum Basin Urgent Flood Control Project (Sep. 2007)

Figure 5.14 Longitudinal Profile of Cikapundung Diversion Channel



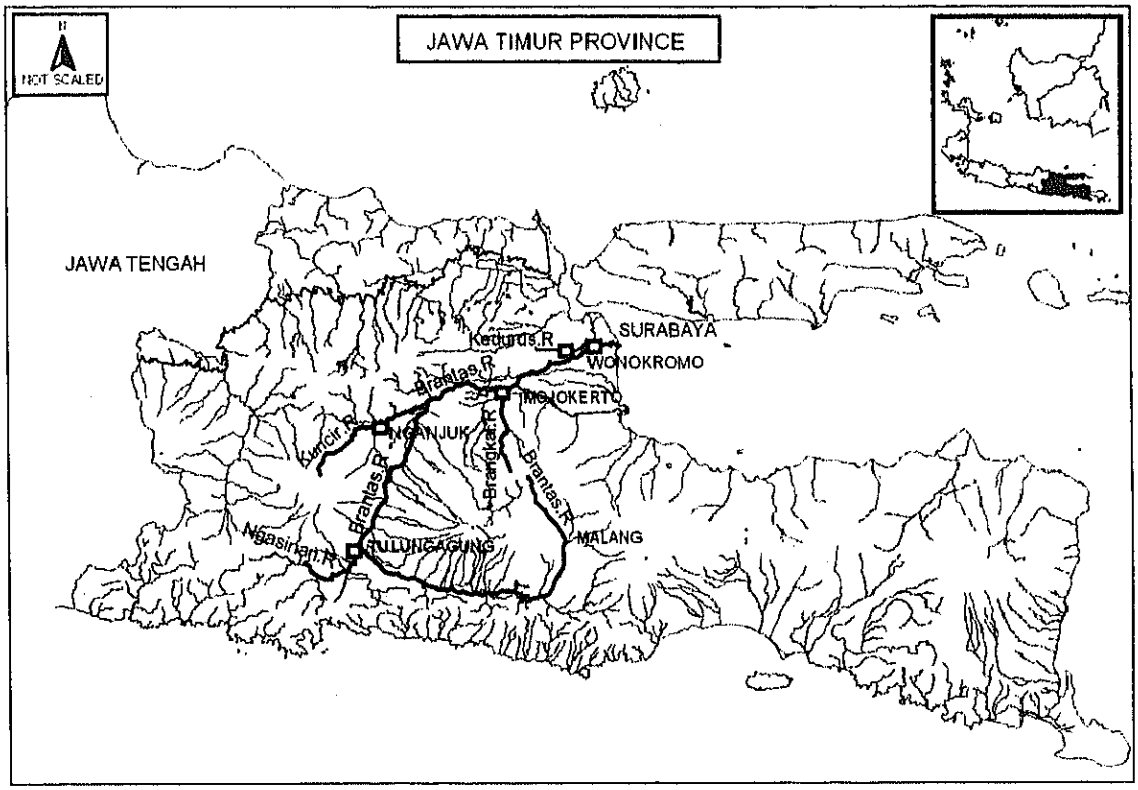
Source: Engineering Report, Upper Citarum Basin Urgent Flood Control Project (Sep. 2007)

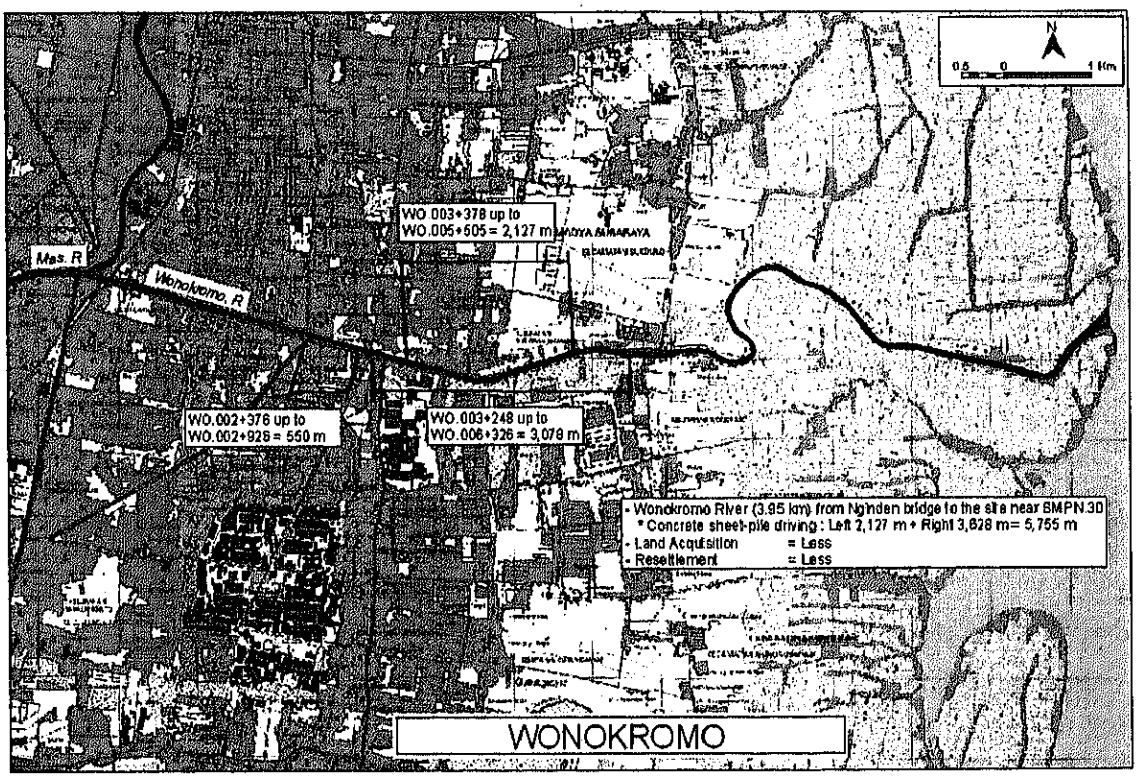
Figure 5.15 Typical Cross-Section of Cikapundung Diversion Channel



Source: BBWS Citarum

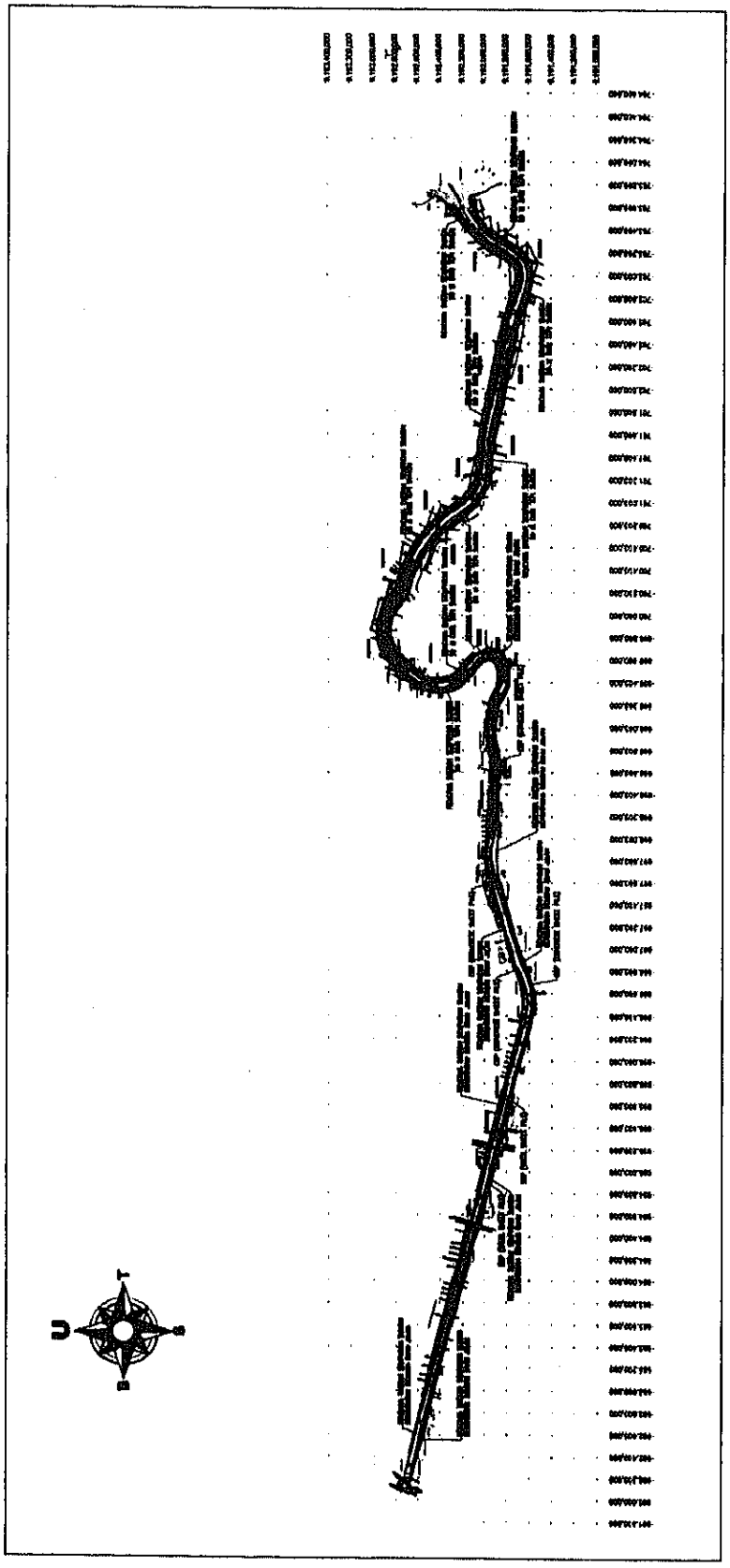
Figure 5.16 Organization Chart of BBWS Citarum





