ANNEX 10

ENVIRONMENT

THE STUDY ON COMPREHENSIVE RIVER WATER MANAGEMENT PLAN IN JABOTABEK

Annex 10 :Environment

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1. GENERAL

1.1 Features of the Project

The priority projects selected out of the master plan projects comprise of the improvement of Western Banjir Canal and the Cisadane river, and Ciliwung floodway (hereinafter referred to as "the Project"). The Projects are to control flood in the western part of DKI Jakarta, and the downstream basin of the Cisadane river. The main features of the optimum scale of the Projects are tentatively summarized as follows:

I. Canal improvement works

Main Features	Improvement of Western Banjir Canal	Improvement of the Cisadane river
1) Canal length to be improved(km)	16.9	16.8
2) Improvement method	Provision of river excavation and dyke system	
3) Design discharge		
a) Design scale	100-year probable flood discharge	25-year probable flood discharge
b) Design discharge	360-500m^3/s	1,500m^3/s
4) Earth work volume		
a) Embankment volume (m^3)	110,000	913,000
b) Excavation volume (m^3)	1,367,420	825,000

II. Construction works of Ciliwung floodway

Main Features	Description
1)Length	1,040
2) Diameter(m)	8
3) Width of inlet and outlet(m)	inlet:80, outlet:25
4) Lane	2
5) Design discharge	
a) Design scale	100-year probable flood discharge
b) Design discharge	300m^3/s per 1 lane
6) Earth Work Volume	
a) Embankment volume (m^3)	420,300
b) Excavation volume (m^3)	32,600

The Projects areas are located in the part of JABOTABEK area of the Kabpatens of Tangerang and Bogor , Kotamadyas Tangerang and Bogor, and DKI Jakarta.

1.2 Objectives of Environmental Impact Assessment

The main objectives of the Environmental Impact Assessment (hereinafter referred to as "EIA") of the priority projects are as follows:

a) to identify the activities of the Projects, particularly those which have potential to create important impact on the environment,

b) to identify the present environmental conditions to be directly affected by the Projects,

c) to assess and evaluate the positive and negative environmental impacts and their magnitude, and

d) to present suggestions for formulating the Environmental Management Plan (RKL) and Environmental Monitoring Plan (RPL) in order to mitigate or control the adverse effects induced by the Projects components.

1.3 EIA Laws, Regulations, Guidelines and Environmental Quality Standard Acts

Regulations related to the EIA of the Project are as follows:

a) Government Act of the Republic of Indonesia No.5, 1974, on the Regional Governmental Principles,

b) Government Act of the Republic of Indonesia No.4, 1982 on the Principles of the Management of Living Environment,

c) Government Act of the Republic of Indonesia No.11, 1974 on the Water Resources Development,

d) Government Act of the Republic of Indonesia No.5, 1990 on the Principles of the Conservation of Ecosystem and Natural Resources,

e) Government Act of the Republic of Indonesia No.24, 1992 on the Principles of the Spatial System,

f) Government Act of the Republic of Indonesia No.4, 1992 on the Housing and the Settlement,

g) Government Regulation of the Republic of Indonesia No.22, 1982 on the Principles of Water Management,

h) Government Regulation of the Republic of Indonesia No.23, 1982 on the Irrigation,

i) Government Regulation No.20, 1990 on Water Pollution Management,

j) Government Regulation No.35, 1991 on River,

k) Government Regulation No.51, 1993 Regarding Environmental Impact Analysis,

l) Presidential Decree of the Republic of Indonesia, No.32, 1990 on Conservation

Area Management,

m) Presidential Decree of the Republic of Indonesia, No.55 of 1993 on the Land Established for the Development of Public Interest,

n) Decree of the Minister of State for the Environment of the Republic of Indonesia No:KEP-14/MENLH/3/1994 Concerning the General Guidelines for the Preparation of an Environmental Impact Assessment,

o) Decree of the Head of the Environmental Impact Management Agency of the Republic of Indonesia No:KEP-056/1994 Concerning Guidelines for the Determination of Significant Impacts,

p) Decree of the Minister of State for the Environment of the Republic of Indonesia No:KEP-11/MENLH/3/1994 Concerning the Types of Businesses or Activities Required to Prepare an Environmental Impact Assessment,

q) Regulation of the Ministry of Public Works, No.69/PRT/1995, on Technical Guidelines of Environmental Impact Analysis of Public Works Projects,

r) Regulation of the Ministry of Public Works, No.63/PRT/1933, on the Boundary of River Limit, Benefit Area of River, River and the Authorized Area of River,

s) Regulation of the Ministry of Public Works, No.39/PRT/1989, on River Area,

t) Regulation of the Ministry of Public Works No.45/PRT/1990, on Water Pollution Control,

u) Regulation of the Indonesian Ministry of Public Works No.48/PRT/1990, on Water Management in the River Area,

v) Regulation of the Indonesian Ministry of Public Works No.49/PRT/1990, on Manner and Custom Concerning Using Water Resources,

w) Decree of the Ministry of Public Works No.147/KPTS/1995, on Technical Guidance of the Terms of Reference for Environmental Impact Analysis of Public Works Projects,

x) Decree of the Ministry of Public Works No.58/KPTS/1995, on the Guideline of Environmental Impact Analysis of Public Works,

y) Decree of the Ministry of Public Works No.148/ KPTS/1995, on Technical Guidance of Environmental Management Plan(RKL) and Environmental Monitoring Plan(RPL),

z) Decree of the Ministry of Public Works No.458/ KPTS/1986, on Sand Mining in the River

1.4 Government Examination of EIA

The EIA of the Projects finally requires to be approved by the Minister of Public Works. Figure 1 shows the current procedure for examination of EIA of the Projects.

