URBAN DRAINAGE SCOPING STUDY – FINAL REPORT

TECHNICAL REPORT

SMEC

Australian AID

Indonesia Infrastructure Initiative

URBAN DRAINAGE SCOPING STUDY – FINAL REPORT

TECHNICAL REPORT

July 2011

SMEC

Australian AID

Indonesia Infrastructure Initiative

INDONESIA INFRASTRUCTURE INITIATIVE

This document has been published by the Indonesia Infrastructure Initiative (IndII), an Australian Government funded project designed to promote economic growth in Indonesia by enhancing the relevance, quality and quantum of infrastructure investment.

The views expressed in this report do not necessarily reflect the views of the Australia Indonesia Partnership or the Australian Government. Please direct any comments or questions to the IndII Director, tel. +62 (21) 230-6063, fax +62 (21) 3190-2994. Website: www.indii.co.id.

ACKNOWLEDGEMENTS

This report has been prepared by the IndII Scoping Study on Urban Drainage (SSUD) consultant team. The support provided by key stakeholders within the Ministry of Public Works (MoPW), Directorate General (DG) Public Housing (Cipta Karya/DGCK), DG Water Resources (DGWR) and IndII technical staff is gratefully acknowledged. Any errors of fact or interpretation are solely those of the author.

Jakarta, July 2011

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

GLOSSARY

	English	*Indonesian*
ADB	Asian Development Bank	*Bank Pembangunan Asia*
AMDAL	Analysis on environmental impact	*Analisis Mengenai Dampak Lingkungan*
APBD	Local Government Revenue and Expenditure Budget	*Anggaran Pendapatan dan Belanja Daerah*
APBN	National Revenue and Expenditure Budget	*Anggaran Pendapatan dan Belanja Negara*
BLUD	Government Service Delivery Agency	*Badan Layanan Umum Daerah*
BMG	Meteorological and Geophysical Agency	*Badan Meteorologi dan Geofisika*
BNPB	The National Disaster Mitigation Agency	*Badan Nasional Penanggulangan Bencana*
DGCK	Directorate General of Housing and Settlements	*Direktorat Jenderal Cipta Karya*
ESDM	Energy and Mineral Resources	*Energi dan Sumber Daya Mineral*
DGWR	Directorate General of Water Resources	*Direktorat Jenderal Sumber Daya Air*
GR	Government Regulation	*Peraturan Pemerintah (PP)*
IEG	Infrastructure Enhancement Grant	*Hibah Pembangunan Infrastruktur*
INDII	The Indonesia Infrastructure Initiative	*Badan Pembangunan Infrastrutur untuk Indonesia*
JICA	Japan International Cooperation Agency	*Agen Kerjasama International Jepang*
Keppres	Presidential Decree	*Keputusan Presiden*
Permen	Ministerial Regulation	*Peraturan Menteri*

Perpres	Presidential Regulation	*Peraturan Presiden*
PLP-Cipta Karya	Environment and Sanitation Development of Cipta Karya	*Penyehatan lingkungan Permukiman Cipta Karya*
PMU	Project Management Unit	*Unit Manajemen Proyek*
PP	Government Regulation	*Peraturan Pemerintah*
PPSP	Accelerated Development of Urban Sanitation	*Percapatan Pembangunan Sanitasi Permukiman*
PSDA	Management of Water Resources	*Pengelolaan Sumber Daya Air*
PU	Public Works Department	*Pekerjaan Umum*
TA	Technical Assistance	*Bantuan Teknis*
TKPSDA	Coordination Team for Water Resource Management	*Tim Koordinasi Pengelolaan Sumber Daya Air*
UU	Regulation	*Undang-Undang*
WB	World Bank	*Bank Dunia*

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Flooding is a widespread and devastating natural disaster across the globe. It is ranked as the worst natural disaster in the UK with annual flood damage estimated at about £ 1.5 billion and is expected to increase to £3.5 million over the next few years according to the Association of British Insurers. The floods that took place in the last decade in China were ranked the worst among recorded floods worldwide in terms of the number of human fatalities and economic losses. The massive flooding that occurred in Queensland and Victoria in Australia during February and March 2011 was the worst for over 35 years and are estimated to have caused billions of dollars worth of damage.

Only last month, the US Corps of Engineers flooded farmland and small townships in the lower Mississippi Valley to protect the larger cities and industrial areas upstream from flooding due to the high water levels in the river caused by prolonged heavy rainfall across the catchment. The compensation bill paid to businesses and house owners in the flooded areas will be a fraction of the compensation due if major cities had been flooded.

In Indonesia flooding is ranked as the second most frequent and fourth most economically damaging natural disaster after wildfires, earthquakes and volcanic eruptions, causing an estimated 2,500 deaths, affecting 6.2 million people and resulting in US$ 2.4 billion in damages. The damage is felt most keenly in the major cities, especially Jakarta the capital city, which is the primary centre of commercial and industrial activity in the country.

1.2 BACKGROUND

On 2 May 2011 SMEC International assigned PT Glendale Partners to undertake a scoping study on urban drainage in Indonesia on behalf of the Indonesia Infrastructure Initiative (IndII) financed by the Australian Government through AusAID, with the aim of identifying potential options and opportunities for IndII to finance appropriate urban drainage programs in Indonesia's municipalities.

1.3 STUDY OBJECTIVES AND SCOPE

The main objective of this study is to develop an 'issues and concept' paper that educates the reader about the current status of urban drainage in Indonesia and outlines a series of key programming options for a possible IndII financed urban drainage program; **in essence, a well reasoned paper that examines the rationale for**

the Australian Government to include urban drainage in its portfolio of water and sanitation grant projects under IndII.

During the course of the study the Consultants have:

- Reviewed the current legal and institutional framework of urban drainage in Indonesia with special attention being given to the correlation with national water resources management
- Reviewed the current status of urban drainage in Indonesia
- Discussed institutional issues and problems concerning urban drainage at the central and local level
- Identified and formulated outline programming options and opportunities for IndII to support improvements in urban drainage including pure technical assistance (TA) options, the blending of TA with grants and the expansion of current grant programs
- Reviewed the broader issue of grant and TA investment in the urban drainage sector

1.4 PROJECT INITIATION AND BRIEFING MEETINGS

Work commenced on the project officially on Monday, 2 May, 2011 and an initial project briefing meeting was held with Jim Coucouvinis, the SMEC/IndII Technical Director of Water and Sanitation, at the IndII office in the E-Trade Building, Jl. Wahid Hasyim No. 55, Menteng, Jakarta Pusat on the morning of 2 May.

The minutes of this meeting and subsequent meetings with representatives of the government agencies involved in managing urban drainage and the multi-lateral and bi-lateral agencies currently involved in financing urban drainage projects or with plans to do so, that have been held during the course of the project, are presented in **Annexe 1.** A summary of each agency's involvement in the urban drainage sector and its priorities regarding the sector is presented in Chapter 2.

1.5 STAGE 1 REPORT

A Stage 1 Report covering the first three weeks of project activity was prepared and submitted to the Client on 23 May, 2011. The report was divided into two parts with Part 1 being, in essence, a standard Project Inception Report while Part 2 provided an outline of the Draft Final report with some sections completed or nearly completed based on the data collected and analysed during Stage 1.

Part 1 summarised the progress made on the project in the first three weeks with particular reference to the views on urban drainage priorities in Indonesia and the causes of urban flooding derived from meetings with officers from the main central

government agencies involved in planning and managing urban drainage, and officials of the major multi-lateral and bi-lateral agencies providing funding for the sector.

Part 2 provided an outline of the contents of the Final Report including some partially completed sections and annexes based on data collection and review during the first three weeks of the project. The submission enabled the Client to provide feedback and ideas on the content of the final report in a timely manner. With only two months to complete the study it was necessary to ensure that the project objectives were being met and that any potentially contentious issues were identified at this stage.

The Report was reviewed by IndII and a number of suggestions and recommendations made regarding the focus and output of the project which were incorporated into the Stage 2 project work schedule. Foremost among these was the requirement to concentrate on the kinds of activities that IndII might include in an urban drainage support program rather than identify at this stage in the process specific projects in specific locations. It was also suggested that the consultants reduce the number of site visits from the six originally proposed, to three and that the three cities should be representative of conditions found in the majority of Indonesian cities that experience serious flooding problems.

The three cities chosen for site visits were Bandung, Semarang and Palembang; all cities with serious flooding problems and locations or flood typologies that were representative of a large number of Indonesian cities. Makassar, one of the original six cities selected for site visits, was also included since field work had been carried out there during the first three weeks of the study.

CHAPTER 2: GOI AND DONOR AGENCY PRIORITIES

2.1 INTRODUCTION

The consultants have held meetings with senior representatives of the main GOI agencies involved in the management and maintenance of water resources and urban infrastructure including urban drainage, and with officials from the major multi-lateral (World Bank and Asian Development Bank – ADB) and bi-lateral agencies currently funding urban drainage programs or likely to fund such programs in the future, especially AusAid, Dutch Aid, and Japanese Aid through JICA (Japan International Cooperation Agency).

For the purposes of this study, meetings were held with key staff from Bappenas, the Directorate General Water Resources (DGWR), the Directorate General Cipta Karya (DGCK) and the municipal governments of Bandung, Semarang, Palembang and Makassar. In addition, interviews with senior staff from the multi-lateral and bi-lateral agencies including the World Bank, the Asian Development Bank (ADB), the Dutch Embassy and JICA were granted.

A brief review of each agency's priorities for urban drainage and the status of any on-going or future projects in the sector are given in the sections below, with details of the discussions and outcomes from these meetings provided in the Meeting Minutes presented in **Annexe 1.**

The summaries present a digest of the views of the agency representative given at the time and do not necessarily reflect the actual situation regarding urban drainage in the municipalities. For various reasons, not all representatives interviewed had full knowledge of the urban drainage projects that were currently under way in the municipalities and a more complete picture of the sector at the municipal level was only obtained during the site visits.

2.2 BAPPENAS

The Director for Housing and Settlements at Bappenas, Ir. Nugroho Triutomo, believed that the urban drainage sector *per se* has been rather neglected in terms of funding by Bappenas (GOI) and the multi-lateral funding agencies compared with the water and sanitation sectors[1] although urban drainage is an integral part of any sanitation program. He believed the reason for this lack of funding is linked to the difficulty of measuring outputs from drainage projects in a verifiable manner to justify budget

[1] This is certainly not true of the bi-lateral sector where over the last decade JICA and the Government of the Netherlands has spent, and are currently spending, large sums of money on building major flood infrastructure improvements in Jakarta, Semarang and Bandung.

allocations. The development of a set of appropriate and acceptable 'performance indicators' and 'bench marks' for urban drainage projects would help greatly in attracting GOI and multi-lateral funding for the sector.

The priority for Bappenas in the urban drainage sector is to build on the work of the Accelerated Development of Urban Sanitation Program *(PPSP – Percapatan Pembangunan Sanitasi Permukiman)* which has already started in 130 cities, many of which already have urban infrastructure master plans, feasibility studies and detailed design for projects including some concerned with urban drainage. The commitment already shown by the local governments involved and the familiarity of some with the IndII program would likely ensure the effective implementation of any identified urban drainage improvement programs.

2.3 DIRECTORATE GENERAL WATER RESOURCES

The DGWR is responsible for flood control and water management at the national level and has taken responsibility for initiating regional and urban flood control which typically involves provincial governments, city (municipality) governments and the surrounding district *(kabupaten)* governments. Within the DGWR, the Directorate of Rivers and Coasts/Beaches *(Direktorat Sungai dan Pantai)* has a central planning role for flood control and river water management at the national level and the Balai Wilaya II an implementation role at the provincial and municipality level. Co-ordination between the central government agencies and those in the provincial and local governments was generally considered to be poor.

The DGWR together with DG Cipta Karya (DGCK), are currently involved in implementing a number of urban drainage and general flood management projects in Jakarta, Semarang and a number of other major cities in Indonesia with funding coming from a variety of multi-lateral and bi-lateral sources including the World Bank, ADB, JICA and the Netherlands Government. Details of these projects are included in the summaries of the donor agencies activities in the urban drainage sector described below and in the individual project digests presented in **Annexe 3.**

The main urban drainage project currently being prepared for tender is the JICA-funded **Urban Flood Control System Improvement in Selected Cities** program. The project, which was prepared in December 2008, aims to mitigate flood damage in major cities by improving flood control infrastructure, assisting in building administrative capacity in the river basin management offices and developing flood damage management plans with a view to supporting the national agenda of adaption to climate change and the Integrated Water Resources Management (IWRM) strategy program.

The largest component of each of the six sub-projects currently being tendered is physical infrastructure improvement with consulting services for construction supervision of physical works. The total cost of construction and supervision services

accounts for 96% of the loan with 4% allocated to capacity building for IWRM and PMU activities and independent monitoring and evaluation.

2.4 DIRECTORATE GENERAL CIPTA KARYA

The DGCK through its Directorate of Environmental Sanitation Development *(PLP – Direktorat Pengembangan Lingkungan Perumahan)* and the sub-directorate of drainage, together with the local government *dinas* agencies are responsible for the planning, design and construction of the urban drainage network and for its operation and maintenance on a daily basis.

The main focus of the Directorate's activities regarding urban flood control is similar to that of DGWR, namely the implementation of the JICA-funded project on **Urban Flood Control System Improvement in Selected Cities** referred to above. During the project preparation period, cities have been prioritised according to size, extent and seriousness of flooding and their preparedness to implement effective flood prevention and amelioration measures through the existence of sanitation and drainage plans, feasibility studies and the like.

At the present time consulting services for 6 sub-projects in 5 cities (Padang, Palembang, Bandung, Surabaya and Gorontalo) are currently being prepared for tender. The sub-projects predominantly consist of the design and construction of civil works such as river channel improvement and normalisation, the construction of diversion channels, sheet piling of river banks, weir improvement and bridge construction.

The Director of Environmental Sanitation emphasised the importance of urban infrastructure master plans especially for sanitation and drainage, and would like to see all local governments producing such plans.

2.5 WORLD BANK

Support for urban drainage in Indonesia from the World Bank is currently focused on Jakarta and preparation of the **Jakarta Urgent Flood Mitigation (JUFM) Project**. Preparation for the project has taken longer than anticipated due, in part, to the poor co-ordination and co-operation between the three main government agencies involved. The Project Development Objective (PDO) is to contribute to the operations and maintenance of a priority part of the flood management system in Jakarta by dredging sections of key floodways, canals and retention basins and disposing of dredge material in proper facilities; rehabilitating and constructing embankments, repairing or replacing mechanical equipment and strengthening institutional capacity and coordination. The project documents are now ready for signature and a Project digest is included in **Annexe 3.** The project evolved from the Jakarta Emergency Dredging Initiative (JEDI) formulated by the Bank in 2006-2007.

For the future, the Bank is planning to work with the Mayor's Office in a number of large cities including Surabaya, Makassar, Palembang and Balikpapan in order to identify potential urban infrastructure investment opportunities including flood management; however, at this stage preparation is concerned with major policy issues such as the likely impact of climate changes on infrastructure development needs.

At a regional level the Bank, in partnership with the Government of the Netherlands is funding a project entitled **Climate Change, Disaster Risk and the Urban Poor - Building Urban Resilience in East Asia**. The project was established under the Mayors' Task Force at the Mayors' Summit in Copenhagen in 2009. The Task Force is composed of the Mayors of Dar es Salaam, Jakarta, Mexico City and Sao Paulo who have recognised the importance of these issues in their cities and demonstrated strong support.

Initial case studies have been carried out by the World Bank and the City of Jakarta has been selected as one of two pilot cities where more detailed studies will be conducted. A Workshop was held in Jakarta on 25 May, 2011 to launch the start of Phase I of the study through policy dialogue with policy makers and practitioners in the Jakarta City Government and in the related national agencies working on Jakarta flood mitigation and climate adaption. Further details of the project are included in the project digest in **Annexe 3.**

Although the World Bank is involved with supporting urban drainage projects throughout Indonesia, the current focus and likely priority for the next five years will be the City of Jakarta, a city where persistent and sometimes prolonged flooding, especially in the subsiding northern part, causes millions of dollars worth of damage and lost productivity and whose industrial and commercial activities account for 22 percent of the nation's GDP.

2.6 ASIAN DEVELOPMENT BANK (ADB)

The ADB funds for urban infrastructure development in Indonesia are being channeled into water supply, wastewater and solid waste management rather than urban drainage *per se* although there are obvious linkages between them. Urban drainage was an integral part of the ADB-financed **Metropolitan Sanitation Health Management Project (MSHMO)** but GOI wanted to drop the drainage component and make other changes that resulted in a much-reduced Pilot Study focusing on extending wastewater collection systems and upgrading wastewater treatment plants being undertaken in Yogyakarta and Medan. The project is only now about to be tendered and is expected to be completed in 2014.

In the 1990s the ADB financed a number of loan projects to improve urban drainage in major cities including Semarang and Palembang where retention basins, weirs, dams and pumping stations were built.

The more recent ADB-funded **Upper Citarum Basin Flood Management (UCBFM) Project** is part of the larger **Institutional Strengthening for Integrated Water**

Resources Management (IWRM) in the 6 CI's River Basin Territory – Package B which is supported by ADB and the Government of the Netherlands. The project is managed by agencies from central government, namely the Directorate General Water Resources, *(Ditjen Sumber Daya Air)*, Ministry of Public Works. A project digest is included in **Annexe 3**.

One of the main reasons for the ADB's lack of investment in urban drainage at the local government and municipal levels is due to the fact that the ADB cannot loan funds to local governments directly but only through the central government, which then 'on-loans' the funds to the local government.

2.7 DUTCH AID PROGRAM

The Government of the Netherlands is one of the two major donors for urban drainage projects in Indonesia, the other being the Japanese Government through JICA. The Dutch legacy in Indonesia and their historical role as one of the leading nations in flood control engineering has meant that the Dutch Government supported by Dutch engineers has been involved for the past 30 years in improving and extending the urban drainage systems in Indonesia that were originally built during the colonial period. The activities, especially the construction of physical drainage works, have been and still are concentrated in Jakarta but assistance has been extended to other cities including Semarang and Bandung.

The Dutch Government together with JICA are providing assistance to Bappenas, the Ministry of Public Works, the Government of DKI Jakarta, the Institut Teknologi Bandung (ITB) and PusAir with the **Coastal Defence Strategy (JCDS)** which forms the basis for a master plan for coastal defence for cities along the north coast of Java including Jakarta for the period 2011-2013. With the predicted continuation of land subsidence in North Jakarta, which is currently averaging between 5 and 10 cm per year, and in preparation for possible sea level rises related to changes in the local climate, the strategy identifies four options for preventing flooding of the city from the sea and coping with flooding caused by increased run-off from the landward side over a 20-year time frame (2010 – 2030). Details of these options are included in the project digest in **Annexe 3**.

A priority program based on 'no regret measures' that aims to restore the original design capacity of the drains by dredging and dyke improvement is currently underway.

A project related to the JCDS and to all flood control projects in Indonesia is the **Joint Co-operation Indonesia – The Netherlands 2011-2015 on Meteorology, Climatology, Hydrology and Early Warning Indonesia**. The project, which involves the Indonesian Meteorological, Climatological and Geophysical Agency (BMKG), The Royal Netherlands Meteorological Institute (KNMI), the Indonesian Research Centre for Water Resources (PusAir) and the Netherlands Water Resources Institute, aims to strengthen weather, climate and river flow data collection and analysis, improve weather prediction and

local climate trend analysis and develop an early warning system for extreme weather events such as heavy rain, flooding and droughts.

The Dutch Government is also providing funds for the **Institutional Strengthening for Integrated Water Resources Management in the 6 CI's River Basin Territory (Package C), Upper Citarum Flood Management Project (UCBFM) Flood Management Strategy 'No Regret' – Urgent Program.** The project objectives are to understand the hydrology and hydraulics of the Bandung Basin through the development and updating of the ID2D flood hazard modeling framework and the identification and implementation of 'fast track' measures to avoid the yearly floods (urgent 'no regret' measures), combined with the development of long-term measures in a long-term plan and updating the flood management strategy for the basin.

Dutch Aid will also fund a part of the **Jakarta Urgent Flood Mitigation (JUFM)** Project that the World Bank is currently preparing, although the amount of aid to the project may be reduced since Dutch Aid is being cut by 20 percent next year in response to the general economic downturn in Europe.

Details of all the aforementioned projects are included in the project digests in **Annexe 3**.

2.8 JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

The Government of Japan through its Japan International Cooperation Agency or JICA is probably the largest donor to the Indonesian urban drainage sector. For the past 30 years, JICA has been involved in providing Indonesia with assistance in the form of grants and soft loans for urban drainage master planning and the construction of urban drainage civil works.

At the present time JICA is involved in four major urban drainage projects; two in Jakarta and two in the provinces. **The Project for Capacity Development of Jakarta Comprehensive Flood Management (JCFM) in Indonesia** has as its target area the Ciliwung River Basin in JABODETABEK. The comprehensive flood management measures (CFM) planned under the project will be based on a legalised Comprehensive Flood Management Plan (CFMP) that will combine structural measures, such as flood storage facilities in the river basins, with non-structural measures such as development control in the basins and the establishment of River Basin Forums. The project team will identify the organisations related to CFM, determine the role of the organisations and provide the necessary support on the legalisation of the CFM approach for urban flood management.

The project is a follow-up from the JICA-financed **Institutional Revitalization Project for Flood Management in JABODETABEK 2006 – 2010** where capacity development in non-structural areas for flood management agencies was carried out including the maintenance and operation of river facilities and the collection and analysis of flood control information. However, since this project did not cover the specific run-off

control measures in the river basin and capacity development on coordination and role sharing between river management and basin management, a follow-up project was requested by GOI to fill these gaps and resulted in the JCFM Project.

The second JICA flood control project in Jakarta is the **Coastal Defence Strategy (JCDS)** where JICA consultants are engaged on the re-design of coastal sea defences in the north-west of the city.

Outside Jakarta JICA are involved in the **Urban Flood Control System Improvement in Selected Cities,** a project that aims to mitigate flood damage in important urban cities vulnerable to flooding by improving flood control infrastructure, assisting in upgrading the administrative capacity of river basin management offices and developing flood damage management plans with a view to supporting the national agenda of adaption to climate change, and thereby contribute to economic and industrial development in .Indonesian cities.

The Project is a sector loan which is composed of sub-projects in several cities across the country. Currently 6six sub-projects in five cities nationwide are the targets of the Project including Surabaya, Bandung, Palembang, Gorontalo and Padang. The six sub-projects are currently being prepared for tender with contractor packages for construction and consultant packages for the supervision of construction works by the two main executing agencies, the DGWR and DGCK of the Ministry of Public Works.

The other regional project is **Stage III – Preparatory Survey of JICA's Urgent Flood Control Project in the Citarum Basin**, a study started in 1988 with Stage I. Stage III of the project is concerned with conducting the environmental impact assessment and preparation of any resettlement plans associated with the proposed urgent flood mitigation measures.

Further details of all JICA projects listed are included in the project digests in **Annexe 3.**

2.9 AUSTRALIAN AID (AUSAID)

The Australian Aid Program (AusAid) has, for the past three years focused on providing assistance to the Government of Indonesia through the Indonesia Infrastructure Initiative (IndII), the funding source for the possible IndII urban drainage project. The program, which currently focuses on the water, sanitation and transport sectors, supports infrastructure reforms and activities at both the national and local level with the overarching objective to strengthen the policy and institutional framework for infrastructure reform and development.

Since 2009, IndII has disbursed infrastructure enhancement grants (IEGs) to over 45 qualified local governments to support committed APBD funding in water supply, sanitation and solid waste. It is now proposed to examine the possibility of extending this support to the urban drainage sector through the current project although such

support will not necessarily be exclusively through grants (IEG) but also through more traditional technical assistance (TA) and a mix of the two funding options.

In addition, The Government of Australia through AusAID is supporting a study conducted by the World Bank East Asia and the Pacific, described in section 2.5, aimed to demonstrate a scalable methodology to increase the resilience of urban infrastructure that can be mainstreamed into city-level investment decisions. This is part of a larger regional initiative focused on building urban resilience to risk from disaster and climate change threats. The City of Jakarta has been selected as one of the two pilot cities where the study will be conducted. The first phase of the study will focus on stock taking of the current identified climate associated risks (mainly urban flooding) and the programs being planned or undertaken to address those risks, while the second phase will be the urban flooding risk assessment.