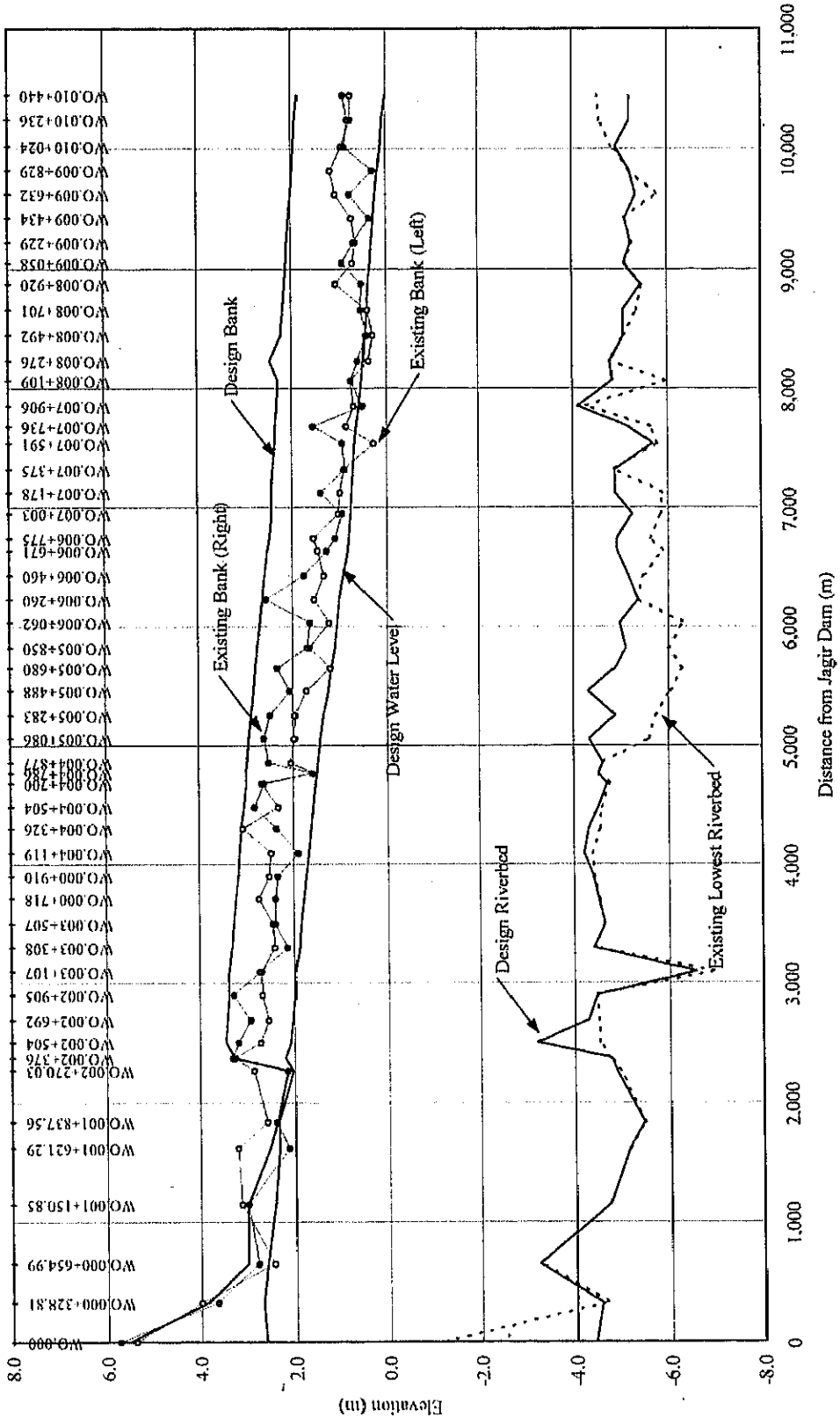
Source: BAKOSURTANAL

Figure 5.17 Location Map of Surabaya - Wonokromo Sub-project



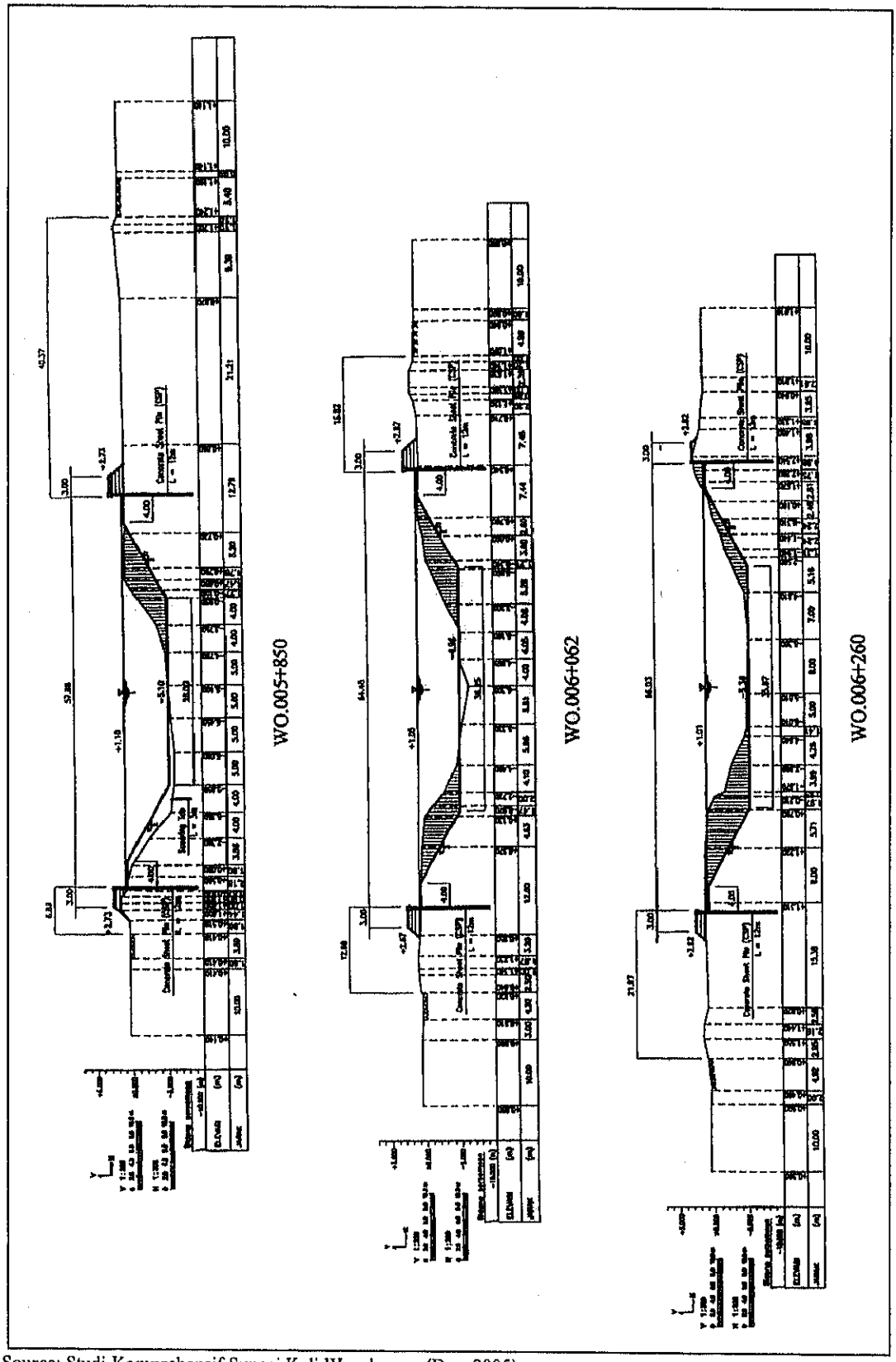
Source: Studi Komprehensif Sungai Kali Wonokromo (Dec. 2005)

Figure 5.18 General Plan of Wonokromo River



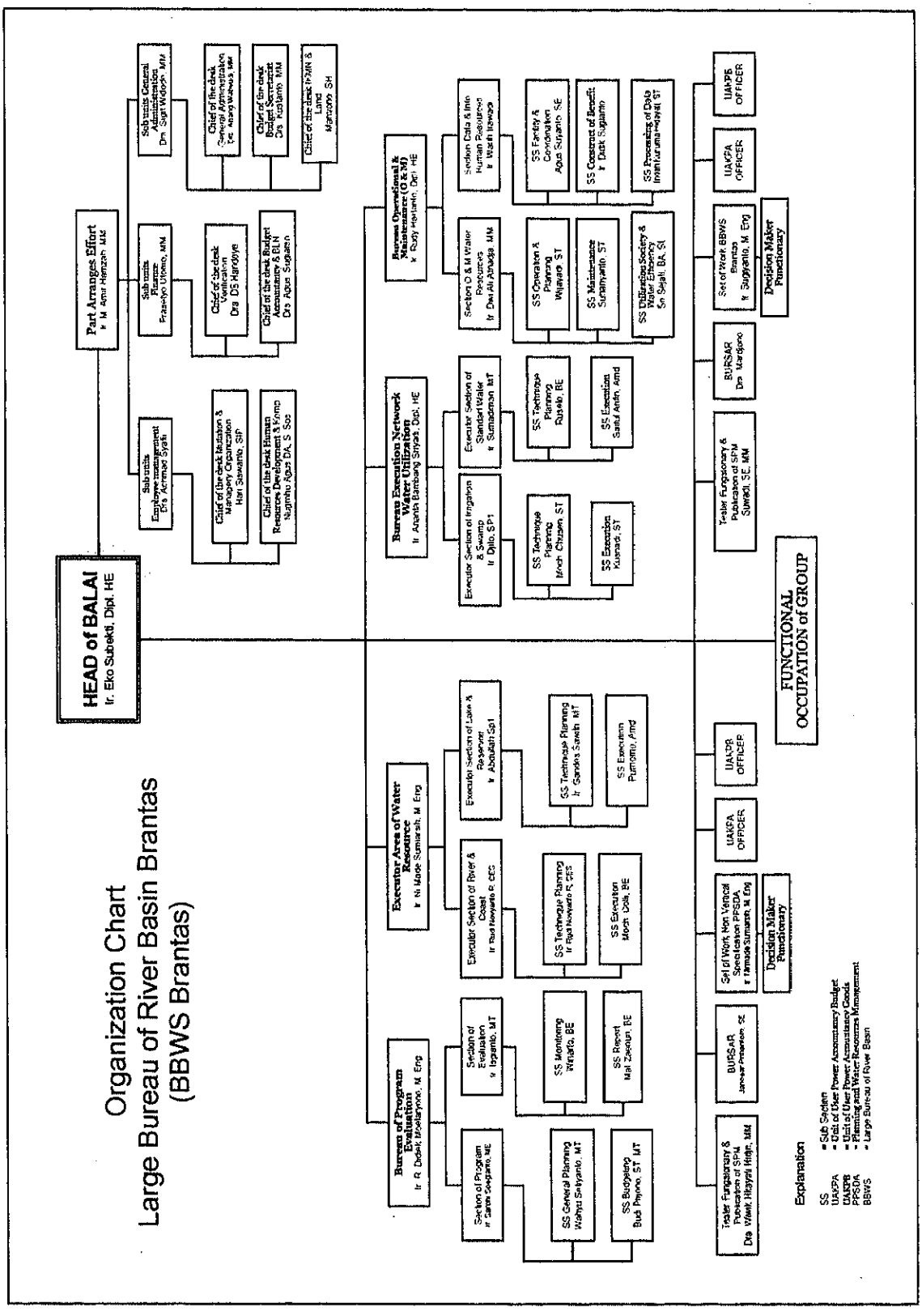
Source: Studi Komprehensif Sungai Kali Wonokromo (Dec. 2005)