According to Figure 1, the ANDAL report(the EIA report) should be submitted to the local committee of West Java Provincial Government and DKI Jakarta Government for assessment, evaluation and approval of EIA at provincial level. At the same time, the ANDAL report(the EIA report) should be also submitted to the Technical Team and the Central Committee in the Ministry of Public Works. The Technical Team assists the Central Committee and gives opinion on the content of the ANDAL report(the EIA report) and prepares detailed explanations on EIA for the Central Committee. The Central Committee finally makes assessment and evaluation on the EIA of the Projects.

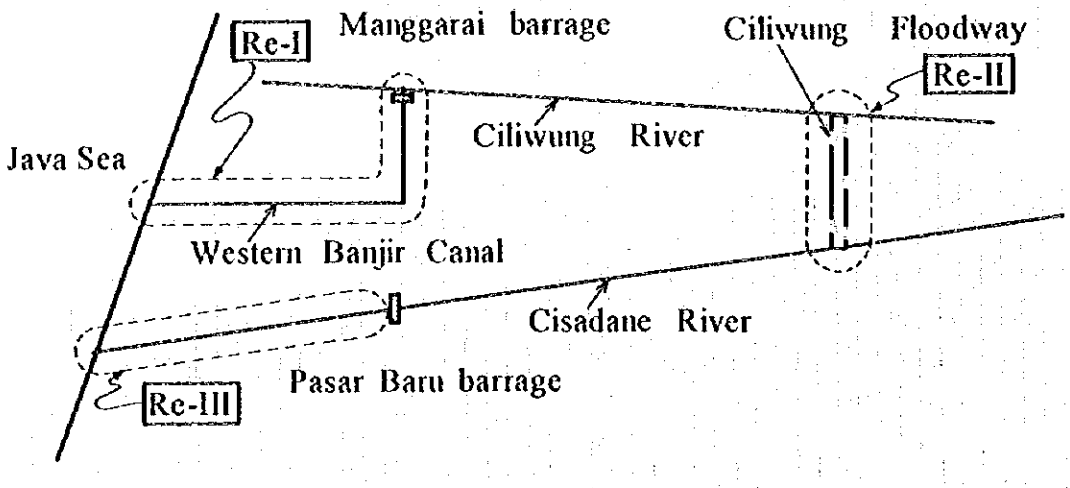
2. ENVIRONMENTAL ITEMS

2.1 Selection of EIA Items and Ecological Regions

According to the Initial Environmental Examination (IEE) in the Master Plan Study, the environmental items for the IEE have been principally selected from common items related river improvement projects.

Besides, taking into consideration the general features of the Project and the possible impacts caused by it, the Study area can be divided into the following three ecological regions in order to determine the locations of impacts.

Region I : Western Banjir Canal (from the Manggarai Barrage to the estuary of that)
Region II : Inret and outlet areas of Ciliwung Floodway and regional upper area of a tunnel of Ciliwung Floodway
ReginalII : Downstream of the Cisadane river (from Pasar Baru Barrage to the estuary of that)



Schematic Location of the Ecological Regions

Among the selected environmental items for the IEE, the following items would be expected to be significant for EIA study through the IEE and general features of the Project.

Environmental Item	Improvement Western Banjir Canal Re-I	Construction of Ciliwung Floodway Re-II	Improvement the Cisadane river Re-III
I. Problems due to Location			
a) Resettlement	C	A	A
b) Encroachment of the precious ecosystem	A	B	A
c) Encroachment on historical Assets	B	B	B
II. Problems associated with the Construction Stage			
a) Air pollution and noise	A	A	B
b) Impairment of the transportation system	A	A	-
c) Deterioration of water quality	A	A	A
d) Using of groundwater	-	A	-
III. Problems related to Project Operations			
a) Deterioration of water quality	-	A	-

note:

1) A; Mostly significant item, B;Significant item, C;Significant but relatively minor item
2) Since no exact data information about historical assets have been available in the IEE study, this item is classified by (B).

In the IEE study, the influence on using of the groundwater due to the construction of Ciliwung Floodway under ground has been considered as a minor problem. However, according to the present study, in the residential areas where Ciliwung Floodway would be constructed, the shallow groundwater is utilized as the main water source for domestic water supply. There are so many shallow wells of which the depth ranges from 1m to 18m. The construction work of the tunnels will influence the use of shallow groundwater due to groundwater gushing out during the construction stage. Therefore, groundwater use is considered to be significant problem.

The following 7 environmental impacts are selected as the items to be studied more detail in the EIA study.

-Impacts on the precious ecosystem
-Impacts on the historical Assets
-Impacts on air pollution and noise
-Impacts on transportation system
-Impacts on water quality in the rivers
-Impacts on using of ground water
-Impacts on the displaced people

2.2 Content of EIA

The EIA study area is shown in Figure 2. and conducted works in the EIA study are as follows:

(1) Study on physical-chemical environment such as climate, noise, air quality, geology, topography, hydrological features of water quality and quantity

(2) Study on biological environment such as flora and fauna, important ecological area and conservation area and aquatic biota.

(3) Study on socio-economical and socio-cultural environment such as population and its density, age distribution, occupation, public health and sanitation, local economic activities, land use, use of natural resources, education, custom, religion, and so on.

