NO.

RECONNAISSANCE STUDY OF
THE INSTITUTIONAL REVITALIZATION PROJECT
FOR MANAGEMENT OF
FLOOD, EROSION AND INNER WATER CONTROL
IN JABOTABEK WATERSHED

FINAL REPORT

JANUARY 2006

JAPAN INTERNATIONAL COOPERATION AGENCY

YACHIYO ENGINEERING CO., LTD

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Abbreviations

BMG	:	Meteorological and Geo-physical Agency (Badan Meteorologi dan Geofisika)
CILCIS	:	Ciliwung-Cisadane River Basin Development Project (Proyec Pengembangan Wilayah Sungai Ciliwung-Cisadane)
Cipta Karya	:	Director General of Housing, Planning and Urban Development,
DGWR	:	Director General of Water Resources
DKI Jakarta	:	Special State Capital of Jakarta (Daerah Khusus Ibukota Jakarta)
DPU	:	Public Works Department of DKI Jakarta (Dinas Pekerjaan Umum)
EBC	:	Eastern Banjir Canal
JABOTABEK	:	Jakarta, Bogor, Tangerang and Bekasi
JABODETABEK	:	Jakarta, Bogor, Depok, Tangerang and Bekasi
JBIC	:	Japan Bank for International Cooperation
JICA	:	Japan International Cooperation Agency
KIMPRASWIL	:	Ministry of Settlement and Regional Infrastructure (Permukiman dan Prasarana Wilayah)
NEDECO	:	Netherlands Engineering Consultants
PP	:	Low – Low Water (Priok Peil)
PU	:	Ministry of Public Works (Departemen Pekerjaan Umum)
WBC	:	Western Banjir Canal
1973 Master Plan	:	Master Plan for Drainage and Flood Control of Jakarta
1997 Master Plan	:	The Study on Comprehensive River Water Management Plan in JABOTABEK
2002 Flood Damage Study	:	Urgent Inventory Study on Damage of Flood 2002 in Jabodetabek Area

1. INTRODUCTION

1.1 BACKGROUND

Jakarta, a capital of Indonesia, is located in lowland where rivers easily overflow because of topographical conditions and thus, is suffering from habitual flood damages. In addition, Jakarta has remarkably developed in recent years and becomes easily and seriously damaged due to concentration of population and properties in flood prone areas.

To tackle flooding problems, the Government of Indonesia has formulated a drainage and flood control master plan in 1973 and a flood control master plan for JABOTABEK in 1994. However, tremendous flooding attacked the Jakarta continuously in 1996 and 2002, paralyzing greatly the capital functions. Under these circumstances, the following projects have been implemented since 1997.

Table 1.1 Flood Control and Drainage Study and Project in JABOTABEK

Name of Project	Year Completed	Contents
The Study on Comprehensive River Management Plan in JABOTABEK	1997	Formulation of flood control master plan for JABOTABEK and feasibility study for priority projects
Ciliwung - Cisadane River Flood Control Project	1998	Implementation of river improvement and construction of new floodway to protect DKI Jakarta
Urgent Inventory Study on Damage of Flood 2002 in JABODETABEK Area in Indonesia	2003	Study on damage and causes of 2002 flood in JABOTABEK

Furthermore, the Government of Indonesia requested the Government of Japan to implement a project-type cooperation, “The Institutional Revitalization Project for Management of Flood, Erosion and Inner Water Control in JABOTABEK Watershed”.

1.2 OBJECTIVES

In connection with the “The Institutional Revitalization Project for Management of Flood, Erosion and Inner Water Control in JABOTABEK Watershed”, JICA dispatched a study team to the Indonesia from September 11 to October 25 2005 to undertake a reconnaissance study for the Project. Objectives of the Study are;

(1) to collect/arrange existing data and information of the related governmental agencies, their flood mitigation activities and flood damages in the JABOTABEK,

(2) to implement additional survey/study; and

(3) to identify problems and issues for institutional revitalization to mitigate flood damages in the JABOTABEK.

In Annex I, member list of the study team for the reconnaissance study, study schedule and interview list are indicated.

1.3 STUDY AREA

The Study Area covers so-called JABOTABEK area, which is composed of DKI Jakarta, regencies and municipalities of Bogor, Depok and Bekasi of the West Java Province and Tangerang regency and municipality of the Banten Province.

2. PRESENT CONDITIONS

2.1 SOCIO-ECONOMIC CONDITIONS

2.1.1 Administration

Administrative units in Indonesia are as summarized in Figure 2.1. Their names under provinces are different for urban areas and rural areas.

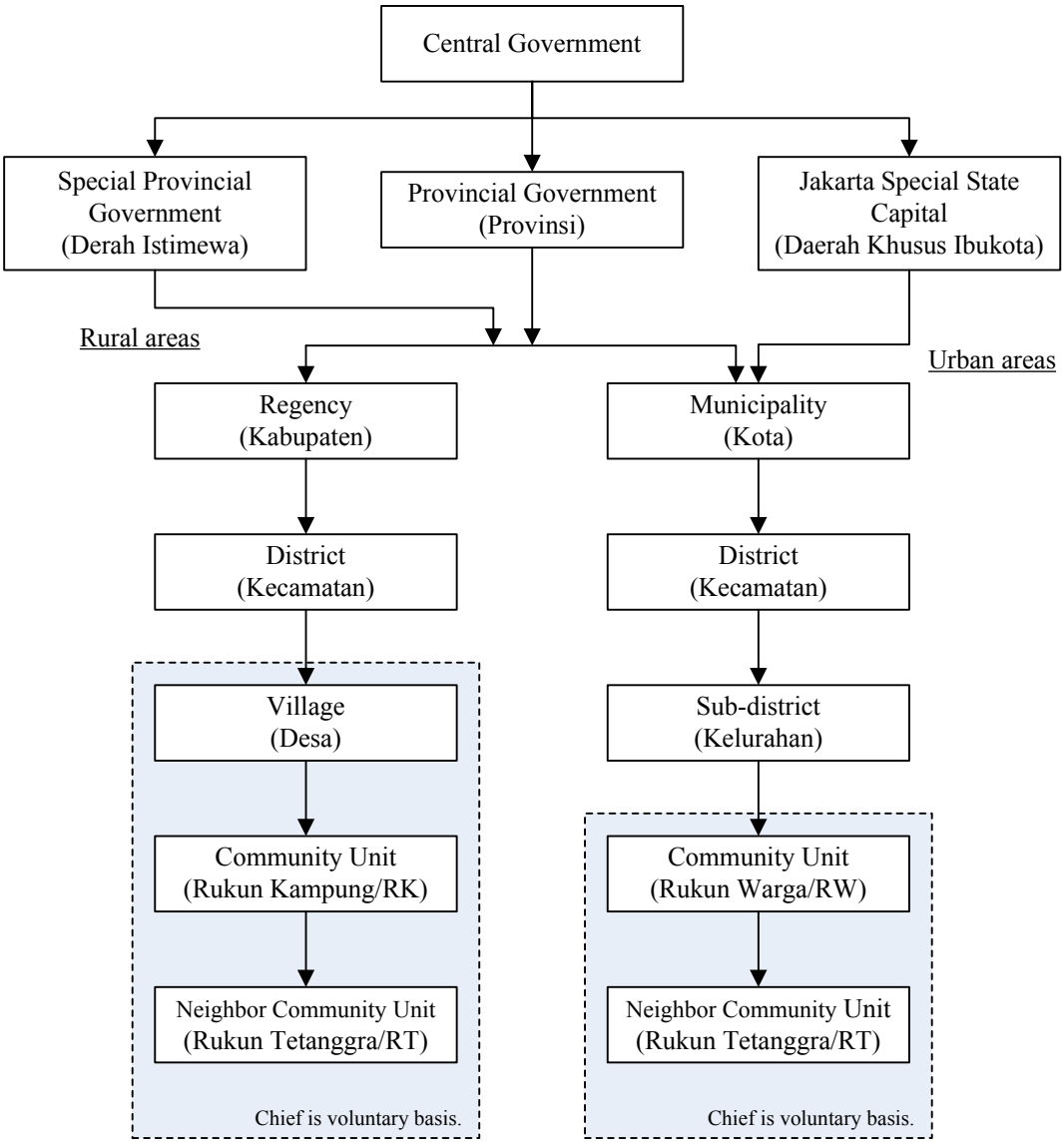

Figure 2.1 Administrative Units in Indonesia

In 2005, Indonesia is composed of 30 provinces and 2 special provinces and 1 special state capital Jakarta (DKI Jakarta) as listed in Table 2.1 and shown in Figure 2.2.

Special State Capital of Jakarta (DKI Jakarta) is a provincial level autonomy given specially to Jakarta due to its role as a capital city of the country. Jakarta is the only provincial level government whose administrative structure oriented itself toward urban activities. Special Province is an area much like a province; however because of their historical commitment toward the sovereignty of Indonesia, it is declared as a special province. Currently, there are two (2) provinces which gain a status as a Special Province: Nangru Aceh Darussalam (NAD) and Daerah IstimewaYogyakarta (DIY).

Under provinces, urban areas are divided into municipalities, then districts and further sub-districts, while rural areas are composed of regencies and districts. The lines of -------- in Figure 2.1 indicates the separation between the administration units under districts of rural areas and those under sub-districts of urban areas, public service of which are done on a voluntary basis. In rural areas, Desa (village), RK and RT are administered voluntarily, while in urban areas, RW and RT are of voluntary basis. RK in rural areas and RW in urban areas consist of 10 to 20 Neighbor Community Units (RT); RT in both of rural and urban areas consists of 30 to 50 households.