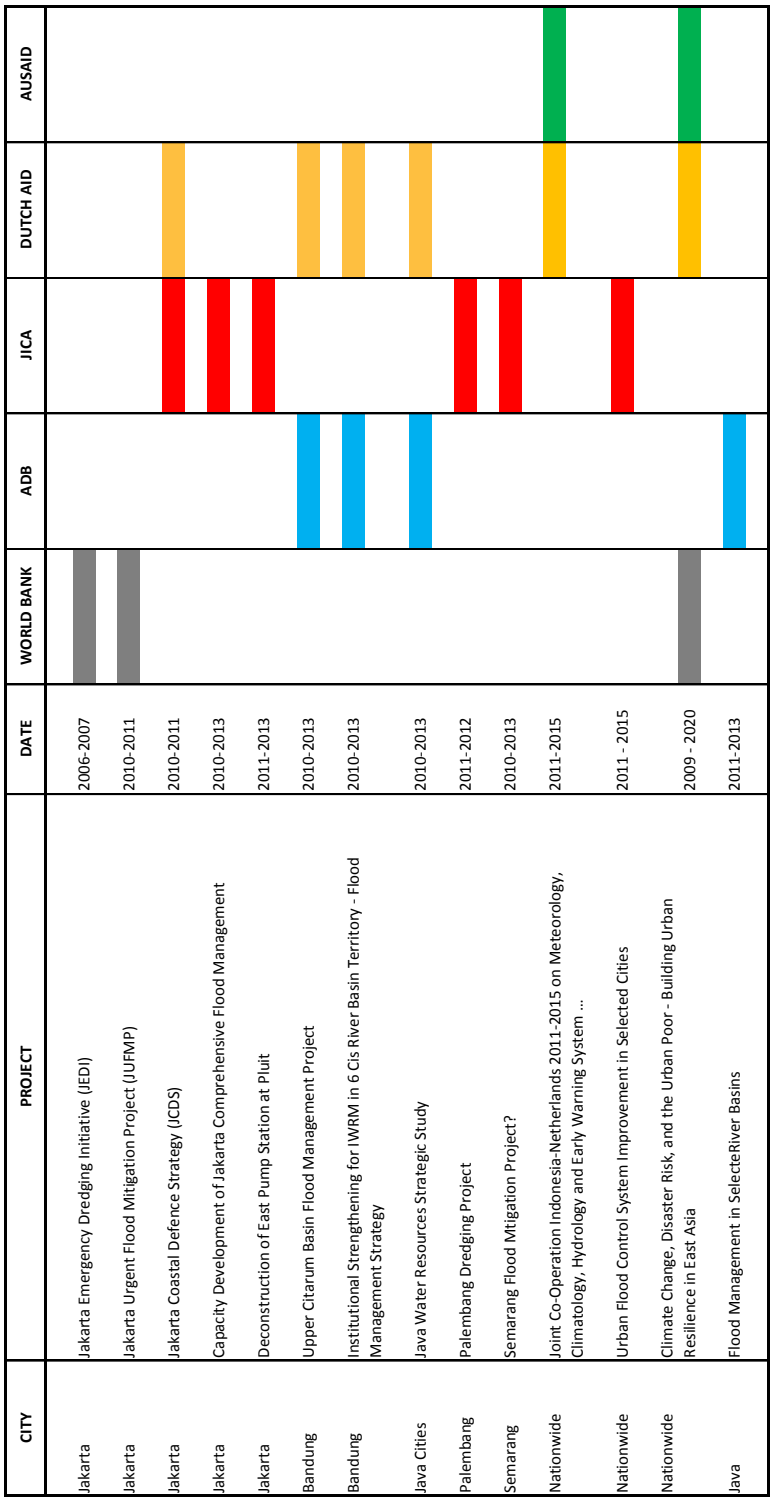
This study will be carried out in close collaboration with the Australia Indonesia Facility for Disaster Reduction (AIFDR), currently conducting an initiative also jointly with the World Bank to develop "Risk-in-a-Box" as practical tool for local governments in carrying out risk assessment. Linking the Urban Resilience Study with the Risk-in-a-Box is only part of a collaborative strategy to promote a risk-based approach to disaster and climate mitigation in urban management in mega cities like Jakarta.

2.10 SUMMARY AND CONCLUSIONS

A summary of the various urban drainage projects in Indonesia and the donor agencies involved is provided in Table 2.1. This shows clearly that JICA and the Dutch Government are the main supporters of Indonesia's urban drainage sector and that the majority (more than 70 percent) of such projects are focused on Jakarta, the JABODETABEK region and the Citarum River Basin.

There is a perception among both GOI agencies at the central level and the multi-lateral donors such as the World Bank and ADB that perhaps not enough is being done to address the issues of urban flooding outside Jakarta, especially with regard to institutional strengthening, capacity building and encouraging behavioural change. Jakarta, because of its national strategic importance as the nation's primary centre for industrial and commercial production, receives the lion's share of funding for urban drainage. Nonetheless, other large and economically important cities such as Bandung, Semarang, Makassar and Palembang have had a long history of urban drainage support from the bi-lateral and multi-lateral agencies and are currently carrying out major urban drainage projects involving substantial civil works. The extent of these civil works and the commitment of local governments to address the urban flooding problems became more fully apparent during the site visits.

Table 2.1 Urban Drainage Projects and Donor Agencies in Indonesia



CITY	PROJECT	DATE	WORLD BANK	ADB	JICA	DUTCH AID	AUSAID
Jakarta	Jakarta Emergency Dredging Initiative (JEDI)	2006-2007					
Jakarta	Jakarta Urgent Flood Mitigation Project (JUFMP)	2010-2011					
Jakarta	Jakarta Coastal Defence Strategy (JCDS)	2010-2011					
Jakarta	Capacity Development of Jakarta Comprehensive Flood Management	2010-2013					
Jakarta	Deconstruction of East Pump Station at Pluit	2011-2013					
Bandung	Upper Citarum Basin Flood Management Project	2010-2013					
Bandung	Institutional Strengthening for IWRM in 6 Cis River Basin Territory - Flood Management Strategy	2010-2013					
Java Cities	Java Water Resources Strategic Study	2010-2013					
Palembang	Palembang Dredging Project	2011-2012					
Semarang	Semarang Flood Mtigation Project?	2010-2013					
Nationwide	Joint Co-Operation Indonesia-Netherlands 2011-2015 on Meteorology, Climatology, Hydrology and Early Warning System ...	2011-2015					
Nationwide	Urban Flood Control System Improvement in Selected Cities	2011 - 2015					
Nationwide	Climate Change, Disaster Risk, and the Urban Poor - Building Urban Resilience in East Asia	2009 - 2020					
Java	Flood Management in SelecteRiver Basins	2011-2013					

CHAPTER 3: URBAN DRAINAGE SECTOR STATUS REPORT

3.1 BACKGROUND

Since 1900 flooding in Indonesia is ranked as the second most frequent and fourth most economically damaging natural disaster after wildfires, earthquakes and volcanic eruptions, causing an estimated 4,493 deaths, affecting 6.2 million people and resulting in US$ 2.4 billion in damages (refer to Table 3.1).

Table 3.1 The Impact of Natural Disasters in Indonesia 1900 - 2011

DISASTER	NO. EVENTS	DEATHS	AFFECTED million	DAMAGE US$ million
Earthquake	97	30,042	8.6	7.0
Tsunami	9	168,372	0.6	4.5
Volcano	50	18,628	1.2	0.35
Floods	90	4,493	6.2	2.4
Wildfire	9	300	3.0	9.3

Source: *EM-DAT: The OFDA/CRED International Disaster Database*

Of the 90 flood events recorded since 1900, some 47 have occurred since 1998 resulting in 2,592 deaths, affecting 3 million people and causing financial losses of US$ 1.6 billion. In the same time period Indonesia recorded more flood disasters than any other South-east Asian country.

Flood incidences are perennial occurrences and have been increasing in severity during the past decade, especially in Jakarta where the multiple threats of rapid and poorly controlled urbanisation, combined with severe watershed degradation, have increased run-off substantially. A combination of inadequate retention basins, an under-sized drainage network and land subsidence has created the conditions for prolonged and extensive flooding during high rainfall events.

The floods of January 1996, February 2002 and February 2007 were especially devastating. The 2007 event inundated 235 km2, about 36% of the city by up to several metres in some areas. The 2007 flood affected more than 2.6 million people and forced 340,000 to flee their homes. Over 70 people died and outbreaks of disease caused by the flood waters affected over 200,000 people. The estimated financial and economic losses from the 2007 flood amounted to US$ 900 million.

Inundations continue to occur under any sustained rainfall conditions especially when the rainfall coincides with a high spring tide in Jakarta Bay. In 2008, a flood event closed the airport toll road, resulting in the cancellation of 1,000 flights and causing serious disruption for the city. But this event was tide-related and had been accurately predicted; there was no heavy rain and the flood was the caused essentially by poor road design and resulted in the elevation of the airport toll road.

Jakarta, as the capital city, the largest city and the economic centre of Indonesia, receives the bulk of media attention during flooding and undoubtedly has suffered the greatest economic losses from flooding of any city in the country, but flooding is a nationwide phenomenon and affects a great number of cities to varying degrees.

3.2 FLOODING IN CITIES THROUGHOUT INDONESIA

Prolonged flooding in urban areas of Indonesia is a regular occurrence and appears to be on the increase due to a combination of reduced water retention capacity, expanding urbanisation with the inevitable increase in non-absorptive surfaces, watershed degradation and a reduction in the hydraulic capacity of urban drainage systems caused by a multitude of factors, chief among which are broken and blocked drains and serious under-funding of the sector especially in operation and maintenance.

Reliable data on urban drainage at the national level and in particular urban flooding, the most damaging manifestation of a failure by government to cope with heavy rainfall events and consequent high run-off, are difficult to come by. The National Survey and Mapping Agency (BAKOSURTANAL) has produced an Indonesian Flood Hazard Map Based on data provided by the National Action Plan for Disaster Risk Reduction *(Badan Nasional Penanggulangan Bencana/BNPB)* that provides a flood risk level map using three categories of risk – high, medium and low – for each province. The scale is, understandably, very small and areas mapped under each category far too large and generalised to be of value in assessing the flood risk within a particular city or, for that matter, the major cause or causes of the flooding.

Nonetheless, the BNPB does provide a list of 22 municipalities with an 'Extremely High Risk' of flood based, one must assume, on data provided by the various municipal governments since the 'Extremely High Risk' category does not feature in their provincial flood risk maps. The list, presented in Table 3.2, provides few surprises with North and West Jakarta, Semarang, Surabaya, Banjarmasin and Makassar prominent, although the inclusion of Malang, Madiun and Tebing Tinggi seems at odds with their flood typology.

Table 3.2 Municipalities with Extremely High Flood Risk

NO.	PROVINCE	MUNICIPALITY
1	Banten	Tangerang Municipality
2	DKI Jakarta	North Jakarta Municipality
3	DKI Jakarta	West Jakarta Municipality
4	Jambi	Jambi Municipality
5	Central java	Semarang Municipality
6	Central Java	Tegal Municipality
7	Central Java	Surakarta Municipality
8	East Java	Kediri Municipality
9	East Java	Malang Municipality
10	East Java	Surabaya Municipality
11	East Java	Mojokerto Municipality
12	East Java	Pasuran Municipality
13	East Java	Madiun Municipality
14	South Kalimantan	Banjarmasin Municipality
15	West Kalimantan	Singkawang Municipality
16	West Kalimantan	Pontianak Municipality
17	Nanggroe Aceh Darussalam	Banda Aceh Municipality
18	Nanggroe Aceh Darussalam	Lhoksumawe Municipality
19	South Sulawesi	Makassar Municipality
20	South Sulawesi	Palopo Municipality
21	North Sumatra	Tebing Tinggi Municipality
22	North Sumatra	Medan Municipality

***Source**: Badan Nasional Penanggulangan Bencana (BNPB)*

The causes of flooding in cities vary according to geographical location, topography, land-use and watershed condition, and this is reflected in the BNPB criteria for determining flood risk. Cities can be grouped into at least five categories of flood threat or flood 'typology', each of which present a different suite of potential interventions.

The five potential categories are:

1. Cities located on the coast within an extensive coastal plain (Jakarta, Makassar, Banjarmasin) which are subject to flooding from inland and from the sea
2. Cities located on the coast with a narrow coastal plain backing onto higher plains and hills (Semarang, Cirebon) subject to flooding from land and sea
3. Cities located on the banks of a large tidal river surrounded by coastal swamp lands (Palembang, Jambi, Rengat, Dumai) subjected to flooding from land and sea
4. Cities located on the coast with no appreciable floodplain and backing directly onto hills and mountains (Lampung, Manado, Palu, Jayapura, Kendari) with no significant flood threat
5. Cities located inland away from the sea at elevation within degraded watershed areas (Bandung, Bogor, Surakarta) subject to flooding from the land

Other categories and sub-categories may become apparent as the database is expanded to cover all the major cities in the country. One important criterion for determining the ease with which water can drain through a drainage system, is the slope and degree of incision of the natural drainage channels. North Jakarta experiences serious flooding problems largely because of the difficulty of gravitational drainage in the flat terrain. Denpasar, on the other hand, has good gravitational drainage capacity and deeply incised natural drainage channels.

Cities in categories 1 and 2 experience the most extensive and damaging flooding because of their low-lying position and the additional flood threat from the sea. The lack of effective gravity drainage in the lower reaches of the coastal plains is compounded in the case of Jakarta and Semarang by serious land subsidence caused by the over-extraction of groundwater. Land subsidence is also a contributory factor to the perennial flooding that occurs in the east and south of the Bandung Basin.

In category 3, flooding is generally associated with the occurrence of high spring tides which, in the case of Palembang, have an impact even 85 km upstream from the river mouth. The gently undulating farm, plantation and forest land inland from Palembang and Jambi is not seriously degraded or urbanised and therefore run-off from a heavy rainfall event does not overwhelm the capacity of the city drainage network except when such events coincide with a high spring tide – a very rare occurrence.

There is a need for a National Urban Flooding Database similar to that established for the national watersheds and river basins to provide a benchmark for national and regional planning of urban drainage initiatives. The BNPB database is a good starting point to develop a more detailed model that concentrates on the flood risk in urban

areas throughout the archipelago and adopts the above typology or something similar for flood risk assessment. A possible framework or matrix for such a flood risk assessment is presented in **Annexe 4**.

3.3 THE CAUSES OF FLOODING

Flooding in urban areas of Indonesia is a recurrent event that appears to be on the increase for a variety of reasons, most of which are well known. The floods inflict millions of dollars worth of direct and indirect economic and financial losses to the state and to individuals through damage to property and infrastructure and lost productivity.

The causes of flooding are many but the initial trigger for a flood is a high intensity rainfall event either directly over the urban area or in the catchment of the urban area. Whether, as some observers claim, rainfall intensities have increased in recent years and will continue to do so as a result of changes occurring in the world's climates, or whether intensities have remained the same but runoff increased as a result of urban expansion and land-use changes, the fact remains that river discharge peaks are often more frequent and of greater magnitude than before.

In a low lying coastal situation such as Jakarta and Semarang, flooding can also occur without rain during periods of high spring tide if coastal sea defences are not high enough. This seaward threat is increased further by land subsidence in some coastal areas due to a combination of excessive and unsustainable groundwater extraction, very soft ground conditions and the weight of concrete structures with shallow foundations.

Increased urbanisation, reduced water retention capacity, out-dated drainage design, blocked drains and land subsidence exacerbate the impact of the increased river discharges and resultant flash flooding. In coastal locations, flooding is often a two-directional event with upstream flooding from river discharge combining with flooding from the sea during high tide events and storm surges. This situation is compounded by the low lying nature of the land and the difficulty of achieving gravitational drainage seawards.

Even though the physical processes contributing to urban flooding are well known and reasonably well understood and engineering solutions to the problems possible, the implementation of such solutions is often delayed because of the unclear and often overlapping mandates of the national, regional and local governments with responsibility for urban flood control and mitigation. Furthermore, the absence of an effective early warning system and the generally inadequate reactive response caused by the lack of coordination between the multitude of government agencies charged with drainage and flood control, particularly in Jakarta, indicates that there are still serious institutional issues at the root of the problem.

The scope for urban drainage options and interventions in Indonesia will be determined by the actual drainage conditions existing in the major urban centres of the archipelago and in the watersheds of the urban hinterlands. Flood mitigation measures required for coastal locations will, in many cases, involve major (and expensive) civil works construction of dykes and sea walls; structures that will not be necessary at inland locations where cheaper and effective options such as the cleaning of drainage ditches may constitute a major part of the urban drainage plan.

The condition of a watershed, usually measured by the percentage or ratio of vegetation cover, especially trees, to bare soil, is a major determinant of run-off and flash flooding. In general, the greater the vegetation cover, the greater the absorption capacity of the soil, the lower the run-off and more stable the base flow of the river. Where watersheds are well wooded, flash flooding as a result of excessive run-off from the upper and middle parts of the catchment is generally not a problem and urban flooding is caused by other factors including a localised high rainfall event, under-sized drains, blocked drains, low lying ground or a combination of all these.

The importance of sound watershed management and the condition of watersheds cannot be over-emphasised when dealing with urban flooding; however, it does introduce a factor that is often beyond the immediate control of those cities directly affected by flooding since the degraded part of the watershed concerned may be outside the administrative jurisdiction of the local government and would be under the mandate of the provincial government or even the central government if the river crossed two or more provinces.

According to the Law on Water Resources 2004, the Ministry of Public Works is responsible for flood control and water management at the national level and has carried out a study of the nation's major watersheds as part of the National Watershed Project. The results of this study indicate that at least 70% of the 140 watersheds considered of strategic national importance are in a seriously degraded state. The rehabilitation of these watersheds is a priority for alleviating and mitigating the risk of urban flooding.

3.4 FLOOD PREVENTION

The Government of DKI Jakarta and the municipal governments of larger cities in Indonesia that experience flooding problems have, over the past 30 years and with the assistance of multi-lateral and bi-lateral donors, instituted a variety of flood prevention measures that have generally been based on a general urban infrastructure master plan or, in some cases such as Surabaya and Semarang, a specific urban drainage master plan.

The kinds of flood prevention measures adopted include the construction and extension of secondary and tertiary drainage networks, the 'normalisation' of rivers and man-made drainage channels to restore the original carrying capacity; the building of retention basins, polders, seawall defenses, weirs, dams and pump stations; urban

drainage master planning; urban flood risk mapping; and the implementation of regular operation and maintenance schedules to clear the drains of sediment and the solid waste that is disposed of in the drainage network by local communities. By and large the flood prevention measures adopted by the cities involve major civil works construction which is paid for with funds provided by the multi-lateral and bi-lateral agencies.

Although weaknesses in institutional capacity and organisation, especially since decentralisation in 1999, have long been recognised as major contributory factors in urban flooding, it is only in the last few years that large projects such as the ADB-funded *Institutional Strengthening for Integrated Water Resources Management in the 6 CI's* and the JICA-funded *Capacity Development of Jakarta Comprehensive Flood Management* are being implemented.

With the notable exception of Jakarta, which represents a special case, the results of these flood prevention measures in cities experiencing perennial flooding has been very positive especially in Semarang, Surabaya and Palembang that are working to updated urban drainage master plans. It is also instructive to note that in the case of Semarang and Palembang, the institutional problems that seem to dog Jakarta's flood prevention activities, appear to have been solved and that the heads of the local municipal government *(Walikota)* are technocrats and champion the cause of urban drainage improvement (refer to section 4.2).

A summary of the status of urban drainage in the cities visited by the consultant's team is given below.

3.5 THE STATUS OF URBAN DRAINAGE IN THE CITIES VISITED

The site visits to the cities of Semarang, Palembang, Bandung and Makassar provided valuable insights into both the flooding problems facing many cities and the potential solution to those problems at the institutional as well as the technical level. The visits also helped dispel some of the more popular misconceptions regarding urban flooding that frequently appear in the media and become lodged in the public perception.

3.5.1 Urban drainage in Semarang City

Historically, flooding in Kota Semarang has been a perennial problem especially in the low-lying northern part of the city adjacent to the Java Sea. The geographical position of the city with some 60% of the area in hilly land more than 100m above sea level and the remainder at or below sea level creates somewhat unique conditions for urban flooding.

The rapid run-off from the hilly areas after heavy rain debouches suddenly onto the flat and narrow coastal plain where gravitational drainage is ineffective because of low or

even negative gradients, retention basins are under-sized and limited in number and the network of pumping stations inadequate to cope with the flood waters. The situation is exacerbated if high run-off from the landward side coincides with the daily high tide or the higher spring tides and flooding from the sea *(Rob)* occurs as well. The result up to 2000 was persistent and damaging flooding in commercial and residential areas close to the port and railway station as well as in other low lying areas. The social disruption and economic damage caused by the flooding made the local government prioritise urban drainage improvement in their master planning, together with water supply, sanitation and transportation.

In 2000 an urban drainage master plan was formulated with the assistance of the World Bank. This plan has been reviewed and updated to 2007 and is now being implemented by the Central Government *(DU DGWR)*, the Provincial Government *(Dinas PSDA)* and the local government *(Dinas PSDA & ESDM)* with donor assistance provided by JICA and the Government of the Netherlands. The concept for preventing flooding in Kota Semarang is a fully integrated one that considers the natural drainage systems and sub-systems in four areas of Semarang (Mangkang, Semarang Tengah, Semarang Timur and Semarang Barat) and adopts a holistic approach to the problem by: reducing run-off in the upper catchments through land-use changes and building retention basins *(bendungan and embung-embung)*; improving the capacity of existing drainage channels through improved roadside drains and river normalisation; increasing the flood water storage capacity with new retention basins in the coastal plain and providing additional pumping capacity together with coastal protection measures using sea walls and polders.

In addition to these physical flood prevention measures, the local government has recognised the need to tackle the legal, institutional and social issues that are an integral part of any flood prevention strategy. Land subsidence, for example, which is caused partly by the over-extraction of groundwater by industries, is being addressed by stronger implementation of local permit regulations (Perda and Perwal) and the predilection of many people to throw rubbish (sampah) into both the natural and man-made drainage channels which then results in blockages to drains, filters, rakes and pump intakes, is being tackled with regular public awareness and 'socialisation' campaigns.

Although the major urban drainage construction projects funded by JICA and the Government of the Netherlands are on-going and not due for completion until 2014, the efforts of the local government in implementing other parts of the Master Plan such as local improvements to roadside drains and raising the level of the roads around the railway station, an area notorious for flooding, are having positive results already.

The City of Semarang has prioritised urban drainage in its master planning and is implementing a comprehensive and integrated plan to prevent flooding within the city. The plan is well advanced and co-ordination and co-operation between the different agencies involved at central, provincial and local government levels appears to be very good. The central government and provincial government manage the bi-lateral aid construction projects dealing with channel normalisation, the building of dams,

divergent tunnels and polders, and the local government, through the single office of *Dinas PSDA & ESDM*, handle everything else including routine operation and maintenance of pumps, drain cleaning and the building and maintenance of the secondary and tertiary city drainage network.

3.5.2 Urban drainage in Palembang City

Palembang City is located on the banks of the Musi River in South Sumatra some 85 km upstream of the estuary in the Straits of Malacca. The majority of the city, some 70 percent, is built on the north side of the river on the levee and gently undulating old alluvial plains that range in elevation from 10 – 30 m above mean sea level. The remaining 30 percent on the south side of the river is located in the recent river floodplain that merges into the extensive swamplands that surround the city to the north-west, north, north-east and east.

The Musi River is one of Indonesia's largest with an estimated discharge in mid-June 2011 in the centre of Palembang, where the river is 500 m wide, 10 – 20 m deep with a flow of between 1 and 1.5m/s, of 5,000 m3/s or thereabouts. Even 85 km upstream at Palembang, the tidal range of the river is 3-4 m and this combined with the low lying nature of the land south of the river causes extensive flooding during periods of high tide, with some areas north of the river affected via the main tributaries such as the Sungai Lambidaro.

Flooding in the city is caused by heavy localised rainfall and over-topping of the Musi River and its tributaries during periods of high tide; the worst flooding occurs when the two events coincide. The occurrence of high spring tides can be predicted accurately and the local population warned in advance of the likelihood of flooding. At the present time no early warning system for localised heavy rainfall events exists. Palembang is representative of one of the main urban flood typologies that of a city located on the banks of a large tidal river surrounded by extensive river floodplains and swamplands. Cities with similar typology in Sumatra include Jambi, Pekanbaru, Rengat, Dumai.

The local Government of Palembang and the Ministry of Public Works have, over the years, built significant flood prevention infrastructure using local, provincial and central government budgets supported by multi-lateral and bi-lateral donor agencies. The infrastructure, consisting largely of a network of retention ponds, gated weirs and pump stations linked to a series of primary drains and normalised rivers, keeps flooding in the city to a minimum except when extremely heavy rainfall events coincide with exceptionally high spring tides. This occurs rarely, perhaps once a year, and mainly affects low-lying areas south of the river, well away from the commercial heart of the city.

The City Government, through the Dinas PU Bina Marga and PSDA *(Pengelolaan Sungai Daerah)* and the Flood and Drainage Sub-Division *(Bidang Pengendalian Banjir dan Drainase)* receive a special budget each year exclusively for operation and

maintenance of the drainage network and have teams continuously cleaning garbage from drains and dredging sediment from drains and retention ponds to re-establish the original discharge and storage capacities.

The mayor of Palembang, Ir. H. Eddy Santana Putra MT, is a drainage engineer and has prioritised the city's urban drainage program. In Palembang, as in Semarang, the urban drainage sector is very well managed through one agency, and co-ordination and co-operation between related agencies such as Bappeda and the *Dinas* Water Resources is very effective. As a result of this prioritisation and the flood prevention measures taken over the past decade, urban flooding does not have a major impact on the city's economic life. Only in exceptional circumstances, such as heavy rain coinciding with a high spring tide, are the city's drainage canals, retention basins and pumping stations unable to contain the flood water but even then, the commercial and residential heart of the city is not affected.

The Musi catchment in the rolling plains to the west of Palembang has very limited urban development, good ground cover with a mix of agricultural land, plantations and forest and is not badly degraded. The infiltration that occurs during storm events combined with the upper basin water retention basins prevents run-off suddenly reaching the city. The presence of such a large river system and the surrounding swamplands also provides huge storage capacity for any floodwaters and act as a natural regulator of floodwaters – the primary function of all natural wetland systems. Since Palembang's swamps are largely undisturbed and intact, this natural storage and regulator function is preserved.

3.5.3 Urban drainage in Bandung City

Flooding in the Bandung Basin is concentrated in south and south-east of the basin away from the main city centre although flooding does occur for short periods in the city centre during periods of heavy rain due largely to blocked drains and inadequate capacity in the roadside drains. The *Dinas Bina Marga dan Pengairan* in Kota Bandung, the agency responsible for managing and maintaining the city's drainage system, has identified 60 areas in the city where flooding normally occurs but since the duration is generally for one hour or less such flooding is referred to as *banjir cileuncang*, a Sundanese term for shallow temporary flooding.