Figure 5.19 Longitudinal Profile of Wonokromo River



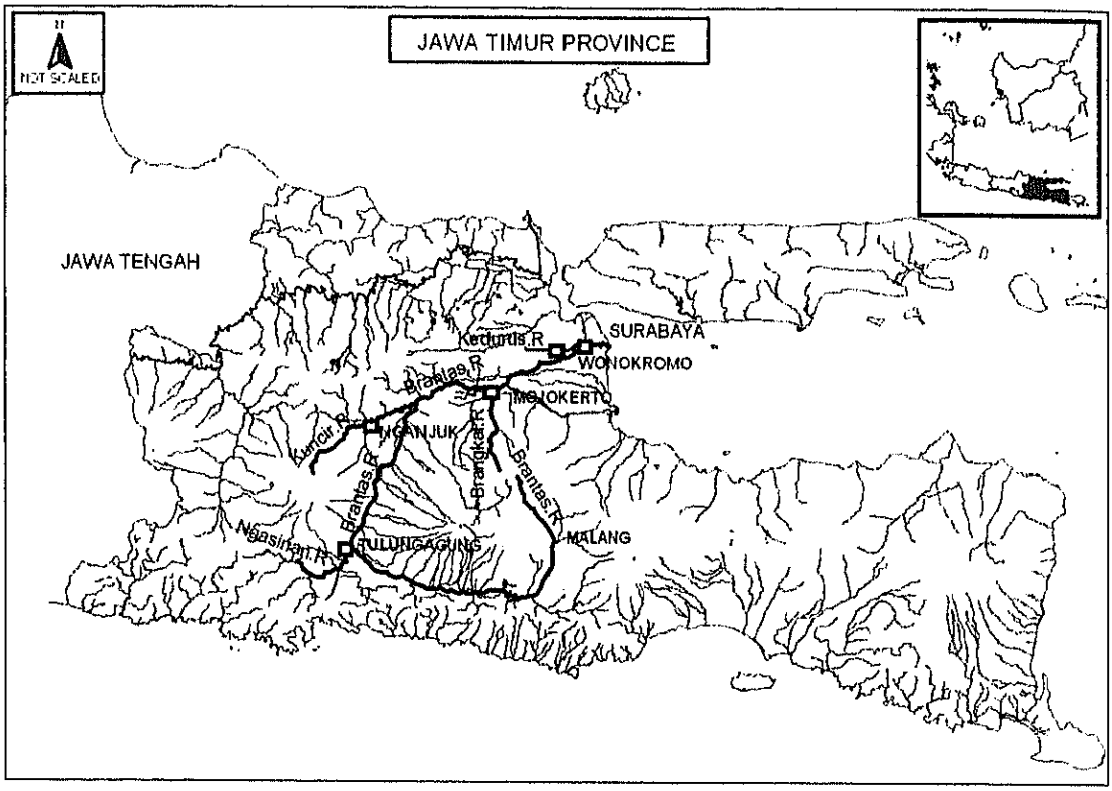
Source: Studi Komprehensif Sungai Kali Wonokromo (Dec. 2005)

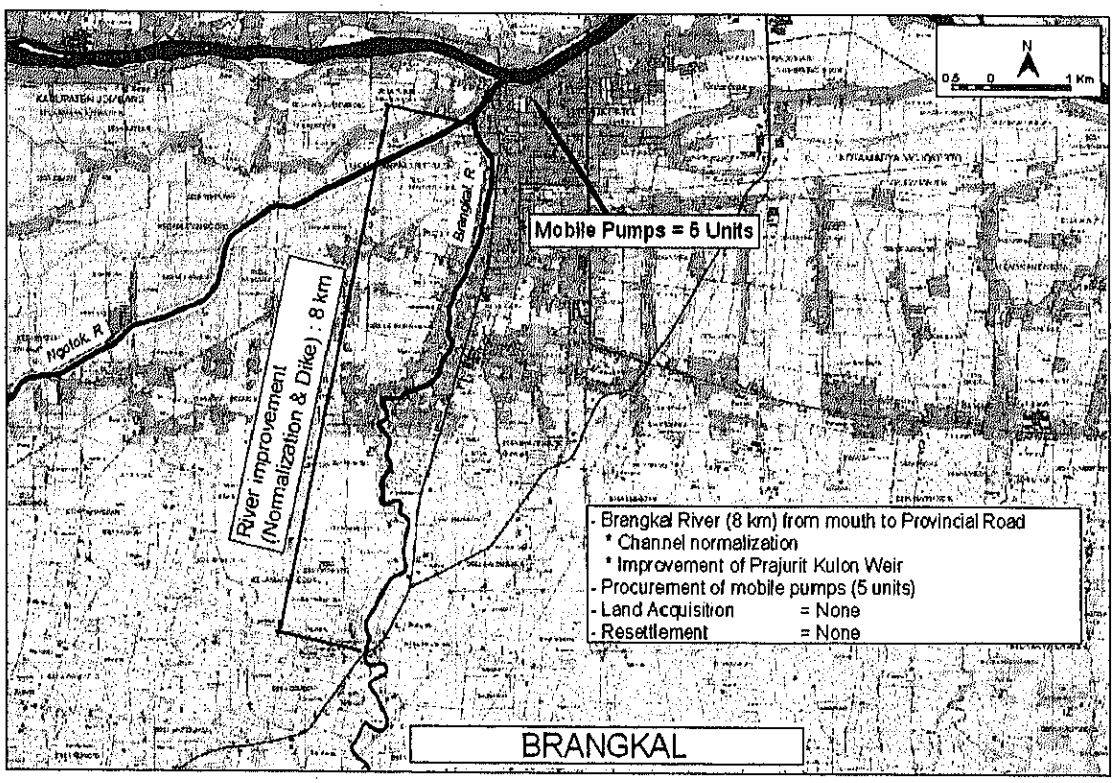
Figure 5.20 Typical Cross-Section of Wonokromo River



Source: BBWS Brantas

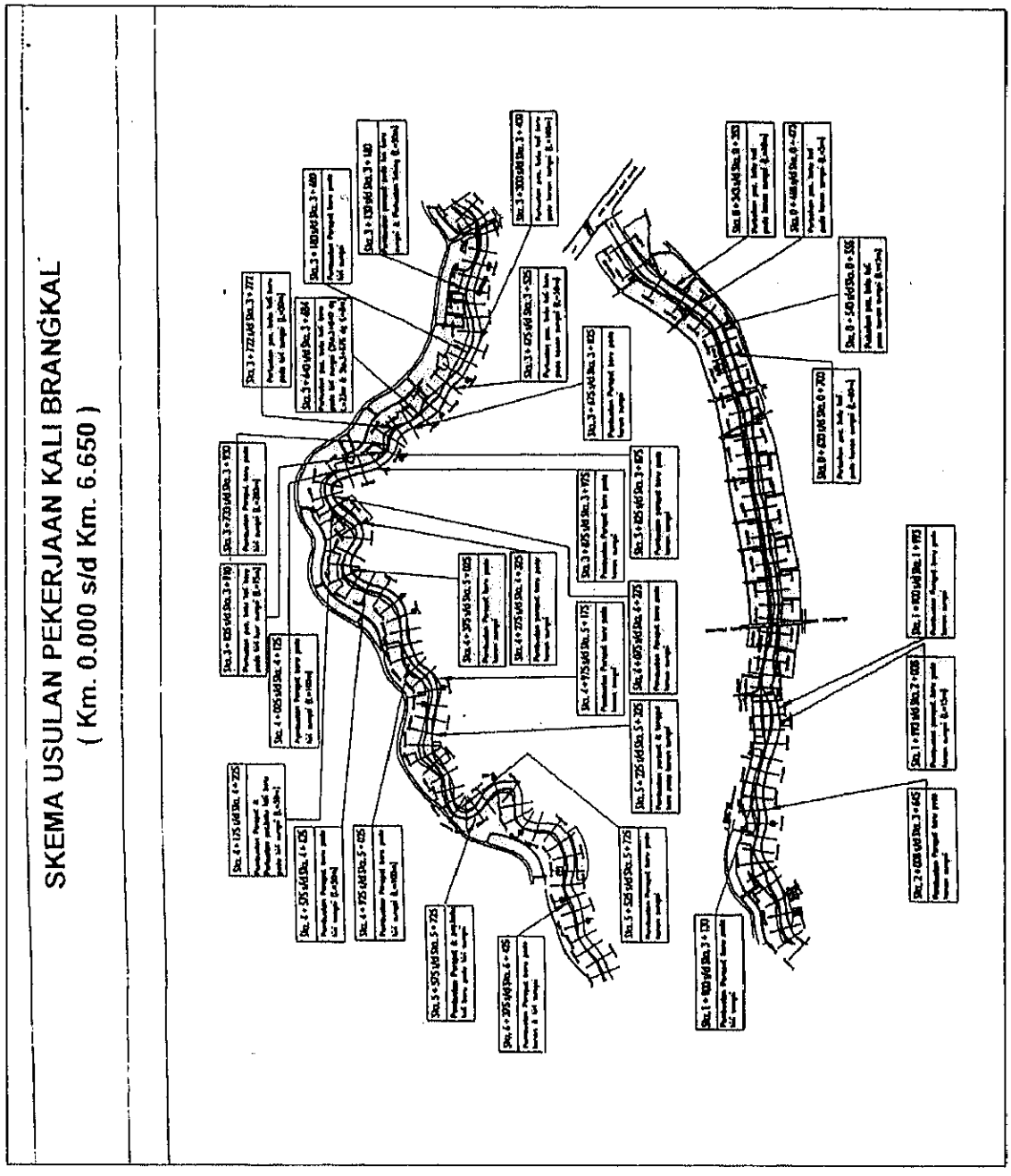
Figure 5.21 Organization Chart of BBWS Brantas





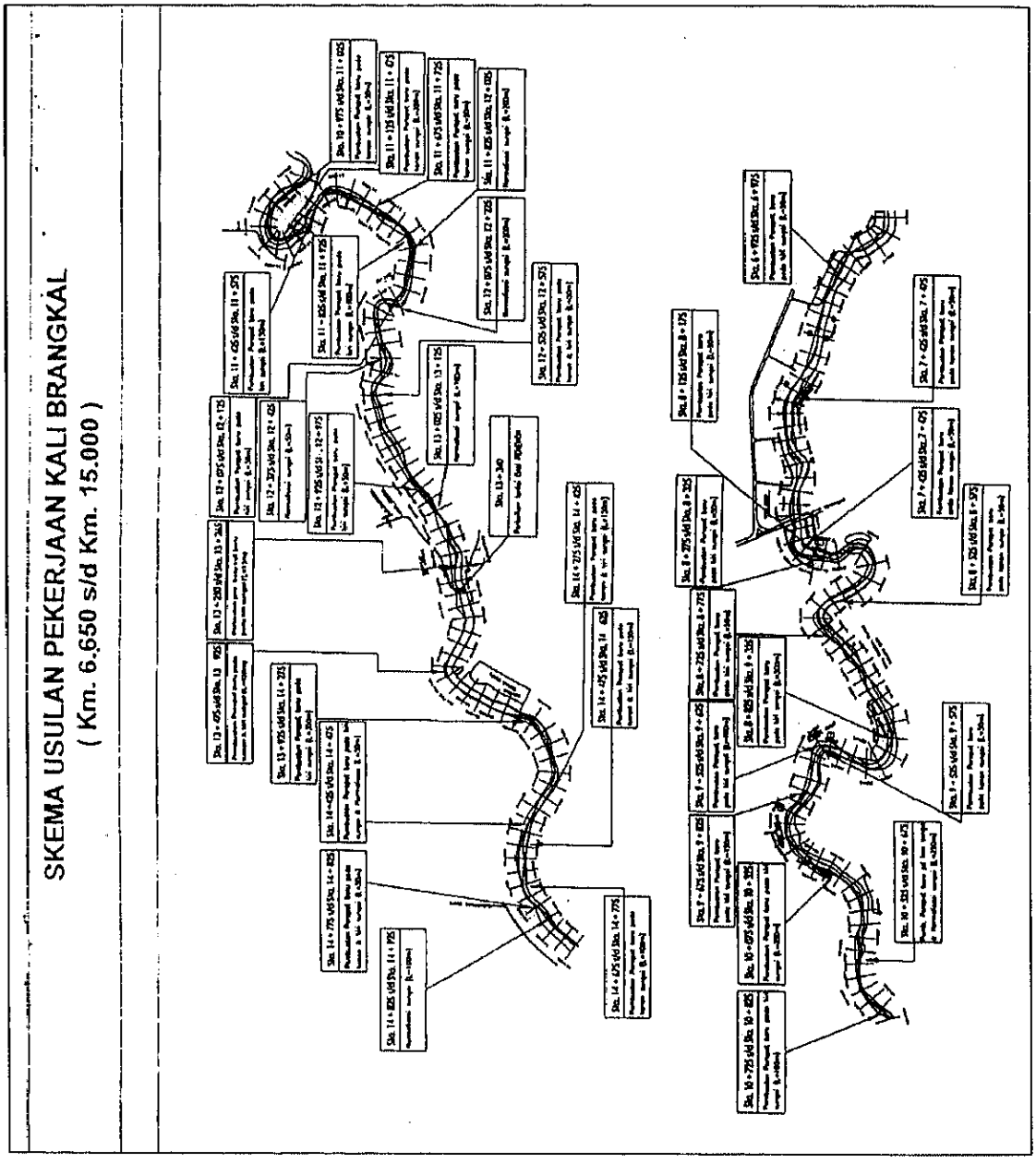
Source: BAKOSURTANAL

Figure 5.22 Location Map of Surabaya - Brangkal Sub-project



Source: SID Perbaikan Sungai Brangkal & Perencanaan DAS Kali Brangkal (Dec. 2005)