Table 2.1 Special Provinces and Provinces in 2004

Name	Area (km^2)	Population (thousand)	Name	Area (km^2)	Population (thousand)
Nangro Aceh Darussalam *	56,500.5	4,089	West Nusa Tenggara	19,708.8	4,084
North Sumatera	72,427.8	12,123	East Nusa Tenggara	46,137.9	4,156
West Sumatera	42,224.8	4,535	South Kalimantan	38,884.3	3,227
Riau	87,844.2	5,712	West Kalimantan	120,114.3	4,033
Riau Islands	8,084.0		Central Kalimantan	153,564.5	1,870
Bengkulu	19,795.2	1,549	East Kalimantan	194,849.1	2,766
Lampung	37,735.2	6,628	South Sulawesi	46,116.5	8,369
Jambi	45,348.5	2,625	Southeast Sulawesi	36,757.5	1,923
South Sumatera	60,302.5	6,628	Central Sulawesi	68,089.8	2,253
Bangka Belitung Island	16,424.1	1,024	North Sulawesi	13,930.7	2,159
Banten	9,018.6	9,129	Gorontalo	12,165.4	897
DKI Jakarta *	740.2	8,750	West Sulawesi	16,787.2	
West Java	36,925.1	38,611	Maluku	47.350.4	1,244
Central Java	2,799.7	32,543	North Maluku	39,960.0	873
DI Yogyakarta *	133.2	3,223	West Papua	309,934.4	2,516
East Java	6,689.6	36,482	Central Papua		
Bali	5,449.4		East Papua		

Note: Names with * are special provinces
Source: Statistical Year Book (2004)

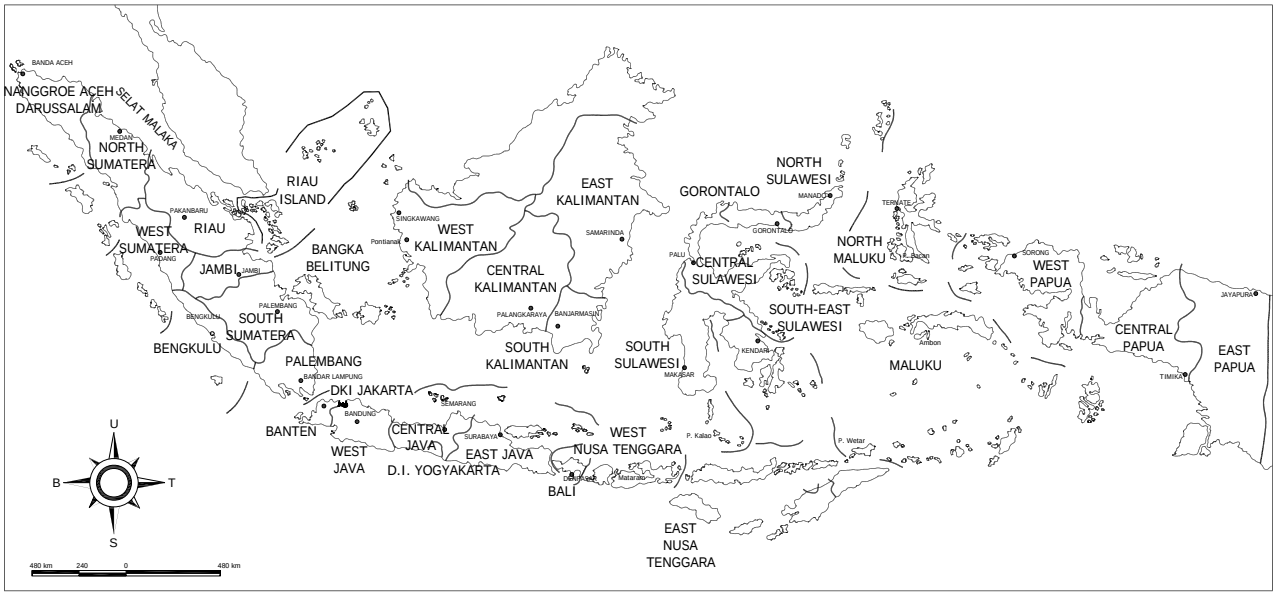

Figure 2.2 Provinces in Indonesia

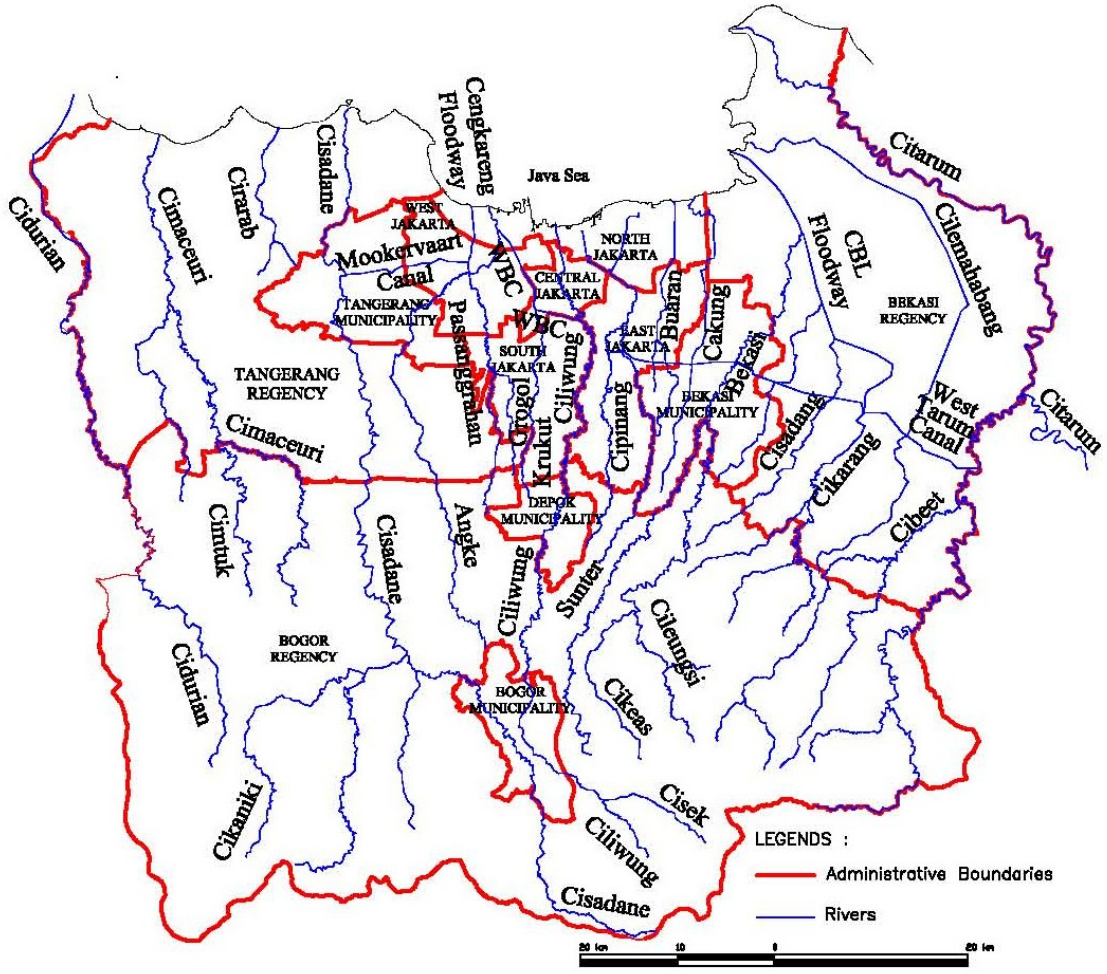

Figure 2.3 Administrative Boundary and Rivers of JABOTABEK

The Study Area is so-called JABOTABEK with area of 6,128.53 km^2, which is composed of DKI Jakarta, Bogor (municipality and regency), Depok (municipality) and Bekasi (municipality and regency) of West Java Province and Tangerang (municipality and regency) of Banten Province as shown in Figure 2.3. DKI Jakarta is composed of one (1) regency of Seribu and five (5) municipalities of South Jakarta, East Jakarta, Central Jakarta, West Jakarta and North Jakarta.

The following table tabulates number of districts and sub-districts/villages in the JABOTABEK.

Table 2.2 Area and Number of Districts and Sub-districts/Villages of JABOTABEK

Provinces	Municipality/Regency	Area (km^2)	Number of District	Number of Sub-district/ Village
JABOTABEK		6,128.53	163	1,485
DKI Jakarta	Seribu Regency	11.81	2	6
	South Jakarta Municipality	145.73	10	65
	East Jakarta Municipality	187.75	10	65
	Central Jakarta Municipality	48.20	8	44
	West Jakarta Municipality	126.15	8	56
	North Jakarta Municipality	141.88	6	31
	Sub-total	661.52 (649.71)	44	267
West Java	Bogor Municipality	118.50	6	56
	Bogor Regency	2,388.93	35	425
	Depok Municipality	200.29	6	63
	Bekasi Municipality	210.49	10	52
	Bekasi Regency	1.273.88	23	186
	Sub-total	4,192.09	80	782
Banten	Tangerang Municipality	164.54	13	104
	Tangerang Regency	1,110.38	26	332
	Sub-total	1,274.92	39	436

Note: Area in parentheses is that of DKI Jakarta excluding Seribu Regency.

2.1.2 Population and Households

Population and households in JABOTABEK in year of 2003 is 21.4 million and 5.3 million, respectively as shown in Table 2.3. Out of the population, 7.5 million or 35.1 % are in DKI Jakarta and 9.3 million or 43.5 % are in municipalities and regencies of the West Java Province, while 4.6 million persons or 21.5 % are registered in municipality and regency of the Banten Province.

Population density of JABOTABEK is 3,5 thousand persons/km^2. Those of DKI Jakarta, West Java Province and Banten Province are 11.3 thousand persons/km^2, 2.2 thousand persons/km^2 and 3.6 thousand persons/km^2, respectively. Out of them, the municipality, which has the highest population density, is Central Jakarta with 18.5 thousand persons/km^2.

Table 2.3 Population and Households of JABOTABEK in 2003

Province	Municipality/Regency	House-holds	Population	Population Density (persons/km^2)
JABOTABEK		5,306,660	21,441,426	3,499
DKI Jakarta	Seribu Regency	5,189	19,596	1,659
	South Jakarta Municipality	386,584	1,707,093	11,714
	East Jakarta Municipality	561,591	2,103,525	11,204
	Central Jakarta Municipality	217,562	893,195	18,531
	West Jakarta Municipality	450,362	1,565,708	12,411
	North Jakarta Municipality	320,110	1,182,749	8,336
	Sub-total	1,941,398	7,471,866	11,295
West Java	Bogor Municipality	188,533	820,707	6,926
	Bogor Regency	845,800	3,408,810	1,427
	Depok Municipality	302,742	1,335,734	6,669
	Bekasi Municipality	430,070	1,914,316	9,095
	Bekasi Regency	512,792	1,877,414	1,474
	Sub-total	2,279,937	9,356,981	2,232
Banten	Tangerang Municipality	368,858	1,416,842	8,611
	Tangerang Regency	716,467	3,195,737	2,878
	Sub-total	1,085,325	4,612,579	3,618

Source: BP5 Each Municipality & Regency, 2003

2.2 NATURAL CONDITIONS

2.2.1 Topography and Geology

Geology of the Study Area is composed of 1) alluvium of the Holocene age mainly in the lowland plain, 2) terrace deposits of the Pleistocene age mainly in alluvial fan of the Bogor zone and the lowland plain, 3) tuffaceous sedimentary rocks of the Pliocene to Miocene age mainly in the Bogor Zone and 4) southern volcanoes of the Miocene Age (Refer Figure 2.4).

2.2.2 Climate

Generally, Indonesia including the Java Island has two seasons; a wet season from November to March and a dry season from June to October mainly affected by monsoons. In addition, Indonesia, which is located near to the equator, is affected by Inter Tropical Convergence Zone (ITCZ or Doldrums), which is region of calms, light variable winds, and thunderstorms, girdling the oceans near the equator and varying in position and extent according to the season.

Figure 2.5 shows monthly rainfall distribution in JABOTABEK. In mountainous area such as Bogor, it rains also in dry season and tends to increase annual rainfall compared to those in low land.

Annual mean rainfall increases with elevation ranging from 1,500 mm at coastal plain to 5.500 mm at mountainous areas as shown in Figure 2.6.