In the lower lying parts of the basin in south-east, centre and south, over-extraction of groundwater by the textile industry has caused the land to subside by as much as 2 – 3 metres since 1988. Among the areas most seriously affected are Dayeuh Kolot, Gedebage and Rancaekek. This subsidence has had a severe impact on river hydraulics and exacerbated the flood problem. Groundwater extraction is now beginning to cause irreversible aquifer damage.

Bandung suffers from the usual urban drainage problems such as drains blocked with solid waste, high sedimentation rates in the local rivers, over-crowded settlements especially along the river banks which use the drains as rubbish tips, high biological

pollution loads from the markets located along the rivers and the reluctance of other agencies such as PLN, Pam Jaya and Telkomsel whose utilities often share the space in the main drainage channels, to contribute to channel maintenance.

Notwithstanding the above, much of the real problem causing flooding in the Bandung Basin lies outside the administrative jurisdiction of Bandung City Government in the degraded catchment of the Citarum River. It will therefore be necessary to engage with representatives of the four administrative areas that make up Bandung Metropolitan Area, namely Bandung City, Cimahi City, Bandung Regency and West Bandung Regency when discussing flooding in the main urban areas and the identification of a range of integrated and linked urban drainage projects within the four administrative units.

The fundamental importance of good watershed management and in the case of Bandung, major watershed rehabilitation, is recognised by the local governments and the donor agencies with ADB and the Dutch Government financing major integrated water resources management projects in the Citarum River Basin. Details of these projects are given in **Annexes 1** and **3**.

3.5.4 Urban drainage in Makassar City

Flooding is a serious and regular occurrence in many parts of Makassar, especially during the wet season but the Municipality is taking steps to prevent and alleviate the problems through an integrated approach to urban drainage that takes into account engineering, environmental, social and economic aspects. The targets of the Municipality for drainage development in Makassar are:

- Development of a decentralised, effective and integrated urban drainage system based on design parameters that are environmentally sound (water conservation) and ensure sustainability; and
- The enhancement of coordination among district/municipalities in drainage system management.

The municipality has spent considerable time and money from its local budget evaluating the problems relating to flooding and urban drainage and is currently in receipt of funds from IndII for the formulation of a sewerage and sanitation master plan.

The Makassar drainage network is currently in very poor condition and cannot cope with the run-off during the wet season or during any high rainfall event due to a combination of hydraulic under-capacity in the face of increased run-off from ever-expanding areas of concrete and asphalt and blockages to the system caused by solid waste.

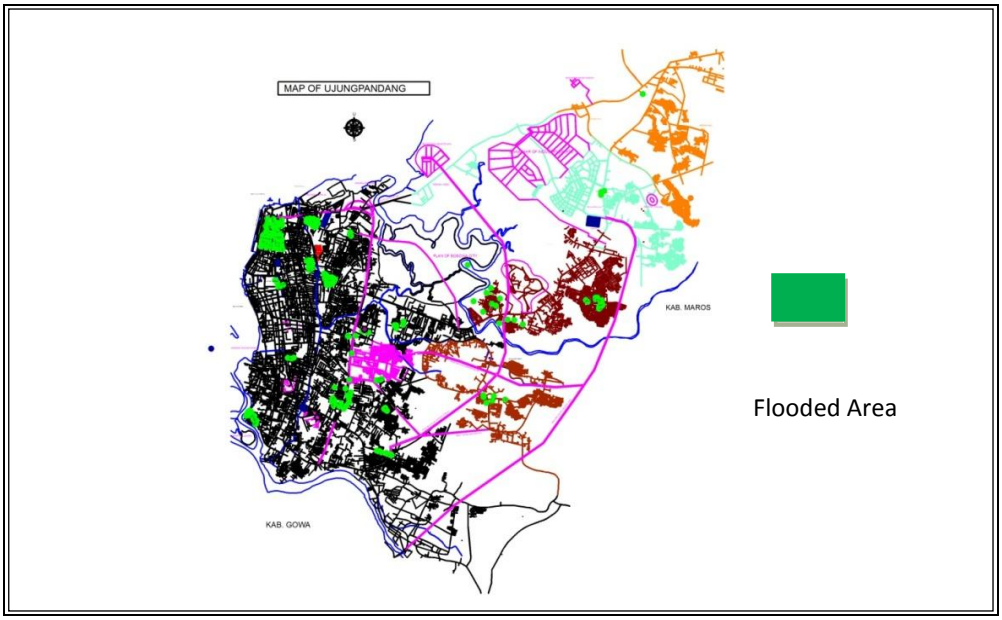
The Municipal Government recognises that the rehabilitation of the drainage system in Makassar municipality will require the following steps to be taken:

- A thorough study of the existing drainage system
- The formulation of a well-planned rehabilitation of the drainage system including larger capacity drains, drainage tunnels under strategic areas, retention ponds etc.
- A committed Operational and Maintenance program for the drainage facilities that tackles the problems of drains blocked by solid waste and damage to drains and other drainage assets such as pumps
- The agencies that manage the infrastructure of urban drainage must consider not only the urban areas but also the adjacent water catchment and coastal areas since these often have a major external impact on urban flooding

The municipality has gone so far as to suggest that an independent urban drainage agency is formed that cuts across existing lines of responsibility and has the mandate for the program development, preparation stages, and implementation of planning development, operation and maintenance and financial management. This Decision Support System or DSS is similar in concept and function to that of an **independent drainage board**.

The Municipality is well aware of the specific problems relating to urban drainage and has maintained a data base providing information on the location, depth and duration of flooding in the municipality over the past years. These data have then been incorporated in a flood GIS system to produce maps of the areas most at risk from flooding. An example of this is shown in Figure 3.1.

Figure 3.1 Areas in Makassar that regularly flood



The specifics of flooding in Makassar are as follows:

a. Overflow of the River Tallo creates ponds of water in the BTP housing estate, Bung Permai, Antara, Wirabuana and part of University Hasanuddin Lecturers' housing estates, Asal Mula, all of which have a high population density

b. The lack of areas with a formal drainage system

c. The inability of the water catchment area to absorb the volume of water produced during high rainfall events combined with the inadequacies of the Makassar City urban drainage network (especially Kaa Jongaya, Paampu, Sinrijala) and the exacerbation of the flood problem when high rainfall and high tides coincide

d. Overflow of river Je'ne Madingin/Borong Jambu and affecting to Manggala/Antang housing estates and the surrounding areas

e. High sedimentation in tertiary and secondary drains due to blockages by solid waste and sediment

f. Many drainage channels have been covered as a result of urban expansion and thus it is difficult to 'normalise' the channel

g. Population growth and rapid urban development have caused changes in land use. Areas that used to be agricultural land or forest has been converted into housing estates and industrial areas. This trend has spread out to nature reserves, protected forest and conservation areas that should act as water catchment reserves. The impact of such development is seen in the increasing volume of runoff during the rainy season, frequent drought during dry season and highly variable river base flows throughout the year.

The Makassar Municipality would like to develop an Urban Drainage Master Plan that examines all these issues as a top priority. In the meantime, the priority urban drainage projects for Makassar in the period 2010 – 2014 are listed below in Table 3.3.

Table 3.3 Priority recommendations for development of urban drainage in Makassar City 2010–2014

No	Description of project	Unit	Source of fund
A	2010		
1	Development of primary drainage Hasanuddin airport area	Package	APBN
2	Development of primary drainage area of Rusunawa Mariso	Package	APBN
3	Development of primary drainage of Tamalanrea area	Package	APBN
4	Development of drainage channel at eastern side of airport	Package	APBN

No	Description of project	Unit	Source of fund
5	Development of rehabilitation/normalisation drainage in 5 sub-districts	Package	APBD municipality
6	Technical assistance for master plan of drainage for Makassar city	Package	APBN
B	2011		
1	Development of rehabilitation/normalisation drainage in 7 Kecamatan	Package	APBD municipality
2	Dredging at secondary channel in 4 locations.	Package	APBD provincial
3	Enhancement of drainage capacity at Tamalanrea/Konservasi Kampus area	Package	APBD municipality
4	Normalisaton of pond/lakes capacity in campus	Package	APBD provincial
5	Development of wall at conservation lakes	Package	APBN
6	Development of Pembangunan Saluran Pembuangan Utama Tamalanrea	Package	APBN
C	2012		
1	Development of rehabilitation/normalisation drainage in 2 sub-districts	Package	APBD municipality
D	2013		
1	Development of wall at river Tallo (area of Antara, Hamzy and BTN Asal Mula housing estate)	Package	APBN
E	Tahun 2014		
1	Development of wall at west river Tallo (area of Perumahan Bung, Wesabbe and BTP housing estate)	Package	APBN

3.6 CONCLUSIONS

Flooding in urban areas of Indonesia is a regular occurrence and appears to be on the increase due to a combination of reduced water retention capacity, expanding urbanisation, watershed degradation and blocked drains. Catastrophic flooding of the type experienced by Jakarta in 1996, 2002 and 2007 is still a rare event but the huge economic and social losses incurred during such floods has put the prevention of flooding at the top of the Jakarta City Government's agenda and raised the profile of urban drainage and flooding nationwide.

The common perception that little is being done by central government, local governments and the donor agencies to tackle the flooding problems is considerably distorted and in fact, the main cities with serious flooding problems from both the seaward and landward directions, such as Jakarta, Semarang, Surabaya and Palembang are spending many millions of dollars in building new flood protection works and in rehabilitating river channels in an attempt to restore and even enlarge their discharge capacity. In addition, many local governments that have prioritised urban drainage are implementing improvement measures based on specific urban drainage master plans and conducting regular operation and maintenance schedules to keep drains free of sediment and solid waste.

At the institutional level, the jibe that coordination between the multitude of agencies with some responsibility for managing urban drainage and the over-lapping nature of their mandates does still bear weight but the situation is improving. This is especially so at the local government level where, in some cities such as Palembang and Semarang, urban drainage management is handled by one agency that has been formed from two or three related agencies. Coordination and cooperation in these municipalities is very good but it should be noted, that in both cases the local mayors *(walikota)* are engineers who champion the urban drainage sector and also understand the technical issues associated with flooding.

CHAPTER 4: INSTITUTIONAL AND LEGAL FRAMEWORK

4.1 BACKGROUND

Among the municipal infrastructure sectors and services in Indonesia, urban drainage does not have the high profile of the water supply or electricity sectors and its funding and performance has suffered accordingly over the last half century. In this respect it is similar to the sanitation sector which for years has been the poor relation of the water sector in the Government of Indonesia's drive to improve water and sanitation services in a complementary and integrated manner. The fact that urban drainage was not included as a major component of the various water and sanitation (Watsan) strategies and projects is indicative of the somewhat ambiguous position the sector occupies in the minds of the government and the funding agencies.

This situation is changing rapidly with regard to sanitation which has now been prioritised by the government and more attention is also being focused on the urban drainage sector, especially in Jakarta and other major coastal cities where flooding from the sea during periods of high tide are becoming increasingly common amid fears of climate-induced sea level rise and the reality of land subsidence..

Institutionally, urban drainage in Indonesia has always been in something of a 'no-man's' land; a sub-sector that is an integral part of the sanitation sector, has important links with the water supply sector through the potential for pollution, contamination and disruption during flood events, is a major component of roads design, has causative links to watershed and river basin management and yet appears to have no real institutional or legal home. This is changing as central and local governments recognise that overcoming the institutional problems relating to inter-agency coordination and jurisdictional mandates are as important as the physical works in the prevention and mitigation of urban flooding.

4.2 URBAN DRAINAGE INSTITUTIONAL FRAMEWORK

Urban drainage as a sector comes under the jurisdiction of the Ministry of Public Works at all levels of government with responsibility for different aspects of drainage shared between the Directorate General of Water Resources (DGWR) and the Directorate General of Housing and Settlements or Cipta Karya (DGCK) and their respective *Dinas a*gencies in the provinces and local governments. A number of studies on natural resources management including the management of water resources, have highlighted the complexity of the institutional roles and responsibilities and the

complex and often overlapping division of work of the many different agencies[2]involved.

At the most basic level, DGWR is responsible for managing and maintaining the natural drainage network of rivers and streams including dams and irrigation off-takes on rivers, whereas DGCK and its local agencies are responsible for the construction, operation and maintenance of the man-made concrete network of secondary and tertiary drains and the associated infrastructure of gates and pump stations.

4.2.1 The roles of DGWR and DGCK

The DGWR has taken responsibility to initiate regional and urban flood control which involves the provincial government, the city governments especially the capital city municipality *(Ibu Kota)* and the surrounding districts *(Kabupaten).* Urban flood control construction measures are coordinated by the DGWR, while urban flood control planning and operations are the responsibility of the provincial governments and the municipalities through the various Dinas PU, with contributions from other ministries such as the Ministry of the Environment (AMDAL regulations), the Ministry of Health (water pollution issues) and the Ministry of Mines and Energy (groundwater issues).

Although coordination between central government and local government agencies concerning action over urban drainage is often reported to be poor, local governments are very quick to demand that central government fulfils its mandate regarding the planning, construction and funding of major flood control structures. Following the serious flooding that occurred in south Bandung and the City of Karawang in April 2009, the Governor of West Java Province recommended that the central government build 22 dams along the Citarum River. To be fair, he also recommended that local governments in the area enforce the local laws regarding deforestation, prevent further conversion of water catchment areas to other uses and put seasonal restrictions on the cultivation of very steep slopes; a clear indication that the provincial government was fully aware of the multi-dimensional nature of urban flooding.

The Central Government is responsible for the major rivers in the country which cross two or more provinces or are considered of national strategic importance. The Governor, as the representative of GOI at the provincial government level, is responsible for oversight of the flood control and urban drainage practices of the municipal and district governments. The provincial government has the responsibility

[2] See Budi Santosa (2006) , 2006, "Pola Pengelolaan Sumber Daya Air di Sistem Kedung Ombo: Tinjaua Aspect Kelembagaan" in *Jurnal Teknik Sipil*, Vol III, No. 2, July, pages 45-59; Anonim (no year) in http://kelembagaandas.wordpress.com/kelembagaan-pengendalian-banjir/anonim/; Jos Houterman, et.al, 2004, "Water Resources Management During Transition and Reform in Indonesia *Toward an Integrated Perspective on Agricultural Drainage"*, in Agriculture and Rural Development Working Paper 14, Washington: The International Bank for Reconstruction and Development Agriculture & Rural Development Department

for the management of a river crossing two municipalities or districts but is still within the provincial boundary.

The municipal and district governments, largely through the various Dinas PU of DGWR and DGCK, are responsible for the local planning and operation of urban drainage services and for the oversight and monitoring of agents and private sector service providers. The local governments are subject to oversight by the provincial government.

The Directorate General Cipta Karya (DGCK) through its Directorate of Environmental Sanitation (PLP) Development *(Direktorat Pengembangan Lingkungan Perumahan),* sub-directorate of Drainage *(Sub-Direktorat Drainase)* and its local government Dinas agencies are responsible for the planning, design and construction of the urban drainage network and for its operation and maintenance on a daily basis. Because urban drainage is generally considered to be an integral part of any sanitation and solid waste projects, plus its role in the design of road networks, its relative importance and hence the amount of funds allocated to it varies greatly between local governments.

Despite the apparent comprehensiveness and integrated nature of the institutional networks in both the Directorate General Cipta Karya and the Directorate General Water Resources (refer to Figures 4.1 and 4.2), the main central government agencies with responsibility for urban drainage, and their local government equivalents, the generally inadequate response of the authorities to flooding events in the nation's major cities, especially Jakarta, is indicative of failures at the institutional level.

4.2.2 The role of the Disaster Mitigation Agency

A further complication is that institutional roles and responsibilities are defined under the two categories of disaster management and water/drainage management. For disaster management, the handling of urban flood control and mitigation is carried out by a disaster handling coordination agency at the national, provincial and municipal/district level, the National Disaster Mitigation Agency or *Badan Nasional Penggulangan Bencana - BNPB*; another agency in an already overcrowded and poorly coordinated command structure.

Flooding events that are not classified as 'disasters', and these represent the majority of flooding incidents in any one year, come under the category of water/drainage management and are handled by the relevant agency at the municipal level, usually the various sub-directorates concerned with drainage, sanitation and rivers at the *Dinas PU*, and the *Balai Sumber Daya Air* which is the primary responsible institution for water management of rivers at the national and provincial level.

When a flood event becomes a disaster to trigger the intervention of the BNPB handling coordination agency is not clear. The final responsibility for declaring a flood event a disaster lies with the head of the local government *(Walikota or Bupati)* and with the Governor at the provincial level but the criteria upon which this judgment is

made is not clear although the decision is a reactive one and not a proactive one. In other words, there are few mechanisms in place to help predict the occurrence of a flood event that may be severe enough in terms of potential damage and so have the BNPB agencies on standby with flood mitigation equipment and supplies in those areas at most risk.

4.2.3 Tackling the problem

There are enormous problems of coordination of all the agencies involved and the strengthening of those agencies with a mandate in urban drainage is now a government and donor agency priority with several new projects started or in the pipeline to address these issues, e.g. *Institutional Strengthening for IWRM in the 6 CI's River Basin Territory*.

In addition, newer institutional models such as the creation of **Independent Drainage Boards**, similar in structure and function to the existing River Basin Management Authorities in Indonesia, and the creation of government service units *(Badan Layanan Umum Daerah – BLUD)* are being considered by the government. The aim would be to create an effective organisation with responsibility for all aspects of urban drainage organisation that is accountable for its performance. Underpinning the agency would be the concept of bench-marked performance with incentives for those that meet the performance targets and meaningful censure for poor performance. Under the present system there is little incentive for agencies in the urban drainage sector to do their job properly.

The site visits demonstrated clearly the commitment of local governments to tackle this issue, especially those where urban drainage had been prioritised in the city planning. Although no cities, as yet, had established an Independent Drainage Board (although Makassar is considering such a move), a number were using an institutional model based on existing agencies that appeared to be working well. This model that is used in both Semarang and Palembang has the jurisdiction for urban drainage under the mandate of Dinas PU Bina Marga and PSDA *(Pengelolaan Sumber Daya Air)*. In the case of Semarang, PSDA was also linked with ESDM *(Energi dan Sumber Daya Mineral)* thus incorporating the agency with responsibility for granting ground water extraction licenses (Semarang has serious subsidence problems). These agencies are housed in the same building and are generally located close to Bappeda.

With strong commitment to urban drainage from the head of local government and the creation of technically strong and dedicated urban drainage planning and management teams along the lines observed in cities like Semarang, Palembang , Makassar and Cimahi, the problems of coordination and cooperation between agencies in the urban drainage sector can be solved using existing institutions in an innovative manner.

4.3 THE LEGAL FRAMEWORK

In water management there are at least three national laws that regulate water and have an impact on water resource management and institutional arrangements. These are: The Water Resource Law no. 7/2004 which is the main national law for water resources and management; The National Spatial Planning Law no. 26/2007; and the Forestry Law no. 19/2004. These laws have enabling laws in the form of Government Regulations (*PP – Peraturan Pemerintah*), Presidential Regulations (*Perpress – Peraturan Presiden*), Presidential Decrees (*Keppres – Keputusan Presiden*), Ministerial Regulations (*Permen – Peraturan Menteri*) and Ministerial Decreea (*Kepmen – Keputusan Menteri*). With decentralisation in 1999, the legal roles and responsibilities of local governments also have major impacts on water resources management.

4.3.1 The Water Law no. 2004

The National Water Law no. 7/2004 is the umbrella for the planning of water resources in Indonesia. The law was ratified on 19 February 2004 by the House of the People's Representatives and signed on 18 March by former President Megawati. Soon after the law was signed, it received many critics, mostly from NGOs, water and natural resources experts, academics, and farmers groups. One of the main criticisms of the law was that it encouraged the privatisation of water resources which will only benefit a few, and will mostly disadvantage farmers.

The Law covers the levels of authority and the general responsibilities of each level, the conservation and exploitation of water resources and, in Chapter V, the management of the destructive force of water which is of particular relevance for urban flooding. The Law states that the control of water's destructive force shall be carried out comprehensively and shall comprise preventative, handling and restoration efforts. It also prescribes that the control of the destructive source of water shall be prioritised to the preventative effort by means of a control plan that is composed in an integrated and comprehensive manner in managing the water resources scheme and has the active participation of the local community. Furthermore, the Law prescribes that all, both persons and enterprises, shall be prohibited from carrying out activities that may generate the destructive force of water through, for instance, construction works or other actions that limit the flood prevention capacities of the urban region.

The legal procedures and sanctions for violation of the Law are covered in Chapter XIII (Settlement of Dispute), Chapter XIV (Law Suits from the Community and Organisation), Chapter XV (Investigation) and Chapter XVI (Criminal Provisions). Like so many of Indonesia's laws, this is a powerful and all-embracing piece of legislation but its successful implementation requires enabling legislation at both the central and local government levels, legislation in the form of government regulations or *Peratuan Pemerintah (PP)* that are often missing or incomplete.

Even where enabling legislation is in place, enforcement of the law is often weak and powerful vested interests continue to violate the law without serious sanction; the

uncontrolled urbanisation of cities and catchment areas and the widespread dumping of untreated industrial waste directly into rivers, being prime examples of this.

4.3.2 Other laws relevant to urban drainage and flood control

Amongst other laws related to urban drainage and flood control are the following:

- Spatial Planning Law no. 26/2007
- Disaster Management Law no. 24/2007
- Forestry Law no. 19/2004
- Water Resource Law no. 7/2004
- Environmental Management Law no. 23/1997
- Conservation of Natural Resources and Ecosystem Law no. 5/1990

In parallel with the Water Law, these laws are all-embracing and in the case of the Spatial Planning Law, are among the most powerful and comprehensive of any country but all suffer from a lack of sufficient enabling legislation and weak enforcement.

4.3.3 Enabling legislation

There are at least 17 government regulations or PP (*Peraturan Pemerintah*), Presidential Regulations and Decrees (*Peraturan presiden and Keputusan Presiden*), and Ministerial Regulations and Decrees (*Peraturan Menteri dan Keputusan Menteri*), that may have a bearing on water management in urban drainage systems: They include:

- GR no. 42/2008 on Water Resources Management
- GR no. 26/2008 on National Spatial Planning
- GR no. 21/2008 on Implementation of Disaster Management
- GR no. 22/2008 on Funding for Disaster Management
- GR no. 45/2004 on Forest Protection
- GR no. 44/2008 on Forest Planning
- GR no. 63/2002 on City Forests
- GR no. 35/1991 on Rivers
- GR no. 22/1982 on Water Utilisation and Arrangement
- GR no. 27/1999 on Environmental Impact Assessment
- GR no. 68/1998 on Natural Reserve and Conservation

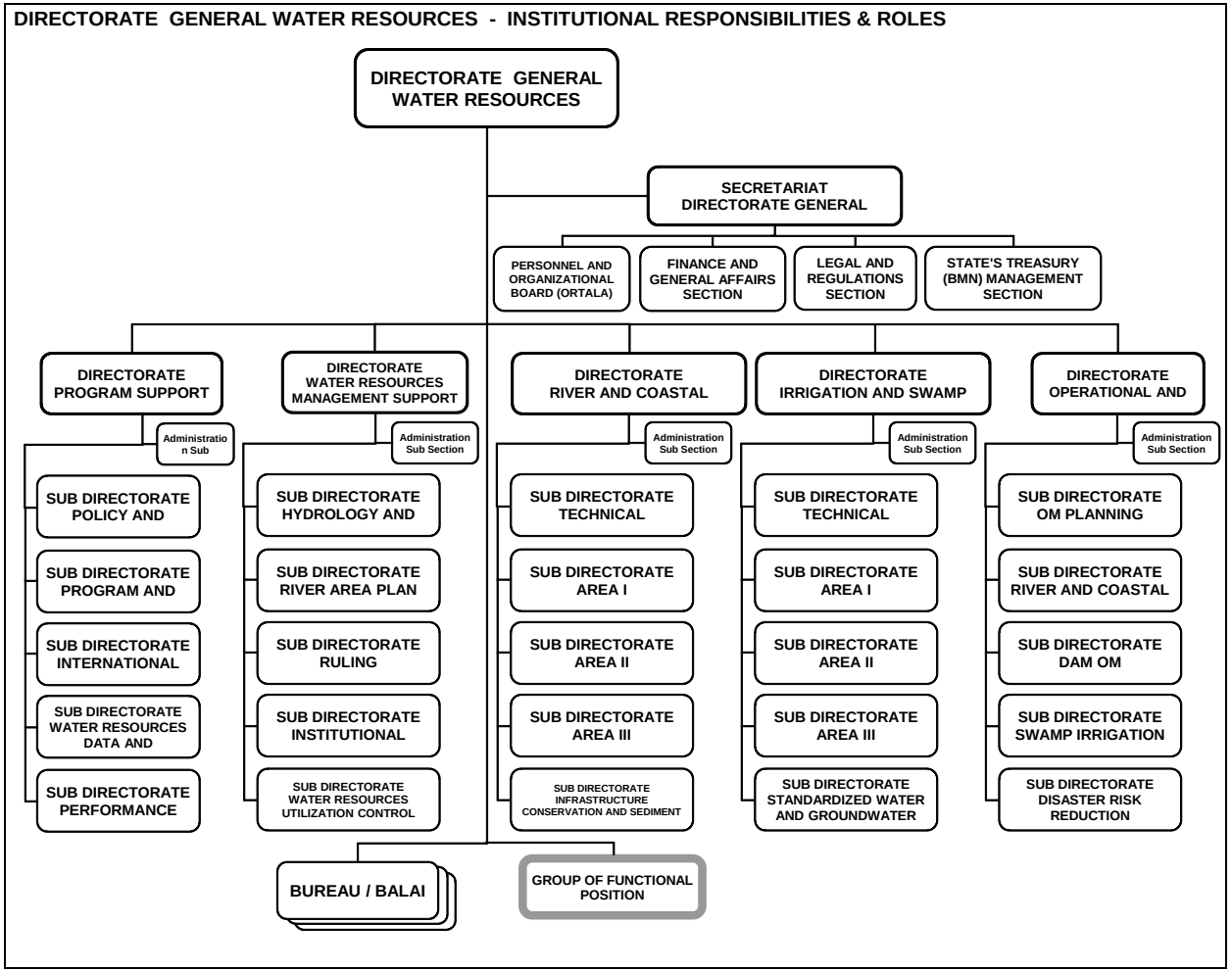
- GR no. 25 /2000 on Division of Work of Government, Provincial Government, District/municipality
- President Regulation no. 12/2008 on Board of Water Resource
- President Regulation no. 89/2007 National Movement on Forest Rehabilitation
- President Decree no. 89/2007 on making coordination team for implementation of utilisation of river and DAS conservation
- Public Works Ministerial Regulation no. 4/PRT/M/2008 about guidance to formation of coordination body for water resource management at provincial, district/municipality, and river area (region)
- Minister of PW Regulation no. 11a/PRT/M/2006 on criteria and decree of river area
- Minister of PW Regulation no. 63/PRT/1993 on river banks demarcation, area of utilisation of river, area of river and ex-river