Figure 5.23 Plan of Brangkal River (1/2)

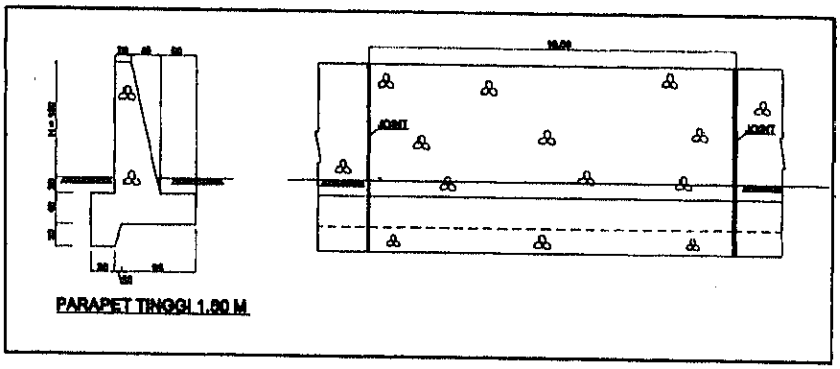


Source: SID Perbaikan Sungai Brangkal & Perencanaan DAS Kali Brangkal (Dec. 2005)

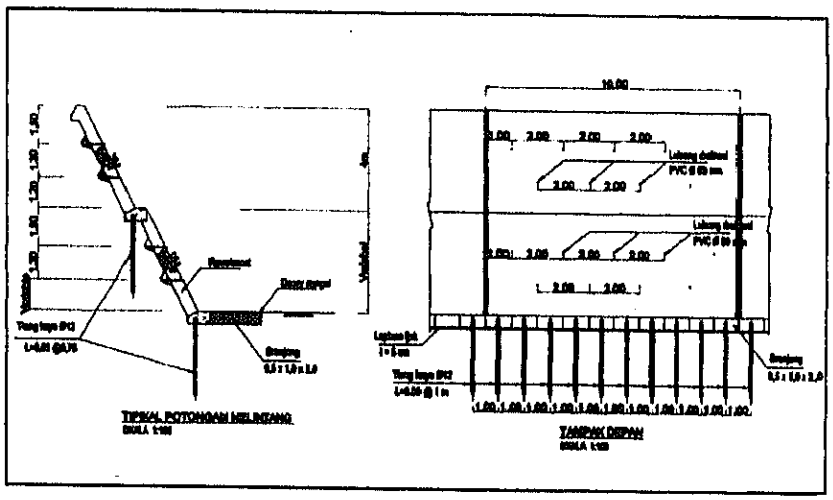
Figure 5.23 Plan of Brangkal River (2/2)

TYPICAL BANGUNAN MAIN STREAM SUNGAI

Typical Bangunan Parapet

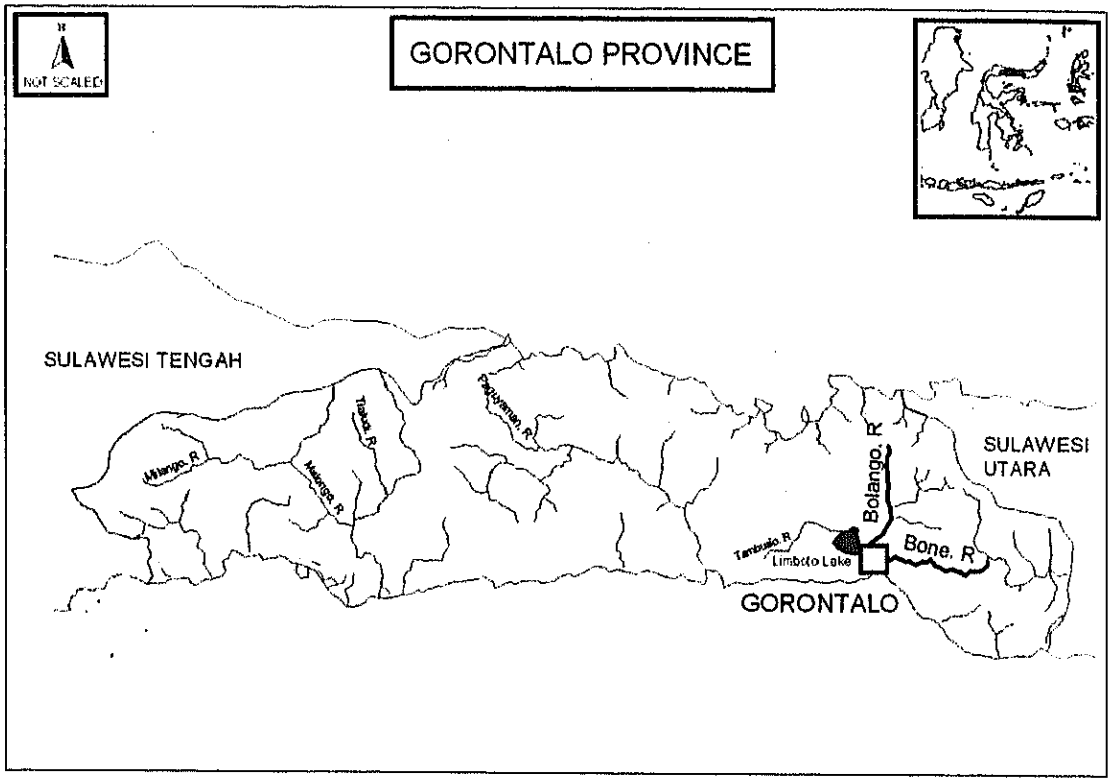


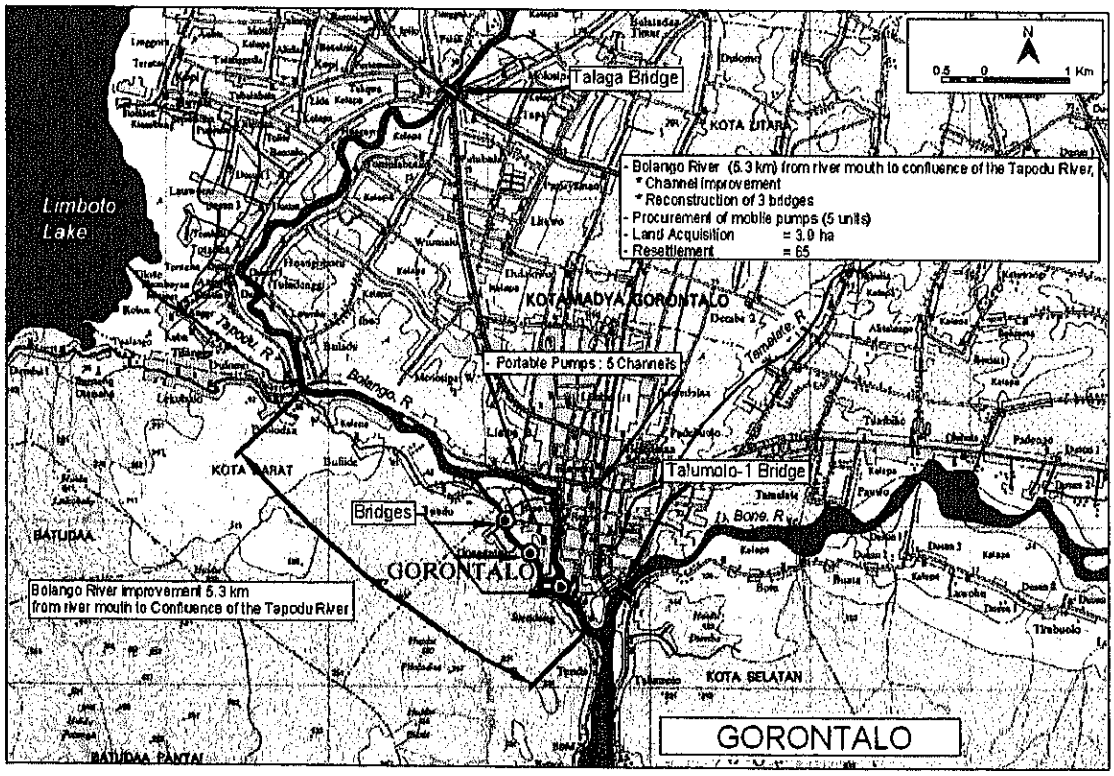
Typical Bangunan Revertment



Source: SID Perbaikan Sungai Brangkal & Perencanaan DAS Kali Brangkal (Dec. 2005)