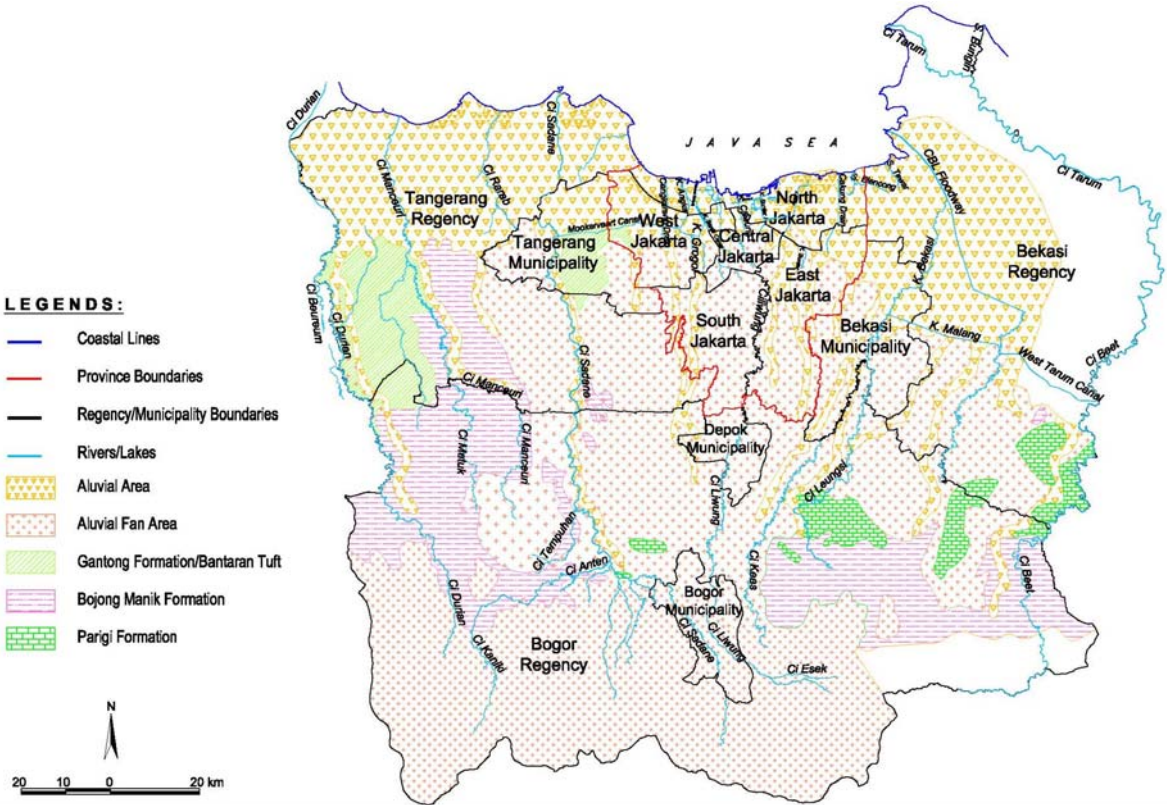

Figure 2.4 Geology in JABOTABEK

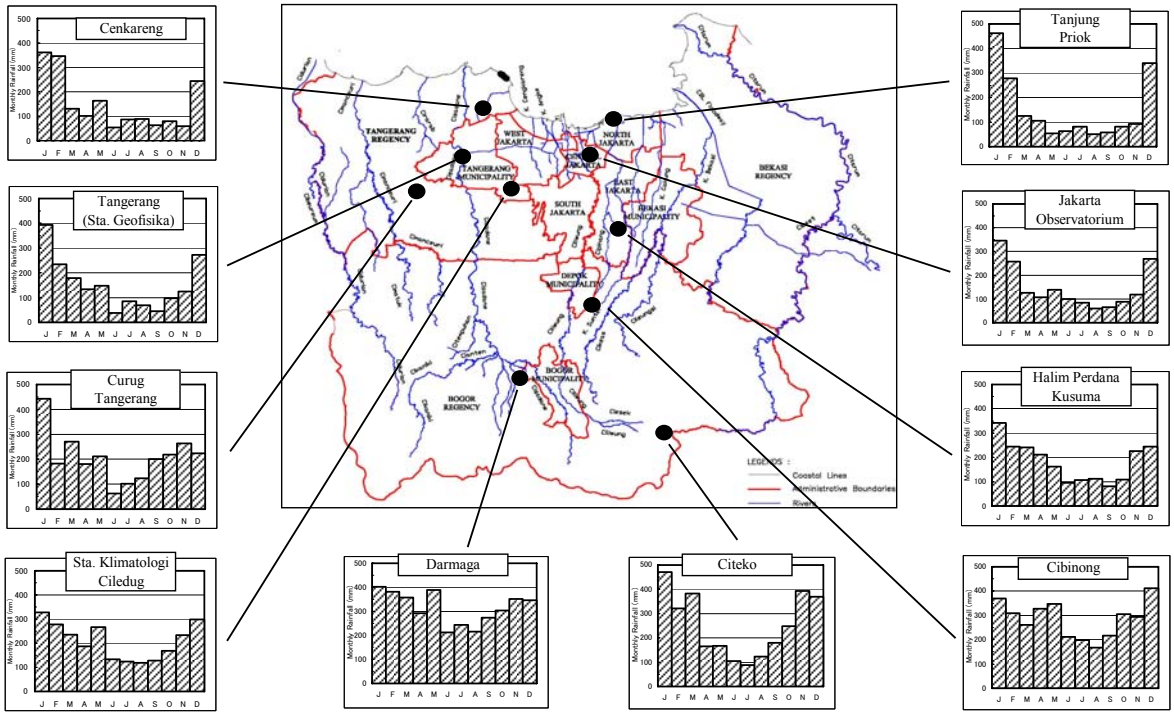

Figure 2.5 Monthly Rainfall Distribution in JABOTABEK

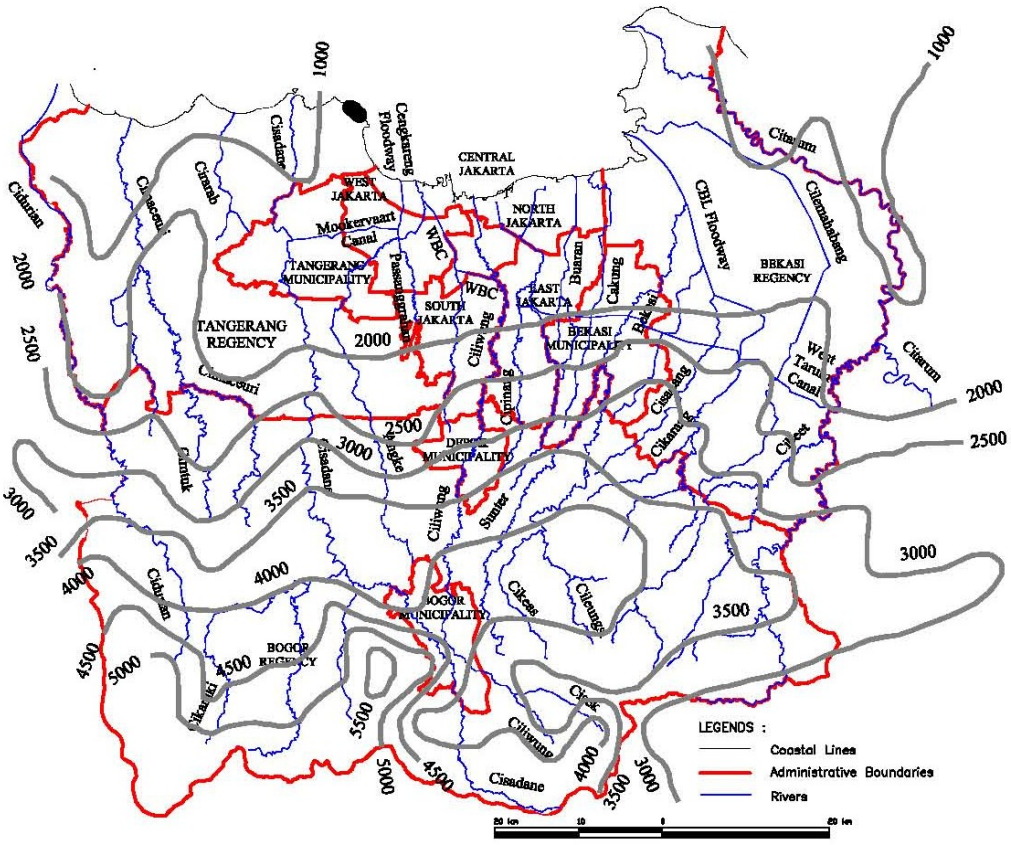

Figure 2.6 Annual Rainfall Distribution in JABOTABEK

2.2.3 River Systems

Rivers in JABOTABEK can be generally divided into eight (8) independent river basins from west to east as listed below and shown in Figures 2.3. All these rivers originate in mountains/hills of the southern parts of Jakarta and pour into the Java Sea. In Jakarta, several artificial floodways have been constructed since 1910's and at present the Eastern Banjir Canal (EBC) is under construction. Therefore, river systems are classified into eight (8) and described hereunder including these artificial floodways.

(1) Cidurian River Basin

(2) Cimanceuri River Basin

(3) Cirarab River Basin

(4) Cisadane River Basin

(5) Cengkareng Floodway Basin

(6) Western Banjir Canal (WBC) – Ciliwung River Basin

(7) Eastern Banjir Canal (EBC) Basin

(8) Cikarang-Bekasi- Laut (CBL) Floodway Basin

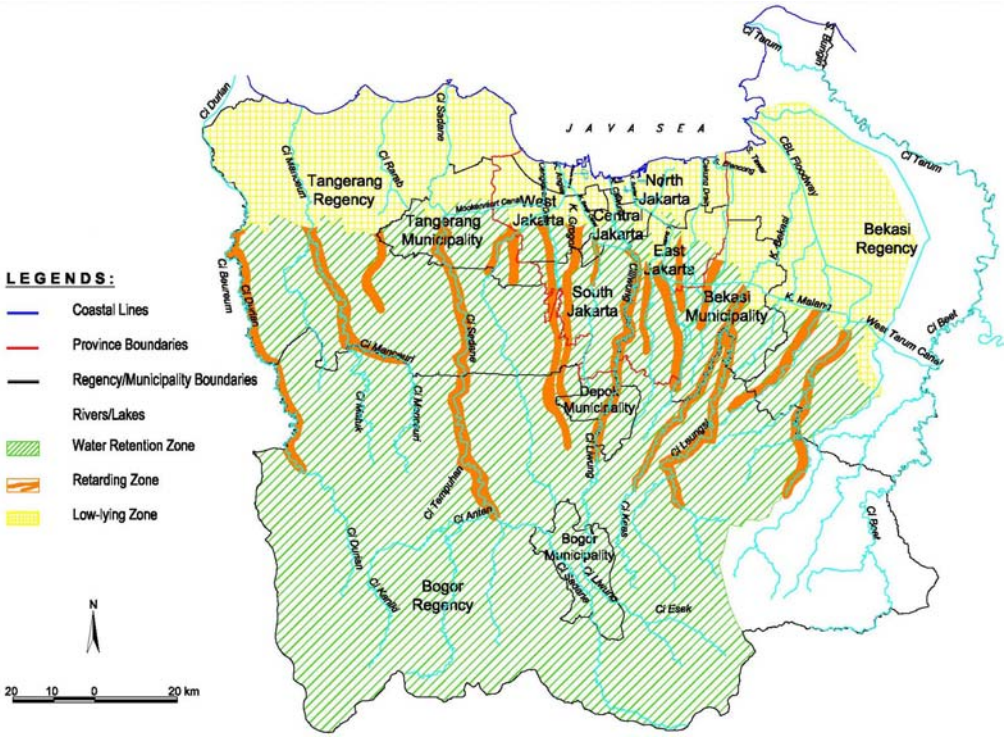

Figure 2.7 Classification by Hydrologic Function of JABOTABEK

Characteristics of each basin and river features are explained below. Catchment area and channel length of each river are tabulated in Table 2.4.