(4) Study on infrastructure and public facilities environment such as road, railway, clean water facilities, and so on.

(5) Study on resettlement for i)preparing inventory of families and populations required to be relocated from the areas affected by the Projects, ii)identification of perspectives of the local residents should be subjected to relocation and their desirable relocation areas, iii)recommending living conditions to the resettlement plan in order to continue the original life style of relocated residents, iv) estimating total cost for relocating local residents.

(6) Preparation of the Environmental Monitoring Plan(RPL) and the Environmental Management Plan(RKL)

As for noise, air quality, water quality and quantity, and flora and fauna, the location map of data collection(sampling) is shown in Figure 3 to 5.

3. ENVIRONMENTAL IMPACT ASSESSMENT

3.1 Encroachment of the Precious Ecosystem

The species or types of flora and fauna existing in the affected areas are given in Table 1 and 2, which were identified by the field survey carried out at the 4 sites shown Figure 3 to 5.

According to the results of field survey, in the estuaries of Western Banjir Canal and the Cisadane river, there are small mangrove forests. However, these mangrove forests have been affected by various problems such as coastal erosion, soil erosion, exhaustion of mangrove forest resources and aqua resources. Therefore the density of mangrove has been reduced and types of remaining mangrove are limited, and dominant types are shown below.

English name	Indonesia name	Latin name
Mangrove	Api-api	*Avicenia marina*
Mangrove	Bakau Merah	*Rhizophora mucronata*

On the other hand, around the proposed inlet and outlet sites of Ciliwung Floodway, there are many houses and small commercial facilities. Therefore, the terrestrial vegetation is in very poor conditions.

The species of fauna existing in the affected areas are given in Table 2. Comparing with the protected species specified by the Indonesia government and other international authorities as given in Table 3 to 5, 16 species of birds and 2 species of reptiles to have been protected were identified in and around estuaries of Western Banjir Canal and the Cisadane river (e.g., birds: *Phalacrocorax niger, Anhinga melanogaster, Egretta alba, Ardea cinerea,* etc. reptiles: *Phyton reticulatus, Varanus salvator*). Remaining mangrove forests in estuaries of these rivers can be considered as a comfortable habitats of water birds. However, according to the Preliminary Design of Western Banjir Canal and the Cisadane river, there is no alteration of land due to a provision of dyke and excavation work around these mangrove forests. Thus, no serious impacts on the terrestrial flora/fauna will be caused by the Project.

70 types of fishes and 7 types of shrimps were identified in the estuary of the Western Banjir Canal, however, these fish types and shrimp types are rather common in Indonesia, and no endangered types can be found there. Thus, no serious impacts on the aquatic biota will be caused by the Project.

3.2 Historical Assets

The Batututis village near the outlet site of Ciliwung Floodway is famous for its historical site, because this village has been located in the Keraton, Pajajaran Kingdom zone. Many types of historical assets symbolizing prosperity of the Keraton, Pajajaran Kingdom have been discovered around this area. Therefore it is probable that some cultural and historical assets will be found during the construction period. If some excavated objects are found around outlet site during construction period, the historical value of them should be identified in cooperation with Archaeology Service of Education and Cultural Office in Kodya Bogor, and if necessary, the appropriate management such as a drilling the ground to identify the possibility of buried archaeological objects should be conducted by above-mentioned executive agency.

3.3 Air Pollution

Considering a construction scale of the river improvement and the similar cases in Japan, Annual mean NO2 concentration normally increases within range from 0.005 to 0.01ppm around the construction sites due to the operation of construction machines such as shovels and bulldozers for excavation works. However, exhausted NO2 gas will be soon dispersed, and this concentration values will become almost same to the background level at the point about 100m apart from the pollution source which is expected to be the maximum level ground point. Thus, no serious impacts on the air quality would be caused by the operation of construction machines.

The dust dispersion caused by the construction vehicles is considered unavoidable to the communities along the construction roads because of the drying up of surface soils especially in the dry season. A periodical water sprinkling of the construction roads should be conducted during the construction period.

3.4 Noise

(1) Prediction Point

Since several villages and communities are located along Western Banjir Canal, the Cisadane river and around the inlet and outlet facility sites of Ciliwung river, the construction activities such as the operation of construction machines and vehicles would cause negative impacts to the local people due to noise hazard during the construction period. Therefore, prediction of noise level has been conducted at prediction points which are 20m, 50m and 100m in distance from the noise source (the construction sites).

(2) Noise Levels of the Construction Works

According to the Hand Book concerning Countermeasures for Construction Noise and Vibration of Japan Construction Machine Association (1986), the noise level of construction works for river improvement can be assumed as follows;

Construction works	Noise level dB(A)
Excavation or Embankment work	about 107dB(A)
Shield tunnel work	about 110dB(A)

(3) Prediction of Noise Level

The noise level at the prediction points is assessed by the following logical formula of propagation:

$$L = Lw - 20 \log R - 8$$

where:

L : Noise level at the point of "R" m apart from the noise source (dB(A)),
Lw : Noise power level of the noise source (dB(A)),
R : Distance from the noise source to the prediction point (m).

The prediction result of noise level at the prediction points is summarized below:

	Noise Level dB(A)		
Construction works	20m point	50m point	100m point
Excavation or Embankment work	73.0	65.0	59.0
Shield tunnel work	76.0	68.0	62.0

The predicted noise levels are almost higher than the noise standard in Indonesia (60dB(A) in the residential area). It should be noted that the actual future noise level during the construction could be less than the predicted noise levels, because the existence of houses, and ground undulation in the Project site will reduce the noise level.