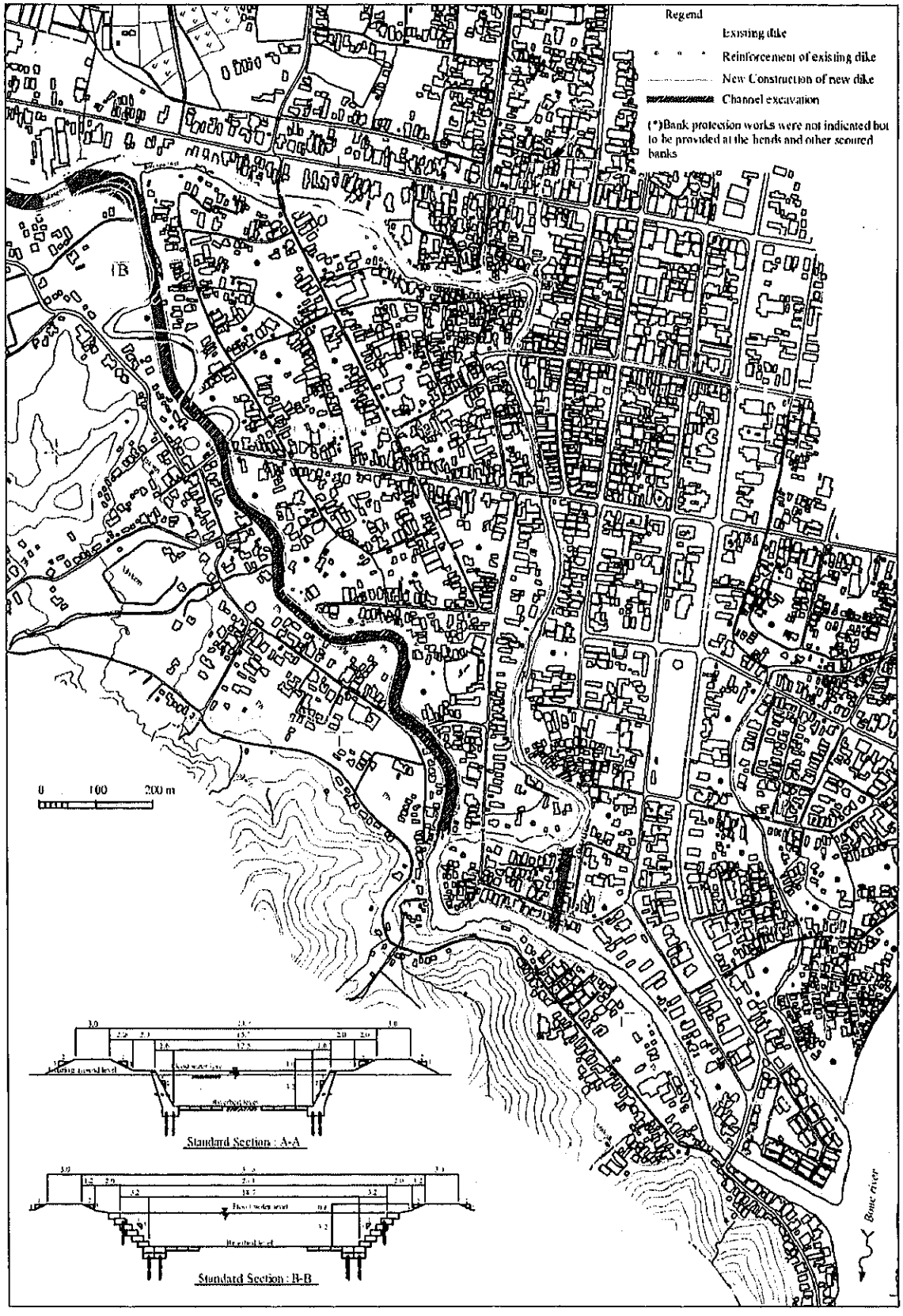
Figure 5.24 Typical Bank Protection for Brangkal River





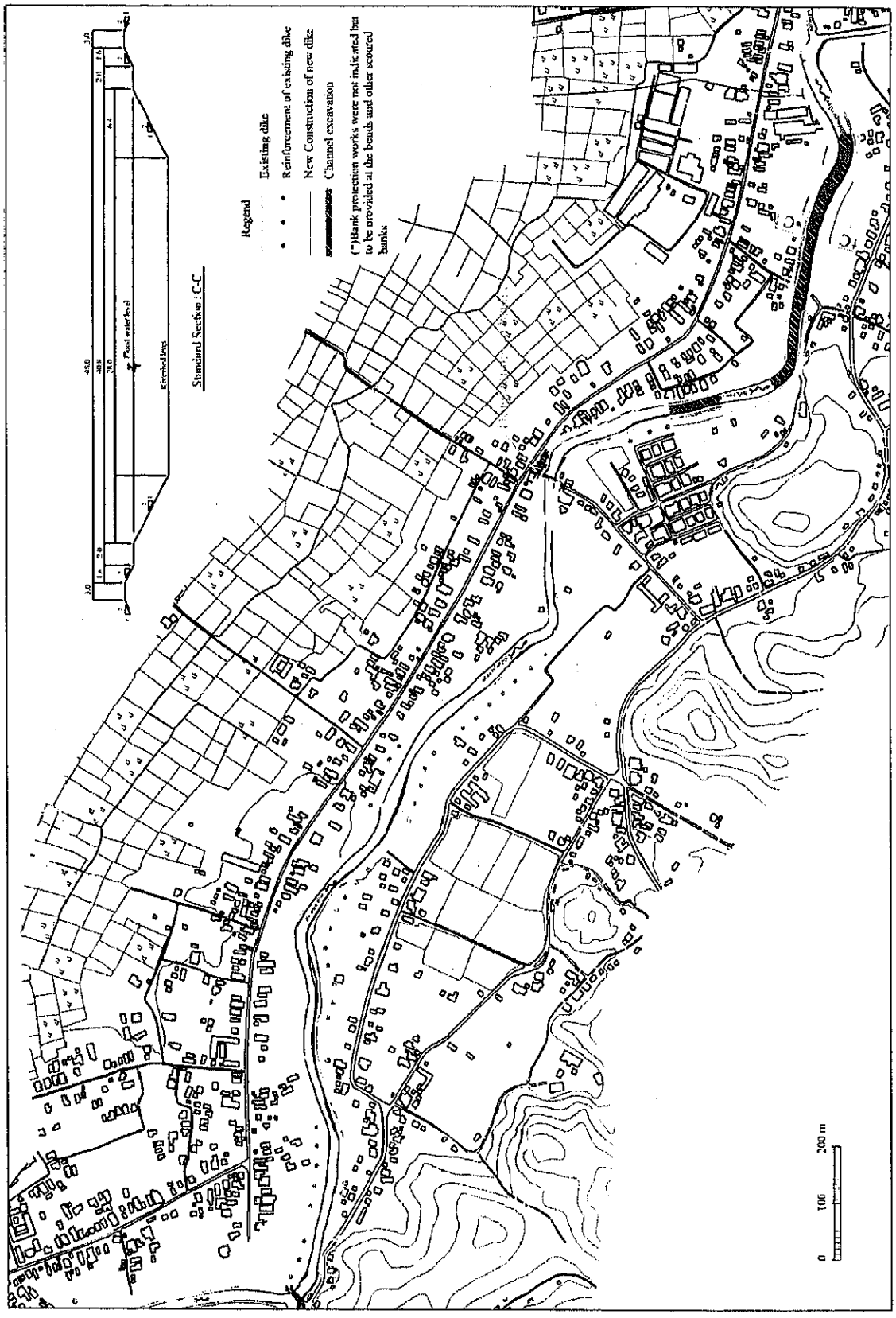
Source: BAKOSURTANAL

Figure 5.25 Location Map of Gorontalo Sub-project



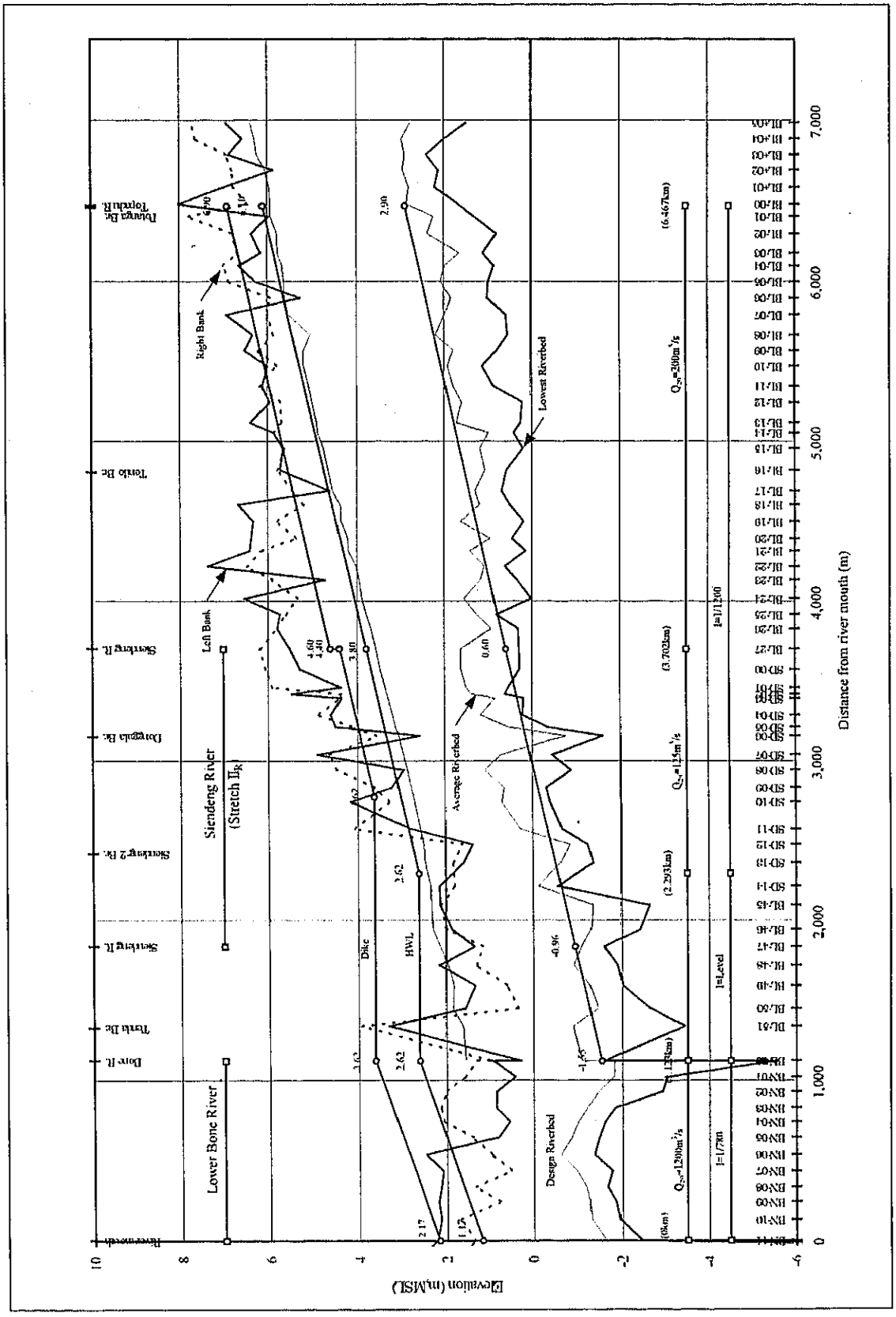
Source: Study on Flood Control and Water Management in Limboto-Bolango-Bone Basin (JICA, Dec. 2002)

Figure 5.26 Design Plan of Bolango River (1/2)