Table 2.4 Catchment Area and Length of Rivers

No.	River System	Sub-River System	Catchment Area (km^2)	Channel Length (km)
1	Cidurian	-	803	130
2	Cimanceuri	-	570	102
3	Cirarab	-	161	49
4	Cisadane	-	1,411	138
5	Cengkareng Floodway	5-1 Floodway	459	7.9
		5-2 Mookervaart Canal	67	13
		5-3 Upper Angke River	255	82
		5-4 Pesanggrahan	107	66
		5-5 Grogol River	30	21
6	WBC-Ciliwung River	6-1 WBC (at Krukut R. Confluence)	421	17
		6-2 Ciliwung River (at Manggarai)	337	109
		6-3 Krukut River	84	34
7	EBC System		207	
8	CBL Floodway	8-1 Floodway	915	29
		8-2 Bekasi River	403	116
		8-3 Cisadang River	135	37
		8-4 Cikarang River	230	66
		8-5 Cilemahabang River	220	63

(1) Cidurian River System

The Cidurian River originates in Mt. Kendeng (1,764 m). The Cidurian River is an administrative boundary of Tangerang Regency in middle and lower reaches, while in the upper reaches the Cidurian River flows in the Bogor Regency. Present land use is mostly for agriculture.

Upstream and middle reaches flow in narrow valley plain. Dikes have been constructed in downstream reaches but overflow occurs often due to lack of flow capacity and affect the agricultural land.

(2) Cimanceuri River System

The Cimanceuri River originates in a low mountain with an elevation of approx. 600 m. The upper reaches flows in the Bogor Regency and then enters to the Tangerang Regency. The upper basin is widely and rapidly developed like Tigaraksa New Town. Middle basins are also widely being developed. Dikes have been constructed in downstream reaches but overflow tends to occur.

(3) Cirarab River System

The Cirarab River originates in a hilly area with an elevation of 60 m.

(4) Cisadane River System

The Cisadane River has the largest river basin in the Study Area. It originates on the northern slope crowned by Mt, Kendeng (1,764 m), Mt. Perbakti (1,699 m), and Mt. Salak (2,211 m). Upper basins of most tributaries extend in the Bogor Regency, while the main Cisadane River flows in the Bogor Municipality, in which the Cisadane and the Ciliwung rivers run closely by 900 m in straight distance. After the Bogor Regency, the Cisadane River enters in the Tangerang Regency, and then in the Tangerang Municipality, which is rapidly urbanized town as a satellite city of Jakarta, and again runs in the Tangerang Regency.

Present land use is mainly of agricultural land except the Bogor Municipality and the Tangerang Municipality.

(5) Cengkareng Floodway System

The Cengkareng floodway system consists of the floodway, the Mookervaart Canal, the Angke River, the Pesanggrahan River and the Grogol River. This system flows mainly in the densely populated areas.

(a) Cengkareng Floodway

Cengkareng Floodway was completed in 1983 to accept flood water of the Mookervaart Canal, the Pesanggrahan River and the Grogol River. The length of the floodway is about 7.9 km.

(b) Mookervaart Canal

In 1920, the Mookervaart Canal was constructed for navigation and irrigation, starting at the Sewan Gate at the confluence with the Cisadane River in Tangerang Municipality.

(c) Upper Angke River

The Upper Angke River originates in the hilly area north of the Bogor Municipality with an elevation of approximately 225m. The original Angke River was divided into the Upper Angke and the Lower Angke by the Floodway. The Upper Angke is controlled by the DGWR, while the Lower Angke is classified as the drainage channel under DKI Jakarta.

(d) Pesanggrahan River

The Pesanggrahan River originates in the hilly area north of the Bogor Municipality with an elevation of approximately 175m.

(e) Upper Grogol River

The Grogol River originates in the hilly area, the suburbs of DKI Jakarta, with an elevation of approximately 100 m. In 1973, the Grogol-Pesanggrahan Interceptor was constructed to divert flood water of the Grogol River to the Pesanggrahan River. The river reaches downstream of the interceptor is called as the Lower Grogol River, which is drainage channel under DKI Jakarta.

(6) Western Banjir Canal (WBC) - Ciliwung River System

The Ciliwung River, which is a main river of this system, originates on the northern side slope of Mt. Pangrango (3,019 m) of the Bogor Regency and flows in the Bogor Municipality, again in the Bogor Regency and the Depok Municipality. Then, the Ciliwung River runs along boundary between the South Jakarta and the East Jakarta. At the Manggarai, it is diverted into the WBC, which flows in the Central Jakarta, the West Jakarta and the North Jakarta. Most of the basin of the Ciliwung River is densely populated.

(a) Western Banjir Canal (WBC)

In 1918, present WBC was constructed, starting at Manggarai of the Ciliwung River and connecting the lower reaches of the Angke River, for navigation purpose.

(b) Ciliwung River

Flood is diverted to the WBC at the Manggarai Weir, excepting discharge of up to 75 m^3/s to the old Ciliwung River, which is a main drain of the central Jakarta.

(c) Krukut River

The Krukut River originates in the hilly area, the suburbs of DKI Jakarta, with an elevation of about 100 m and joins the WBC at the upstream of the Karet Barrage.

(7) Eastern Banjir Canal (EBC)

The EBC is under construction by local fund based on the 1997 Master Plan. In this master plan, the EBC is planned to intercept flood of the rivers such as the Cipinang, the Sunter, the Buaran, the Jatikramat and the Cakung rivers, which are flowing in the urbanized areas of the East Jakarta and Bekasi Municipality, coming from the southern hilly areas. The Sunter River is an administrative boundary of the East Jakarta and the Bekasi Municipality.

(8) Cikarang-Bekasi-Laut (CBL) Floodway System

The CBL Floodway system is composed of the CBL Floodway and rivers, which join to the floodway, namely the Bekasi, the Cisadang, the Cikarang and the Cilemahabang rivers. The Bekasi Municipality, urbanized as a satellite city of Jakarta, is located in the middle reach of the Bekasi River.

(a) CBL Floodway

The CBL Floodway was constructed under Jatiluhur Irrigation Extension Project to divert flood of the Bekasi, the Cisadang and the Cikarang rivers.

(b) Bekasi River

Tributaries of the Bekasi River, namely the Cikeas and the Cileungsi rivers originate in the mountains with an elevation of about 1,500 m and join in the south of Bekasi Municipality and becomes the Bekasi River.

(c) Cisadang River

The Cisadang River originates in the hilly area with an elevation of about 90 m and flows under the West Tarum Canal through culverts.

(d) Cikarang River

The Cikarang River originates in the hilly area with an elevation of about 300 m and is connected to the CBL Floodway by the gate located at Cikarang.

(e) Cilemahabang River

The Cilemahabang River originates in the low hilly area with an elevation of 50 m. The river course near the river mouth is unclear; the main stream joins to the Java Sea, while a branch is diverted to the Cikarang River.

3. BASIC INFORMATION RELATED TO FLOOD MITIGATION AND FLOODING IN JABODETABEK

3.1 INSTITUTION

3.1.1 Water Laws and Regulations

(1) Law on Water Resources 2004

The President of the Indonesia issued a new water resources law in 2004. In this law, it is stipulated that water resources consist of water, water resources and water potentials, which include damage potentials. Water is specified as all types of water found in, on or under the land surface, including surface water, groundwater, rainwater, and seawater that are found on land.

River basins (river areas) can be classified into; regent/municipal, inter-regent/municipal, inter-provincial, inter-country and nationally strategic. The formulation of water resources management master plan and implementation of water resource management shall be made by the National Government, Provincial Government and Regent/Municipal Government as tabulated below in accordance with the classification of river basins.

(a) National Government

Inter-provincial river areas, inter-country river areas and nationally strategic river areas

(b) Provincial Government

Inter-regent/municipal river areas

(c) Regent/Municipal Government

River areas in the regency/municipality

Water resource management master plan mentioned above shall constitute a fundamental framework in the planning, execution, monitoring and evaluation of water resources conservation, utilization and controlling potential water damage activities.

Based on the Law on Water Resources, eight (8) government and ministerial regulations mentioned below will be necessary to be revised. However, current regulations remain effective by the time when these are revised.

(a) Government Regulation on Water Resource Management

(b) Government Regulation on Right of Exploitation and Right of Use

(c) Government Regulation on Drinking Water

(d) Government Regulation on Groundwater Management

(e) Government Regulation on Irrigation

(f) Government Regulation on Rivers

(g) Government Regulation on Lakes and Dams

(h) Government Regulation on Finance

(2) The Government Regulation on River (No.35/1991)

(a) Definition

River is the places and basins as well as the flow system where water flows starting from the spring to estuary and bordered by so-called the boundary line of river conservation zone along river meandering

(b) River Ownership

River is owned by State and implemented by the Government.

(c) Utilization of River and River Structures

(i) Utilization of river and/or river structures aiming to public welfare and safety shall be conducted by the Government.

(ii) The implementation of river and/or river structures utilization as stated above shall be conducted by a state-owned company.

(iii) Besides the state-owned company as stated in (ii), the utilization of river and/or river structures may conducted by legal institutions, social foundations or an individual person after a permission has been got from authorized official.

(d) Fighting against Flood Danger

For fighting against the danger of flood, the Government shall prepare;

(i) Regulations for fighting to the flood danger,

(ii) Management of flood plain zone including setting the retention area, and

(iii) Guidelines on fighting against flood danger, either the danger before the flood coming, during the flood and after end of the flood.

The Governor makes coordination to fight danger of floods in his/her

territory by involving Government Institutions and people. In a dangerous situation, the Governor has an authority to conduct emergency actions for protection against the danger of floods.

(3) Minister of Public Works' Regulation on River Zone and River Conservation Zone (No. 63/PRT/1993)

In Indonesia, land registration is in charge of Land Agency. But, land registration is not obliged both in rural areas and urban areas including Jakarta and thus definition of boundary of River Zone and/or River Conservation Zone is difficult to be implemented.

In addition, some people not only throw garbage into rivers, but also increase their own land or say, decrease the river zone by using garbage for land filling materials.

After 1997 decentralization, regencies and municipalities have autonomy and thus this regulation was used as a guideline or a reference for the regencies/municipalities.