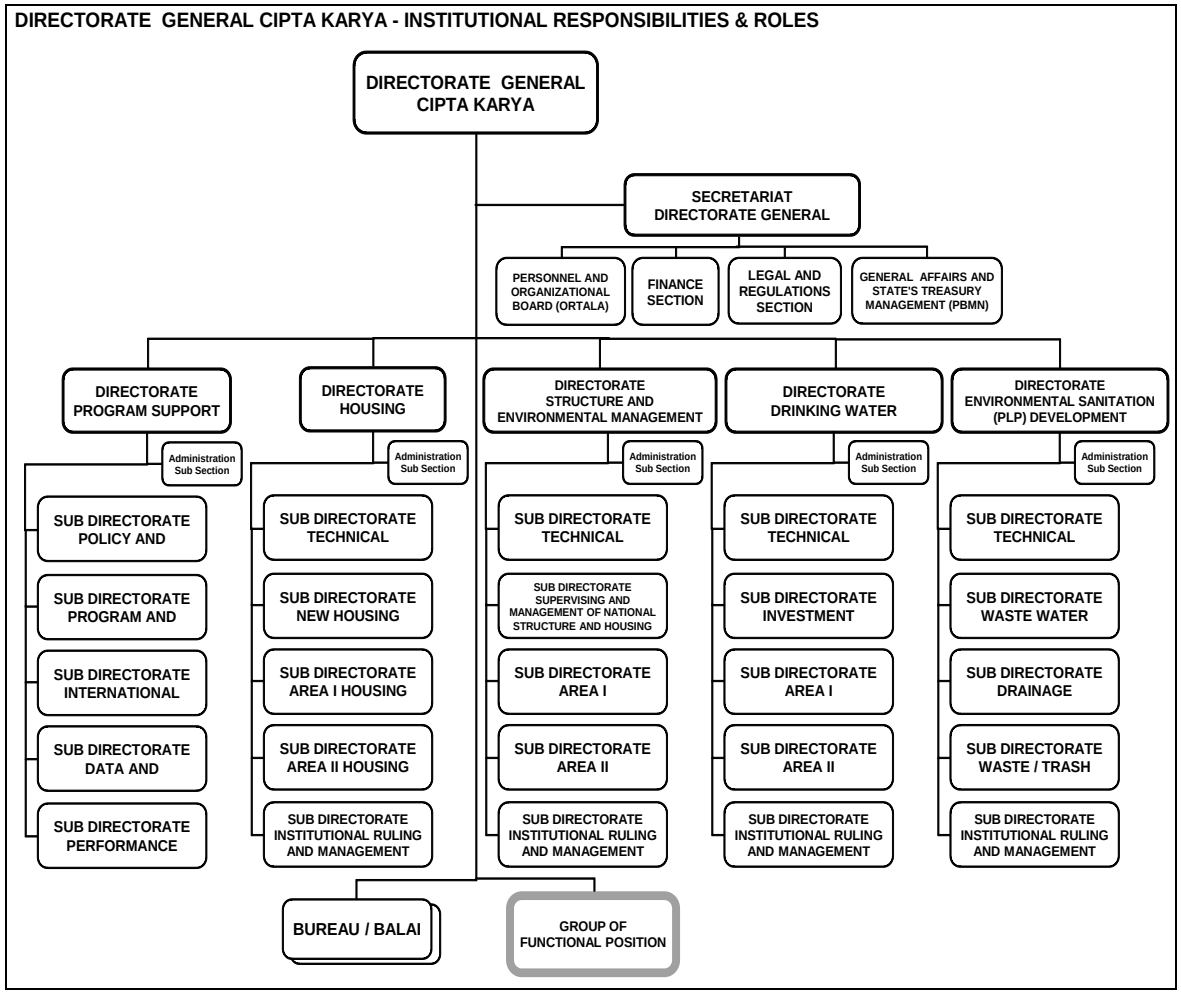
The hierarchy of laws, rules and regulations in Indonesia are as follows:

a. Undang-undang Dasar Republic of Indonesia 1945 (National Base Regulation of RI 1945)
b. National Regulation or Governmental Regulation for Replacement of national regulation
c. Government regulation
d. Presidential regulation and
e. Local government regulation

The ministerial regulation no. 4/PRT/M/2008 about guidance in the formation of a coordination body for water resources management at provincial, district/municipality and river basin area is a regulation that regulates river water resource as vital resources that can cross different governmental administrative boundaries and on which many millions of people depend, and therefore such a resources must be managed, coordinated and bound by law.

For the Water Law and the related laws that have an impact on urban flooding to be effective it is essential for the local municipalities and their respective provincial governments to draft the required enabling legislation concerning the management of the destructive force of water and vigorously enforce the law in cases of violation and abuse.


DIRECTORATE GENERAL WATER RESOURCES - INSTITUTIONAL RESPONSIBILITIES & ROLES
DIRECTORATE GENERAL WATER RESOURCES
SECRETARIAT DIRECTORATE GENERAL
PERSONNEL AND ORGANIZATIONAL BOARD (ORTALA)
FINANCE AND GENERAL AFFAIRS SECTION
LEGAL AND REGULATIONS SECTION
STATE'S TREASURY (BMN) MANAGEMENT SECTION
DIRECTORATE PROGRAM SUPPORT
DIRECTORATE WATER RESOURCES MANAGEMENT SUPPORT
DIRECTORATE RIVER AND COASTAL
DIRECTORATE IRRIGATION AND SWAMP
DIRECTORATE OPERATIONAL AND
Administratio n Sub
Administration Sub Section
Administration Sub Section
Administration Sub Section
Administration Sub Section
SUB DIRECTORATE POLICY AND
SUB DIRECTORATE PROGRAM AND
SUB DIRECTORATE INTERNATIONAL
SUB DIRECTORATE WATER RESOURCES DATA AND
SUB DIRECTORATE PERFORMANCE
SUB DIRECTORATE HYDROLOGY AND
SUB DIRECTORATE RIVER AREA PLAN
SUB DIRECTORATE RULING
SUB DIRECTORATE INSTITUTIONAL
SUB DIRECTORATE WATER RESOURCES UTILIZATION CONTROL
SUB DIRECTORATE TECHNICAL
SUB DIRECTORATE AREA I
SUB DIRECTORATE AREA II
SUB DIRECTORATE AREA III
SUB DIRECTORATE INFRASTRUCTURE CONSERVATION AND SEDIMENT
SUB DIRECTORATE TECHNICAL
SUB DIRECTORATE AREA I
SUB DIRECTORATE AREA II
SUB DIRECTORATE AREA III
SUB DIRECTORATE STANDARDIZED WATER AND GROUNDWATER
SUB DIRECTORATE OM PLANNING
SUB DIRECTORATE RIVER AND COASTAL
SUB DIRECTORATE DAM OM
SUB DIRECTORATE SWAMP IRRIGATION
SUB DIRECTORATE DISASTER RISK REDUCTION
BUREAU / BALAI
GROUP OF FUNCTIONAL POSITION


DIRECTORATE GENERAL CIPTA KARYA - INSTITUTIONAL RESPONSIBILITIES & ROLES
DIRECTORATE GENERAL CIPTA KARYA
SECRETARIAT DIRECTORATE GENERAL
PERSONNEL AND ORGANIZATIONAL BOARD (ORTALA)
FINANCE SECTION
LEGAL AND REGULATIONS SECTION
GENERAL AFFAIRS AND STATE'S TREASURY MANAGEMENT (PBMN)
DIRECTORATE PROGRAM SUPPORT
DIRECTORATE HOUSING
DIRECTORATE STRUCTURE AND ENVIRONMENTAL MANAGEMENT
DIRECTORATE DRINKING WATER
DIRECTORATE ENVIRONMENTAL SANITATION (PLP) DEVELOPMENT
Administration Sub Section
SUB DIRECTORATE POLICY AND
SUB DIRECTORATE PROGRAM AND
SUB DIRECTORATE INTERNATIONAL
SUB DIRECTORATE DATA AND
SUB DIRECTORATE PERFORMANCE
SUB DIRECTORATE TECHNICAL
SUB DIRECTORATE NEW HOUSING
SUB DIRECTORATE AREA I HOUSING
SUB DIRECTORATE AREA II HOUSING
SUB DIRECTORATE INSTITUTIONAL RULING AND MANAGEMENT
SUB DIRECTORATE SUPERVISING AND MANAGEMENT OF NATIONAL STRUCTURE AND HOUSING
SUB DIRECTORATE AREA I
SUB DIRECTORATE AREA II
SUB DIRECTORATE INVESTMENT
SUB DIRECTORATE WASTE WATER
SUB DIRECTORATE DRAINAGE
SUB DIRECTORATE WASTE / TRASH
BUREAU / BALAI
GROUP OF FUNCTIONAL POSITION

CHAPTER 5: URBAN DRAINAGE PROGRAM OPTIONS

5.1 INTRODUCTION

The primary objective of the Urban Drainage Scoping Study is to identify potential interventions that IndII could support through an urban drainage sector grant and TA program directed at local governments. At this stage, only the type of intervention, such as assistance with master planning, local institutional strengthening and capacity building, the development of an early warning system or the more conventional design and construction supervision of civil works, needs to be considered rather than city-specific recommendations.

Before deciding on the type of intervention it is also necessary to review the likely budgets that IndII would be able to provide under an urban drainage grant or hibah scheme combined with technical assistance (TA). The only frame of reference for such budgets is provided by the IndII water and sanitation programs which have provided IEG grants to a large number of local governments and funded TA programs for teams of specialist consultants to prepare feasibility studies and assist with master planning in water and sanitation.

The size of the water and sanitation Infrastructure Enhancement Grants (IEG) vary between a minimum of AUD 40,000 to just under AUD 1 million, and the TA grants range from AUD 95,000 to AUD 1.5 million. IndII spreads the grants as widely as possible throughout the archipelago to local governments that meet the required criteria rather than concentrating the assistance in any one area. If an IndII urban drainage assistance program was to be established under a similar framework and budget, then this would limit the kinds of interventions that would be possible. For example, no major civil works could be funded with similar-sized grants but, as our review of the sector has shown, this may not be necessary since by and large, those cities that require major civil works to solve their flooding problems are already in receipt of funds from the multi-lateral and bi-lateral agencies.

During the course of the scoping study it has become increasingly apparent that some of the more common perceptions surrounding urban drainage and the government's attempts to deal with its major manifestation, flooding, are not entirely accurate. There is much discussion in the media and in government about the huge economic and social costs of flooding, especially in the major cities. It is indeed the second most frequent and fourth most economically damaging disaster in Indonesia but this is set in the context of the word **disaster**. The reality is that flooding is an intermittent event that is generally confined to the wet season and that disastrous flooding of the kind referred in the statistics is a very rare event – the last three big Jakarta floods have, on average, occurred every five years – 1996, 2002 and 2007.

The lack of access to clean drinking water and basic sanitation that affects millions of people in Indonesia and billions worldwide is a daily reality, not an isolated event that does not rate the soubriquet 'disaster' unless an epidemic occurs. Cumulatively, both

in Indonesia and throughout the world, lack of access to clean water and basic sanitation facilities must be responsible for far greater social and economic losses due to ill health than flooding *per se*.

The world community and the United Nations have recognised the fundamental importance of improving water supply and sanitation through the Millennium Development Goals (MDG) and the Government of Indonesia, with the assistance of the multi-lateral and bi-lateral agencies, especially the Australian Government through IndII, has ramped up its efforts to provide society, especially the lower income groups, with access to clean water and basic sanitation facilities.

The IndII water and sanitation IEG programs have been successful and are making a positive impact in the water and sanitation sectors and an argument could be made for expanding these programs rather than moving into another sector whose problems are not so readily solved by relatively small interventions. Of course, there are some exceptions to this and these will be discussed in the following sections.

5.2 FLOOD PREVENTION IN THE MAJOR CITIES

In assessing the current status of urban drainage in Indonesia it became clear that those major cities with severe flooding problems especially those with a coastal location such as Jakarta, Surabaya, and Semarang were not only tackling the problem with priority action programs but were also receiving significant funds from the multi-lateral and bi-lateral donor agencies especially JICA, the Government of the Netherlands, ADB and the World Bank. In some cases, such as Jakarta, Bandung and Semarang, major flood alleviation programs had been in place for a decade or more and generally consisted of flood protection civil works and river/drainage channel normalisation to restore the original design capacity.

Judging by the results of the site visits, these programs have been successful and improvements are continuing under a new tranche of urban drainage programs some of which are based on an urban drainage master plan. The flooding situation in smaller cities, those with a million or less people, is less well known although judging by the BNPB database, there are at least 27 smaller cities in Indonesia with an extremely high to very high flood risk that would benefit from urban drainage master planning and the establishment of a flood prediction and early warning system.

5.3 INFRASTRUCTURE ENHANCEMENT GRANT (IEG) OPTIONS

The IEGs are generally provided directly to the local governments that officially request such assistance and meet the criteria for qualification. But first, the kinds of interventions that might benefit from IEGs must be identified and secondly, specific potential projects identified in the municipalities. Unlike the water and sanitation sectors, where project success can generally be measured directly in terms of numbers

of new connections or communal septic tanks built, measureable success in drainage is more difficult to achieve because of the integrated nature of the problem – solving one part of the problem will not necessarily show a tangible result that can be quantified.

IndII infrastructure enhancement grants are output-based and, in addition to guarantees that the local governments qualifying for IEGs will spend their APBD funds as promised, require verification of outputs. Benchmarking and performance indicators have been developed in the water supply sector over the past decade but there is no standard set of performance indicators for the urban drainage sector. This drawback is recognised by Bappenas and is partially responsible for the central government's reluctance to commit funds to drainage compared with the other urban infrastructure sectors. The development of a set of performance indicators as a benchmark for measuring success in urban drainage projects is badly needed and could be the subject of an IndII TA project. The details of such a project are discussed in section 5.4.5.

During the course of the urban drainage scoping study, a number of possible types of intervention have been identified that would be suitable for IEG funding at the local government level and other types of intervention suggested that is more suited to the Technical Assistance (TA) format at both the local government and the central government level. These types of intervention are described below.

5.3.1 Civil works and O & M

The size of the IEG puts a limit on the kinds of interventions in the drainage sector that could be funded and more or less rules out any major civil works civil works such as dyke, polder, sea wall or channel building. However, support for rehabilitation programs involving some dredging, channel repair work and an intensification and expansion of the city's operation and maintenance schedules, especially the removal of solid waste material from the minor drains that causes significant blockages to occur, would benefit from grants of between AUD$ 100,000 and AUD 1 million. All the cities visited complained of the inadequacy of local drainage O&M budgets provided from APBD funds and cited blocked drains as a significant cause of local flooding.

5.3.2 Upgrade of pumping stations

In those locations where pumping stations provide protection against external upland waters and urban waters through the discharge of excess water from the urban drainage system into the sea, as is the case in Jakarta, Surabaya, Semarang, Palembang and Makassar, number of interventions may be possible including:

- Making an inventory of the current capacity and current state of the pumps and to determine the number of pumps that need to be replaced or upgraded
- Implement repair and maintenance works on the pumping stations

Extend the pumping capacity by constructing new stations is unlikely to be feasible under IEG funding.

5.3.3 Urban flood risk mapping

Urban flood risk mapping produces urban flood hazard and risk maps for critical cities including the completion of a preliminary flood risk assessment of urban areas where potential significant flood risks exist or are likely to occur. Such maps could form the basis for the development of an Integrated Flood Risk Management and Urban Drainage Strategy. Such mapping has been carried in many of the major cities with a high flood risk including Jakarta, Bandung and Semarang but the situation in other cities is not known.

Financial assistance from IndII in the form of an IEG to assist the local Bappeda or Dinas Bina Marga & PSDA office to carry out urban flood risk mapping in those cities without such maps could be part of an IndII urban drainage program. The selection of those cities without flood risk maps could be determined through a small TA project using an e-mail based questionnaire survey of the country's municipal drainage and flood protection agencies.

Some activities in this field are currently being undertaken under the Australia Indonesia Disaster Facility and the World Bank's 'Building Urban Resilience in East Asia', a project that is described in detail in **Annexe 3**.

5.4 TECHNICAL ASSISTANCE (TA) OPTIONS

The IndII Technical Assistance programs generally involve the recruitment of international and national consultants to carry out project identification, pre-feasibility and feasibility studies, preliminary and detailed design for IndII projects under preparation and project monitoring and evaluation activities for IndII projects that are on-going or have been completed.

In the context of the urban drainage sector, the scoping study has identified a number of potential interventions that could be funded through a TA program both at the local municipal government level and the central or national government level. These options involve 'studies' of various types that would contribute significantly to flood prevention and mitigation in the cities.

5.4.1 Urban drainage master planning

There is a real need for integrated urban drainage master plans to underpin the flood prevention measures adopted by cities. The Director of Environmental Sanitation

Development at DG Cipta Karya believed that drainage master plans were required in all cities experiencing flooding problems and, as the site visits revealed, those cities that were following drainage master plans were generally successful in solving their flooding problems.

The TAs could be in the form of direct consultant assistance to the local government agencies responsible for drainage master planning such as Bappeda and Dinas PU Bina Marga & PDSA but would need to be preceded by a small TA study to identify which cities in the archipelago required a drainage master plan and met the criteria for IndII assistance.

5.4.2 Sustainable Urban Drainage Systems (SUDS)

The concept of sustainable urban drainage systems or SUDS that integrates catchment management and river enhancement with medium and micro-sustainable urban drainage systems that embrace water conservation, compensatory storage, recycling, water quality enhancement measures and 'green' construction techniques in the home, office and factory was first proposed in Indonesia on the Metropolitan Management and Health Project, a TA funded by ADB in 2008. It is a holistic approach to drainage aimed at conservation, reducing surface run-off and flooding and improving water quality and amenity value. The concept can be used to flesh out the details of a Master Plan or become part of Action Plans derived from a Master Plan.

One of the problems with the more conventional drainage improvement programs such as lining and extending a local tertiary drainage network in a housing estate for example, is that drainage is improved locally but at often at the expense of those areas downstream where the flooding becomes worse; it is often in such low lying areas that the poorer communities with the least resilience to flooding live. The holistic approach adopted by a SUDS program would address all the causes of urban flooding in a fully integrated manner.

A SUDS Pilot Project TA in one of the smaller cities with a flood problem would be a suitable intervention for an IndII urban drainage project. One candidate for such support could be Palembang where, starting in 2011 as an initial trial phase, Bappeda Kota Palembang plan to implement a pilot integrated poverty reduction program in a "small" 50 ha plot in the Lima Ulu region. This pilot project is designed as an experimental one in the 50 hectare area where all stakeholders from different sectors of development can participate and actualise their ideas of creating or making good living conditions for the people.

In this pilot project area, a good and integrated drainage system will also be implemented and this could incorporate the SUDS principles. The Government of Palembang city will invite any parties - CSO, NGOs, community organisations and the private sector to participate and be actively involved in the planning and implementation of this experimental 'well living community' plot.

5.4.3 Development of a National Urban Drainage Database

As discussed above, there is no comprehensive urban drainage database that provides the level of detail required for strategic planning. The flood hazard maps produced by BAKOSURTANAL and based on data provided by The National Action Plan for Disaster Risk Reduction *(Badan Nasional Penanggulangan Bencana/BNPB)* described insection 3.2 provides a starting point but the scale is very small and areas mapped under each category far too large and generalised to be of value in assessing the flood risk within a particular city or, for that matter, the major cause or causes of the flooding.

5.4.4 Development of early warning and flood prediction systems

When a major rainfall event triggers urban flooding the government's response is predominantly reactive rather than proactive. Local governments who are responsible for managing urban drainage wait for the event to happen and then attempt to deal with the impact of the flood. There is very little effort made, either at central or local government levels, to anticipate the flood by establishing an early warning system and having field maintenance teams in place in areas of high flood risk to help alleviate the flood.

Reducing the risk of urban flooding can be achieved through a reduction in the frequency of flooding by increasing the retention and hydraulic capacities of the system, through a reduction in the consequences of a flooding event by an effective early warning system and by a combination of both. Accurate flood prediction together with an effective early warning system, such as that established in Kuala Lumpur[3], is an effective possibility to reduce the consequences of a flood.

Such a system allows for a proper evacuation schedule to be implemented which significantly reduces the damages and casualties during an urban flooding event. The local media, especially radio and television, were used to great effect in Jakarta to warn residents of impending flooding and the location of unaffected areas during the devastating flooding in February 2007. The extensive use of social media, particularly 'Smart 'phones'(iPhone, Blackberry, Android) and hand-held computers (Notebooks, Tablets, etc.) by an ever expanding proportion of the population particularly among the young, suggests that such devices will play an even greater role in any future flood warning system.

[3] The Government of Malaysia established a system of automatic rain gauges and river flow recorders in the watersheds surrounding the capital city, Kuala Lumpur which was linked by telemetry to a central control in the city. When rainfall and run-off reached critical levels in the hills, the city received about 30 minutes warning, sufficient time to operate the SMART tunnel, a twin road tunnel and urban storm water drain running under the city centre, that would operate entirely as a drainage channel to divert the excessive flow under the city centre and into the natural drainage system. Following the storm event, the tunnel would be cleaned and the upper half carrying the road, re-opened to traffic.

The development of an early warning system and the improvement of flood prediction capability are integral parts of the World Bank's Building Urban Resilience in East Asia Project and the ADB-Dutch Government funded Upper Citarum Flood Management Project and the primary objective of the joint cooperation project between Indonesia and the Netherlands Government entitled Meteorology, Climatology, Hydrology and Early Warning Indonesia (details of these three projects are included in **Annexe 3**).

The Australian Government is already involved in the urban resilience project through the Australia-Indonesia Facility for Disaster Reduction (AIFDR) which is currently conducting an initiative with the World Bank to develop "Risk-in-a-Box as a practical tool for governments in carrying out risk assessment. Early warning and extreme weather event prediction are an important part of this 'tool kit'.

The may be some scope for IndII to contribute to this collaborative program by co-financing some expertise through a TA program.

5.4.5 Development of a set of urban drainage performance indicators

The lack of a standard set of performance indicators for urban drainage is seen by many, including Bappenas, as a serious disincentive for funding in the sector for without measureable and verifiable outputs of project success, justification for budget expenditure becomes difficult; however, defining the performance of a storm drainage system is not straightforward. How, for example, would a community know that a drainage system had improved the quality of its life?

Conventional design in textbooks usually defines storm drainage in terms of the frequency of flooding; however, given the high frequency of 'normal' flooding in many Indonesian cities as opposed to the very rare catastrophic flood events, a broader and more specific definition is required that takes into account:

- Flood frequency
- Flood extent
- Flood depth and
- Flood duration

Such a definition thus distinguishes between a centimeter of flooding above a single stretch of road for five minutes, and flooding 30 cm deep across a large area for six hours, even if both types of 'event' occurred 10 times a year. But research has established that predictability of flooding was also a key element for local people. To the vulnerable, whether in Jakarta or London, reasonable warning allows a family to ensure its own safety and protect its most valued possessions.

The measurement of performance in achieving the objectives of reduced depth, duration, extent and frequency of flooding is conceptually straightforward. Predictability, however, is a more complex objective, both to measure and to achieve.

An IndII TA project could try to establish an appropriate performance benchmarking system for urban drainage.

5.5 CRITERIA FOR CITY SELECTION

As the interviews with the various agencies involved in urban drainage revealed, most recognise that the sector has been neglected in favour of water and sanitation *per se*, and that now they would like as much done as possible to retrieve the situation in as many cities as possible. This desire is encapsulated in the PPSP program promoted by Bappenas, the World Bank and Dutch Aid which has already started in 130 cities and plans to expand to 300 cities. Clearly, it is not possible for IndII to include all 300 cities in an urban drainage program but selection of an appropriate number could be made by filtering against the following criteria.

5.6 GOI AND FUNDING AGENCY PRIORITIES

For project success, it is clearly imperative that urban drainage improvement has the support of the central government agencies involved, the local governments who will be in receipt of the assistance and the multi-lateral and bi-lateral funding agencies. From our meetings with the main government agencies involved with urban drainage and the multi-lateral and bi-lateral agencies assisting the Government of Indonesia fund urban drainage improvement projects, we have compiled a long list of cities that are considered to be in urgent need of urban drainage assistance to prevent, alleviate and mitigate the effects of urban flooding. This initial long list is presented in **Table 5.1** according to the priorities of the agencies listed.