Since there is no noise criteria related to construction works in Indonesia, the criteria in Japan is shown below. The prediction point of 20m from noise source could be assumed to be on the boundary of construction site. The predicted noise level would be low compared with this criteria.

- 85dB(A) : at the boundary of construction site

However, some houses are close to the noise source, in particular residential complex the southern portion of which is facing to the inlet facility site of Ciliwung Floodway has been extended on the right bank of the Ciliwung river, it is recommended that the following countermeasures should be taken in order to reduce the noise level.

- Installing the temporary sound proof panels between the noise source and residential area
- Surrounding the main facilities related to shield tunnel works with proof sound panels

3.5 Impairment of theTransportation System

The traffic density investigation has been conducted at 7 points on the main streets in DKI Jakarta and Kodya Bogor. These streets are around and across the Project sites, and some impacts on the traffic density of them would be caused by the construction transportation. The result of the field survey are shown in Figure 6 and summarized as follows:

(unit : vehicles/hour)

Region	Location	Small-sized vehicles	Large-sized vehicles	Total
DKI Jakarta	JL. KS Tubun	1,918	175	2,093
	JL. Kyai Tapa	3,795	621	4,416
	JL. Sultan Agung	2,304	110	2,415
Kodya Bogor	JL. Pajajaran	2,174	249	2,423
	JL. Pahlawan	1,431	79	1,510
	JL. Siliwangi	1,353	47	1,401
	JL. Sukasari I	732	57	788

Note: average traffic density per hour in the investigation term

In DKI Jakarta and Kodya Bogor, traffic jam caused by high traffic density is a common phenomena. According to the field survey, the present traffic density of the main streets along and across the Project sites ranged from 700 to 4,400 vehicles/hour on the average, and in general, the maximum hourly traffic density occurred in the morning and evening, and it is probable that there will be no more capacity for further increasing traffic density. However, these main streets would be used for the transportation of excavated material to the disposal areas, it would cause some impacts on the traffic capacity during the construction stage.

According to the construction plan of the Project, the number of dump truck to be necessary for transportation of excavated material could be estimated at about 8 to 24 trucks/hour as shown in Table 6, which is very little compared with present traffic density. Therefore, it is probable that the allowable load of these streets are enough for increasing traffic caused by construction transportation, and the relatively low magnitude of impacts would be expected. However,

taking into consideration the present traffic conditions, it is recommended that the following efforts should be adopted.

- Pontoons should be used for the alternative transportation of excavated material as much as possible in the Western Banjir Canal.
- Transportation activities should be carried out except for rush-hour in the morning and evening
- The pedestrian road which runs from along the right bank of Western Banjir Canal between Guntur bridge and Karet Barrage should be temporarily used for access road to the construction sites. No directly using the main streets (e.g., JL.Sultan Agung, JL. Halimun, JL. Galunggung and JL. Karet Pasar Baru Timur) along the Western Banjir Canal, would mitigate some impacts on the traffic capacity of them.

5 road bridges and 2 railway bridges, which are across the Western Banjir Canal, are built on the trunk line streets in DKI Jakarta. It is probable that the allowable load of some bridges are not enough for increasing traffic. As for rebuilding these bridges, it is recommended that the temporary bridges should be built along the present bridges, and/or the comprehensive traffic control should be conducted in order to reduce magnitude of impacts on the traffic current.

3.6 Water Quality Change

The river water quality investigation has been conducted at 10 points in the Western Banjir Canal, Ciliwung river and Cisadane river. The sampling points are shown in Figure 3 to 5, and the result of laboratory test for samples are shown in Table 7 and summarized as follows:

(unit:mg/l)

Locations	BOD	COD	DO	NH4-N	Water quality classes
Western Banjir Canal					
Muara Kapuk	23.9	53.0	0.8	0.320	D(JKT)
Tambora	23.1	39.7	0.5	0.369	B(JKT)
Tanah Abang	20.3	25.1	1.5	0.336	B(JKT)
Manggarai	23.5	29.5	1.5	0.241	B(JKT)
Lower reaches of Cisadane River					
Tanjung Burung	23.1	124.9	6.0	0.138	B(WJP)
Kampung Kelor	1.4	7.4	6.0	0.221	B(WJP)
Pasar Baru	18.9	23.6	5.0	0.162	B(WJP)
Middle reaches of Cisadane River (Ciliwung Floodway)					
Parung jambu	21.2	25.1	14.7	0.676	C,D(WJP)
Middle reaches of Ciliwung River (Ciliwung Floodway)					
Pulau Armin	2.1	8.9	17.4	0.705	C,D(WJP)

Note: JKT; Water quality standard in Jakarta city , WJP; Water quality standard in West Java Province

Water quality standards issued by DKI Jakarta and West Java province are shown in Table 8 to 9. The water quality classes have been determined by the Government regulation, number

20/1990 on water pollution control as follows:

Class A : Water that can be used directly as drinking water without any treatment
Class B : Water that can be used as raw water for drinking water
Class C : Water that can be used for fisheries and livestock, and
Class D : Water that can be used for agricultural, commercial, and industrial uses and hydropower generation.

BOD and COD which are key indicators for evaluating the water pollution situation by domestic and industrial waste water, and these indicators obviously show high values. The Western Banjir Canal is running through Jakarta city with high pollution density, and therefore, it is judged that the present water quality of the Western Banjir Canal is affected mainly by chemical pollutants caused by domestic and commercial waste water. On the other hand, the water quality of the Cisadane river is judged to be polluted less than the Western Banjir Canal except for the estuary sampling point. As for one of the Ciliwung river, BOD and COD indicators show low values in comparison with the Western Banjir Canal and Cisadane river.