(a) Definition

(i) River

River is place and basin, where water flows from its spring to their estuary. River is bordered by so-called the boundary line of river conservation zone;

(ii) River Conservation Zone

Boundary line of river conservation zone is an outermost-bordered line for river protection

(b) Aim and Purpose of River Conservation Zone

The decision on the boundary line of river conservation zone aims at:

(i) Protecting the functions of river including lake and reservoir against activities developing in its surroundings,

(ii) Enabling the utilization activities and value-adding efforts of river resources to give optimal results and preserve the river's functions all at once, and

(iii) Limiting the water destructive power on river.

(c) Agencies to Decide River Conservation Zone

The boundary line of river conservation zone shall be determined based on

the regulations as follows.

(i) Rivers under minister's authority: by ministerial regulation based on Director General's proposal

(ii) Rivers under Regional Government's authority: by Regional regulation based on the proposal of the Provincial Public Works Agency or the Provincial Water Resources of Public Works Agency

(iii) Rivers managed by Legal Institutions: by ministerial regulation based on the Legal Institutions' proposal

(d) Boundary Line of River Conservation Zone

Boundary line of river conservation zone for rivers, which are not influenced by tide, is decided as follows.

(i) River with Dike outside Urban Area

The boundary line of river conservation zone of river with dike outside urban area is at least five (5) meters of outer part from the dike edge.

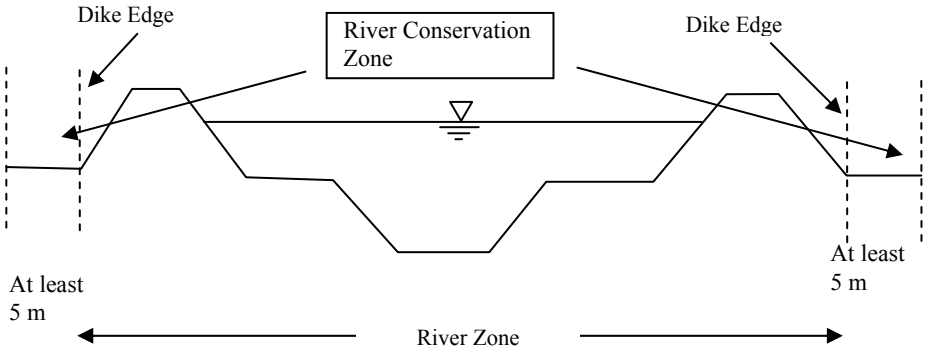

Figure 3.1 River Conservation Zone for River with Dike

(ii) River with Dike inside Urban Area

The boundary line of river conservation zone of river with dike inside urban area is at least three (3) meters of outer part from the dike edge.

(iii) River without Dike outside of Urban Area

The boundary line of river conservation zone of these rivers is determined in accordance with their catchment area of the river cross section.

The boundary line shall be at least 100 m from the wet outer line of river flow at the certain time for the cross section, catchment area of which is equal to or more than 500 km^2, while the boundary line

shall be at least 50 m from the wet outer line of river flow at the certain time for the cross section, catchment area of which is less than 500 km^2.

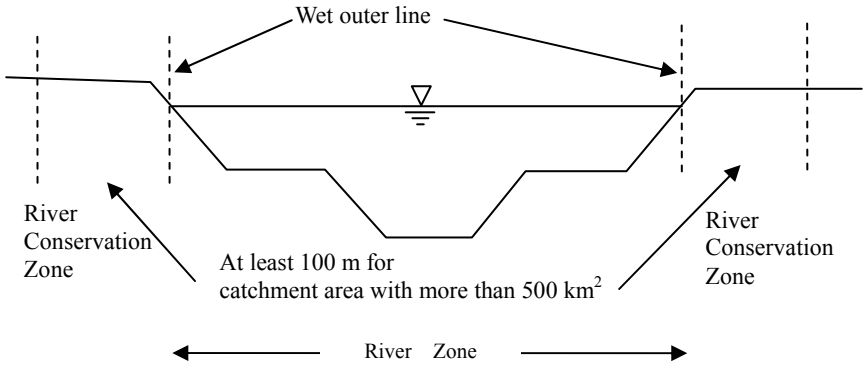

Figure 3.2 River Conservation Zone for River without Dike

(iv) River without Dike inside of Urban Area

The boundary line of river conservation zone of these rivers is determined from the wet outer line of river flow at the certain time in accordance with river depth as tabulated below.

Table 3.1 Distance of Boundary Line from Wet Outer Line

River Depth (H)	$H \leq 3$ m	3 m < $H \leq 20$ m	$H > 20$
Distance	10 m	15 m	30 m

(v) Rivers without Dike along Public Road

When river conservation zone includes public roads, the boundary line of the river conservation zone shall be end of the road shoulder so as to avoid the public road to be located inside the river conservation zone.

Boundary line of river conservation zone for rivers, which are influenced by tide, is decided as follows based on the criteria stipulated in the Presidential Decree No. 32/1990.

(vi) River Influenced by Tide

For rivers influenced by tide, the boundary line of river conservation zone is at least 100 meters from the wet outer line of river flow.

(e) Utilization of River Zones and River Conservation Zones

People can use the bank at the river zone and/or the land at the river conservation zone for the following activities after getting the land use

permission from authorized officials:

(i) Agricultural cultivation with permitted kinds of plant,

(ii) Commercial excavation and heaping activities,

(iii) Installation of billboard, information and announcement board, and working signs,

(iv) Installation of electrical cable, telephone wire and drinking water pipe,

(v) Driving pole or foundation for the infrastructure of road, bridge for public or train,

(vi) Social activities by organization not damaging the river's preservation and protection functionally and physically, and

(vii) Construction of river structures including outlet and intake

At the bank of the river zone and/or at the land of the river conservation zone, it is not allowed to:

(i) throw away garbage, solid waste and/or water, and

(ii) build permanent buildings for residence or commercial activities.

3.1.2 Decentralization and Autonomy

(1) Law of Decentralization No.22/1999

One of the most important laws in relation to decentralization is the Law No. 22 of the year 1999. The law stipulates the definition of decentralization, the procedures, and the organization of Province, Regency and Municipality and its relationship to each other and to the central government. This law also shows the relationship between the local government and the local parliament. There are two (2) important words, which may describe the state or public administration of Indonesia government, i.e. Decentralization and Deconcentration.

(a) Decentralization

Decentralization is more or less a transfer of authority from the central government to the local government. In the case of Indonesia, decentralization is transfer of an authority from the central government to regency and municipal government (local government), consisting of 349 regency and 91 municipalities. These regencies and municipalities are thus called regencies or municipalities with autonomy; it is an administrative area within the Republic of Indonesia, which has a right to manage their community within their administrative area and to make their own decision

to satisfy all the community needs.

(b) Deconcentration

Unlike decentralization, deconcentration is not a transfer of authority but an extension of the central government to make the target reachable due to the fact that the control of the central government is too broad and too widespread, so this is like a spilling over of power or authority from the central government to local government. Provincial government is actually the form of deconcentration in Indonesia.

(2) Reformed Public Administration

Among the Indonesia administrative units, namely, 1) provincials, 2) regencies, and 3) municipalities, regencies and municipalities are autonomy administration, where they can form governmental services according to the local needs, while provincial government is an administrative region only as a hand of the central government to coordinate regencies/municipalities within the provincial region for the central government. There is no hierarchical relationship between regencies/municipalities and provincial government. They are all independent to each other.

The authority of local government with autonomy embraces all of government sectors except foreign affairs, defense and security, justice, religion and finance, and any other authorities, which are considerably still on the central government, such as national planning, monetary balancing, state administration system, human resource empowerment, natural resource exploitation and highly strategic technology, conservation and national standardization.

The provincial government has authority to manage trans-regions affairs and other services of the local regency, which has no resource to manage government services. In addition, the governor as the head of the province has authority to manage other things from the central government in his area as the behalf of the central government.

Government sectors, which have been handed over to local governments, are comprised of 1) public works, 2) health, 3) education and culture, 4) agriculture, 5) transportation, 6) commerce and industry, 7) investment, 8) environment, 9) defense, 10) cooperatives, and 11) manpower.

3.1.3 Organization and Functions of Flood Control and Drainage System

Under the decentralization policy, an agreement has been made concerning the river management. A river, which lies in one (1) regency/municipality is under the responsibility of that regency/municipality, a river, which runs in more than one (1) regency/municipality of the same province, is in the hand of the provincial government, and a river which lies in more than one (1) province is managed by the central government.

Six (6) years have passed since the decentralization was implemented and the local government plays an important role to manage all public works, which formerly were determined and executed by the central government. At present, the central government, mainly produces direction, guidance, and regulation concerning water resource management, general highway, human settlement, spatial planning, research and human resource in public works, while the provincial government carries out services, which are not covered by the regencies/municipalities.

After the decentralization in 1997, flood control and drainage activities are made under the responsibility of the following organizations.

Table 3.2 Responsibility of Organization for Flood Control and Drainage Activities

Work Items	Flood control facilities in Rivers flowing in more than one (1) province				Flood control facilities main drains/rives in DKI &macro drainage facilities			
	Planning & design	Imple mentation	Operation	Mainte-nance	Planning & design	Imple mentation	Operation	Mainte-nance
PU	○			○	○			
CILCIS		○	○			○		
DPU DKI				○	○		○	○

Macro drainage facilities cover most of drainage facilities such as drains, gates and pumping stations, while micro drainage facilities are composed of road ditches and gutters. In DKI Jakarta, out of macro drainage system, secondary/tertiary drains are planned and designed by DPU (Public Works Department) of DKI Jakarta, while these are maintained by SDPU, namely mayor level of DPU.

Hereinafter, organization of Ministry of Public Works (PU) and three (3) (Directorates General (DG), namely DG of Water Resources, DG of Housing Planning and Urban Development, and DG of Spatial Planning are explained, since DG of Housing Planning and Urban Development are related to planning and design of the macro drainage facilities, while DG of Spatial Planning is related land use planning, which is closely connected to watershed management and flood plain management.

(1) Ministry of Public Works (PU)

The Ministry of Public Works (PU) was reorganized in 2004 from the KIMPRASWIL which was created in 1999 with a main function to assist the president in the field of public works. At present, the ministry is expected; 1) to produce the national policy, the direction, and the guidance in infrastructure and also 2) to evaluate whether all the policies are met in the regions. However, the decision on the implementation of public works under the national policy is fully under the local government. Organization chart of the PU is shown in Figure 3.3.