Table 5.1 GOI and Donor Agencies Urban Drainage Priority Cities

	Bappenas	DGCK	DGWR	World Bank	ADB	Dutch Aid	AusAID	JICA	BNPB	Score
BANDUNG	√	√	√		√	√	√	√		7
BOGOR	√	√	√				√			4
SEMARANG	√	√	√			√		√	√	6
YOGYAKARTA	√				√					2
SURAKARTA	√					√			√	3
SURABAYA	√	√	√	√			√	√	√	7
GRESIK	√									1

	Bappenas	DGCK	DGWR	World Bank	ADB	Dutch Aid	AusAID	JICA	BNPB	Score
TEGAL	√						√		√	3
PEKALONGAN	√						√			2
SERANG	√									1
MAKASSAR	√	√	√	√			√	√	√	7
MEDN	√				√				√	2
PEKANBAU	√	√	√					√		4
JAMBI	√	√	√				√		√	5
LAMPUNG	√									1
PALEMBANG	√	√	√		√			√		5
PADANG	√	√	√					√		4
BANJARMASIN	√						√		√	3
DENPASAR	√									1
BALIKPAPAN	√	√	√					√		4

Note: *Jakarta is not included in this list since it is clearly the national priority for urban drainage*

There is a measurement of agreement between agencies as to which cities are prioritised but inevitably priorities differ in some cases due to competing demands from other sectors such as water supply and sanitation or transportation and the perceived ranking of urban flooding in the infrastructural constraints of a particular municipality or sub-district.

In the case of the multi-lateral and bi-lateral funding agencies, the priorities are often dictated by wider policy and strategic issues regarding the sector and by budgetary constraints. For both the World Bank and the ADB and to a lesser extent Dutch Aid, urban drainage support is confined almost exclusively to Jakarta and this will continue for at least the next 4 years. Jakarta is also the recipient of urban drainage assistance from other bi-lateral agencies and for this reason is not included as one of the cities that might qualify for urban drainage grants from IndII.

5.6.1 Local government commitment

The commitment of local governments to improve their urban drainage network and initiate steps to tackle the basic causes of urban flooding are important indicators of the likelihood of achieving lasting results, as too is the preparedness of local governments to receive assistance in the sector and translate that into effective and sustainable action.

A local government's commitment to any sector can usually be gauged from its historical spending pattern in the yearly APBD budgets. Commitment to spend APBD funds allocated for sanitation was an important criterion for cities applying for an IndII sanitation grant, and such commitment in the urban drainage sector will be a basic requirement for IndII support.

5.6.2 Local government preparedness

Many local governments may be committed to improve urban drainage but their degree of preparedness to translate that commitment into effective action varies greatly. The degree of preparedness can be gauged by such things as the existence of preliminary studies, master plans, feasibility studies and detailed designs in addition to the status of environmental and social safeguard considerations such as EIA and LARAP preparation and the scale of land acquisition and resettlement. The existence of an urban drainage master plan is a particularly strong indicator of commitment and intent to tackle urban drainage in a holistic integrated manner.

5.6.3 Familiarity with the IndII Grant Program

It is argued in this instance that those local governments who are familiar with the IndII program and have either been selected as recipients of previous IndII water and sanitation grants or have been the subject of review for such grants, have an advantage over local governments with no involvement in the program. The governments know the stringent budget commitment criteria demanded by IndII and the process of grant application, disbursement and reimbursement against a verified output. It is felt that there is more likelihood of project success in such cities in the short-term than in those without such experience. On the other hand, it could also be argued that those cities that meet all the other criteria should be given a chance to prove themselves under the IndII banner and thus expand the reach of the IndII program.

From the IndII perspective, interventions in the urban drainage sector in cities that have already received water or sanitation grants *(hibah)* from IndII would help consolidate the IndII-financed urban infrastructure program and integrate naturally with the existing sanitation interventions given the importance of urban drainage in any city sanitation program.

5.7 CONCLUSIONS AND RECOMMENDATIONS

In the urban drainage sector the kinds of relatively lost cost interventions that are so successful in water and sanitation such as the installation of small water treatment plants, increased house connections for water supply and sanitation, water pumps, the building of communal septic tanks and public toilets (MCK) and the like, cannot be replicated in urban drainage to the same degree. The integrated nature of the causes of urban flooding and the scale of the flooding in many of the larger cities means that major civil works are required costing millions of dollars. The kinds of interventions that are beyond the budget scope of the usual IndII grants and TAs are, in fact, being funded largely by the multi-lateral and bi-lateral donor agencies with the support of APBN and APBD budgets.

The type of smaller interventions discussed above would be more suited to an IndII urban drainage support program although it is suggested that a 'pipeline' approach to urban drainage projects is adopted to enhance the prospects of project success. Such an approach presents an opportunity to address the causes of urban flooding at a number of levels and across a spectrum of tasks in one location at a time. First, in the field of flood warning and prediction, secondly through assistance with urban drainage master planning, thirdly, in the more usual design, construction and rehabilitation of appropriate urban drainage infrastructure, and lastly, through the strengthening of operation and maintenance procedures in the sector.

By initiating a 'menu' of integrated sub-projects dealing with urban drainage issues in one municipality there is a far greater likelihood that, together with current drainage projects under way or planned by the local government, flooding will be reduced in the long-term and that such flooding as will occur during extremely high rainfall events, will be accurately predicted in time for appropriate evacuation procedures to be executed.

Social research has shown that people will tolerate a degree of flooding providing they are given sufficient warning to enable them to move valuable property, the sick, the elderly and the young to higher ground. Infrequent, shallow flooding of short duration is generally considered an unpleasant but tolerable fact of life in areas such as low-lying coastal plains that are naturally disposed to flooding. What is intolerable is sudden, deep and prolonged flooding such as currently occurs in so many cities across the archipelago.

ANNEXES

ANNEXE 1: MINUTES OF MEETINGS

MINUTES OF MEETING

Location **: Directorate General Cipta Karya, DPU, Jakarta**

Date **: 3 May 2011**

Meeting Opened **: 11.00 hrs** **Meeting Closed: 11.45 hrs**

Present:

NAME	AGENCY/COMPANY	POSITION
Ir. M. Sjukrul Amien (SA)	Directorate Environmental Sanitation Development, DG CK, DPU	Director
Ir. Dodi Krispratmadi (DK)	Directorate Environmental Sanitation Development	Head of Drainage Section
Ir. Pongsilurang Boneng (PB)	Directorate Environmental Sanitation Development	Expert Staff
Dr. D.E. Parry (DEP)	Glendale Partners	TL IndII Scoping Study on Urban Drainage (SSUD)
Kiki Chrysantini M.Sc (KC)	Glendale Partners	Socio-economist/Institutions Specialist (SSUD)

Objectives and Agenda:

- To introduce the project to the Directorate of Environmental Sanitation and Development
- To ascertain the role of the DGCK and the Directorate in managing urban drainage and flooding
- To obtain a list of priority projects concerned with urban drainage
- To establish the criteria that triggers the intervention of the Disaster Management Agencies in a flood event
- To establish the links between the DGCK/the Directorate of Environmental Sanitation and Development and the DGWR, and the various roles played by each in a flood event

- To establish the mechanism by action is taken in the event of heavy rainfall events and resultant flooding

Discussion:

The meeting was opened by FCE and DEP introduced the Consultant's project team and gave a brief overview of the study. The Director (JA) then explained that the main focus of the Directorate's activities regarding urban flood control was the implementation of the JICA-funded project on Urban Flood Control System Improvement in Selected Cities, a project first formulated in late 2008 between JICA, the Ministry of Public Works and Bappenas. During the project preparation period, cities have been prioritised according to size, extent and seriousness of flooding and their preparedness to implement effective flood prevention and amelioration measures through the existence of sanitation and drainage plans, feasibility studies and the like.

First, long-listed sub-projects are selected in terms of immediate priority such as the volume of direct or indirect flood damage, the frequency of flood, the existence of economic disparity and presence of important infrastructure and existing flood control facilities; 17 sub-projects in 14 cities were thus selected. In the second phase, short-listed sub-projects are selected from the long list in terms of the maturity of project preparation or 'readiness' and the status of project design preparation. Such a state of 'readiness' might include the existence of preliminary studies, master plans, feasibility studies and detailed designs in addition to the status of environmental and social safeguard considerations such as EIA and LARAP preparation and the scale of land acquisition and resettlement.

At the present time consulting services for 6 sub-projects in 5 cities (Padang, Palembang, Bandung, Surabaya and Gorontalo) are currently being prepared for tender. The sub-projects predominantly consist of the design and construction of civil works such as river channel improvement and normalisation, the construction of diversion channels, sheet piling of river banks, weir improvement and bridge construction.

In addition to the 5 cities named above, the Director suggested IndII should consider urban drainage interventions as a first priority in Semarang, since Cipta Karya has an on-going project with JICA to install new drainage pumps in the city and the city has a drainage master plan; and in Medan, Pontianak, Manado and Makassar, all of which have urban infrastructure master plans. Other cities where urban drainage is considered a priority by Cipta Karya include Pekanbaru, Jambi, Bengkulu, Bandar Lampung, Surakarta, Pekalongan, Gresik, Yogyakarta, Palangkaraya, Balikpapan, Samarinda, Banjarmasin, Palu, Kendari, Denpasar and Jayapura, all of which have master plans.

The Director emphasised the importance of urban infrastructure master plans especially for sanitation and drainage, and would like to see all local governments producing such plans.

MINUTES OF MEETING

Location : World Bank Office, Jakarta

Date : 6 May 2011

Meeting Opened : 10:15 hours Meeting Closed: 11:30 hrs

Present:

NAME	AGENCY/COMPANY	POSITION
Fook Chuan Eng	World Bank	Sr. Water & Sanitation Manager
Dr. D.E. Parry	Glendale Partners	TL IndII Scoping Study on Urban Drainage (SSUD)
Kiki Chrysantini M.Sc	Glendale Partners	Socio-economist/Institutions Specialist (SSUD)
Dr. Eng. Mukhsan P. Hatta	Glendale Partners	Hydraulic Engineer/Hydrologist (SSUD)

Objectives and Agenda:

- To introduce the project to the World Bank's Senior Water & Sanitation Manager
- To ascertain the World Bank's current strategy and support for urban drainage in Indonesia
- To obtain details of current urban drainage projects that have WB funding and/or managerial support
- To explore the possibility of co-financing of selected urban drainage projects between IndII and the World Bank

Discussion:

The meeting was opened by FCE and DEP introduced the Consultant's project team and gave a brief overview of the study. FCE then summarised his role in the World Bank, explaining the fact that he was recently appointed to the post of Senior Water and Sanitation Manager and was familiar with the World Bank's overall strategy concerning urban drainage in Indonesia but not yet familiar with the historic details of the Bank's involvement in the sector in Indonesia.

FCE explained his role as leading the World Bank Team responsible for preparing the **Jakarta Drainage Project** as a World Bank funded infrastructure project and emphasised the fact that at the present time, urban drainage support from the World Bank in Indonesia is focused largely on Jakarta, the capital city, in general and the Jakarta Drainage Project in particular.

The Bank is planning to work with the Mayor's Office of a number of large cities including Surabaya, Makassar, Palembang and Balikpapan to identify potential urban infrastructure investment opportunities including flood management; however, at this stage the preparation is concerned with major policy issues such as the likely impact of climate changes on infrastructure development needs, the comparative advantages of investing in different parts of the city's development program and the local government's credit rating rather than the technical details of sector development. For this year, improving flood management in Jakarta is the Bank's priority.

The preparation for the Jakarta Drainage Project has taken longer than expected due in part to the poor coordination between the three major government agencies involved, two of whom are from Cipta Karya, Ministry of Public Works and the third from the DKI, and because of environmental concerns regarding the disposal of dredged material from rivers and drains and issues relating to the resettlement of 'illegal' squatters along the banks of the major rivers and drains.

In response to DEP's query regarding other multi-lateral and bi-lateral urban drainage studies that the Bank may be involved with or aware of, FCE mentioned the **Jakarta Subsidence Study** that the European Space Agency (ESA) was carrying out in partnership with the World Bank using ESA satellite imagery and a similar study that was being done by JICA. He also recommended we meet with the Dutch Aid specialists as the Netherlands, both historically and currently, was and is involved in urban drainage projects.

In response to DEP's question regarding the Bank's longer-term policy for the urban drainage sector in Indonesia, FCE stressed that the Bank were building on the integrated, multi-sector approach to urban infrastructure and in particular, would be looking at 'urban resilience' and how city government's incorporate risk in to their decision-making. He agreed that piece-meal development in the various sectors was unlikely to have any major and widespread benefits unless they were part of a well coordinate, and integrated urban master plan. The 'pipeline' approach to project identification and implementation within one city was an option worth exploring.

MINUTES OF MEETING

Location : Directorate General of Water Resources, DPU, Jakarta

Date : 10 May 2011

Meeting Opened : 10.15 hrs Meeting Closed: 11.15 hrs

Present:

NAME	AGENCY/COMPANY	POSITION
Ir. Wahyu Hauziyanto	DGWR, Directorate of Rivers, Lakes and Dams *(Dit. Sungai, Danau, Waduk)*	Kasil. Wilaya II
Ir. Thompson Pangabuan	DGWR, Directorate of Rivers, Lakes and Dams *(Dit. Sungai, Danau, Waduk)*	Staf Ahli, Wilaya II
Dr. D.E. Parry	Glendale Partners	TL IndII Scoping Study on Urban Drainage (SSUD)
Kiki Chrysantini M.Sc	Glendale Partners	Socio-economist/Institutions Specialist (SSUD)

Objectives and Agenda:

- To introduce the project to the Directorate of Rivers, Lakes and Dams
- To ascertain the role of the DGWR and the Directorate in managing rivers and flooding
- To obtain a list of priority projects concerned with river management and flooding
- To establish the criteria that triggers the intervention of the Disaster Management Agencies in a flood event
- To establish the links between the Directorate and Cipta Karya and the various roles played by each in a flood event
- To establish the mechanism by which rainfall events and river flows are recorded and the information used
- Obtain any background information on related projects funded by the multi-lateral and bi-lateral agencies

Discussion:

DEP explained the background to the project and its objectives and requested assistance of clarifying a number of issues related to urban drainage and the Directorate's role in flood prediction, prevention and mitigation. Ir. Wahyu explained the institutional responsibilities and roles of DGWR and DGCK with regard to urban

drainage emphasising the central planning role of the Directorate for flood control and river water management at the national level and the implementation role of the Balai Wilaya II at the provincial and municipality level. Co-ordination between the central government agencies and those in the provincial and local governments was generally considered to be poor.

The Directorate together with Cipta Karya, was currently with implementing the JICA-funded **Urban Flood Control System Improvement in Selected Cities program.** The project, which was prepared in December 2008, aimed to mitigate flood damage in major cities by improving flood control infrastructure, assisting in building administrative capacity in the river basin management offices and developing flood damage management plans with a view to supporting the national agenda of adaption to climate change and the Integrated Water Resources Management (IWRM) strategy program.

The project is a Sector Loan which is composed of sub-projects in several cities across the country. The executing agency at central level is DGSDA with the Balai Wilayah II implementing the sub-projects at provincial and municipal level. Currently 6 sub-projects in 5 cities nationwide are the targets of this project. The screening of the target sub-projects is conducted using a two-stage selection criteria: 'priority' and 'readiness'. First, long-listed sub-projects are selected in terms of immediate priority such as the volume of direct and indirect flood damage, the frequency of flooding, and the existence of economic disparity, important infrastructure and existing flood control facilities. On this basis, some 17 sub-projects in fourteen cities were identified initially.

Secondly, sub-projects for short-listing were selected from the long-list based on project preparation and 'readiness' for example, the status of project design preparation, the existence of preliminary studies, master plans, feasibility studies, detailed designs and the status of environmental and social safeguard considerations such as EIA and LARAP preparation under the AMDAL process and the scale of land acquisition and resettlements.

Some six sub-projects in five cities have been short-listed and the projects prepared by DGWR for implementation initially over the period 2009 – 2014. Delays in project preparation have meant that the first projects will now start in 2011 once consultant procurement is complete. The largest component of each of the six sub-projects is physical infrastructure improvement with consulting services for construction supervision of physical works. The total cost of construction and supervision services accounts for 95% of the loan with 4% allocated to capacity building for IWRM and PMU activities and independent monitoring and evaluation. Details of the sub-project components are included in Annex C.

In response to questions regarding the co-ordination and co-operation between agencies with a mandate in the urban drainage sector, the problems were seen to be more acute between the central agencies and their counterparts in the provincial and local governments than between the agencies at central level. Nonetheless, the respective roles of DJSDA and DJCK and criteria that justified a certain line of action to be taken regarding urban flooding, especially the day-to-day response to flooding

caused by an extreme rainfall event, was not always clear although it is local governments through the Dinas Cipta Karya that are responsible for tackling both the causes of urban drainage problems and the major manifestation, flooding and dealing with the physical impacts (clean-up operations, repair of drains, removal of solid waste from drains etc). The DGWR is responsible for flood control and water management at the national level and during a flood event will focus attention on assessing the condition of the major river or rivers draining the flooded area.

DGWR also measures the level of the Ciliwung River at water gates (POSKOs) located at Katulampa in Bogor, at Depok in Cawang-Kalimalang, and at the Pintu Air Manggarai in Jakarta and have predictive formula for calculating the flood threat in Jakarta. All water gates are managed by Balai Sungai under DGWR. DGWR also has Standard Operation Procedures (SOP) giving a set of criteria that can be used to determine the level of flood risk but these do not appear to be widely used outside DKI according to TP.

DGWR admits that they do not have a well integrated early warning flood system but in instances of heavy rain they always immediately warn communities living along river banks of the flood risk. What criteria are used to define 'heavy rain' was not disclosed. On an informal level, information on rainfall and water levels is generally sent from the POSKO's to the relevant agencies in Jakarta by mobile telephone and so the data is passed on in 'real time' directly to the person or persons charged with acting on such data. This process of 'real time' collection of rainfall and river flow data and the line of decision making between mandated agencies is clearly critical in providing adequate early warning of an impending flood. This is an area where improvements to both the data collection and transmission and the chain of command could be of great benefit to urban communities living in areas with a high flood risk.

DEP asked if DGWR has criteria or for categorising a flood as a 'disaster'. TM said that certain conditions need to be met if a flood is to be classified as a disaster and a statement to that effect would be issued by the National Disaster Management Agency *(Badan Pengendalian Bencana)* not through DGWR although the necessary data on rainfall, water levels and extent of flooding would be provided by DGWR's Sub-Directorate of Disaster Risk Reduction *(SubDit Penanggulangan Bencana)* under the Directorate of Operation and Maintenance *(Direktorat Bina Operasi dan Pemelharaan)*.

MINUTES OF MEETING

Location : Bappenas, Jl. Diponegoro, Jakarta

Date : 1 May 2011

Meeting Opened : 12.00 hrs Meeting Closed: 12.35 hrs

Present:

NAME	AGENCY/COMPANY	POSITION
Ir. Nugroho Triutomo, MRP	Bappenas	Director for Housing and Settlements
Dr. D.E. Parry	Glendale Partners	TL IndII Scoping Study on Urban Drainage (SSUD)
Kiki Chrysantini M.Sc	Glendale Partners	Socio-economist/Institutions Specialist (SSUD)

Objectives and Agenda:

- To introduce the project
- To ascertain Bappenas' current strategy and support for urban drainage in Indonesia
- To obtain the Director's views on the major urban drainage issues and their resolution
- To ascertain where Bappenas believe IndII interventions in the drainage sector might be most effective and appropriate and the nature of such interventions

Discussion:

The meeting was opened by the Director who requested DEP to provide a summary of the project and its objectives and the nature of the assistance requested from Bappenas. DEP went onto explain some of the concepts that both IndII and the consultants had developed to test during the project. One of these was the 'pipeline' approach to interventions whereby a group of integrated urban drainage interventions were indentified in one city. The pipeline might start with one project looking at flood prediction and early warning (there is no reason why the BMG *(Badan Meteorologi dan Geofisika)* the local meteorological offices cannot provide at least 24 hours warning of a heavy rainfall event in any city throughout Indonesia), another at the management of the watersheds surrounding the city, a third at institutional and legal constraints to effective urban drainage management and a fourth at more physical interventions dealing with such issues as blocked drains, under-designed drains or network extension. The type of interventions would be determined by the current status of the urban drainage sector in the city concerned which would be determined by the Scoping Study team.

In answer to the question on the relative priority of the urban drainage sector in the Bappenas agenda for urban infrastructure development, the Director admitted that urban drainage had been neglected when compared with the projects and funding given to the water and sanitation sectors in the past decade despite being an integral part of any sanitation program. He felt that the reason for this 'neglect' and lack of funding was the difficulty of measuring outputs from drainage projects to justify the budget allocations. To date, no set of suitable and acceptable 'performance indicators' for drainage had been agreed. The development of such a set of indicators would help greatly in attracting funding to the sector.

The performance indicators should be evidence-based (target-oriented), easily verifiable and measureable. He quoted an example from an RPMJ (- Mid-Term Development Plan) where the target was the reduction of flooded areas by some 22,500 ha in 100 strategic urban areas throughout Indonesia. For individual cities a more precise and specific set of indicators would need to be developed that measure the improvements resulting from investment in the sector. Such indicators might include measurement of the frequency, extent, depth and duration of flooding, among others.

Regarding the kind of interventions that IndII might support, the Director thought that the 'pipeline' approach explained by DEP and favoured by IndII would have more impact than scattered 'piece meal' interventions across a wide spectrum of cities. He suggested that interventions should be concentrated in cities that are part of the PPSP *(Percepatan Pembangunan Sanitasi Permukiman)* program since these cities already had city sanitation strategies in place and some were already recipients of IndII water and sanitation *hibah* grants. The commitment already shown by these cities to the improvement of urban infrastructure and their familiarity with the IndII program would likely ensure that the effective implementation of the identified programs.

The PPSP program has already started in 130 cities with some at a more advanced state of readiness to implement urban drainage improvement plans than others. Pekalongon is one city that is highly committed to urban infrastructure improvement including urban drainage, is in an advanced stage of readiness to receive funding and has requested assistance from Bappenas. The Tegal local government was also highly committed to sanitation and urban drainage improvement; both local governments are already recipients of water and sanitation *hibah* grants.

The Director agreed to provide the consultants with details of the PPSP program by e-mail.

MINUTES OF MEETING

Location **: Embassy of the Kingdom of the Netherlands, Jl. H.R. Rasuna Said Ka. S-3, Kuningan, Jakarta 12950**

Date **: 13 May 2011**

Meeting Opened **: 14.10 hrs** **Meeting Closed: 14.45 hrs**

Present:

NAME	AGENCY/COMPANY	POSITION
Ms Liliana D. Tunggal	Netherlands Embassy	Senior Policy Advisor, Watsan & Energy Sector
Dr. D.E. Parry (DEP)	Glendale Partners	TL IndII Scoping Study on Urban Drainage (SSUD)
Kiki Chrysantini M.Sc (KC)	Glendale Partners	Socio-economist/Institutions Specialist (SSUD)

Objectives and Agenda:

- To introduce the project
- To ascertain the Dutch Government's current strategy and support for urban flood management in Indonesia
- To obtain information on any current or future urban drainage and flood management projects funded by Dutch Aid

Discussion:

After DEP had introduced the scope and objectives of the study, LT gave an overview of the Dutch Government's water and sanitation aid program to Indonesia. There is no specific program for urban drainage since it is generally considered to be part of the general water and sanitation program (WASAP), a mixed funding program including Dutch Aid managed by the World Bank that has been on-going for three years. The strategy in water and sanitation, and by implication urban drainage, is to concentrate on capacity building and training of government officers especially in all aspects water resources management rather than fund civil works and construction supervision. Dutch Aid is contributing to a Community-led on-going sanitation project (STBM) over the period 2010-2014 that supports local governments prepare sanitation programs and master plans with Dutch consultants preparing policy and strategy modules to be used by 'facilitating' consultants working with the local governments.

The Dutch legacy in Indonesia and their historical role as one of the leading nations in flood control engineering, has meant that the more traditional drainage projects have not been entirely abandoned in the aid program but relegated to a lower priority and

generally concentrated in Jakarta or in Banda Aceh, as part of the reconstruction program following the earthquake and tsunami of 2004.

In Jakarta a pilot dredging project on the Kali Mati in Padamangan, North Jakarta was funded by Dutch Aid four years ago. The Dutch Government provided the dredger and the trained operators to teach the local engineers and, at the end of the demonstration period, gave the dredger to the local government. In Aceh, Dutch Aid funded the Sea Defences Project that was completed in 2008 as part of the Aceh Reconstruction Program. Dutch Aid will also fund a part of the Jakarta Drainage Project that the World Bank is currently preparing, although the amount of aid to the project may be reduced since Dutch Aid is being cut by 20 percent next year in response to the general economic downturn in Europe.

More recently (2006 – 2010), the Dutch Aid program in Indonesia funded the Urban Sanitation and Development Project (USDP), together with Bappenas and the World Bank, more generally referred to as the PPSP *(Percepatan Pembangunan Sanitasi Permukiman)* which aims to develop long-term development plans (road maps) for urban sanitation and drainage in 300 cities throughout Indonesia. The following cities are already well advanced in establishing sanitation working groups with the relevant Dinas: Padang, Jambi, Solo, Blitar, Semarang, Denpasar and Balikpapan.