Besides, several harmful heavy metals for human health such as Lead, Cyanide, Cadmium and Hexavalent Chromium exceeds the standard of raw water for drinking water in the all sampling points.

(1) Water quality change on the construction stage

River dredging and excavation works worsen river water quality caused by increasing suspended solids (SS) during the construction period. In the rainy season, its impact on river water quality is not considered due to high SS, but it could cause some impacts on the river water quality in the dry season.

In the residential areas along Western Banjir Canal, the main water source is the municipal water and groundwater of shallow and deep wells, and the utilization of river water by inhabitants is almost limited to agricultural use such as a cultivation of vegetable in the low water channel. Therefore water quality deterioration due to high SS is considered to be no significant problems for the utilization of river water. However, the intake gates are existing of the PAMJAYA filtration plant on the left bank of the Western Banjir Canal, and some impacts on the filtration capacity of this plant are expected due to high SS, thus SS is necessary to be monitored by periodical sampling of river water during the construction period.

On the other hand, in the lower reaches of the Cisadane river, surface river water is utilized as water source for bathing and washing, therefore necessary countermeasures should be taken, such as a control of work times, a information to residents about kinds of work and a provision of other domestic water supply.

Several harmful heavy metals for human health such as Lead, Cyanide, Cadmium and Hexavalent Chromium exceeds the standard of raw water for drinking water in both the rivers, therefore water quality in the rivers is necessary to be monitored by periodical sampling of river water during the construction period.

The proposed inlet site of Ciliwung Floodway is located on the left bank of the Ciliwung river, the slope of which is very steep. Thus, soil erosion could be caused by construction works such as land cleaning and excavation in the inlet and outlet sites of Ciliwung Floodway, and it could cause some impacts on river water quality due to high SS. Therefore necessary countermeasures such as preparation of sedimentation ponds and temporary facing the steep slope should be taken in order to reduce the magnitude of impacts.

(2) Water quality change due to the project operations

According to the water quality analysis, COD and BOD concentrations of the Cisadane river are higher than ones of the Ciliwung river in the middle reaches of the both rivers, thus it is judged that water quality in the Cisadane river is characterized by chemical pollutants caused by domestic and commercial waste water more than the Ciliwung river.

According to the discharge table at Ciliwung Floodway inlet which is shown in Figure. 4-14 (described in Chapter 4 of the Main Report), the peak discharge less than about 80m3/s in the Ciliwung river could flow to the downstream without flowing into the Ciliwung Floodway.

Based on the discharge hydolograph of the flood in February 1996 at Katulampa weir station which is located in upstream of the control weir of Ciliwung Floodway, the peak discharge and daily discharge could be approximately expressed by the following equation.

$$Q_p=(Q_{day}-Q_{base})\cdot(24/T_b)\cdot 2+Q_{base}$$

Where,
- Q_p : peak water discharge (m^3/s)
- Q_{day} : daily discharge (m^3/s)
- Q_{base} : discharge of base flow (m^3/s) (=10m3/s)
- T_b : base time (hr) (=12hours)

According to the daily discharge data from 1980 to 1990 at Katulampa weir, the average of normal discharge at the floodway inlet could be estimated at about 10m3/s, besides the daily discharge against the peak discharge of 80m3/s could be estimated at 27.5m3/s using the above-mentioned equation. A part of river flow would be diverted from the river course to Ciliwung Floodway only when a flooding occurs, such as a daily discharge more than 27.5m3/s, therefore no significant negative impacts on the water quality in the Cisadane river are expected due to the diversion water from the Ciliwung river.

3.7 Using of Groundwater

In the residential areas under which Ciliwung Floodway would be constructed, the shallow groundwater is utilized as the main water source for domestic water supply. There are about 60 wells of which the depth are ranged from 1.0m to 18.0m, and the elevation of the residential areas ranges from EL. 275.0 m to EL. 300.0 m.

According to the geotechnical investigation (described in ANNEX 2 for details), the groundwater flows across the tunnel floodway, because the elevation of tunnel floodway ranges from EL. 257.0 m to EL. 269.0 m, and that of groundwater ranges from EL .258.8 m to EL.

280.4 m. Therefore, the construction work of the tunnel floodway will influence the use of shallow groundwater due to groundwater gushing out during the construction stage. However, adopting a muddy water shield method for construction of tunnel, no groundwater gushing out can be expected. Therefore, no serious impacts on the using groundwater would be caused by the construction of tunnel floodway.

3.8 Resettlement and Compensation

Detailed socio-economic study was conducted to assess the impact of the Project to the people, which is summarized in Section 8.2 of the Main Report and ANNEX 1.

Among the various socio-economic impacts caused by the projects, resettlement was identified as the most direct and critical problem. Therefore, additional socio-economic studies were conducted to evaluate the impact of potential resettlement. Approximately 10 % of the heads of the potentially resettled households were interviewed to obtain a better picture of the present socio-economic condition and their needs in relation to the resettlement.

(1) Magnitude of expected land acquisition

Despite the efforts to minimize the resettlement, a total of 52.4 hectare of the land will be subject to the land acquisition as shown below.