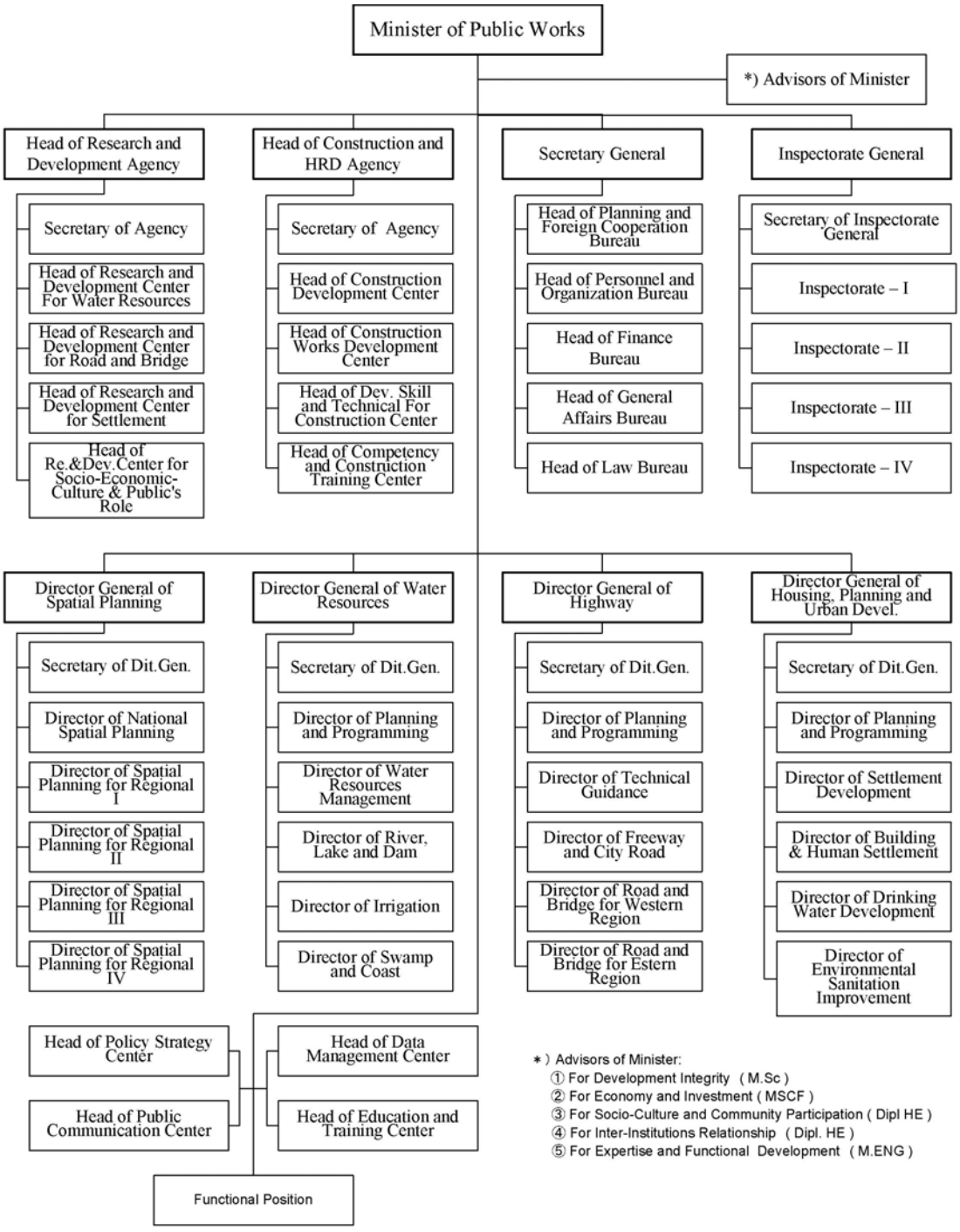

Figure 3.3 Organization Chart of PU

(a) DGWR

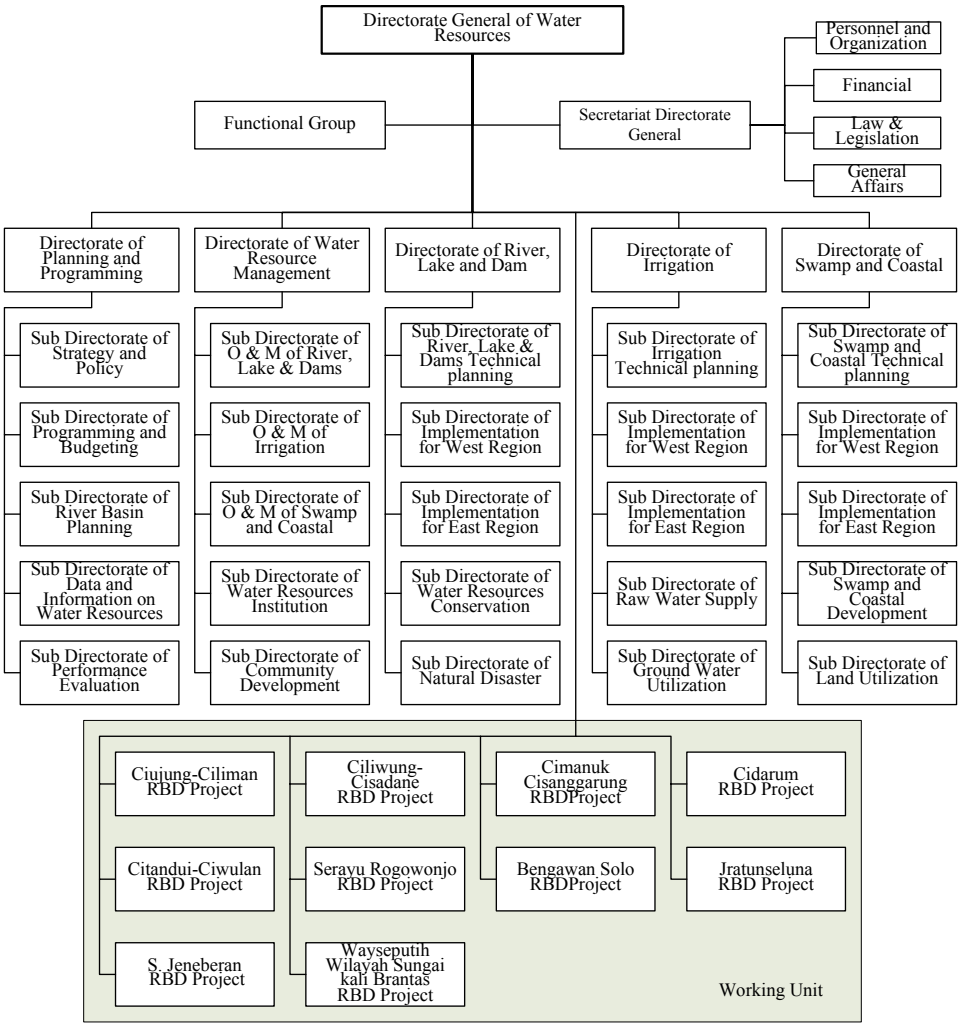

Figure 3.4 Organization Chart of Directorate General of Water Resources

Table 3.3 General Functions of DGWR

Level	Name	Function	Headed
1	Directorate General	The general function is to produce rule, regulation, direction, guidance on water resource management, irrigation, coastal and swamp management, river and lake management	Director General directly under the ministry
2	Directorate	Dit Water Resource Management stresses in the management aspects of water resource. Dit of River Lake and Dams stresses on the matters of rivers, lakes and dams including the management aspects also. Dit. Irrigation is to manage water resource related to agriculture. Swamp and coastal directorate stresses on the coastal management aspects. Dit of Planning and Programming is more or less related to planning aspects within the DGWR	Director under DG
3	Sub Directorate	Technical elaboration of policy which is decided by the Director for the practical application, criteria etc. Producing guidance of implementation within their own scope of works.	Sub-director under Director
4	Section	Implementation or supervisory level to any activities together with other expert staffs within the sub directorate and the Directorate,	Section and under Sub-director

DGWR has sub directorates of implementation for east and west regions in the directorate of river, lake and dam, Directorate of Irrigation, and Directorate of swamp and coastal. Despite of its policy and decision making function in water resource of the country, the DGWR has an implementation unit in the form of project offices such as river basin management for Ciliwung - Cisadane, Citandui - Ciwulan, Solo, etc. After completion of these projects, completed facilities are turned over to the local government. A further management then is the responsibility of local government.

(b) DG of Housing Planning and Urban Development (Cipta Karya)

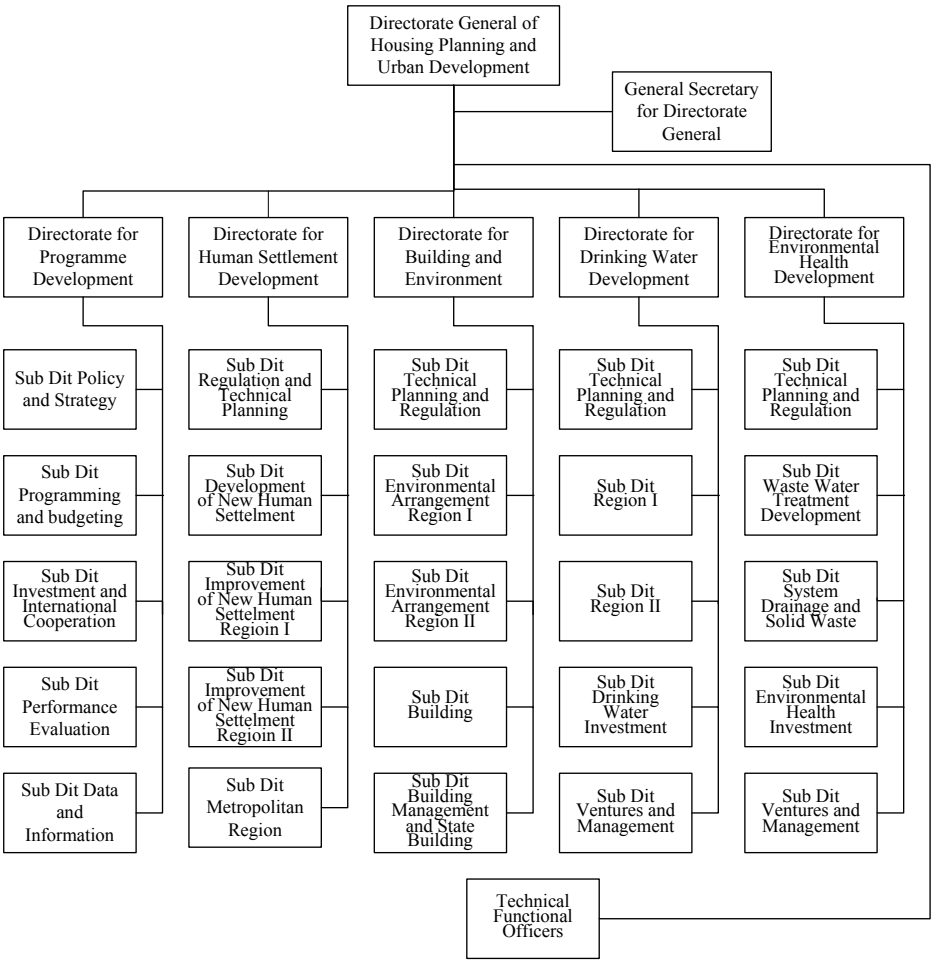

Figure 3.5 Organization Chart of Directorate General of Housing Planning and Urban Development