MINUTES OF MEETING

Location **: Asian Development Bank (ADB), Gedung BRI II 7th Floor, Jl. Jend. Sudirman Kav. 44-46, Jakarta 10210**

Date **: 16 May 2011**

Meeting Opened **: 11.15 hrs** **Meeting Closed: 11.45 hrs**

Present:

NAME	AGENCY/COMPANY	POSITION
Javier Coloma Brotons (JCB)	Asian Development Bank (ADB)	Urban Development Specialist (Water Supply and Sanitation)
Dr. D.E. Parry (DEP)	Glendale Partners	TL IndII Scoping Study on Urban Drainage (SSUD)
Kiki Chrysantini M.Sc (KC)	Glendale Partners	Socio-economist/Institutions Specialist (SSUD)

Objectives and Agenda:

- To introduce the project
- To ascertain the ADB's current strategy and support for urban flood prevention and management in Indonesia
- To obtain the ADB's views on the major urban flood management and their resolution

Discussion:

After DEP had introduced the scope and objectives of the study, JCB gave an overview of the ADB's strategy regarding urban drainage. The ADB recognises the importance of action to alleviate urban flooding and improve the management of urban drainage but funds at the present time and for the immediate future are being channeled into water supply, waste water management and solid waste treatment and disposal.

The urban drainage sector was an integral part of the original ADB-financed **Metropolitan Sanitation Health Management Project (MSHMP)** which included water supply, sanitation, solid waste and urban drainage but the Government wanted to drop drainage and make other changes to the project scope that almost killed the project. A much reduced **Pilot MSHMP** project worth US$ 35 million and focusing on extending waste water collection systems and in Yogyakarta and Medan and upgrading the waste water treatment plant in Medan, is currently at the stage of tendering for consultants, with the project expected to begin in September 2011 and finish in 2014.

One of the major problems for the ADB in investing in urban drainage is the fact that the municipalities own the drainage assets and are directly responsible for urban drainage; the Bank cannot loan funds to local governments directly but only through the Central Government, which then 'on-loans' the funds to local government.

Notwithstanding the problems associated with channeling funds directly to local governments, the ADB are more likely to put funds into the solid waste sector, especially sanitary landfill projects, than urban drainage as open dumping will be phased out by the Government by 2013 and a number of local governments including Makassar Municipality, have already expressed interest in developing new regional sanitary landfill sites.

Despite the current relatively low priority given by the ADB to urban drainage for the reasons cited, the Bank would be interested in the possibility of co-financing appropriate urban drainage initiatives identified by IndII especially if they were more regionally oriented rather than confined to a specific local government.

The ADB's long-running SANIMAS program, an urban community-based sanitation program with decentralised waste water treatment, does not include urban drainage *per se*.

MINUTES OF MEETING

Location : Gedung G VI (ex) SUDAWAL Lt. 1, Ditjen SDA, Departemen Pekerjaan Umum, Jl. Pattimura No. 20, Kebayoran Baru, Jakarta Selatan 12100

Date : 7 June 2011

Meeting Opened : 09.00hrs Meeting Closed: 11.30 hrs

Present:

NAME	AGENCY/COMPANY	POSITION
Jan Jaap Brinkman (JJB)	Deltares Delft Hydraulics	Water Resources and Flood Management Specialist
Ir W. (Williem) Mak	Ministerie van Infrastructuur en Milieu, Government of the Netherlands	Plv. Programmaleider Waterkwantiteit en-kwaliteit
Dr. D.E. Parry (DEP)	Glendale Partners	TL IndII Scoping Study on Urban Drainage (SSUD)

Objectives and Agenda:

- To introduce the project
- To ascertain the current status of the urban drainage projects funded by Dutch-Aid in Jakarta, JABODETABEK and the Citarum River Basin

Discussion:

After DEP had introduced the scope and objectives of the study, JJB gave an overview of the Jakarta Coastal Defence Strategy (JCDS) Project, the Upper Citarum Flood Management Project and the Joint Cooperation Indonesia – The Netherlands 2011-2015 on Meteorology, Climatology, Hydrology and Early Warning Indonesia, all projects with significant Dutch Government funding.

MINUTES OF MEETING

Location **: Japan International Cooperation Agency (JICA), Indonesia Office, Sentral Senayan II 14th Floor, Jl. Asia Afrika No. 8, Jakarta 10270**

Date **: 8 June 2011**

Meeting Opened **: 09.00hrs** **Meeting Closed: 10.00 hrs**

Present:

NAME	AGENCY/COMPANY	POSITION
Okita Yosuke	Japan International Cooperation Agency (JICA)	Representative
Sawono Hisaya	Japan International Cooperation Agency (JICA)	JICA Expert on Integrated Water Resources Management
Dr. D.E. Parry (DEP)	Glendale Partners	TL IndII Scoping Study on Urban Drainage (SSUD)

Objectives and Agenda:

- To introduce the project to JICA
- To ascertain the JICA's current strategy and support for urban flood prevention and management in Indonesia
- To ascertain the current status of JICA-funded urban drainage projects in Indonesia

Discussion:

After DEP had introduced the scope and objectives of the study, Mr. Okite Yosuka gave an overview of the JICA urban drainage assistance program in Indonesia which is concentrated in Jakarta and Bandung with the Jakarta Coastal Defence Strategy (JCDS), the Capacity Development of Jakarta Comprehensive Flood Management and the Deconstruction of the East Pump Station at Pluit foremost among the current projects. JICA was also providing assistance to the municipality of Semarang with dredging the main rivers and flood canals and is in the process of preparing and tendering the Urban Flood Control System Improvement in Selected Cites with DGWR and DGCK as the primary executing agents. The project should be tendered this year and will focus on six sub-projects in the cities of Surabaya, Padang, Palembang, Bandung and Gorontalo. All six sub-projects will involve river channel improvement, the construction of diversion channels and access roads and consulting packages for construction supervision.

Although the emphasis in JICA urban drainage projects is still very much on the construction of civil works, more attention is now being paid to capacity building and

institutional strengthening and the recent TA Project for Capacity Development of Jakarta Comprehensive Flood Management is focusing on capacity building in the Department of Public Works and the Government of DKI Jakarta.

MINUTES OF MEETING

Location : Dinas Bina Marga dan Pengairan Kota Bandung

Date : 9 June 2011

Meeting Opened : 13.30 hours Meeting Closed: 14.00 hours

Present:

NAME	AGENCY/COMPANY	POSITION
Ir. Didi Ruswandi	Dinas Bina Marga dan Pengairan	Kasubdit
Dr. D.E. Parry (DEP)	Glendale Partners	TL IndII Scoping Study on Urban Drainage (SSUD)
Kiki Chrysantini M.Sc (KC)	Glendale Partners	Socio-economist/Institutions Specialist (SSUD)
Dr. Eng. Mukhsan P. Hatta	Glendale Partners	Hydraulic Engineer/Hydrologist (SSUD)
Ida Syukur M.Com	Glendale Partners	Liaison Officer

Objectives and Agenda:

- To introduce the project to the Kepala Dinas Kota Bandung
- To obtain information from the Office on Bandung's urban drainage problems
- Establish the status of current and future urban drainage projects in Kota Bandung and surrounding districts

Discussion:

DEP introduced the consultant's project team and the objectives of the SSUD Project using the project presentation material. Pak Didi, Ruswandi explained that related with urban drainage in Kota Bandung they must consider the influence of 12 rivers running through the city which end at the Citarum. Dinas Bina Marga and Pengairan have DED for 2 rivers and 10 at planning/preparartion of DED stage.

The problems relating to urban drainage in Bandung are:

- Backwater, bottleneck at river creating blockages that need to be cleared
- The building of septic tanks along the river banks
- The land and rivers need to be 'normalised'
- Sedimentation is high in the rivers and drainage channels

- Squatter settlements on river banks
- Minor rivers cross toll road and city boundary to discharge in the major river which is under the jurisdiction of the adjacent district government
- Markets located on river fronts and pollute with garbage
- Public awareness about discharge of rubbish (*sampah)* to river and drainage channels still poor – need to have *'penyuluhan'* (guidance) – education about the river
- Roadside drainage has at least two problems – open drains make it easy for rubbish to be thrown in but closed drains make access for routine inspection and maintenance difficult

There are 60 specific flood points in Bandung but normally the floor stays only for about 1 hour locally named 'Banjir Cileuncang'. Drainage in the city also faces a problem with other utilities that are placed in the drainage channels (water supply pipes, electrical cables, telecoms etc), plus tree roots. Difficult to solve problem because co-ordination between agencies – PAM, PLN, Telkom – is still poor. These other agencies that share the drainage channel ROW are reluctant to help with maintenance of the channel.

Kota Bandung does not have an early warning system for flooding. This is perhaps due to the fact that flooding in Kota although creating traffic jams and causing damage to the roads, is generally considered as *'banjir cileuncang'* that only stays for a short time. According to Pak Didi, the current program of river 'normalisation' needs to be completed in order to solve the flooding problems in Bandung.

MINUTES OF MEETING

Location : Dinas PSDA &ESDM, Semarang

Date : 13 June 2011

Meeting Opened : 09.24 hours Meeting Closed: 11.00 hours

Present:

NAME	AGENCY/COMPANY	POSITION
Ir. Agus Riyanto	PSDA & ESDM	Kepala Dinas
Ir. Gatot Suhendro, MM, MT	PSDA & ESDM	Kepala Bidang Rekayasa Teknis
Ir. Surono	PSDA & ESDM	
Ir. Roshid	PSDA & ESDM	
Dr. D.E. Parry	Glendale Partners	Team Leader
Ms Kiki Chrysantini	Glendale Partners	Socio-economist/Institutions Specialist
Dr. Mukhsan P. Hatta	Glendale Partners	Hydraulic Engineer/Hydrologist

Objectives and Agenda:

- To introduce the project to the Kepala PSDA & ESDM Semarang
- To ascertain the current program of urban drainage projects in Kota Semarang
- To discuss causes and solutions to Semarang's urban drainage problems
- Obtain information on APBD expenditure on urban drainage
- Visit the sites of current drainage projects in the city

Discussion:

After the SSUD Project introduction by DEP, Pak Agus, the Kepala Dinas PSDA & ESDM, who was only appointed in May, explained that there were several on-going drainage projects in Semarang City including:

a. The Western Canal Normalisation Project 2010-2014 funded by JICA and implemented by DGWR, Ministry of Public Works. The Dinas PSDA & ESDM Kota Semarang is only involved in acquiring the land for the project. The project has other elements including the construction of a dam at Jatibarang Reservoir and a retention pool.

b. The Construction of a Polder for Sungai Banger (2010-2014) funded by the Government of the Netherlands with co-financing from the central, provincial and local governments. The design for the polder was made by Dutch engineers

A third project involving the construction of sea wall defenses under a 'government to government' grant mechanism between Korea and the Government of Indonesia in currently in the preparation stage.

Flooding in Semarang is caused by a number of factors including:

- High tides (Rob)
- Rapid run-off from surrounding hills
- Heavy rainfall over the city
- Sedimentation of rivers and city drains
- Land subsidence caused by groundwater extraction
- Blocked channels and drains caused by rubbish thrown in by people

The City of Semarang has prioritised urban drainage in its master planning and is implementing a comprehensive and integrated plan to prevent flooding within the city. The original Urban Drainage Master Plan was formulated with the assistance of the World Bank in 2000 and has been continuously reviewed and updated up to 2007. The 2000 Master Plan divided Semarang into 7 drainage systems; these were reduced to four in 2005 review, namely 1. Eastern Semarang; 2. Western Semarang; 3. Central Semarang; and Tugu Area. The 2007 update of the Master Plan which was carried out by Dinas PSDA and Bappeda, was funded by the World Bank. It is now being implemented by the Central Government *(DU DGWR)*, the Provincial Government *(Dinas PSDA)* and the local government *(Dinas PSDA & ESDM)* with donor assistance provided by JICA and the Government of the Netherlands.

The plan prioritises the Central Semarang drainage system since this is the centre of the city's economic and commercial activities. The three rivers that cross the central system (Semarang Tengah), the Sungai Banger, Kali Baru and Kali Semarang, will be closed at the mouth and fed into a large retention pond before being pumped out to sea. The Eastern and Western Drainage systems have received less attention although a start has been made on 'normalising' Eastern Drainage Canal. The Master Plan is currently being reviewed by the Semarang House of Parliament *(DPRD – Dewan Perwakilan Rakyat Daerah)* for approval and for the enabling legislation *(perda – peraturan daerah)* to be drafted to provide the legal framework for implementation.

The concept for preventing flooding in Kota Semarang is a fully integrated one that considers the natural drainage systems and sub-systems in four areas of Semarang (Mangkang, Semarang Tengah, Semarang Timur and Semarang Barat) and adopts a holistic approach to the problem by: reducing run-off in the upper catchments through land-use changes and building retention basins *(bendungan and embung-embung)*; improving the capacity of existing drainage channels through improved roadside drains and river normalisation; increasing the flood water storage capacity with new retention

basins in the coastal plain and providing additional pumping capacity together with coastal protection measures using sea walls and polders.

In addition to these physical flood prevention measures, the local government has recognised the need to tackle the legal, institutional and social issues that are an integral part of any flood prevention strategy. Land subsidence, for example, which is caused partly by the over-extraction of groundwater by industries is being addressed by stronger implementation of local permit regulations *(Perda and Perwal)* and the predilection of many people to throw rubbish *(sampah)* into both the natural and man-made drainage channels which then results in blockages to drains, filters, rakes and pump intakes, is being tackled with regular public awareness and 'socialisation' campaigns.

Although the major urban drainage construction projects funded by JICA and the Government of the Netherlands are on-going and not due for completion until 2014, the efforts of the local government in implementing other parts of the Master Plan such as local improvements to roadside drains and raising the level of the roads around the railway station, an area notorious for flooding, are having positive results already.

The plan is well advanced and co-ordination and co-operation between the different agencies involved at central, provincial and local government levels appears to be very good. The central government and provincial government manage the bi-lateral aid construction projects dealing with channel normalisation, the building of dams, divergent tunnels and polders, and the local government, through the single office of Dinas PSDA & ESDM, handle everything else including routine operation and maintenance of pumps, drain cleaning and the building and maintenance of the secondary and tertiary city drainage network. However, outside the City of Semarang, Dinas PSDA claim to have little knowledge of drainage planning in the surrounding districts *(kabupaten)* of Kendal, Ungaran, Semarang and Purwodadi *(Kedungspur)*, plus Kabupaten Demak, and feel that these local governments must be involved in spatial planning and master planning for the whole region because of the impact of run-off from catchment areas within their boundaries if flooding in the lower part of Semarang City *(Semarang Bawah)* is to be prevented.

MINUTES OF MEETING

Location : Bappeda, Semarang

Date : 14 June 2011

Meeting Opened : 09.05 hours Meeting Closed: 10.30 hours

Present:

NAME	AGENCY/COMPANY	POSITION
Ir. Bambang Haryono	Bappeda Kota Semarang	Kepala Bappeda
Ir. Purnomo Dwi	Bappeda Kota Semarang	Kepala Bidang Fisik dan Prasarana
Ir. Rosidi Hudoyo MM MT	PSDA &EDSM	Kabid
Ir. Bagus	Bappeda Kota Semarang	Staf Fisik dan Prasarana
Dr. D.E. Parry	Glendale Partners	Team Leader
Ms Kiki Chrysantini	Glendale Partners	Socio-economist/Institutions Specialist
Dr. Mukhsan P. Hatta	Glendale Partners	Hydraulic Engineer/Hydrologist

Objectives and Agenda:

- To introduce the project to the Kepala Bappeda Semarang
- To ascertain the current program of urban drainage projects in Kota Semarang
- To discuss causes and solutions to Semarang's urban drainage problems
- To discuss the role of Bappeda in urban drainage planning and preparation of the drainage Master Plan

Discussion:

After the SSUD Project introduction by DEP, Pak Bambang Haryono, explained that the urban drainage program in Semarang is a priority program for the next five years and is based on the Master Plan that has just been completed by Bappeda with technical support from PSDA &EDSM and is now being reviewed by the DPRD prior to receiving its legal status as *perda (peraturan daerah)*.

The process for preparing the Master Plan began in 2000 and was reviewed in 2005. The current Master Plan being reviewed by DPRD covers the period 2011 – 2013 and covers provincial and central government policy issues relating to urban drainage as

well as taking account of the existing situation in the surrounding districts (kabupten) of Kendal, Unggaran, Purwodadi (Kedungspur) and Semarang

In response to questions about disaster management and what triggers the intervention of the local Disaster Management Agency *(BPBD – Badan Penanggulangan Bencana Daerah)*, Pak Bambang said that the BPBD is under the direct command of the Mayor's Office (Walikota) but the functions of the agency and the criteria for its intervention during a major flood event or other natural disaster are in the process of preparation.

Bappeda are preparing an Early Warning System for flooding that will involve BMKG *(Badan Meterologi, Klimatologi dan Geofisika)* for rainfall data, PDSA for river flow data and the local communities who will provide local information (via sms) and will be involved in the monitoring maintenance of data measuring equipment. These data will be sent to BPBD for analysis and a decision made on whether a disastrous flood is imminent. If this is the case, a disaster mitigation plan will be formulated and the appropriate agencies instructed to implement the plan (search and rescue, boats, clean-up activities, temporary shelter, food, water and clothing etc.).

MINUTES OF MEETING

Location : Ruang Rapat Dinas PU Bina Marga & PSDA Kota Palembang

Date : 20 June 2011

Meeting Opened : 09.00 hours Meeting Closed: 11.00 hours

Present:

NAME	AGENCY/COMPANY	POSITION
Ir. Bastari Tusak	Dinas PU Bina Marga & PSDA	Kepala Bappeda
Ir. Soluhuddin	Setda Kota Palembang	Kebag Pembaya
Ir. Samsun Gunawan	DPU	Staf PBD
Ir. Ir. Elea Ustin	Dinas PU Bina Marga & PSDA	Staf PBD
Ir. Tri Hidayat	PU CFP PLB	Koord Perencana
Ir. Abdul Muis	BBWSS-VIII	Kabid. Propinsi
Ir. Ridwan	Dinas Tata Kota	Devisi Perencana Kota
Ir. Djunaidi Mustofa	Dinas PU Cipta Karya Prov. Sumsel	Staf Perencana
Ir. Joko Supriambodo	Dinas PU Cipta Karya Prov. Sumsel	Staf Perencana
Ir. Muchtar S.	Dinas PU Bina Marga & PSDA	Kasi ALKAL
Ir. Dartia	Dinas PU Bina Marga & PSDA	Kasi Bintek PBD
Ir. M. Suridi	Dinas PU Bina Marga & PSDA	Staf BM Plg
Ir. M. Saleh Ali	DPU Kota Palembang	Staf
Ir. Syafrian	DPU Kota Palembang	Kasi
Ir. Tuti Alawiyah	Bappeda Kota Palembang	Kab. Renastra
Ir. Retno Widhastuti	Bappeda Kota Palembang	Staf Renstra
Ir. M. Syafredin	Bag.	Kasi
Ir. Neni Trisa	DKK	Subag Perencana & Evaluasi
Ir. Amir Yunis	DKK	Staf Perencana & Evaluasi

NAME	AGENCY/COMPANY	POSITION
Ir. Budi Hariyanto	BLH	Kab. Tata …
Dr. D.E. Parry	Glendale Partners	Team Leader
Ms Kiki Chrysantini	Glendale Partners	Socio-economist/Institutions Specialist
Dr. Mukhsan P. Hatta	Glendale Partners	Hydraulic Engineer/Hydrologist
Ida Syukur	Glendale Partners	Liaison Officer

Objectives and Agenda:

- To introduce the project to Dinas Bina Marga & PSDA Kota Palembang
- To ascertain the current program of urban drainage projects in Kota Palembang
- To discuss causes and solutions to Palembang's urban drainage problems

Discussion:

The meeting was started with a presentation from *Dinas PU Bina Marga and PSDA*. The presentation entitled *Flood Control System and Drainage in Palembang* gave a general overview about flooding and drainage in Palembang including the existing condition of the drainage system, the causes of flooding and the problems related to flood control. The presentation also highlighted some key initiatives taken by the government to improve the drainage system in Palembang and achieve the targets for drainage set out in the master plan for the city.

Kota Palembang is divided by the River Musi into two regions called Sebrang Ulu (down stream) and Sebrang Ilir (upper stream). The Sebrang Ilir region is said by Dina PU to be about 12 m above mean sea level and has a greater population density than the Sebrang Ulu region which is also known as the Palembang floodplain. The proportion of population in Sebrang Ilir and Ulu is approximately 70:30. The concentration of drainage planning and development is in the Sebrang Ilir area. The Musi river which crosses several provinces in Sumatera is managed by the national government through *BBWS Sumatera Delapan (Balai Besar Wilayah Sungai Sumatera Delapan)*.

There are 19 rivers and catchments *(DAS – Daerah Aliran Sungai)* draining the Sebrang Ilir region which is considered as the 'dominant' river flow. Of the 19 DAS in Sebrang Ilir 4 are given priority in Palembang's drainage development plan, namely: Sungai Bendung, Sungai Sekanak, Sungai Buah and Sungai Lambidaro. The Sungai Bendung now prioritised for intensive drainage works. The Sungai Bendung as one of main drains of the city, plays an important role in channeling water from dense settlements, and minor drains (small rivers and small drainage), to the Musi river and finally to the sea. Sedimentation and blockage from solid waste in the Sungai Bendung cause

reduction in channel capacity and regular cleaning and maintenance of the channel is carried out. During high tide and heavy rainfall, the river, will rise quickly and the ability of the pumps to move the water from the minor drains to the Sungai Bendung is impaired, creating flooding in parts of the city. This only happens when a particularly high tide coincides with a hea rainfall event and this is a rare occurrence – once a year. The problem of the minor drains in Palembang have not yet received any planning for development. The head of the program of *BBWS Sumatera Delapan* believes that minor drains system in Palembang should receive more attention in drainage development plan because the minor drains are the key factor in reducing flooding by connecting the flow of water from the settlements to the Sungai Bendung. During high tide, the small rivers and minor drains cannot flow into the Sungai Bendung because the latter is already full to capacity from the tidal water in the Musi.

The importance of the Sungai Bendung – Sungai Musi relation for flood control in Palembang has resulted in JICA giving a loan for the development of dredging in the mouth of river Bendung where it joins the Musi river. This project is handled by *BBWS (the Balai Sungai Besar)* of central government, and the project is now waiting for approval for the DED from the central government. If the DED is approved, the construction will begin this year with JICA funding and BBWS as coordinator in the field with cooperation and support from technical Dinas units. Earlier last year, in the same location, the government of Palembang built an inspection road with APBN funding.

Palembang does not have a specific master plan for drainage. They have a planning document that contains some DED for drainage that was made in 2004 and are now preparing a Drainage Master Plan. The plan will be put together by *Bappeda Kota* and *Dinas PU Bina Marga dan PSDA*. The Master Plan will be projected as a 20 year plan - 2011-2031 and will be integrated with the RTRW *(Ruang Tata Ruang Wilayah)* spatial planning document.

In answer to a question about an early warning system, Dinas PU said they only use print media like newspaper to inform the public about the prediction of a coming flood. They claim to have all information that can be used to predict flood such as high tide and rainfall from BMG and PT. Pelindo. Pak Bastari said in the future they want to have a system that can connect government to the people through local leaders to inform and to warn about flood and other issues concerning public awareness.

When asked about what is the greatest challenge for drainage in Palembang, Pak Bastari said that the operation and maintenance is perhaps the biggest challenge they now face due to the very small budget they receive from APBD. From at total APBD budget for Kota Palembang of Rp.1.3 trillion, *Dinas PU* receive only Rp50 billion which is then shared between 5 sub-divisions. The operation and maintenance sub-division only receives Rp250.000.000 per month to operate 11 trucks throughout the city, and to pay the salaries of 148 workers. The O&M said the need for money is very pressing, and they should have 60 trucks and more workers up to around 600 persons to do the work properly.

MINUTES OF MEETING

Location : Ruang Rapat Dinas Bappeda Kota Palembang

Date : 20 June 2011

Meeting Opened : 16.00 hours Meeting Closed: 17.00 hours

Present:

NAME	AGENCY/COMPANY	POSITION
Ir. Faisyar	Bapeda Kota	Head
Ir. Zailani	Bapeda Kota	Staff Bapeda kota
Ir. Eka	Dinas PU	Staff Dinas PU
Ir. A. Bastari	DInas PU	Head of Flood management and drainage
Ir. Kira Tarigan	Dinas PU	Head
Dr. D.E. Parry	Glendale Partners	SSUD Team Leader
Ms Kiki Chrysantini	Glendale Partners	Socio-economist/Institutions Specialist
Dr. Mukhsan P. Hatta	Glendale Partners	Hydraulic Engineer/Hydrologist
Ida Syukur	Glendale Partners	Liaison Officer

Objectives and Agenda:

- To introduce the project to Bappeda Kota Palembang
- To ascertain the current program of urban drainage projects in Kota Palembang and the Bappeda relationship with Dinas Bina Marga & PDSA
- To discuss urban drainage master planning and its integration with the City's Spatial Plan (RTRW)

Discussion:

The head of Bapeda Kota Palembang, Ir. Faisyar, opened the discussion about the importance of involving local consultants in projects. Based on previous experience with an international agency, the international and national consultants engaged neglect or were reluctant to involve local agencies with local knowledge in project planning and implementation and this caused an ineffective result.

Bappeda plan to make a drainage master plan this year and mentioned that the funding from APBD is not enough. The master plan for drainage will use the RTRW or spatial plan as reference, and it will be made as a 20 years document plan - 2011-2031. He wanted to have a comprehensive, integrated and well designed of master plan. Palembang drainage plan is still partially made and not well connected as a system.

About flooding in Palembang, he said that the flood condition is now much better with retention pools and pumps operating well in the city. He is concerned with the broader issue of poverty reduction. Although there are many poverty reduction programs, none seem to work successfully. The integration of different sectors in poverty reduction program is still poor and this needs to be addressed.