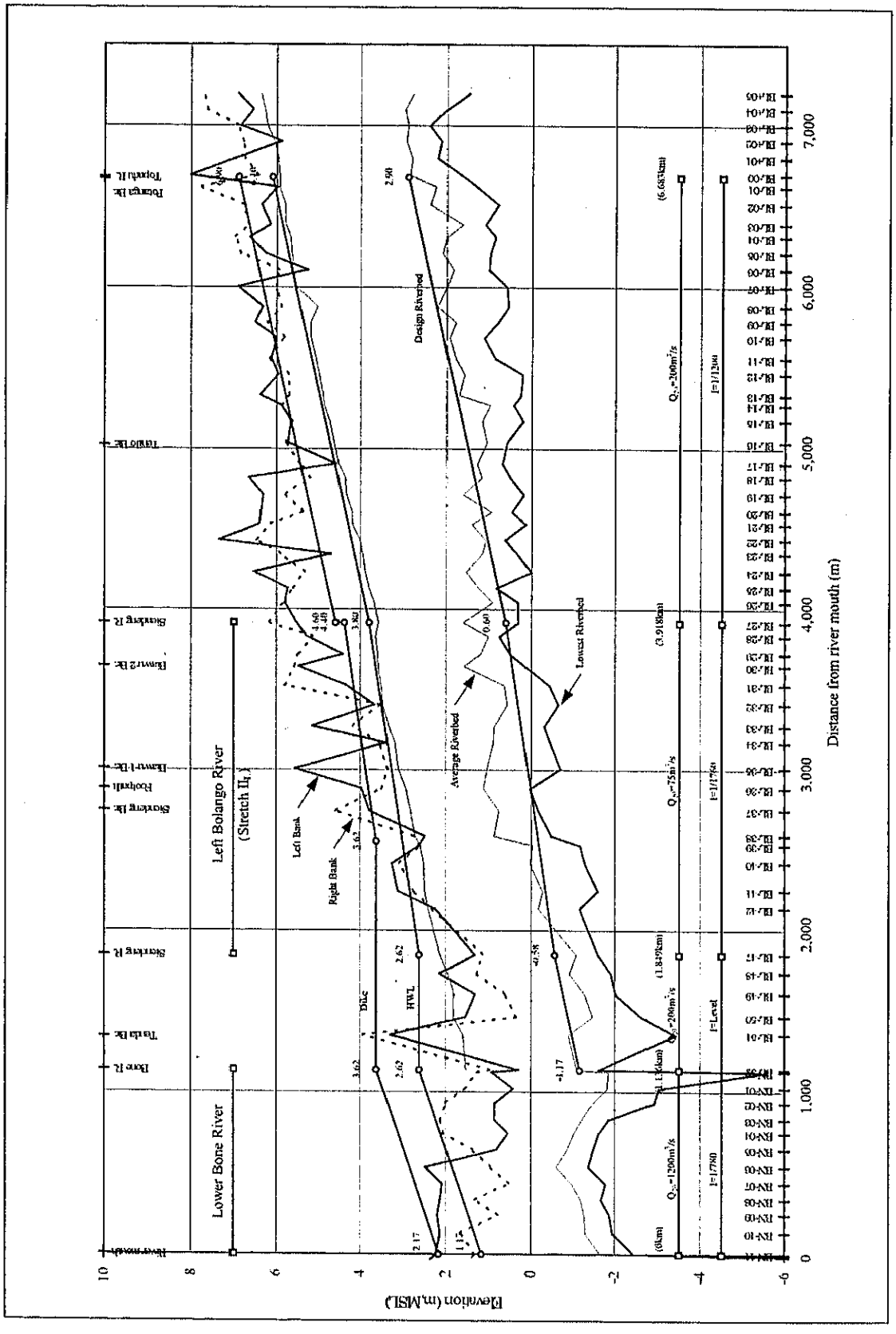
Source: Study on Flood Control and Water Management in Limboto-Bolango-Bone Basin (JICA, Dec. 2002)

Figure 5.26 Design Plan of Bolango River (2/2)



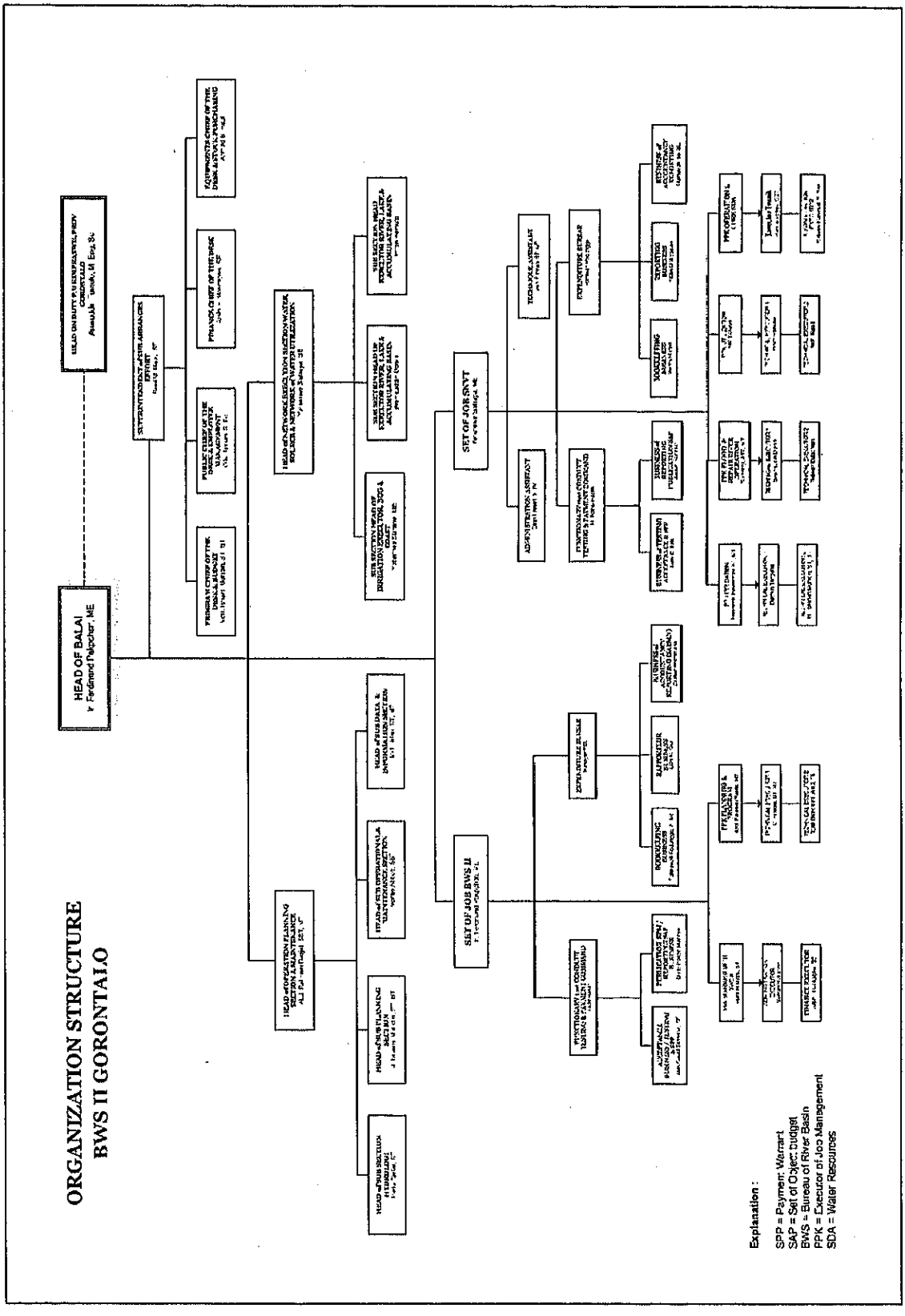
Source: Study on Flood Control and Water Management in Limboto-Bolango-Bone Basin (JICA, Dec. 2002)

Figure 5.27 Longitudinal Profile of Bolango River (1/2): Stretch II_R



Source: Study on Flood Control and Water Management in Limboto-Bolango-Bone Basin (JICA, Dec. 2002)