Project	area (ha)
Ciliwung Floodway	4.1
Cisadane River Improvement	45.3
Western Banjir Canal Improvement	3.0

(2) Use and ownership of land directly affected by the Project

Ciliwung Floodway

- Inlet region : There are state-owned land and privately owned land (by tradition/inheritance) in the area. However, the distinction between the state land and privately owned land is not very clear because the people in the area are officially registered, and pay SPPT (taxation system) based tax while they also pay rents to the Bogor Municipality. The area is mainly used for residential area, and there are public facilities, such as praying houses and mosques.

- Outlet region : The irrigation office owns the land along the river (to about 5 meters from the bank). The rest of the land is shared by the state and the traditional land owners. These areas are used for housing, agriculture, and small-scale business.

- Due to the dual-nature of the land ownership in state-owned land, for which the residents pay official land tax, mediators and legal interpreters will be needed to set appropriate valuation criteria for land/building compensation.

Cisadane River improvement

- Most of the land is used presently as agricultural area. The population density is generally low (around 1,000-10,000 people/km^2). There are houses, but they are not as densely built as the other two project sites. Quite intensive sand mining activities are carried out in the region.

Western Banjir Canal improvement

- Most of the land in the planned area is used for housing. Residents legally controlling the land build permanent to semi-permanent houses while illegal residents build shanties along the flood plain line. The flood plain is also used for intensive agricultural activities using the river water. They are given the right to use the land by the subdistrict or river managers who manage the space between the riverbank and road wall boundaries. The illegal residents are aware of the fact that the land belongs to the Ministry of Public Works.

- The major issues in this area are (1) the compensation for the buildings on the public land (Ministry of Public Work), and (2) the compensation for land and building for the people who have paid official tax. Only 15 % of the potential resettlers prefer the compensation in the form of new settlement .

(3) Socio-economic profiles of potential resettlers

The general socio-economic characteristics of the people affected by the land acquisition are summarized as follows:

Project	number of household*1	population*2	average per household income/year	occupation
Ciliwung Flood Tunnel	145	725	medium*3	agriculture, trade, service, others
Cisadane River Improvement	460	2300	Rp 4.0 million/year	transportation (25%), agriculture (18%), fishery, porters, others
Western Banjir Canal	81	405	Rp 5.6 million/year	agriculture (19%), fishery (19%), trade, construction, others

note: *1 : estimated from aerial photographs.
*2 : assuming 5 persons per household
*3 : medium income (Rp 4 to 6 million/year)

The potential resettlers are mainly farmers, fishermen, traders, workers in transportation industry, etc., and they belong to the low to middle income class (average annual household income < Rp 6 million). The area of the Cisadane River Improvement project is rural, and the average income is correspondingly lower. The proportion of the productive generation (age 15 to 55) is relatively low (about 50 to 60%) due to a large proportion of children.

Only the legal occupants are considered as above. However, there are considerable uncertainties in these estimates because the land ownership has not been fully scrutinized yet, and in some areas, e.g., the inlet and outlet regions of the proposed Ciliwung Flood Tunnel, the numbers of the legal and illegal residents were difficult to estimate.

There is essentially no reliable statistics of illegal residents, and the number of the illegal residents who are subject to resettlement can only be "guessed". Nevertheless, efforts were made to roughly estimate the number of illegal residents directly affected by the projects from the knowledge obtained through site visits and interview surveys. The project that will affect the largest number of illegal residents is the Western Banjir Canal project : as much as several hundreds illegal families will be directly affected by this project. On the other hand, the numbers of illegal residents directly affected by the Ciliwung Flood Tunnel project and Cisadane River Improvement project will be limited, probably less than a few hundreds.

(4) Public perception of the Project/Resettlement

Ciliwung Floodway

The residents feel that it would be difficult for the government or the project implementor to satisfy their hope, namely to be resettled in the site surrounding or at least in the regions of Bogor Municipality. This request is associated with their status mostly as land tenant. They believe they are entitled to more compensations than the official land price set by the government. Building compensation also becomes the main issue.

Cisadane River improvement

The residents are worried that they may have to move out of the land in short notice without adequate compensation. They believe they are entitled to more compensations than the official land price set by the government.

Western Banjir Canal improvement

The residents along the riverbank are worried that they may have to move out of the land in a very short notice. They are also concerned that their requests will not be adequately reflected in the actual compensation. They believe that the compensation will be assessed on the basis of the official land price. Therefore, illegal residents, who account for about 90 % of the total residents directly affected by the projects, are pessimistic because they may not be entitled to any compensation. In view of the fact that the Jakarta Banjir Canal project is a well known project, however, there is also a hope that adequate compensation would be provided and sufficient time would be granted for resettlement.

(5) Estimated cost for land acquisition/compensation

In ANNEX 1, the total cost for land acquisition/compensation was evaluated on the basis of the estimated values of the assets. They are summarized below (described in ANNEX 1 for details).

Project	number of household	compensation per household	total compensation
Ciliwung Flood Tunnel	145	Rp 27 million	Rp 3,915 million
Cisadane River Improvement	460	Rp. 7 million	Rp 3,220 million
Western Banjir Canal Improvement	81	Rp. 27 million	Rp 2,187 million

Project	area, hectare	compensation per hectare	total compensation
Ciliwung Flood Tunnel	4.1	Rp 2,200 million	Rp 9,020 million
Cisadane River Improvement	45.3	Rp. 1,000 million	Rp 45,300 million
Western Banjir Canal Improvement	3.01	Rp. 6,000 million	Rp 18,060 million

(6) Public relation/resettlement program

The potential resettlers and other affected parties (e.g., illegal residents) are deeply concerned about their future, and compensation alone will not remove their fear. To facilitate the resettlement process, therefore, a comprehensive public relation/resettlement program needs to be developed in the Detailed Design stage of the project. The development of such program is critical for the success of the projects. The program should focus on assisting the resettlers and other affected parties in their efforts to integrate themselves socially and economically into the new host communities. The program shall be based on, but not limited to, the World Bank Operational Directive 4.30 (1990), and has to be developed in the earliest stage of the project preparation.

4. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMMP)

Normally, prediction of impacts and evaluation of these magnitude are conducted by Environmental Impact Assessment (EIA). When adverse impacts are predicted, mitigation measures or control methods are also studied as definitely as possible in the EIA. Besides, unexpected environmental problems may occur during and after implementation of the projects. In this case, it is very important to monitor and thereby manage the effectiveness and efficiency of the proposed mitigation measures and control methods. Thus, the Environmental Management and Monitoring Plan (EMMP) is required to cope with these matters.

4.1 Environmental Items for EMMP

Considering the period to be continued and magnitude of negative effects of the possible impacts, the 5 items namely 1) Noise, 2) Impairment of the transportation, 3) Water quality, 4)

Groundwater and 4) Resettlement are selected for EMMP of the Project. As for the item of historical assets, when some archaeological objects are found around outlet site of Ciliwung Floodway during construction period, it become very important item, therefore it is considered appropriate to be managed by Archaeology Service of Education and Cultural Office in Kodya Bogor

Item	Evaluation			Recommended EMMP for the Project
	Period	Mag'tude	Nece'ty	
A.Ecosystem	C	C	X	No EMMP is required
B.Historical assets	B	B	O	No EMMP is required, but the buried archaeological objects should be managed by Archaeology Service of Education and Cultural Office in Kodya Bogor
C.Air & noise	C	A	O	EMMP is needed concerning noise
D.Transportation	B	B	O	EMMP is needed
E.Water quality				
1)SS, Heavy metal	B	B	O	EMMP is needed
2)Soil erosion	B	C	X	No EMMP is required, but sedimentation ponds and early facing are necessary in construction site of the inlet and outlet of floodway
3)Floodway	C	C	X	No EMMP is required
F.Ground water	B	B	O	EMMP is needed
G.Resettlement	A	A	O	EMMP is needed

Note ; A: high/long B: medium C: low/short
O: EMMP is needed X: EMMP is not needed

4.2 Institutional Aspect

4.2.1 Structural Organization

A new unit for EMMP, which will mainly deal with environmental issues, should be established in the Ciliwung - Cisadane River Basin Development Project Office provided by DGWRD, and the EMMP unit should carry out actual resettlement and compensation activities as a member of the Task Force.

Basically, the EMMP Unit consists of three sub-units, namely the Environmental Management Sub-unit (MAU), the Environmental Monitoring Sub-unit (MOU) and the Laboratory (LAB). Since the laboratory of Cisadane Water Data Center which has been installed under financial assistance of the World Bank and the French Government under the DGWRD is capable of analyzing water quality, the installation of a new laboratory for EMMP implementation will not be required. The proposed structural organization of EMMP during the construction and operation stages is shown in Figure 7.

4.2.2 Principal Functions

MAU supervises EMMP, maintains inter and inner institutional coordination and makes fundamental decisions concerning the effective implementation of each plan and program. On the other hand, MOU has planning and executing control of various studies and the monitoring plan and program, in accordance with the policy decided by MAU. LAB undertakes physical and chemical analysis and testing of water, and research and development studies for the establishment of appropriate EMMP for the Project. The principal functions of each Sub-unit are described below:

(1) Environmental Management Sub-unit (MAU)

- To manage all environmental aspects related to the Project, and to organize the implementation of EMMP;
- To prepare a concrete short-term and long-term management plan;
- To coordinate inter and inner institutional matters related to EMMP;
- To cope with expected/unexpected environmental issues;
- To conduct and supervise actual management programs;
- To establish environmental standards and criteria as a goal and target of EMMP; and
- To research and develop appropriate technology for management and monitoring methods related to environmental issues.

(2) Environmental Monitoring Sub-unit (MOU)

- To prepare a concrete monitoring plan;
- To conduct and supervise actual monitoring programs;
- To analyze data obtained from the monitoring plan;
- To propose concrete mitigation measure and evaluate effectiveness thereof; and
- To develop effective survey and evaluation methods for specific studies, such as the resettlement and compensation plan.

(3) Laboratory (LAB)

- To analyze water quality ;
- To develop effective analysis methods for specific studies;
- To conduct basic studies for the establishment of environmental standards and criteria; and
- To research and develop appropriate technology for management and monitoring methods related to environmental issues.

4.2.3 Necessary Input

To attain the objectives of EMMP Unit more effectively and successfully, the following input data and information should be previously obtained:

(1) Executing system of projects and programs of EMMP

EMMP must be headquarters related to environmental aspects of the Project, but it does not mean to keep all task forces in it. Considering tight and scarce budgets and sophisticated human resources in Indonesia, a proper entrusting system would be essential for smooth and efficient

execution of actual projects and programs.

(2) Authorization of activities of EMMP

The activities of EMMP unit could include inter-institutional matters such as resettlement and compensation. So, necessary right or power authorized by laws and ordinaries of the nation must be given to EMMP for establishing not only effective execution of the activities but also appropriate collaboration system with the existing concerned agencies.