Starting in 2011 as an initial trial phase, Bappeda Kota Palembang plan to implement a pilot integrated poverty reduction program in a "small" 50 ha in the Lima Ulu region. This pilot project (not yet given name) is designed as an experimental project in the 50 hectare areas where all stakeholders from different sectors of development can participate and actualise their ideas of creating or making good living conditions for the people. In this pilot project area, a good and integrated drainage system will also be implemented. The detailed design of this project will be made by Cipta Karya of the central government, along with the RTBL (*Rencana Tata Bangunan dan Lingkungan* – Plan for Building Sites and Environment). The city of Palembang will contribute Rp10 billion for the economic development plan and some of the physical works, whereas the provincial government will contribute Rp750 million. Government of Palembang city will invite any parties; CSO, NGOs, community organisations and the private sector to participate and be actively involved in the planning and implementation of this experimental 'well living community' plot. Bappeda would welcome any assistance that IndII could provide for this project.

MINUTES OF MEETING

Location : Mayor's Office, Walikota Palembang

Date : 20 June 2011

Meeting Opened : 15.00 hours Meeting Closed: 15.30 hours

Present:

NAME	AGENCY/COMPANY	POSITION
Ir. Eddy	Walikota Palembang	Walikota Palembang
Ir. Faisyar	Bapeda Kota	Head
Ir. A. Bastari	DInas PU	Head of Flood management and drainage
Ir. Kira Tarigan	Dinas PU	Head
Dr. D.E. Parry	Glendale Partners	Team Leader
Ms Kiki Chrysantini	Glendale Partners	Socio-economist/Institutions Specialist
Dr. Mukhsan P. Hatta	Glendale Partners	Hydraulic Engineer/Hydrologist
Ida Syukur	Glendale Partners	Liaison Officer

Objectives and Agenda:

- To introduce the project to the Walikota Palembang
- To ascertain the priority of urban drainage in the City's infrastructure development

Discussion:

The Mayor, Ir. Eddy Santana Putra, MT, explained the reasons behind the prioritisation of urban drainage in Palembang and his personal interest in the problem since he is a drainage engineer. He was confident that the measures taken by the City Government to combat flooding both at the technical level and the institutional levels were a success and that while flooding was still a problem in some areas, the impact was much less than it was and the measures currently underway to normalise the rivers and drainage channels and rehabilitate the retention basins would put an end to the tidal flooding from the Musi River. The City Administration now need to focus on the operation and maintenance of the secondary and tertiary drainage network in the city and especially educating the local population on the benefits of not using the drainage channels as rubbish dumps.

ANNEXE 2: BASELINE DATA – REPORTS, DOCUMENTS AND DATABASES

REPORTS

1. **Surabaya Drainage Master Plan to 2018, Final Report**: Mott MacDonald in association with PT Tricon Jaya for Pemerintah Kotamadya Daerah Tk. II Surabaya, BAPPEDA Kotamadya Surabaya, Level II Local Government of Surabaya Municipality, Level II Local Government Planning Board, June 2000.

   Volume 1 : Main Report

   Volume 2 : Annexes

   Volume 3 : Album of Drawings/Album Gambar

   Engineering Proposals Album of Drawings/Album Gambar Usulan Pekerjan

   Immediate Action Plan to Alleviate Flooding

2. **Western Java Environmental Management Project (WJEMP) IBRD Loan 4612-IND/IDA Credit 3519 IND, Drainage Management for Jakarta Strategic Action Program Development**, NEDECO (Netherlands Engineering Consultants) with PT Indra karya, PT Amythas Experts & Associates and PT Mitra Lingkungan Dutaconsult (MLD)

   Final DED Reports:

   DKI-46 (Suntur Timur Kodamar); DKI-27 (Mangga Besar); DKI-5 (Kapuk Kedaung Poglar); DKI-3 (Tegal Alur); DKI-11 (Pondok Pinang/Pasar Jumat); DKI-42 (Warakas); DKI-44 (Papanggo); DKI-15 (Tomang Rawa Kepa)

3. **Master Plan for Drainage and Flood Control of Jakarta**, NEDECO, 1973
4. **Urban Drainage and Wastewater Disposal in the City of Jakarta**, JICA, 1991
5. **Comprehensive River Water Management Plan in JABOTABEK**, JICA, 1997
6. **Detailed design of Urban Drainage Project**, JICA, 1997
7. **DKI Urban Drainage Rehabilitation Project**, 2002
8. **Flood Management Report DKI Jakarta**, Rijkswaterstaat, Netherlands, 2003
9. **Urgent Inventory Study on Damage of Flood 2002 in JABODETABEK Area,** PT Mitrapacific Consulindo International, 2003
10. **WJEMP Drainage Management for Jakarta Priority Assistance DKI 13-8**, PT Indah Karya, 2004
11. **Pekerjaan Identifikasi Saluran Kegiatan Pelaksanaan Normalisasi Sungai Kota Cimahi Tahun Angarran 2010**, CV. Cipta Nusa Konsultan Teknik dan Manajemen for Pemerintah Koya Cimahi, Dinas Penyehatan Lingkingan dan Kebersihan, 2010.

ANNEXE 3: URBAN DRAINAGE PROJECT DIGESTS

PROJECT NAME : Jakarta Urgent Flood Mitigation (JUFM) Project

STATUS : Project tender stage

PERIOD : 2011 - 2015

EXECUTING AGENCY : DGWR and DGCK, DPU and DPU-DKI

FUNDING SOURCE : World Bank

PROJECT OBJECTIVES :

The Project Development Objective (PDO) is to contribute to the improvement of the operations and maintenance of a priority part of the flood management system in Jakarta. The PDO will be achieved through:

- Dredging sections of selected key floodways, canals and retention basins to improve their flow capacities, and disposing the dredge material in proper facilities
- Rehabilitating and constructing embankment in sections of, and repairing or replacing mechanical equipment in, the same selected key floodways, canals and retention basins to sustain and improve their operations
- Establishing institutional coordination between the three responsible agencies to encourage coordinated development, and operations and maintenance (O&M) of Jakarta's flood management system
- Strengthening the capability of the responsible agencies to improve the operations, maintenance and management of Jakarta's flood management system

PROJECT DESCRIPTION:

The Project consists of two components which are summarised as followed:

- ***Component 1***. *Dredging and rehabilitation of selected key floodways, canals and retention basins.* This component will support the dredging and rehabilitation of 11 floodways / canals and four retention basins which have been identified as priority sections of the Jakarta flood management system in need of urgent rehabilitation and improvement in flow capacities. The 11 floodways / canals are estimated to have a total length of 67.5 km, while the four retention basins estimated to cover a total area of 65.1 hectares (see summary details in Table 1 below). About 42.2 km of embankments are expected to be rehabilitated or constructed within these floodways, canals and retention ponds. Where necessary, mechanical equipment (pumps, gates, etc) will be replaced or repaired.

- ***Component 2***. *Technical assistance for project management, social safeguards, and capacity building*. This component will support contracts management, engineering design reviews, construction supervision engineers for the dredging and rehabilitation works and technical assistance. Technical assistance includes support to improve institutional coordination for operations and maintenance of Jakarta's flood management system as well as the establishment of a Floods Management Information System (FMIS). Provision has been made for the cost of implementing required Resettlement Action Plans, as well as the establishment and operations of a project Grievance Redress System and a Panel of Experts.

Project Sites

Fifteen priority floodways, canals and retention ponds were identified to be included in the scope of the project works. These were identified by the Government as in priority need of rehabilitation and improvement in flow capacities.

Table 1: Description of Floodways, Canals and Retention Ponds under Project

Location	Description of Drains (Estimated)		
	Length (m)	Width (m)	Area (m^2 or ha.)
Ciliwung-Gunung Sahari Drain	5,100	21.50 ~ 45.90	171,870 m^2
Waduk Melati (Kali Gresik & Cideng Hulu)	(2,004) (1,260)		4.90 ha.
Cengkareng Floodway (including sea side)	7,840 (540)	38.00 ~ 87.00	490,000 m^2
Lower Sunter Floodway Note 1	9,980	20.20 ~ 47.40	338,320 m^2
Cideng Thamrin Drain (Round Road drain)	3,840 (1,960)	10.00 ~ 19.00	55,680 m^2
Sentiong-Sunter Drain (including Ancol Canal)	5,950 (400)	16.10 ~ 31.20	161,240 m^2
Waduk Sunter Utara (Outlet drain)	(570)		33.00 ha.
Waduk Sunter Selatan			19.20 ha.
Waduk Sunter Timur III			8.00 ha.
Tanjungan Drain	600	9.20 ~ 26.00	10,560 m^2
Lower Angke Drain	4,050	31.00 ~ 51.00	166,050 m^2
West Banjir Canal (sea side)	3,060 (590)	33.00 ~ 141.00	266,220 m^2
Upper Sunter Floodway Note 1	5,150	15.00 ~ 36.00	131,320 m^2
Grogol – Sekretaris Drain	2,970	21.00 ~ 51.00	106,920 m^2

Location	Description of Drains (Estimated)		
	Length (m)	Width (m)	Area (m^2 or ha.)
Pakin – Kail Besar – Jelakeng Drain	4,910	13.00 ~ 31.00	108,020 m^2
Krukut Cideng Drain Note 2	3,250	15.00 ~ 29.00	71,500 m^2
Krukut Lama Drain Note 2	3,490	7.00 ~ 29.00	62,820 m^2
	67,514		**2,140,520 m^2** **65 ha.**

Note 1 *Sunter Floodways has been divided into Upper Sunter Floodway and Lower Sunter Floodway for assessment purposes*

Note 2 *Krukut Drain has been divided into Krukut Cideng Drain and Krukut Lama Drain for assessment purposes*

Disposal Sites

The approximately 3.4 million m^3 of sediment material[4] and the approximately 95,000 m^3 of solid waste that will be removed from the floodways, canals and retention ponds that are being dredged by this project will be disposed of in the following manner.

- Non Hazardous Sediment Material – will be transported and disposed of at a sea reclamation works in Ancol, known as the Ancol CDF
- Hazardous Sediment Material (if any are found) – are planned to be disposed of at the PPLi Hazardous Waste facility in Bogor, West Java
- Solid Waste – will be transported and disposed of at City of Jakarta's landfill in Bekasi, West Java, known as the Bantar Gebang Landfill

The disposal sites are not financed by the project.

[4] Extensive sampling during project preparation has not found hazardous material. However, all sections of the project floodways, canals and retention basins will be tested again for the presence of hazardous material prior to dredging.

PROJECT NAME : **The Project for Capacity Development of Jakarta Comprehensive Flood Management (CFM) in Indonesia**

STATUS : **Implementation**

PERIOD : **2010 - 2013**

EXECUTING AGENCY : **DGWR, DGCK, DGSP in DPU; DPU-DKI, DPU West Java, Bogor Regency (Kabupaten), Bogor Municipality (Kota Bogor) and Municipality of Depok (Kota Depok)**

FUNDING SOURCE : **JICA (Japanese International Cooperation Agency)**

PROJECT OBJECTIVES :

In the latest five-year plan (2010 to 2014) of the Ministry of Public Works, priority programs for the Directorate General Water Resources (DGWR) include the integration of flood management measures and spatial planning, the implementation of non-structural measures and river basin management and the promotion of community participation. These priority programs are planned to be carried out in densely populated areas such as the CFMP project target area of the Ciliwung River Basin in JABODETABEK.

Based on this policy, coordination among the related agencies has been conducted by DGWR and individual measures by each agency have been carried out; however, comprehensive measures for flood management have not been achieved due to insufficient coherence in the inter-organisational approach. Through the formulation of the Comprehensive Flood Management Plan (CFMP), the project aims to organise, coordinate and align the roles of related agencies and develop capacity for comprehensive flood management for each project implementing agency. The project lo intends to strengthen the operating supervisory and monitoring capacity of the agencies and establish a River Basin Forum to manage and coordinate the relevant organisations implementing the proposed projects in the CFM Action Plan based on the concept of a Zero Increase in Run-off policy - ΔQ=0 Policy.

PROJECT DESCRIPTION:

The project is, in effect, a follow-up from the JICA financed Institutional Revitalisation Project for Flood Management in JABODETABEK from 2006 – 2010, where capacity development in non-structural areas for flood management agencies was carried out including the maintenance and operation of river facilities and the collection and analysis of flood control information. However since this project did not cover the specific run-off control measures in the river basin and capacity development on coordination and role sharing between river management and basin management, a follow-up project was requested by GOI to fill these gaps and resulted in the CFMP Project.

In this technical cooperation project a core objective is to establish a River Basin Forum to support sustainable operations. Article 87 of the Water Resources Law 2004 raised the need to establish coordination and discussion institutions for river basins at the national, provincial, district (kabuptaten/regency) and municipal levels to deal effectively with current and future water resources management issues. Based on this law, the Ministry of Public Works (PU) issued a Ministerial Regulation (Number 04/PRT/M/2008) to provide guidelines for the establishment of such institutions. Following this regulation (Peraturan), a Technical Coordination Team for the Management of Water Resources *(TKPSDA – Tim Koordinasi Pengelolaan Sumber Daya Air)* in the Brantas and Solo River Basins was established. The establishment of the TKPSDA-6Ci, targeting the six major rivers in JABODETABEK, namely from west to east the Cidanau-Ciujung-Cidurian-Ciliwung-Cisadane and Citarum, is currently in progress. Since the Ciliwung River originates in the Bogor region (West Java Province) and flows through DKI Jakarta into Jakarta Bay, it is classified as an inter-provincial river and is therefore managed and regulated by the central government. The 6 Ci's and the river basin areas of these rivers stretch over Banten, DKI and West Java Provinces.

The comprehensive flood management measures (CFM) planned under the project will be based on a legalised Comprehensive Flood Management Plan (CFMP) that will combine structural measures such as flood storage facilities in the river basins with non-structural measures such as development control in the basins and the establishment of River Basin Forums. The project team will identify the organisations related to CFM, determine the role of the organisations and provide the necessary support on the legalisation of the CFM approach for urban flood management. Some 14 government agencies at the directorate and Dinas level are involved in urban flood management in JABODETABEK within the Ministry of Public Works, the Provincial Government of DKI Jakarta and the Provincial Government of West Java. A further 8 or so agencies are involved in the Provincial Government of Banten. Other activities include the establishment of a supervisory mechanism for monitoring and the installation of storage facilities and implementation of measures for run-off control in a pilot area to achieve basic concept of JCFM, namely the implementation of $\Delta Q=0$ Policy.

This will require the retardation of water in the city as much as possible through the development of multi-purpose retarding areas such as parks and other public facilities, improvements to the drainage system (dredging, cleaning, rehabilitating), polder and pump rehabilitation, the integrated and efficient management of the pumping system and river rehabilitation and normalisation. There should be no increase in run-off from the upper catchment areas and this will require developers to make regulating ponds, and the government to develop multi-purpose retarding basins (the Ciliwung short-cut), rehabilitate and improve the capacity of the flood retention ponds (situ) and rehabilitate the river channels.

PROJECT PROGRESS

A project Inception Report was submitted in December 2010 and the Japanese Consultants, YEO – Yachiyo Engineering Co. Ltd., and are continuing with the Phase 1 field activities which are scheduled to last until February 2012.

PROJECT NAME : **Institutional Strengthening for Integrated Water resources Management (IWRM) in the 6 CI's River Basin Territory – Package B**

STATUS : **Implementation**

PERIOD : **2009 - 2012**

EXECUTING AGENCY : **DGWR**

UNDING SOURCE : **ADB (TA 7189-INO)**

PROJECT OBJECTIVES :

To overall objective is to strengthen government institutions and civil service organisations involved in the planning of Integrated Water Resources Management (IWRM) comprising the planning of water, land, people, institutions and finances. Package B will apply more efficient, effective and integrated WRM to alleviate current levels of water stress and improve critical water quality conditions in the 6 Ci's River Basin Territory as well as maximising the benefits of the ICWRIMP in the Citarum Basin specifically.

PROJECT DESCRIPTION:

Key Area of Capacity Building (Sub-component B1A)

1. Capacity building of stakeholders, including the establishment of Water Councils and empowerment of stakeholders to create a conductive environment for proper governance in the balanced participation of stakeholders.
2. Capacity building of River Basin Management Organisations (RBMO) comprising not only training for staff but also involving measures at RBMO level or even sector level, to enable trained staff to apply their new skills

Key area of WRM Planning (Sub-component B1B)

1. The development of proper tools for data base management, concerns applied Data Bases for Asset Management (AM), Geographical Information Systems (GIS) and Management Information Systems (MIS).
2. The development of proper tools for WRM planning including models for simulation and decision support systems.
3. Strategic WRM planning under one coordinated framework plan that both recognises the role of water in fulfilling economic growth targets in a sustainable manner and the diverse individual characteristics and needs of each of the sub-basin territories.
4. Develop 'State of the Basin' reporting (road map key Environmental Protection and Enhancement) to support WRM planning through monitoring and evaluation and regular updating as an input for continuously upgraded WRM planning.

Key Area of Strategic Spatial Planning (Sub-component B2)

This sub-component will address the sensitivity of water systems for increasing urbanisation and land-use intensities evidenced in increased water demand and the adverse impact on run-off and erosion, resulting in increased flood hasards. Spatial developments play a critical role in the realisation of a sustainable future for WRM and can be simulated through the Java Spatial Model (JSM).

Key Area of Policy Development (Sub-component B3)

This sub-component comprises the development of key government policies and strategies that will be fundamental to the achievement of IWRM in the future in the 6 Ci's River Basin Territory (RBT) and indeed across Indonesia in areas of relative water scarcity. Three tasks are identified and specified: Entitlements and Licensing, Water Allocation and Water Pricing and Water Demand Management.

PROJECT PROGRESS

An Inception Report was submitted by the Dutch Project Consultants, DHV/MLD in 2011 a copy of which can be accessed at the project's website www.6cis.org

PROJECT NAME : **Joint Cooperation Indonesia – The Netherlands 2011-2015 on Meteorology, Climatology, Hydrology and Early Warning Indonesia**

STATUS : **Implementation**

PERIOD : **2011 - 2015**

EXECUTING AGENCY : **DGWR, BMKG, PusAir**

FUNDING SOURCE : **Government of the Netherlands, Netherlands Meteorological Institute (KNMI), Netherlands Water Research Institute**

PROJECT OBJECTIVES:

To strengthen weather, climate and river flow data collection and analysis, improve weather prediction and local climate trend analysis and develop an early warning system for extreme weather events such as heavy rain, flooding and droughts.

PROJECT DESCRIPTION:

The project, which involves the Indonesian Meteorological, Climatological and Geophysical Agency (BMKG), The Royal Netherlands Water Resources Institute (KNMI), the Indonesian Research Centre for Water Resources (PusAir) and the Netherlands Water Resources Institute is part of a joint cooperation agreement between GOI and the Dutch Government and builds on the co-operation that has been in place between the agencies since 2007 to improve the data collection and analysis of climate and river flow data and develop a disaster early warning system for Indonesia. The project will help maintain and improve the national weather and climate knowledge infrastructure with particular emphasis on weather prediction, climate change and early warning through satellite precipitation measurement (Jakarta, Lampung, Bogor, Bandung, Banjar Baru, East Java), restoring the climatological series in Indonesia from 1870 – 2008, analysing the trends in global average surface temperatures and monitoring sea level rise.

A drought monitoring and flood early warning system (FEWS) will be developed using Numerical Weather Prediction (NWP) models which factor in rainfall radar data for 1-3 hour time intervals, meteorological data for 0 – 3 and 12 hour intervals and 1 – 3 day and 7 day intervals, historical weather data, river flow records, tidal gauge records and sea level changes at the local level and derived from the South China Sea Model.

PROJECT PROGRESS:

The project was launched with a seminar held in Bandung on 23 March, 2011 entitled "Managing the current change, the best preparation for climate change" and presented an analysis of the 2007 Jakarta floods and the rationale for the Jakarta Coastal Defense Strategy.

PROJECT NAME : **Urban Flood Control System Improvement in Selected Cities**

STATUS : **Project tender stage**

PERIOD : **2011 - 2015**

EXECUTING AGENCY : **DGWR and DGCK, DPU and DPU-DKI**

FUNDING SOURCE : **JICA (Japanese International Cooperation Agency)**

PROJECT OBJECTIVES:

To mitigate flood damage in important urban cities vulnerable to flood damage by improving flood control infrastructure, assisting in upgrading the administrative capacity of river basin management offices and developing flood damage management plans with a view to supporting the national agenda of adaption to climate change, and thereby contribute to economic and industrial development in urban cities in Indonesia.

PROJECT DESCRIPTION:

The Project is a Sector Loan which is composed of sub-projects in several cities across the country. Currently 6 sub-projects in 5 cities nationwide are the targets of the Project. These are:

1. **Padang Sub-Project**

   Anai River channel improvement from the river mouth to the section 50m upstream of the Bypass Bridge (4.1 km) and construction of river structures.

2. **Palembang Sub-Project**

   Bendiung River channel normalisation from the confluence with the Musi River to Talang Aman Pond (5.5 km) and reconstruction of the inspection road.

3. **Bandung Sub-Project**

   Construction of Cikapundung diversion channel (0.7 km) including construction of Jl. Moh Toha road bridge in Dayeuhkolot area.

4. **Surabaya (Wonokromo) Sub-Project**

   Wonokromo River channel improvement (3.9 km) with driving concrete sheet piles on either bank totaling 5.7 km.

5. **Surabaya (Brangkal) Sub-Project**

   Brangkal River normalisation from the river mouth to the provincial road (7.9 km) including improvement of Prajurit Kulon Weir and procurement of 5 sets of mobile pumps.

6. **Gorontalo Sub-Project**

Bolango River channel improvement from the river mouth to the confluence with thw Tapodu River (5.3 km) and Left Bolango River (2 km) including construction of cut-off channels with construction of 1 bridge and reconstruction of 2 bridges and the procurement of 5 sets of mobile pumps.

The screening of the target sub-projects was conducted using a two-stage selection process based on the criteria of 'priority' and 'readiness'. First long-listed sub-projected were selected in terms of immediate priority such as the volume of direct and indirect flood damage, the frequency of flood, existence of important infrastructure and flood control facilities the existence of economic disparity. The long-list included 17 sub-projects in 14 cities. These were subjected to a second round of screening based on the maturity of project preparation or 'readiness'. For example, the status of project design preparation, the existence of preliminary studies, master plans, feasibility studies and detailed designs, and the status of environmental and social safeguard considerations such as EIA and LARAP preparation and the scale of land acquisition and resettlement.

The 6 short-listed sub-projects are considered the immediate priority but a list of alternative replaceable projects has been identified should any of the former fail to meet the sub-project 'readiness' criteria. The possible replacement cities include Tulungagung, Surabaya (Gunungsari), Surabaya (Kedurus), Rengat, Manado, Nganjuk, Pekanbaru, Dumai, Makassar, Jambi and Balikpapan.

Originally the Project was due to start in November 2009 with the selection of the consultants who would prepare the tender and contract documents for the 6 sub-projects between February and October 2010 with construction starting in June 2011 and finishing in October 2012 although the official Project Completion Date was scheduled for May 2014, defined as the end of the liability period.

The Directorate General of Water Resources (DGWR) of the Ministry of Public Works will be the main executing agency responsible for the implementation of the overall Project including the selection of the consultant(s), appointment of SATKER, supervision for preparing Implementation Plans of each sub-project for review and concurrence of JICA, tendering, contracts and construction works. DGWR will also take responsibility for monitoring and evaluation of the Project in cooperation with the National Steering Committee on Water Resources. A National Project Management Unit (NPMU) will be established to carry out DGWR's responsibilities.

The following river basin management offices (BBWS/BWS) under the DGWR will be the Implementing Agencies for the sub-projects:

- Balai Wilayah Sungai (BWS) Sumatra V: Padang Sub-Project
- Balai Wilayah Sungai (BWS) Sumatra VIII: Palembang Sub-Project
- Balai Besar Wilayah Sungai (BBWS) Citarum: Bandung Sub-Project
- Balai Besar Wilayah Sungai (BBWS) Brantas: Surabaya Brangkal and Wonokromo Sub-Projects and
- Balai Besar Wilayah Sungai (BBWS) Sulawesi II: Gorontalo Sub-Project

Each BBWS/BWS will take responsibility for the preparation of Implementation Plans to be submitted to JICA prior to the review of the Detailed Design. After the commencement of each sub-project, each BBWS/BWS will be responsible for implementation of the construction works and the activities for Integrated Water resources Management (IWRM) with a view to supporting the national agenda of adaption to climate change. The implementing agencies will work in close coordination with each local government through the provincial Water Resources Management Office.

PROJECT PROGRESS

The original schedule has been delayed by 2.5 years and the 6 sub-projects are currently being prepared for tender with contractor packages for construction and consultant packages for the supervision of construction works and non-structural consultant assistance to the Project Management Units (PMU) for strengthening Integrated Water Resources Management (IWRM), policy formulation and independent monitoring and evaluation. The consultant packages should be ready for tender by

The largest component of each of the six sub-projects currently being tendered is physical infrastructure improvement with consulting services for construction supervision of physical works. The total cost of construction and supervision services accounts for 95% of the loan with 4% allocated to capacity building for IWRM and PMU activities and independent monitoring and evaluation.

PROJECT NAME : **Institutional Strengthening for Integrated Water Resources Management in the 6 CIs River Basin Territory (Package C), Upper Citarum Flood Management Project (UCBFM), Flood Management Strategy 'No Regret' – Urgent Program**

STATUS : **Implementation**

PERIOD : **2010 - 2012**

EXECUTING AGENCY : **DGWR**

FUNDING SOURCE : **ADB and the Government of the Netherlands**

PROJECT OBJECTIVES:

To understand the hydrology and hydraulics of the Bandung Basin through the development and updating of the ID2D flood hazard modeling framework and the identification and implementation of 'fast track' measures to avoid the yearly floods (urgent 'no regret' measures) combined with the development of long-term measures in a long-term plan and updating the flood management strategy for the basin.