Figure 5.27 Longitudinal Profile of Bolango River (2/2): Stretch II_L



Source: BWS Sulawesi II - Gorontalo

Figure 5.28 Organization Chart of BWS Sulawesi II

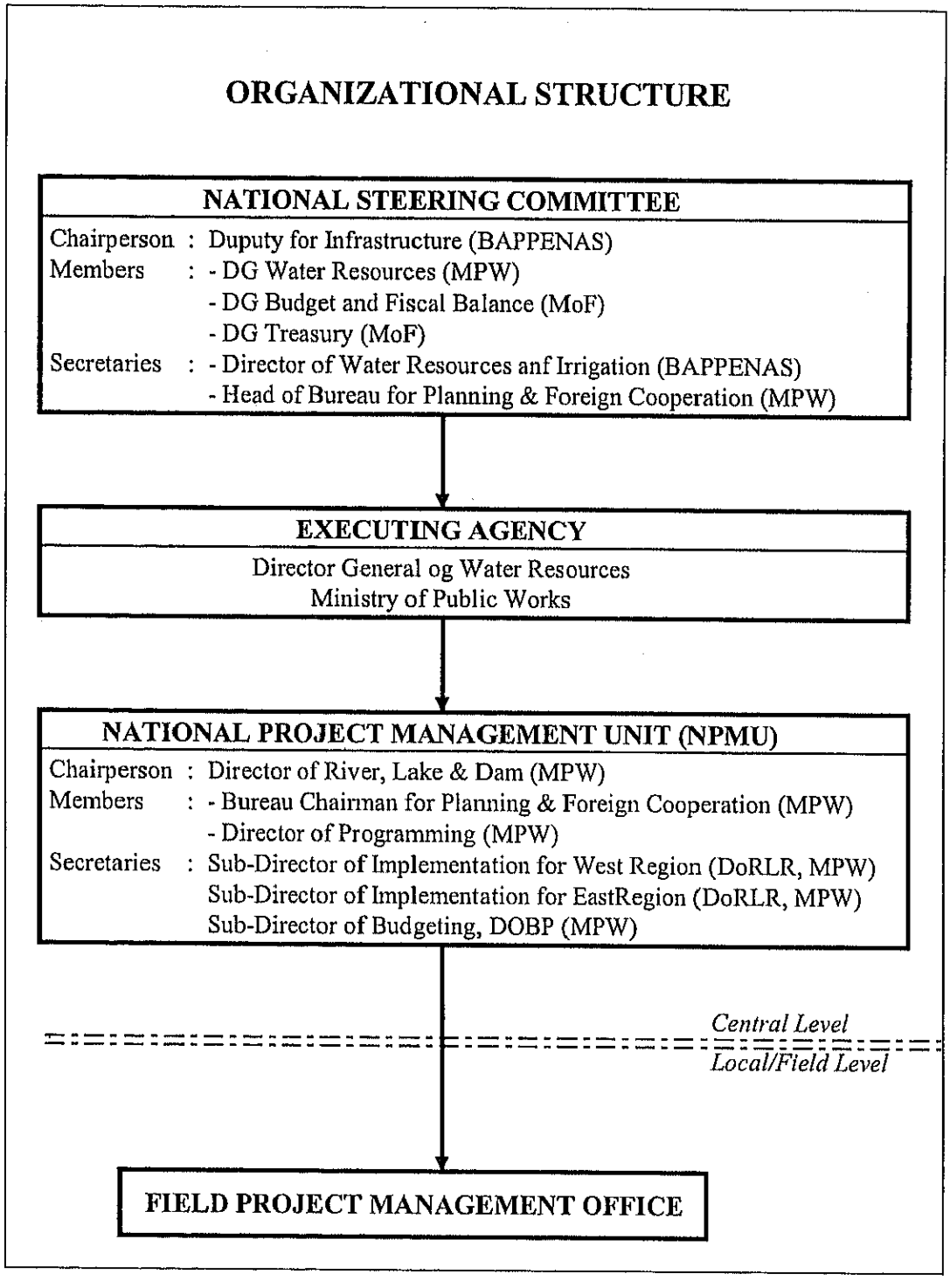


Figure 6.1 Organizations for Implementation

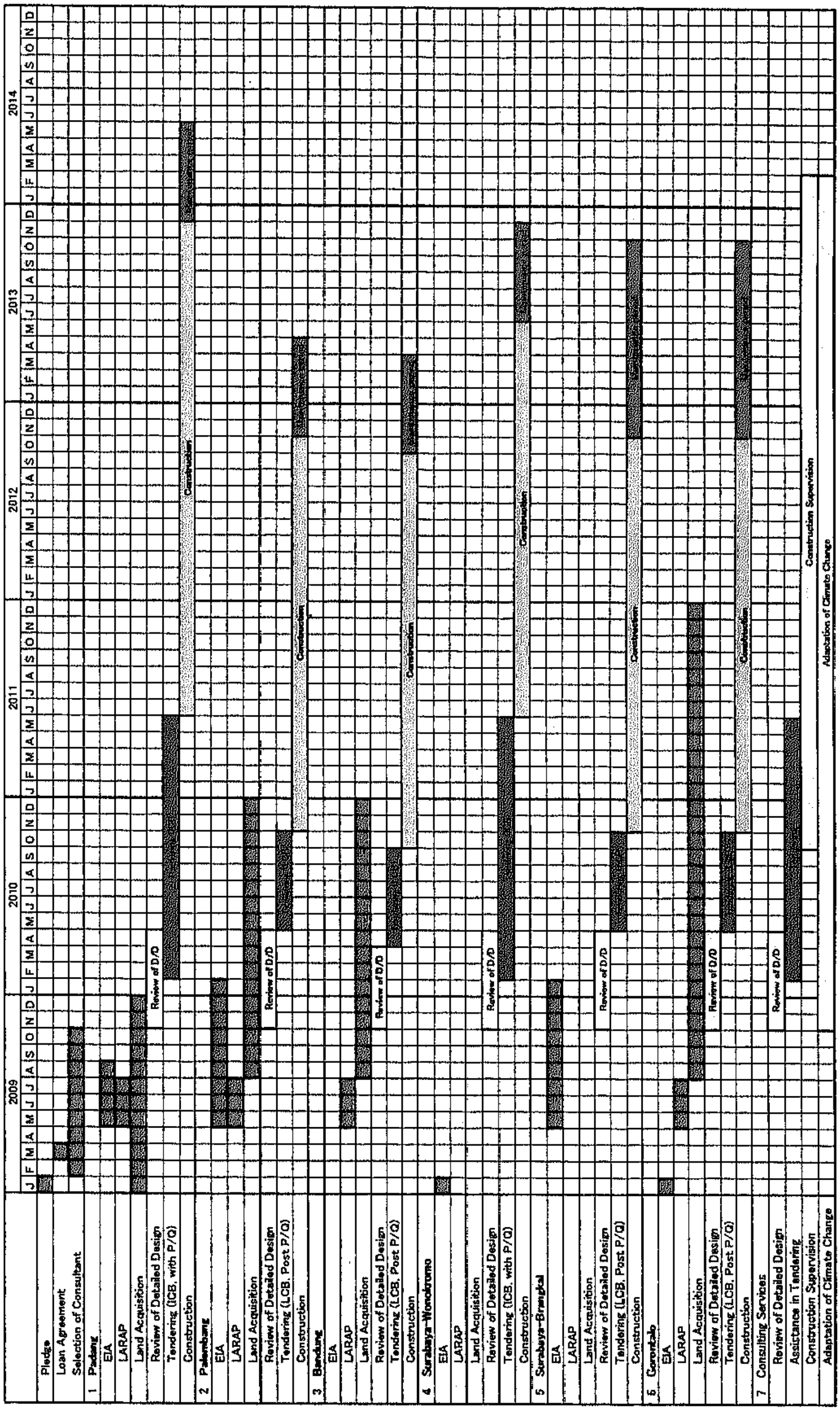


Figure 6.2 Overall Implementation Schedule

APPENDIX

DRAFT CONSULTANT SERVICES TOR

TERMS OF REFERENCE
FOR
CONSULTING SERVICES
OF
URBAN FLOOD CONTROL SYSTEM IMPROVEMENT
IN SELECTED CITIES

PART – A

Review of Detailed Design and Construction Supervision

1. DESCRIPTION OF PROJECT

(1) Background of the Project

According to the database on International Disaster (OFDA/CRED), number of flood damage arose forty (47) including 2,592 of death toll, 3,023,310 of affected person and US$ 1,613 million in Indonesia during recent 10 years from 1998 to the end of 2007. These flood damage causes not only direct physical loss of infrastructure/buildings but also indirect economical/social loss due to suspension of economic activities and/or increase of the poor, which is one adverse factor of sustainable economic development in Indonesia. In addition, flood menace caused by the future climate change will worsen the situation of flood management so that the further strengthening of countermeasures against flood and improvement of related infrastructures are necessary.

Under the above circumstances, the Government of the Republic of Indonesia (GOI) stipulates the Mid-term National Development Plan (RPJM) 2004-2009 describing that the mitigation of flood damage under the comprehensive water resources management is one of the important strategy program with promotion of construction/improvement of flood mitigation infrastructures and disaster mitigation activities through public involvement. Based on the Law on Water Resources (U.U. No.7, 2004), improvement of water management system is conducted drafting the regulations on water resources committee.

With such background, the Japan Bank for International Cooperation (JBIC; current Japan International Cooperation Agency: JICA), the Directorate General of Water Resources (DGWR), Ministry of Public Works and the Directorate for Water Resources and Irrigation, National Development Planning Agency (BAPPENAS) have agreed to implement the "Flood Control Sector Program Loan on Urban Flood Control System Improvement in Selected Cities" (the Project).

(2) Objective of the Project

The objective of the Project is to mitigate flood damage in important urban cities vulnerable against flood damage by improving flood control infrastructure, and thereby contribute to economic and industrial development in urban cities in Indonesia.

(3) Project Area

The project area is expanding in urban cities in whole Indonesia. These cities are vulnerable against flood damage.

2. OBJECTIVE OF CONSULTING SERVICES

The consulting services are required for implementation of the Project; Urban Flood Control System Improvement in Selected Cities. The objectives of the consulting services are to facilitate the implementation of the Project by assisting the Directorate General of Water Resources, Ministry of Public Works in review of detailed design, tendering and supervision of construction works.

3. SCOPE OF SERVICES

The scope of the services for the consulting services is itemized as follows:

- Review of the existing study and detailed design
- Review of documents for tendering
- Assistance of tendering and contracting
- Assistance in construction supervision
- Transfer of knowledge to counterpart personnel
- Reporting

3.1 Review of Detailed Design

The following works are to be included:

- to review previous study and design
- to review previous detailed design including quantity and cost estimate
- to prepare pre-qualification documents for International Competitive Bidding (ICB)
- to prepare documents for tendering

3.2 Assistance of Supervision of Construction Works

The Consultants shall perform the following services through the period from the preparation of construction works to the completion of all construction works of the Project.

1) To assist the Ministry in evaluation of pre-qualification documents submitted by the applicants for ICB sub-projects.
2) To assist the Ministry in evaluation of bids and awarding of contract for construction of the project works.
3) To check the detailed working drawings for construction of all the structures and facilities which are prepared and submitted by contractors.
4) To execute revision of design, if it is deemed necessary in the case of construction.
5) To check shop works and tests of contractors/suppliers in their factories before shipment and issue necessary certificates of inspection, if it is requested by the Ministry.

6) To carry out additional investigation and surveys, if it is deemed necessary in the course of construction.
7) To assist the Ministry in receiving and approval of working and shop drawing, construction program and schedule to be furnished by contractors/suppliers.
8) To assist the Ministry in carrying out the inspection of the works during the construction.
9) To assist the Ministry in keeping the progress of the work including checking modified working schedule that is proposed by the contractor in response to change of situation.
10) To assist the Ministry to evaluate progress and quality of the works and to certify the payment to contractors, if requested.
11) To assist the Ministry in final inspection and completion test of completed works.
12) To assist and advice the Engineer for the Project in preparing monthly construction schedule and works records.
12) To assist the Ministry in monitoring the influence against environmental condition.
13) To assist the Ministry in monitoring the river-mouth conditions.
14) To prepare completion reports for all the construction works of the Project including completion drawings of the structures and facilities.
15) To prepare report on Operation and Maintenance of the Project Facilities, if required.

3.3 Transfer of Knowledge

The consultant shall conduct the transfer of knowledge on the related field to the related government's personnel during the whole services period. Transfer of knowledge shall be conducted through on-the-job training.

3.4 Required Expertise for Consulting Services

The required expertise for the consulting services is as shown below, but not limited to the following:

Review of Detailed Design and Construction Supervision

1) Team Leader
Professional A with at least 25 years of experience in study, detailed design, construction supervision, and operation and maintenance of flood control/river improvement project. He shall have master degree(s) of science/engineering and shall have experiences as project manager or leader in similar detailed design or construction supervision in Indonesia at least two (2) projects and more than five (5) years.
2) Sector Leader I, II, III, IV and V
Professional A with at least 18 years of experience in study, detailed design and construction supervision of flood control/river improvement works in similar project. He shall have experience in similar detailed design or construction supervision in Indonesia at least two (2) projects.
3) Sector Co-Leader I, II, III, IV, V and VI
Professional B with at least 15 years of experience in study, detailed design and construction supervision of flood control/river improvement works in similar project.

4) Design Engineer I, II, III, IV, V and VI
Professional B with at least 12 years of experience in study, detailed design and construction supervision of flood control/river improvement works in similar project.

5) Survey Engineer I, II, III, IV, V and VI
Professional B with at least 8 years of experience in geodetic survey for detailed design of flood control/river improvement works in similar project.

6) Soil-mechanics Engineer IV and VI
Professional B with at least 10 years of experience in detailed design in similar project.

7) Bridge Engineer
Professional B with at least 10 years of experience in detailed design in similar project.

8) Pump Mechanical Engineer A-I
Professional A with at least 10 years of experience in study and design of pump mechanical works for drainage facilities in similar project.

9) Pump Mechanical Engineer B-V and B-VI
Professional B with at least 12 years of experience in study and design of pump mechanical works for drainage facilities in similar project.

10) Construction Plan Engineer I, II, III, IV, V and VI
Professional B with at least 10 years of experience in detailed design, construction planning and cost estimate in similar project.

11) Cost Estimate Engineer I, II, III, IV, V and VI
Professional B with at least 8 years of experience in detailed design, construction planning and cost estimate in similar project.

12) Documents Engineer I, II, III, IV, V and VI
Professional B with at least 15 years of experience in preparation of specifications for detailed design of flood control/river improvement works in similar project.

13) Bid Evaluator I, II, III, IV and VI
Professional B with at least 15 years of experience in preparation of specifications for detailed design of flood control/river improvement works in similar project.

14) Social Environmentalist I, II, III, IV, V and IV
Professional B with at least 8 years of experience in social environmental analysis in similar project.

15) Construction Engineer I, II, III, IV, and IV
Professional B with at least at least 10 years experience in detailed design and construction supervision of control/river improvement works in similar project.

3.5 Assignment of Consultants for the Services

The services period of the Consultants is 52 months. The total man-months for the services are 525 man-months comprising 105 man-months for Professional A and 420 man-months for Professional B.

3.6 Reporting

The metric system shall be used exclusively in all the reports, drawings and calculations. Reports and calculations shall be edited in English.

(1) Overall Management

a) Inception Report giving comment and/or suggestion based on review of previous studies

and detailed design, summary of main findings and technical problem obtained through field survey, detailed work plan and program of the Consultant's Services, and recommendation of possible alternative plan, if any (25 copies).

b) Monthly and quarterly progress reports giving a summary of progress of the works during the reporting period including the Consultant's activities and the program and schedule of the works in next period (25 copies).
c) Annual report which gives the details of the works executed in the past twelve months and the program and schedule of the next twelve months including the budgetary schedule (25 copies).
d) Service completion report giving the summary of all Consultant's activities in the service Period. (25 copies).

(2) Review of Study and Detailed Design

a) Finalized Pre-qualification Documents (30 copies for each Sub-project)
b) Finalized Bid Documents for international competitive bidding (10 copies for each Sub-project).
c) Review of Design Report giving all the results of the reviewed design including tender drawings (25 copies for each Sub-project).