Table 3.4 General Functions of DG of Housing Planning and Urban Development

Level	Name	Function	Headed
1	Directorate General	Policy making and top decision making for the urban and housing planning under the PU	Director General directly under the ministry
2	Directorate	Elaboration of policy made by DG and its complexity, decision is made on the matters of 1) human settlement development, 2) building and housing and its environment, 3) drinking water, and 4) environmental health development in the human settlement. Furthermore, there is the other directorate in DG that concerns programme development.	A Director is directly under the Director General
3	Sub Directorate	Technical elaboration of policy which is decided by the Director for the practical application, criteria etc. Producing guidance of implementation etc	Chief of Sub Directorate is directly under Director
4	Section	Implementation or supervisory level to any activities under Directorate	Chief of Section and under Ka SubDit

(c) DG Spatial Planning

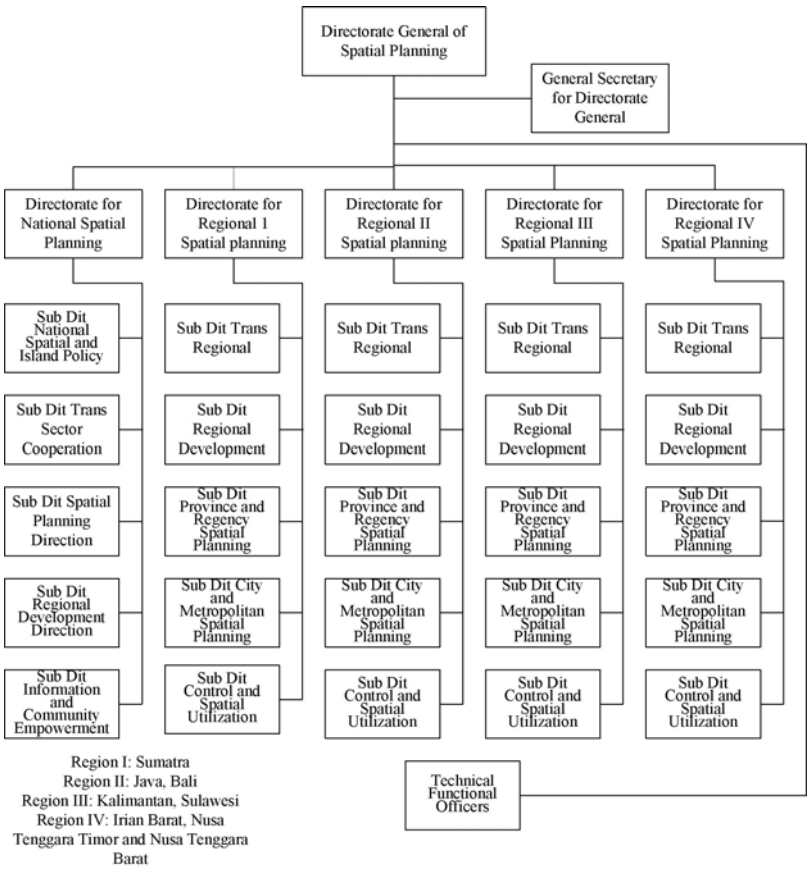

Figure 3.6 Organization Chart of Directorate General of Spatial Planning

Table 3.5 General Functions of DG of Spatial Planning

Level	Name	Function	Headed
1	Directorate General	Policy making and top decision making for National Spatial Planning under the PU	Director General directly under the ministry
2	Directorate	Elaboration of policy made by DG and its complexity, decision is made for the regions like region I, region II, region III and region IV and directions are produced.	Director under DG
3	Sub Directorate	Technical elaboration of policy decided by director for practical application criteria etc. Producing guidance of implementation etc	Ka.Subdit under Director
4	Section	Implementation or supervisory level to any activities under Directorate	Ka.Section and under Ka SubDit

(2) CILCIS

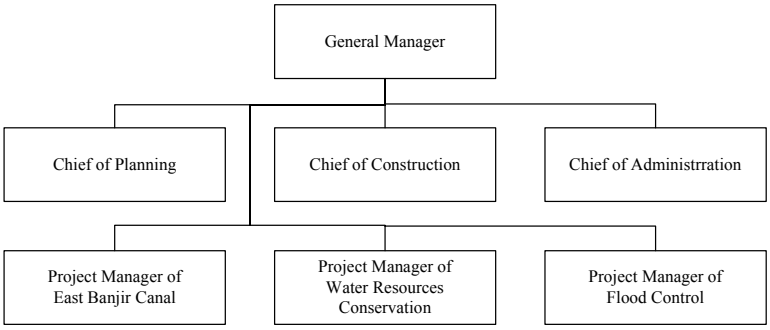

Figure 3.7 Organization Chart of CILCIS

The Ciliwung Cisadane River Basin Development Project (CILCIS) is one of the working units under the Directorate General of Water Resources in the Ministry of Public Works. This working unit is recognized as a project because it has a time limit to achieve the objectives of the organization. The formation of this organization is based on the decision of Directorate General of Water Resources No. 25/KPTS/D/2005.

This project organization mainly consists of three (3) projects i.e.; Project of East Banjir Canal, Project of Flood Control as well as Project of Water Resources Conservation within the river basins of Ciliwung and Cisadane, which covers the Cidurian River Basin in westernmost part and the Cibeet River Basin in easternmost part. The involvement of Directorate General of Water Resources in this project is due to the realities that these two (2) rivers are located in three (3) provinces i.e. Provinces of West Java, Banten, and DKI Jakarta. Therefore, planning phase of the projects is mainly in the Directorate of River, Lake and Dam, Directorate of Water Resource Management and Directorate of Planning and Program in Directorate General of Water Resources.

In observing the organization structure of the CILCIS, it shows that the head of the project (General Project Manager) is supported by three (3) main staffs i.e.

planning, construction, and administration. These three (3) staffs do not have control and responsibility to the project. All the responsibility, the control and the success of these projects are in the head of the projects (the project managers). The staff functions in planning in this project are limited to the planning inside the project itself, while the strategic planning of this project is in the Directorate General of water resources, particularly, the Directorate of Planning and Programme and also Directorate of River, Lakes and Dams.

The Project of Flood Control is mainly conducting the maintenance works and the flood operation for the rivers and their tributaries under jurisdiction of the CILCIS. The Project of Eastern Banjir Canal is constructing the EBC to protect Jakarta against flood particularly region of East Jakarta. This project needs a lot of coordination with the local government DKI Jakarta.

(3) DPU of DKI JAKARTA

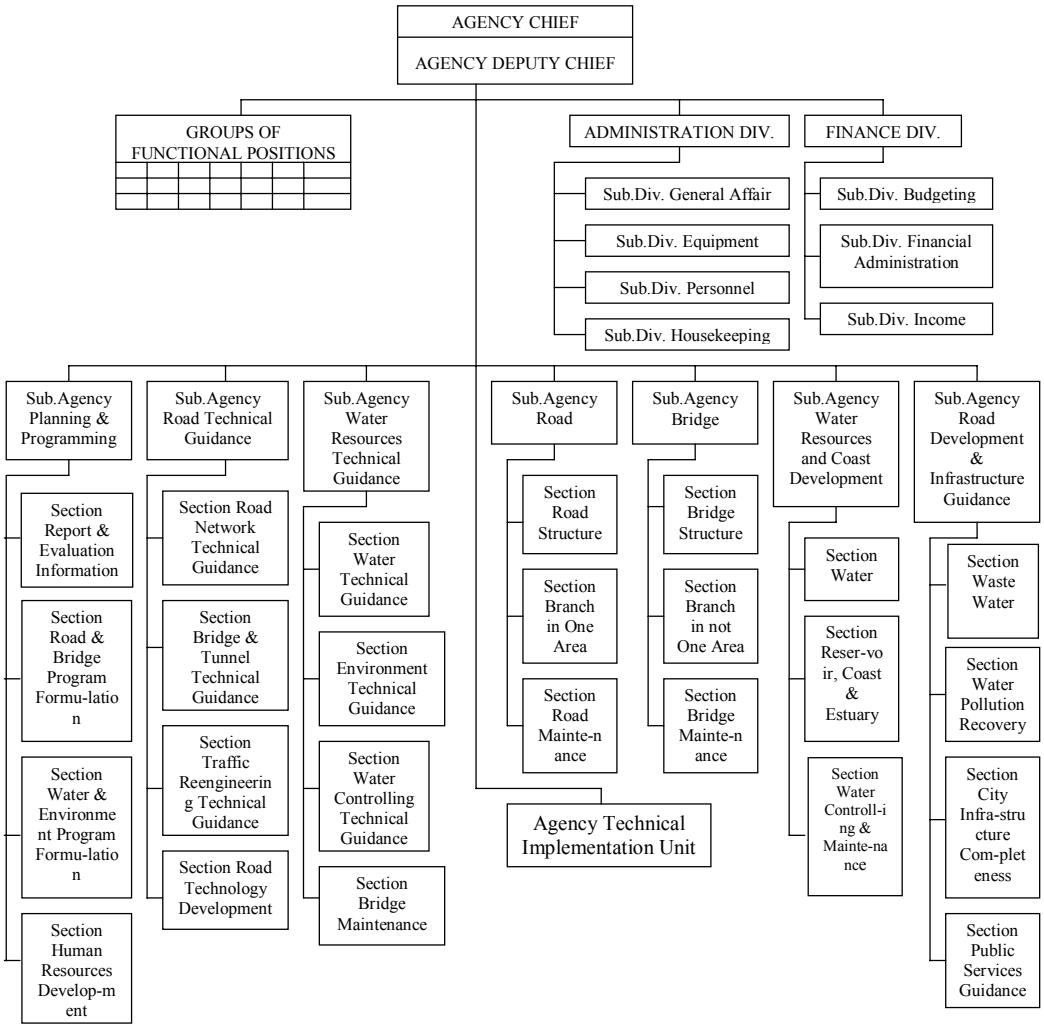

Figure 3.8 Organization Chart of DPU of DKI Jakarta

Figure 3.8 shows organization chart of Public Works Department (DPU) of DKI

Jakarta. Main function of DPU is to develop and to control public infrastructures including water management, road and building.

(4) SDPU

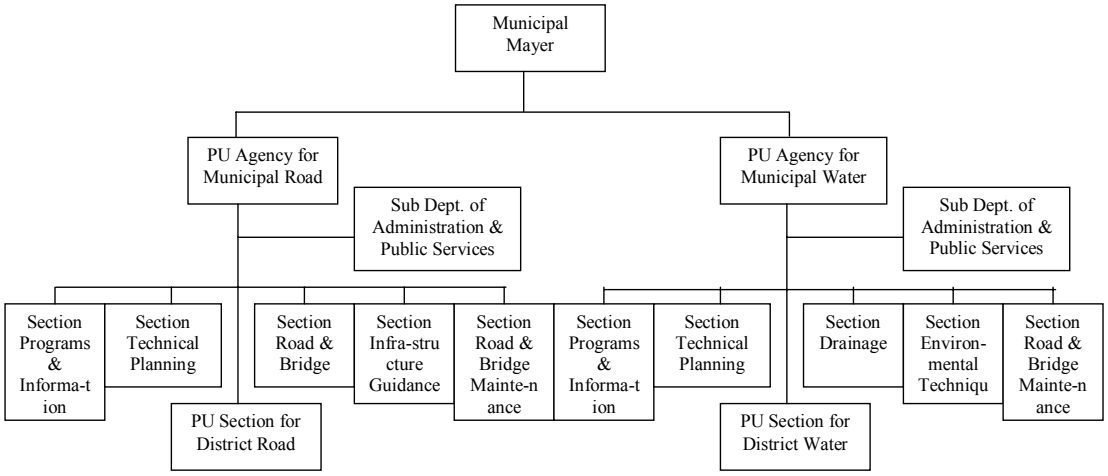

Figure 3.9 Organization Chart of Public Work Agencies under Municipality

At municipality level, the public works are split into two (2) agencies, namely PU Agency for Municipal Water and Agency for Municipal Road.