PROJECT DESCRIPTION:

The Project has been studying the historical trends in rainfall, run-off and river flows and their relation to flooding in the Bandung Basin and formulated a series of short – term and longer-term measures to prevent flooding taking into account measures already proposed a JICA funded study that has been in operation in the Bandung basin since 1988. The current phase of the JICA Study, Phase III Preparatory Survey for the JICA Urgent Flood Control Project, has similar objectives to that of the ADB-Dutch funded project and there is close cooperation between the two projects.

PROJECT PROGRESS

At the time of the 5th ADB project Review in May 2011, the consultants, Deltares from the Netherlands, had identified a series of short-term measures to reduce and eventually prevent flooding that were underpinned by the dredging and maintenance of the River Citarum in an effort to restore it to its 'as-built' capacity. Other measures such as included flood storage and retention were found to be impractical in the short-term in the Bandung Basin because of the lack of suitable sites due to urban expansion, the high cost of land acquisition the long timetable required for any resettlement plans.

The urgent 'no regret' implementation strategy for 2011-2013 requires no land acquisition or resettlement, the rehabilitation in stream of the Citarum River channel and the disposal of dredged sediment only on government property. The outline dredging plan calls for permanent equipment for rehabilitation and maintenance, single channel dredging, deepening by maintenance cycles and the flexible disposal of sediment via a sludge pipeline along the river bank inspection road (no trucks required)

into protected and confined disposal sites such as upper stream inlets of the Saguling Reservoir that are owned by the government.

Special attention is also given to a Community Participation, one of the pillars of the Water Law of 2004 whereby small community programs will be set up to solve the many small local problems associated with flooding and provide communities during the flood with assistance in 'flood fighting'. Community portals will be established at the BBWSC and close connections will be maintained with the National Community Empowerment Program (NCEP).

PROJECT NAME **: Jakarta Coastal Defense Strategy (JCDS)**

STATUS **: Implementation**

PERIOD **: 2011 - 2015**

EXECUTING AGENCY **: MPW, Bappenas, PU DKI**

FUNDING SOURCE **: GOI and the Netherlands Government**

PROJECT OBJECTIVES:

To prepare a master plan for coastal defence for cities along the north coast of Java including Jakarta for the period 2011 – 2013.

PROJECT DESCRIPTION:

With the predicted continuation of land subsidence in North Jakarta, which is currently averaging between 5 and 10 cm per year, and in preparation for possible sea-level rises related to changes in local climate, the strategy identifies four options for preventing flooding of the city from the sea and coping with flooding caused by increased run-off from the landward side over a 20-year time frame (2010 – 2030). These include the continuation of the 'urgent measures' currently being implemented, a resilient on-land strategy, a resilient off-ashore strategy with the main rivers and channels remaining open and lastly, a resilient off-shore strategy with the main rivers and channels closed. The aim is to move from Jakarta Coastal Defence Strategy towards a Jakarta Coastal Development Strategy; from old concepts where no people live on the dike, to new concepts which combine safety and development – 'the liveable dike'.

PROJECT PROGRESS:

The project has updated facts and trends in land subsidence in Jakarta with ITB and PusAir by reviewing the data from leveling surveys carried out between 1982 – 1997, examined the data from extensometers, carried out GPS surveys, compared time-sequenced aerial photographs and satellite images between 2004 – 2010 and looked for field evidence in the form of tide marks, flood marks and evidence of bridge lowering.

An initial Intensive Response Program under PU DKI has identified urgent measures that are required to protect the city from flooding from the sea (Rob) that include the building of new sea walls, the heightening of existing ones and the detailed design of coastal pumps and gates.

PROJECT NAME : **Climate Change, Disaster Risk, and the Urban Poor – Building Urban Resilience in East Asia**

STATUS : **Implementation**

PERIOD : **2009 – 2020?**

EXECUTING AGENCY : **DGWR, BMKG, PusAir**

FUNDING SOURCE : **World Bank, the Netherlands Government and the Government of Australia**

PROJECT OBJECTIVES:

To demonstrate a scalable methodology in East Asia and the Pacific to increase the resilience of urban infrastructure that can be mainstreamed into city-level investment decisions. This is part of a larger regional initiative focused on building urban resilience to risk from disaster and climate change threats.

For those that live in slums in cities throughout the developing world, the daily challenges of accessing safe and reliable drinking water, proper sanitation facilities, transport services to commute to and from work, regular solid waste collection, and health and education services can be enormous. These challenges are increasingly exacerbated by the impacts of natural hazards and the effects of climate change. Residents, especially the poor, are increasingly exposed to the impacts of landslides, sea level rise, flooding and other hazards, increasing risks in already vulnerable communities and impacting health and the spread of disease, livelihoods and the very limited assets of the poor. This is the reality in city after city but this reality does not have to be destiny. The set of broad actions outlined in the project can help build resilience for those at greatest risk in cities. Implementing these will involve a strong commitment by local governments working with communities, as well as national and international institutions.

PROJECT DESCRIPTION:

The Project was established under the Mayors' Task Force on Climate Change, Disaster Risk, and the Urban Poor that was launched at the Mayors' Summit in Copenhagen in 2009. The Task Force is composed of the Mayors of Dar es Salaam, Jakarta, Mexico City and Sao Paulo who have recognised the importance of these issues in their cities and demonstrated strong support. The three key objectives of the Task Force include (i) a better understanding of the links among climate change, disaster risk and the urban poor; (ii) identifying good practice examples where resilience of the urban poor has been improved; and (iii) proposing policy and investment programs for scaling up efforts to reduce risk for the urban poor.

PROJECT PROGRESS

Initial case studies in the four cities have been carried out by the World Bank[5] and the City of Jakarta has been selected as one of two pilot cities where more detailed studies will be conducted. The first phase of the study will focus on stock taking of the current identified climate associated risks (manily urban flooding) and the programs being planned or undertaken to address those risks, while the second phase will be the urban flooding risk assessment.

This study will be carried out in close collaboration with the Australia Indonesia Facility for Disaster reduction (AIFDR), currently conducting an initiative also jointly with the World Bank to develop "Risk-in-a-Box' as a practical tool for governments in carrying out risk assessment. Linking the Urban Resilience Study with the Risk-in-a-Box is only part of a collaborative strategy to promote risk based approach in disaster and climate mitigation in urban management in mega-cities like Jakarta.

A workshop was held in Jakarta on May 25th 2011 to launch the start of Phase I of the study through policy dialogue with policy makers and practitioners in the Jakarta City Government and in the related national agencies working on Jakarta flood mitigation and climate adaption. Participants came from different sections within the Jakarta Government (public works, spatial planning, disaster management, environmental management etc.), and from the related line agencies at the national level (e.g. Bappenas, Ministry of Public Works, Ministry of Environment, BNPB and DNPI) plus representatives from the Australian Embassy and the World Bank.

The workshop was carried out in collaboration with the on-going Jakarta Coastal Defense Strategy Study funded by the Netherlands Government. This collaboration is expected to provide a more comprehensive view of the issues and potential solutions and, more importantly, to forge closer engagement with the various players involved in supporting the DKI Jakarta Government in addressing its inland and coastal flooding problem and the future climate related threats.

[5] *Climate Change, Disaster Risk, and the Urban Poor Cities Building Resilience for a Changing World, Summary,* The World Bank, June 2011

PROJECT NAME : **Flood Management in Selected River Basins Project (Phase II)**

STATUS : **Project tender stage**

PERIOD : **2011 - 2015**

EXECUTING AGENCY : **Directorate General of Water Resources (DGWR)**

FUNDING SOURCE : **Asian Development Bank (ADB)**

PROJECT OBJECTIVES:

The TA will support the preparation of a multitranche financing facility (MFF) within selected river basins in Java to: (i) strengthen upstream-downstream cooperation in the basins; (ii) strengthen watershed conservation activities; (iii) flood plain management, providing public information on flood risks; (iv) reduction of flood peaks and/or improvement of drainage capacity: and (vi) flood governance, including (a) synchronisation of governance by local agencies in flood management, and (b) a study in each basin to identify suitable procedures and institutions for financing environmental services to reduce floods.

PROJECT DESCRIPTION:

The tranche 1 loan will focus on the preparation of interventions in the first 3 or 4 river basins selected under the MFF. The TA will update previous studies and advance preparatory work for FMSRB and prepare a detailed Roadmap and financing plan required for implementation using the MFF modality. The proposed project will coordinate with ICHARM as the Asia Pacific Water Forum's regional knowledge hub for disaster risk reduction and flood management.

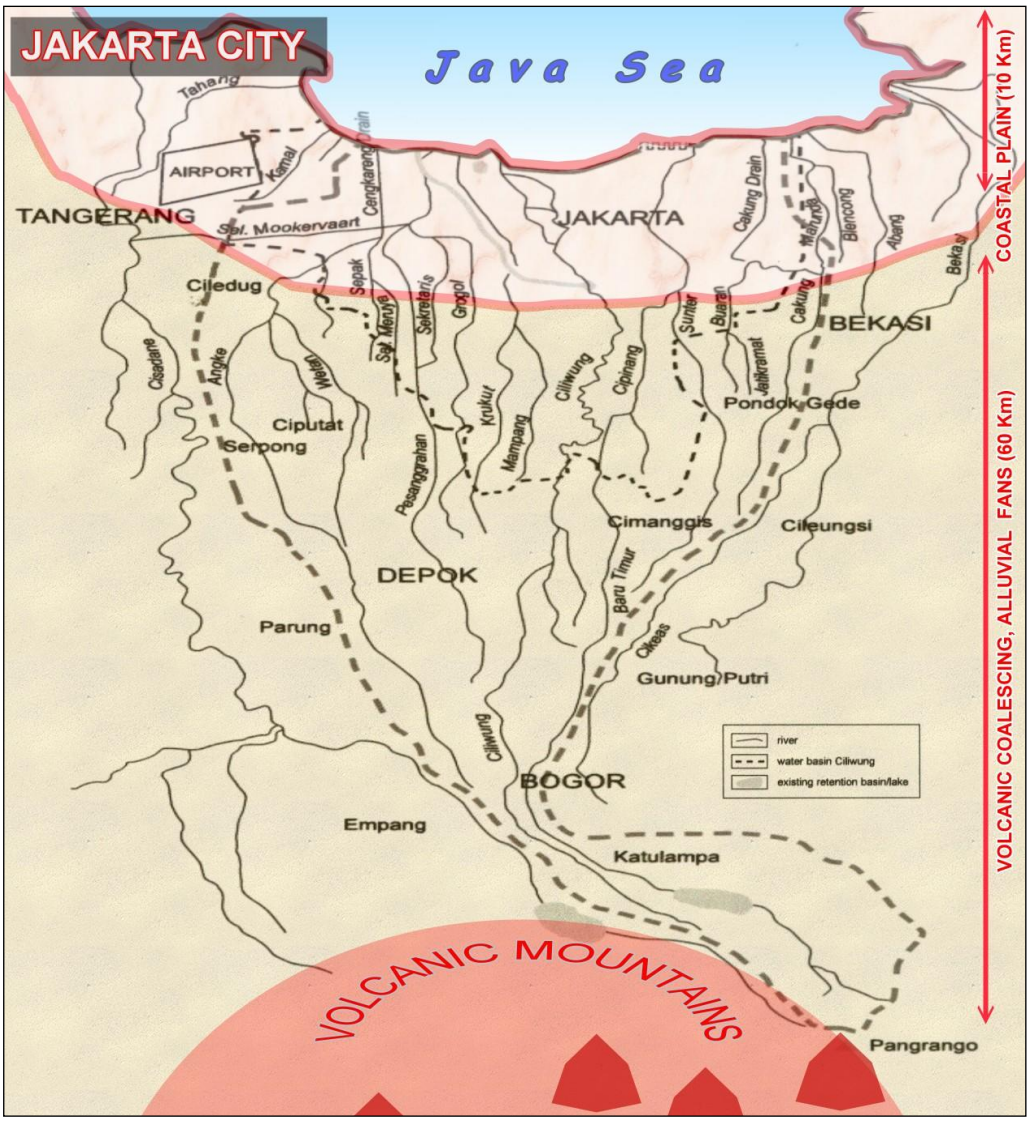
The Government of Indonesia has increasingly required ADB support to be closely aligned with the national program in the water resources sector. A full range of participatory workshops is planned during the conduct of the PPTA. Stakeholders will be consulted and participate at various stages of Investment Program preparation (i) formal public consultation workshops to present/discuss assessment of development issues, project identification/prioritisation criteria, feasibility study recommendations, and subsequent basin Roadmap development; (ii) focus group discussion with stakeholders in basins impacted by the program; and (iii) meetings/interviews with government officials (at national, provincial, and district levels), as well as key informants (water utility executives, NGOs, personnel working on related projects in the basin).

PROJECT PROGRESS:

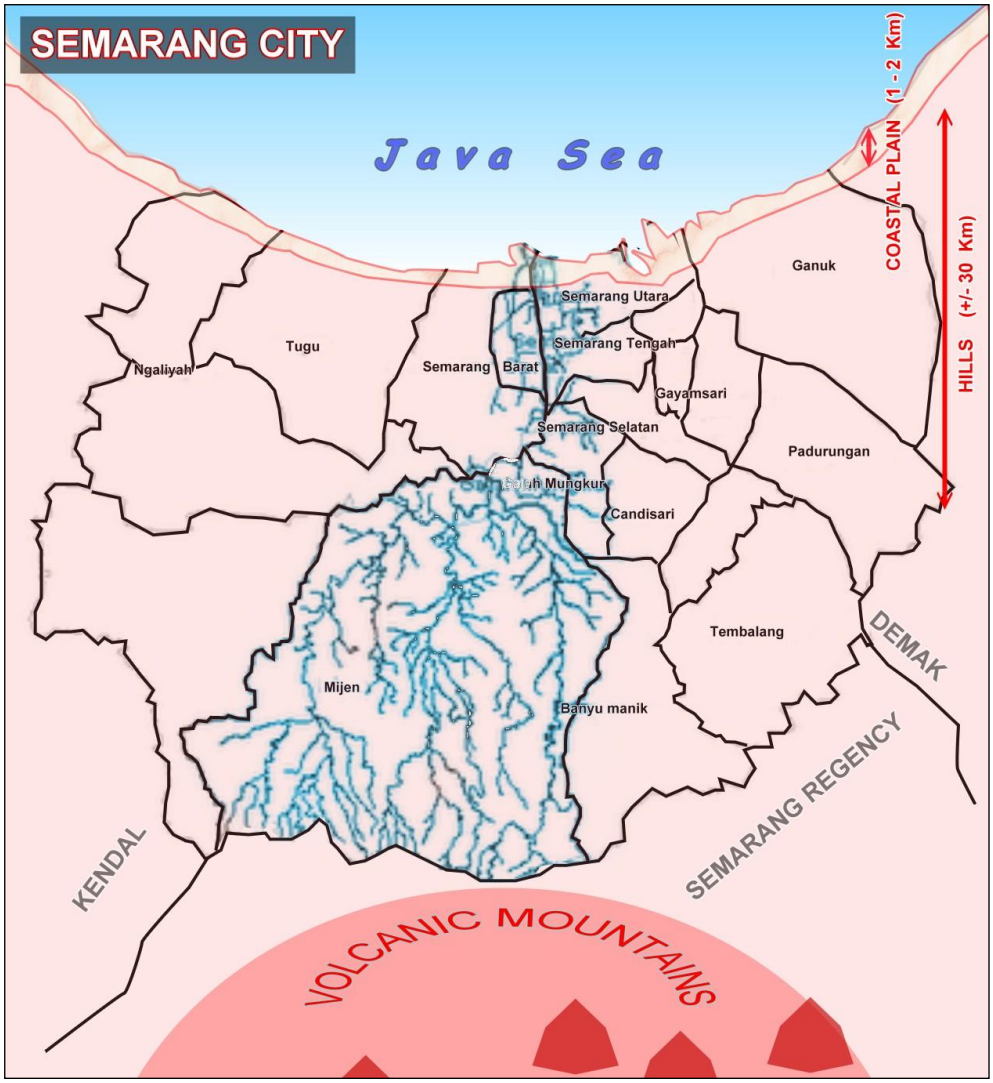
Funding approval and the financing plan was approved by ADB in October 2009 and the project is in the tender process stage.

ANNEXE 4: TYPOLOGY OF CITIES EXPERIENCING FLOODING

TYPE 1. Coastal location with wide low lying coastal plain. (Jakarta City, Tegal City, etc)

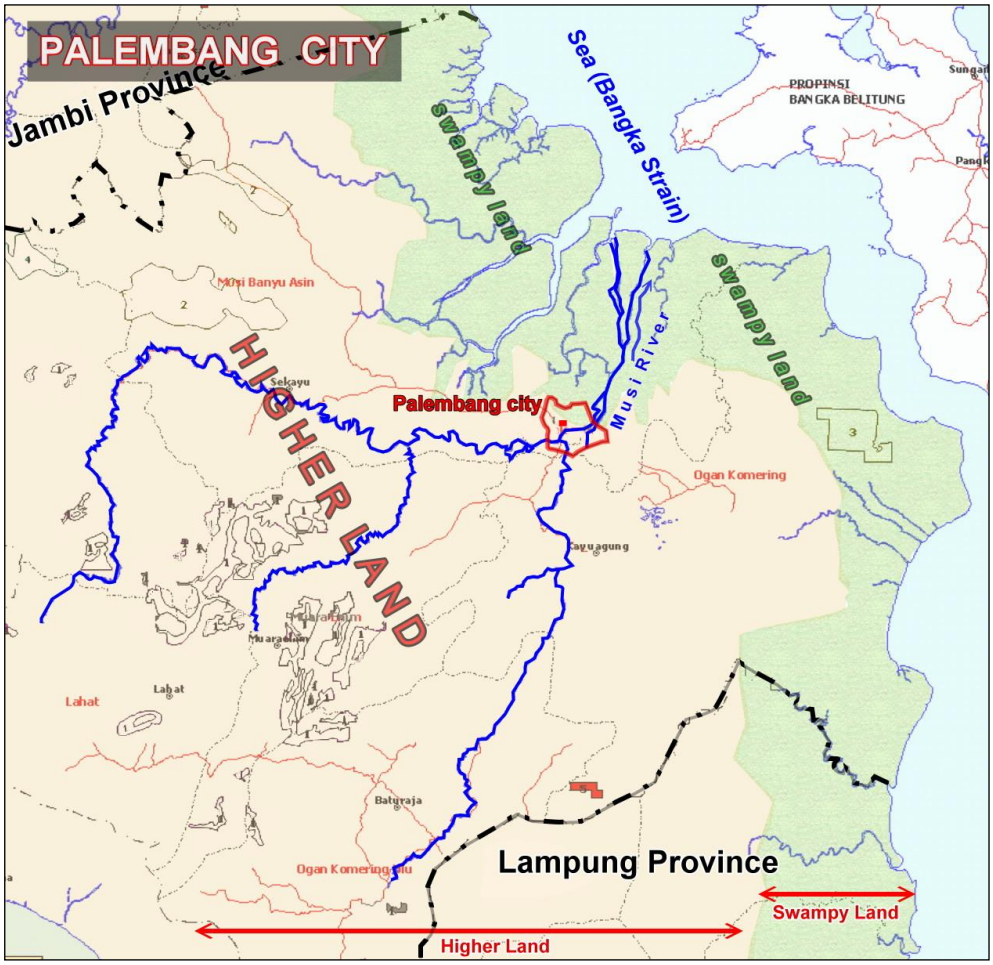


TYPE 2. Coastal location with narrow coastal plains backing onto higher plains and hills. (Semarang City)



TYPE 3. Large tidal river bank location with coastal low lands and swamp lands.

(Palembang City, Jambi City, Rengat City, Dumai City)

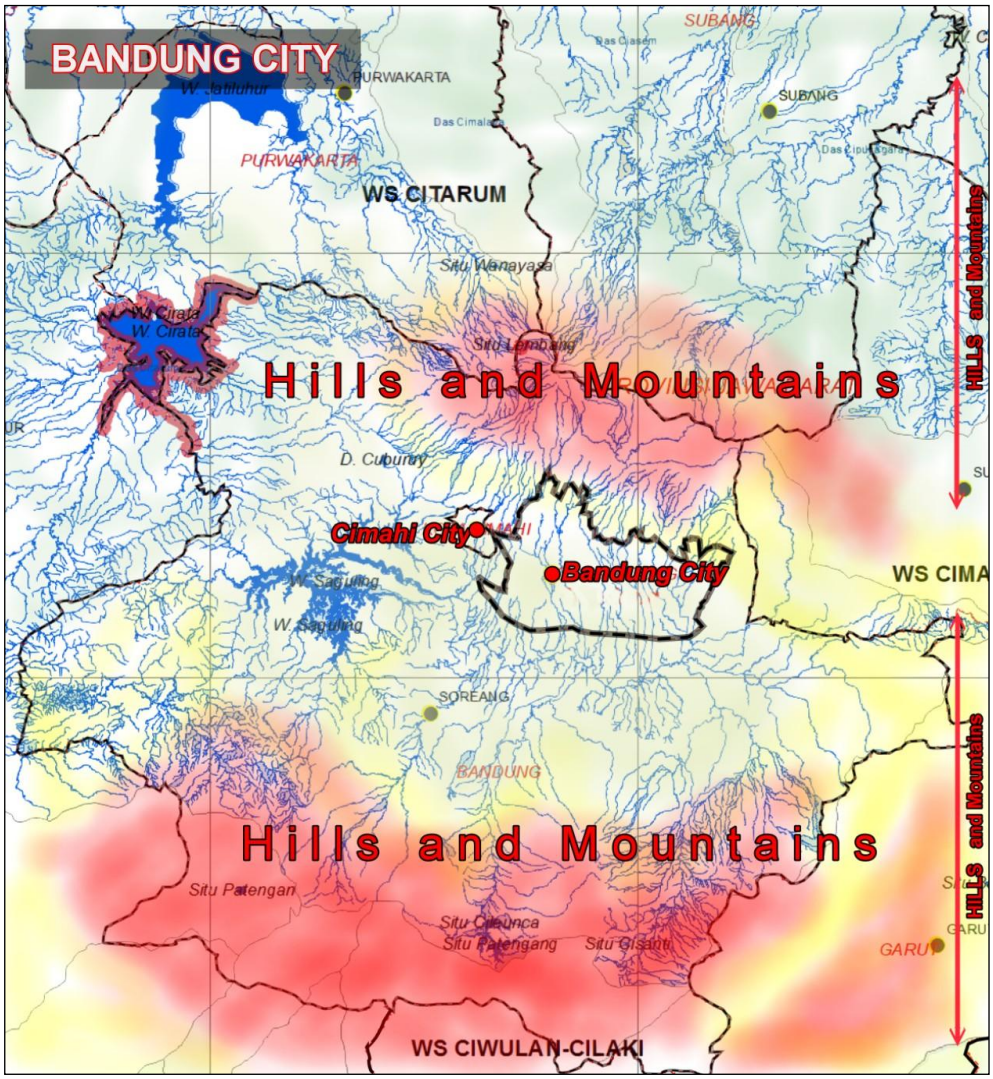


TYPE 4. Coastal location a hilly land with no appreciable coastal plain and no significant flood thrust.

(Bandar Lampung City, Manado City, Palu City, Jayapura City, Kendari City and Sorong City)

TYPE 5. Inland location with undulating to hilly and mountainous terrain (inter-mountain base in)

(Bandung City, Yogyakarta City, Surakarta City, Medan City, Bogor City)



Indonesian Major Cities Urban Flood Risk Matrix

PROVINCE	CITY	POPULATION	COAST	COASTAL PLAIN	INLAND	ELEVATION m	KOPPEN CLIMATE	ANNUAL RAIN mm	WETTEST MONTHS	FLOOD FREQUENCY	FLOOD SEVERITY	AREA AFFECTED ha
West Java	Jakarta	9,000,000	√	√	√	- 2 - + 80	Awaiw	1,500 - 2,500	Jan - Feb	annually	very severe	
	Bogor	2,000,000			√	150 - 300	Afaiw	3,500 - 4,000	Nov - Mar	occasional localised	low	
	Serang	1,500,000		√		25	Awaiw	1,674	Jan - Feb			
	Bandung	2,000,000			√	300 - 800	Awaiw	1,936	Nov - Apr			
	Cirebon		√	√		3 - 15	Awaiw	1,537	Dec - Mar			
Central Java	Semarang		√	√	√	3 - 150	Afaiw	2,364	Jan - Mar			
	Surakarta				√	100 - 150	Awaiw	1,969	Jan - Apr			
D.I. Yogyakarta	Yogyakarta				√	100 - 200	Awaiw	2,022	Jan - Mar			
East Java	Surabaya		√	√		7 - 15	Awaiw	1,756	Jan - Mar			
	Madiun				√	100 - 130	Awaiw	2,045	Jan - Apr			

RIVER BASIN	CATCHMENT CONDITION	RETENTION	DESIGN ISSUES	BLOCKAGES	SUBSIDENCE	LOW GRADIENTS	RIVER CAPACITY	TIDAL SURGES	OTHERS	DRAINAGE MP	RATING
	severely degraded	√	√	√	√ in north	√ in north	under capacity	√			
Cimanuk	moderately degraded	√		√							
										√	

Indonesia
Infrastructure Initiative

Ratu Plaza Office Tower
20th Floor
Jl. Jenderal Sudirman No. 9
Jakarta 10270
Indonesia

Tel: +62-21 7278 0538
Fax: +62-21 7278 0539

www.indii.co.id