(3) Construction Supervision

a) Environmental Monitoring Report (10 copies for each Sub-project)
b) Inspection report giving the detail of shop inspection and tests at supplier's factories before shipment (10 copies for each Sub-project).
c) Technical Advice Note for special topics on technical issues (4 times for each Sub-project with 5 copies)
d) Project completion report and drawings of all the aspects of construction of the Project at completion of services (25 copies).

PART – B

Adaptation of Climate Change

1. DESCRIPTION OF PROJECT

(1) Background

Adverse impacts of climate change are already expanding worldwide, and this presents unavoidable risks in the coming decades. Even though the mitigation of emission volume of carbon dioxide would be possible, climate change cannot be stopped in a short time. Climate change causes unexpected climatic phenomena such as frequent heavy storm, flooding by extreme high tide, etc. These phenomena reduce the safety level of river facilities even they are constructed in accordance with the original plan/design.

It is a matter of course that the structural measures should be implemented securely by the government, and it is also important for the inhabitants to take proper actions against such disasters. Therefore the adaptation of climate change through preparing disaster management plan and execution of countermeasures by the inhabitants against unexpected disaster is very important to enhance effects from structural measures implemented in the Project of "Urban Flood Control System Improvement in Selected Cities."

(2) Objective of the Adaptation of Climate Change

One of the major objectives of the adaptation of climate change is to mitigate flood disaster with participation of inhabitants in important urban cities vulnerable against flood damage and to enhance the capacity of BBWS/BWS personnel.

(3) Project Area

The project area is selected urban cities in whole Indonesia. These cities are vulnerable against flood damage.

2. OBJECTIVE OF CONSULTING SERVICES

The consulting services are required for adaptation of climate change in the Project; Urban Flood Control System Improvement in Selected Cities. The objectives of the consulting services are to design the adaptation of climate change, to facilitate the implementation of the adaptation of climate change with inhabitants, and to support the Directorate General of Water Resources, Ministry of Public Works.

3. SCOPE OF SERVICES

The scope of the services for the consulting services is itemized initially, as follows:

- Supporting inhabitant's activities for adaptation of climate change
- Transfer of knowledge to counterpart personnel

- Reporting

3.1 Assistance in Adaptation of Climate Change

The Consultants shall perform the following services to the defined cities/river basins throughout the service period. Through these activities, practical use of simple rainfall observation by local people can develop an understanding on rainfall characteristics which will be affected by the Global Warming.

(1) Overall

For respective cities/river basins of the sub-projects, flood risks accompanied to the climate change will be evaluated based on the field reconnaissance including inventory survey and interview survey, review of previous reports, and various data/information respecting Japanese adaptation methods to the climate change. Following scopes are changeable after evaluation of the flood risks.

(2) Padang Sub-project

(a) Study on hydrological characteristics using the available rainfall and water level data.
(b) Installation of adequate and simple hydrological observation equipment in cooperation with inhabitants. Number and location will be determined based on the above study on hydrological characteristics. Exercise or demonstration of sandbag construction method will be done at the time of above installation to understand simple and easy measures to prevent or reduce flood water damage.
(c) Compilation of hydrological data observed by inhabitants together with BWS staff.
(d) Determination of accumulated rainfall amount and/or water levels for flood warning such as rainfall-water level relationship, which gives river water warning level by measuring on site rainfall amount, ans water-level-water level relationship, which also gives river water warning level by measuring upstream river water level.
(e) Transfer of knowledge to the inhabitants on the Flood Early Warning Procedures (FEWP) based on the understanding of the above (b) and (d).
(f) Proposal on flood disaster management plan as adaptation of climate change.

(3) Palembang Sub-project

(a) Inventory survey of existing ponds through topographic survey.
(b) Flood runoff analysis with existing ponds and without existing ponds.
(c) Estimation of stormwater detention/retention volume in the basin required for the condition of "without flood" in several probabilities, i.e. difference between runoff discharge and existing channel capacity. Excess runoff over the channel capacity flows into adjacent terrain as flooding. If these volumes could be stored in detention/retention pond or reservoir, no flooding will occur.
(d) Proposal on stormwater detention/retention facilities with their location, area and volume: "Basin Runoff Control." Under such conditions as densely built area along the channel, channel widening cannot be expected for flood mitigation. Based on the above study (c), conceivable sites for stormwater detention/retention facilities will be proposed.
(e) Auger boring and permeability test for proposed pilot site of stormwater detention/retention facilities. The pilot site will be selected at the appropriate location for demonstration of effectiveness of stormwater storage/infiltration.
(f) Construction of infiltration well at the pilot site of stormwater detention/retention facilities together with BWS staff.

(g) Demonstration of infiltration exercise.
(h) Proposal on flood disaster management plan as adaptation of climate change.

(4) Bandung

(a) Channel profile survey for the Cikapundung River and Citarum Main River including inventory survey on existing 3 drainage pumping stations along the Citarum Main River.
(b) Estimation of existing channel capacities of the above two rivers by non-uniform flow.
(c) Assessment of flood risks in Dayeuhkolot area based on the existing channel capacities, past flood/inundation records and forecast flooding/inundation condition by extraordinary floods brought by future climate change.
(d) Evaluation on operation and maintenance plan for river facilities, watershed management plan, flood plain management plan, and telemetering plan.
(e) Proposal on flood disaster management plan as adaptation of climate change.

(5) Surabaya-Wonokromo Sub-project

(a) Topographic survey on ground elevation around the Wonokromo River as the basic data for flood flow analysis mentioned below.
(b) Flood flow analysis using unsteady flow simulation.
(c) Preparation of flood risk map based on the field survey and simulation results.
(d) Proposal on flood disaster management plan as adaptation of climate change.
(e) Evaluation of existing functions of Jagir Weir on the Wonokromo River and Wonokromo Sluice on the Mas River clarifying (i) their dimensions, (ii) operation and maintenance manuals, and (iii) confirmation of operation manual against extraordinary flood event and emergency.
(f) Proposal on operation and maintenance plan for Jagir Weir including the operation for extraordinary flood events.

(6) Surabaya-Brangkal (Mojokerto) Sub-project

(a) Study on hydrological characteristics using the available rainfall and water level data.
(b) Installation of adequate and simple hydrological observation equipment in cooperation with inhabitants. Number and location will be determined based on the above study on hydrological characteristics. Exercise or demonstration of sandbag construction method will be done at the time of above installation to understand simple and easy measures to prevent or reduce flood water damage.
(c) Compilation of hydrological data observed by inhabitants together with BBWS staff.
(d) Determination of accumulated rainfall amount and/or water levels for flood warning such as rainfall-water level relationship, which gives river water warning level by measuring on site rainfall amount, ans water-level-water level relationship, which also gives river water warning level by measuring upstream river water level.
(e) Transfer of knowledge to the inhabitants on the Flood Early Warning Procedures (FEWP) based on the understanding of the above (b) and (d).
(f) Topographic survey on ground elevation in the heart of Mojokerto as the basic data for flood flow analysis mentioned below.
(g) Flood flow analysis using unsteady flow simulation.
(h) Preparation of flood risk map.
(i) Formulation of operation plan of mobile pumps utilizing the above flood risk map and FEWP.
(j) Proposal on flood disaster management plan as adaptation of climate change.

(7) Gorontalo Sub-project

(a) Study on hydrological characteristics using the available rainfall and water level data including the review of master plan study by JICA in 2002.
(b) Installation of adequate and simple hydrological observation equipment in cooperation with inhabitants. Number and location will be determined based on the above study on hydrological characteristics. Exercise or demonstration of sandbag construction method will be done at the time of above installation to understand simple and easy measures to prevent or reduce flood water damage.
(c) Compilation of hydrological data observed by inhabitants together with BWS staff.
(d) Determination of accumulated rainfall amount and/or water levels for flood warning such as rainfall-water level relationship, which gives river water warning level by measuring on site rainfall amount, ans water-level-water level relationship, which also gives river water warning level by measuring upstream river water level.
(e) Transfer of knowledge to the inhabitants on the Flood Early Warning Procedures (FEWP) based on the understanding of the above (b) and (d).
(f) Topographic survey on ground elevation in the center of Gorontalo as the basic data for flood flow analysis mentioned below.
(g) Flood flow analysis using unsteady flow simulation.
(h) Preparation of flood risk map expanding existing Tsunami hazard map.
(i) Formulation of operation plan of mobile pumps utilizing the above flood risk map and FEWP.
(j) Proposal on flood disaster management plan as adaptation of climate change.

3.2 Transfer of Knowledge

The consultant shall conduct the transfer of knowledge on the related field to the related government's personnel during the whole services period. Transfer of knowledge shall be conducted through on-the-job training.

3.3 Required Expertise for Consulting Services

The required expertise for the consulting services is as shown below, but not limited to the following:

Adaptation of Climate Change

1) Climate Change Adaptation Expert-A
Professional A with at least 18 years of experience in study on disaster prevention, flood policy, flood management and planning/study/detailed design of flood control/river improvement project. He shall have experiences in similar study or detailed design in Indonesia at least two (2) projects and more than twelve (12) months.
2) Climate Change Adaptation Expert-B
Professional B with at least 15 years of experience in study on disaster prevention, flood policy, flood management and planning/study/detailed design of flood control/river improvement works in similar project.
3) Disaster Management Engineer A
Professional A with at least 18 years of experience in study on disaster prevention, flood

management and planning/study/detailed design of flood control/river improvement works in similar project.

4) Disaster Management Engineer B
Professional B with at least 15 years of experience in study on disaster prevention, flood management and detailed design of flood control/river improvement project.

5) Monitoring & Evaluation Engineer-A
Professional A with at least 8 years of experience in project management and monitoring in similar project.

6) Monitoring & Evaluation Engineer-B
Professional A with at least 8 years of experience in project management and monitoring in similar project.

7) Watershed Management Engineer
Professional B with at least 12 years of experience in study or detailed design on watershed management, flood management and flood control/river improvement project.

8) Flood Forecasting & Early Warning Engineer
Professional B with at least 10 years experience in study on hydraulics/hydrology, disaster prevention, flood management and study/detailed design of flood forecasting, warning and evacuation planning in similar project.

9) Community Development Engineer
Professional B with at least 8 years experience in hydraulic study. He shall also have experience in community participant project.

10) River Facility Management Engineer
Professional B with at least 8 years experience in study and detailed design of mechanical design for pump equipment/gate facilities in similar project.

3.4 Assignment of Consultants for the Services

The services period of the Consultants is 52 months. The total man-months for the services are 201 man-months comprising 34 man-months for Professional A and 167 man-months for Professional B.

3.5 Reporting

a) Inception Report giving comment and/or suggestion based on review of previous studies and detailed design, summary of main findings and technical problem obtained through field survey, detailed work plan and program of the Consultant's Services, and recommendation of possible alternative plan, if any (25 copies).

b) Monthly and quarterly progress reports giving a summary of progress of the works during the reporting period including the Consultant's activities and the program and schedule of the works in next period (25 copies).

c) Annual report which gives the details of the works executed in the past twelve months and the program and schedule of the next twelve months including the budgetary schedule (25 copies).

d) Engineering Study Report on Adaptation of Climate Change (25 copies)
Flood Risk Map (100 copies for selected Sub-projects)
Service completion report giving the summary of all Consultant's activities in the service Period. (25 copies).


JICA