3.2 MAPPING

3.2.1 National Coordination Survey and Mapping Bureau

National Coordination Survey and Mapping Bureau prepares topographical maps with a scale of 1/25,000, which cover all of the Java Island, Bali and Nusa Tenggara. Furthermore, these maps have been digitized and can be purchased from this agency.

3.2.2 DKI Jakarta

Land and Mapping Services (Dinas Pertanahan dan Pemetaan) of DKI Jakarta has made digital maps (Auto CAD dwg files) of all the area with a scale of 1/10,000 based on aero photos taken in 2003. Furthermore, the Land and Mapping Services prepares digital maps (ArcView shp files) on sub-district basis with a scale of 1/2,500, which separately indicate detailed locations of houses/buildings and the present land use.

3.3 RAINFALL AND WATER LEVEL OBSERVATION

3.3.1 Organization Related to Rainfall Observation

Hydrological observation of rainfall, water level and tidal level in the Study Area is undertaking by the following agencies according to the 1997 Master Plan Report.

(1) Meteorological and Geo-physical Agency (BMG, Badan Meteorologi dan

Geofisika)

(2) Agricultural Offices

(3) Pambangkit Listrick Tenaga Air (PLTA) Site Office

(4) Irrigation Sector, Ministry of Public Works

(5) Pengembangan Data Sumber Air (PDSA) Offices under the Ciliwung – Cisadane River Basin Development Project, Ministry of Public Works

(6) Institute of Hydraulic Engineering (IHE): Pusat Litbang Pengairan, Ministory of Public Works

3.3.2 Rainfall and Water Level Stations for Flood Operation in JABOTABEK

(1) Ciliwung – Cisadane River Basin Development Project Office

The CILCIS installed in the year of 2003 a monitoring system consisting of three (3) rainfall gauging stations, 17 water level gauging stations and two (2) stations monitoring both of water level and rainfall as shown in Figure 3.10 and tabulated in Table 3.6. Figure 3.10 is a screen image of computers in the operation center of the CILCIS. All of the water level gauges and rainfall gauges are telemetered and data are sent to the operation center and stored in the database.

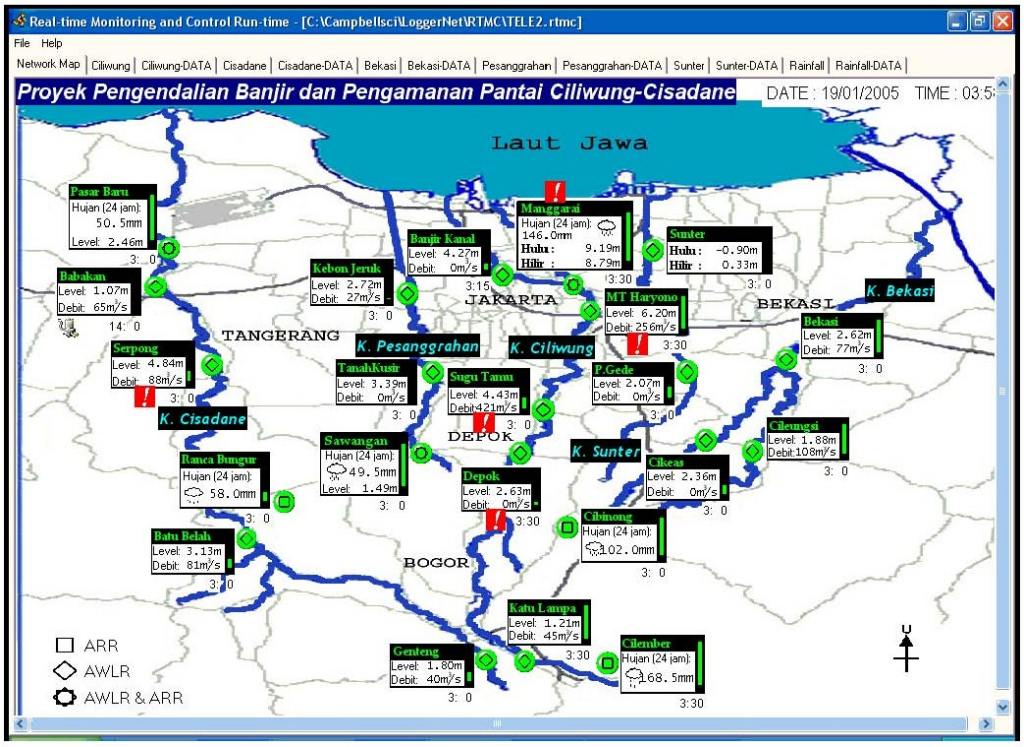

Figure 3.10 Flood Monitoring System of Ciliwung-Cisadane Project Office

Table 3.6 Flood Monitoring System of Ciliwung-Cisadane Project Office

No	Name	River	WL	R	Latitude	Longitude	Commence-ment of Observation
1	Pasar Baru	Cisadane	O	O	6.110278	106.627222	Feb. 13 2003
2	Babakan	Cisadane	O	x	6.186389	106.630833	Feb. 13 2003
3	Serpong	Cisadane	O	x	6.311389	106.658333	Feb. 13 2003
4	Batu Belah	Cisadane	O	x	6.517222	106.689167	Feb. 13 2003
5	Ranca Bungur	Cisadane	x	O			Feb. 13 2003
6	Genteng	Cisadane	O	x	6.653333	106.808611	Feb. 13 2003
7	Kebun Jeruk	Pesanggrahan	O	x	6.197500	106.762778	Feb. 13 2003
8	Tanah Kusir	Pesanggrahan	O	x			Jan.19 2004
9	Sawangan	Pesanggrahan	O	O	6.397222	106.771667	Feb. 13 2003
10	Banjir Kanal	Ciliwung	O	x			Jan. 16 2004
11	Manggarai	Ciliwung	O	O	6.207500	106.848611	Feb. 13 2003
12	MT Haryono	Ciliwung	O	x	6.242778	106.865278	Feb. 13 2003
13	Sugutamu	Ciliwung	O	x	6.374444	106.841389	Feb. 13 2003
14	Depok	Ciliwung	O	x			Jan. 20 2004
15	Katu Lampa	Ciliwung	O	x	6.633056	106.836667	Feb. 13 2003
16	Cilember	Ciliwung	x	O			Feb. 13 2003
17	Sunter	Sunter	O	x			Mar. 28 2004
18	Pondok Gede	Sunter	O	x			Feb. 28 2004
19	Bekasi	Bekasi	O	x	6.286667	106.974722	Feb. 13 2003
20	Cikeas	Bekasi (Cikeas)	O	x			Jan. 20 2004
21	Cileungsi	Bekasi (Cileungsi)	O	x	6.453333	106.924167	Feb. 13 2003
22	Cibinong	Bekasi	x	O			Feb. 13 2003

Note: WL= Water Level, R=Rainfall, O = Observing, x = Not observing

(2) Rainfall Data from BMG

The Meteorological and Geo-physical Agency (BMG) sends daily rainfall data of 13 stations to the governmental agencies through facsimile, when they request the rainfall data of the JABOTABEK. During the 2002 flood, which brought tremendous flood damages to the JABOTABEK, the BMG provided daily rainfall data to the operation center of the CILCIS. Figure 3.11 indicates locations of these rainfall stations, data of which was sent to the CILCIS.

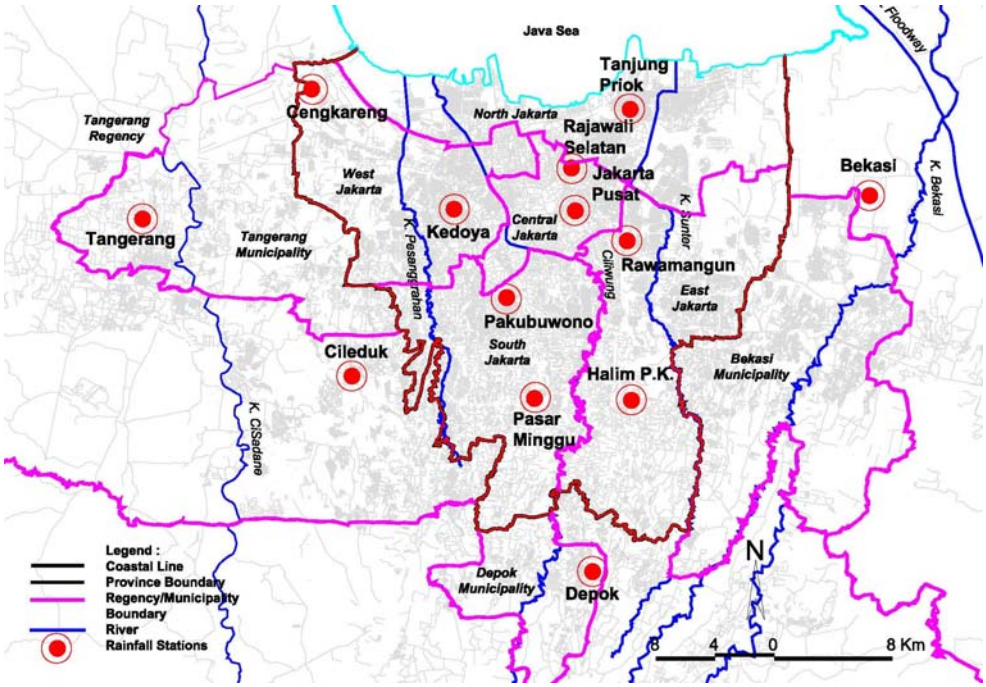

Figure 3.11 Daily Rainfall Data Provided by BMG

3.3.3 Tidal Data

In 1925, tidal measurements were made and the following data were established and published based on the Priok Peil – Low Low Water.

Table 3.7 1925 Tidal Level in Java

Tide	Elevation above P.P. (Low Low Water)
Spring tide (High High Water)	P.P. + 1.15
Average high water (H.W.)	P.P. + 0.90
Mean Sea Level (M.S.L)	P.P. + 0.60
Average low water (L.W.)	P.P. + 0.25
Spring tide (Low Low Water)	P.P. = 0.00

During the 1973 Master Plan Study, new sea level observation was made at two (2) points, in the Tanjung Priok harbor and at Pesar Ikan. However, no conclusive results are obtained due to inaccuracies in the initial measurements and thus tidal level 1925 was used for the 1973 master plan.

The tidal movement at Jakarta of the Java Sea is mainly a single day tide with one high tide and one low tide in 24 hours.