4.3 Technical Aspect

Based on the results of EIA, noise, construction transportation, water quality on the construction stage and resettlement are selected as the environmental aspects to be managed and monitored.

4.3.1 Noise

(a) Items to be managed

- Protection the residential area from noise hazard due to the operation of construction machines; and
- Setting up noise level criterion and standards as the management goal and target.

(b) Items to be monitored

- Noise level on the construction stage.

(c) Management area and monitoring stations

The management and monitoring area is in the inlet and outlet sites of Ciliwung Floodway. As for the monitoring stations, 3 points shown in Figure 8 shall be monitored periodically.

(d) Monitoring period and frequency

Periodic monitoring of the noise level should be conducted at least once a month during the shield tunnel work.

(e) Projects/programs to be conducted

The following projects/programs are to be conducted under the EMMP for the Project.

-Program for Establishment of Noise level standard for the construction works(EMMP-NO1); and
-Program for Prevention of Noise hazard due to construction works(EMMP-NO2).

4.3.2 Transportation System

(a) Items to be managed

- Protection the impairment of transportation system due to the construction works;
- Setting up the adequate traffic control in the city during the construction stage.

(b) Items to be monitored

- Traffic density (small-sized vehicle and large-sized vehicle) on the main streets;
- Traffic density of the dump truck for the construction transportation.

(c) Management area and monitoring stations

In principle, the management and monitoring area is to be main streets used for construction transportation in DKI Jakarta and Kodya Bogor. As for the traffic density of the dump trucks, that is to be construction site.

(d) Monitoring period and frequency

Periodic monitoring of the traffic density should be conducted once every three month during the construction stage.

(e) Projects/programs to be conducted

The following projects/programs are to be conducted under the EMMP for the Project.

-Program for Integrated traffic control in the city (EMMP-TRA1).

4.3.3 Water Quality

(a) Items to be managed

- Protection of the water to be used for domestic use from quality deterioration;
- Protection of the water to be used for municipal water supply from quality deterioration;
- Setting up water quality criteria and standards as the management goal and target.

(b) Items to be monitored

- Phisico-chemical substances (pH, SS);
- Organo-chemical substances (DO, BOD, COD, NH4-N, NO2-N, NO3-N, T-N, T-P);
- Inorgano-chemical substances (Pb, Cn, Cd, Cr6+); and
- Land use conditions

(c) Management area and monitoring stations

In principle, the management and monitoring area is to be in the downstream reaches of the Cisadane river and in the upstream of the intake gates of PAMJAYA filtration in the Western Banjir Canal.

(d) Monitoring period and frequency

Periodic monitoring should be conducted at least once a month and once every three months for inorgano chemical substances during the construction stage.

(c) Projects/programs to be conducted

The following projects/programs are to be conducted under the EMMP for the Project.

- Program for the Establishment of Quality standard and Water Quality Conservation Plan (EMMP-WQ1) ; and
- Project/Program for Domestic Water Supply t the Local People (EMMP-WQ2).

4.3.4 *Groundwater*

(a) Items to be managed

- Protection of the water to be used for domestic use from the fall in groundwater level; and
- Protection of the land subsidence due to the fall in groundwater level.

(b) Items to be monitored

- Groundwater level; and
- Condition of the groundwater use in the residential areas.

(c) Management area and monitoring stations

In principle, the management and monitoring area is to be in the residential areas where the Ciliwung Floodway would be constructed. As for the monitoring stations, 4 points shown in Figure 9 shall be monitored periodically.

(d) Monitoring period and frequency

Periodic monitoring should be conducted at least twice a month and once every three months for the groundwater use in the dry season during the construction stage.

(e) Projects/programs to be conducted

The following projects/programs are to be conducted under the EMMP for the Project.

- Program for the Groundwater Monitoring System (EMMP-GW1) ; and
- Project/Program for Domestic Water Supply t the Local People (EMMP-GW2).

4.3.5 **Resettlement**

(a) Items to be managed

- Involvement of the displaced people in resettlement programs;
- Timely dissemination of necessary and correct information to the displaced people;
- Full support for attaining the displaced people's current or higher living standards; and

- Coordination of necessary arrangements between inner/inter agencies and the displaced people.

(b) Items to be monitored

- Actual progress of the resettlement and compensation plan;
- Socio-economic conditions of the displaced people; and
- Requirements of the displaced people related to resettlement.

(c) Management area and monitoring stations

The management and monitoring area should include all resettlement sites of the displaced people.

(d) Monitoring period and frequency

- During the preparation period (up to the time of payment of the compensation amount) and transfer period (up to the time of the completion of relocation), frequent discussions with the displaced people should be held by the EMMP Unit.
- During the transitional period (after settling down), periodic evaluation studies should be conducted by the EMMP unit at least once a year based on the criteria prepared by MAU.

(e) Projects/programs to be conducted

The following projects/programs are to be conducted under the EMMP for the Project.

- Program for Evaluation of Living Standards of Resettlers (EMMP-RP1);
- Basic Socio-economic Study of Resettlers including counseling activities for the displaced people (EMMP-RP2).

Table 1. LIST OF THE SPECIES OF FLORA IDENTIFIED IN THE SURVEY AREA

No.	English Name	Indonesian Name	Latin Name	Presence		
				A	B	C
1	Mangrove	Api-api	*Avicennia marina*	X	X	-
2	Mangrove	Bakau Merah	*Rhizophora mucronata*	X	X	-
3	-	Kedongdong	*Polysia fructocosa*	X	X	-
4	Acacia Tree	Laut	*Acacia Auriculiformis*	X	X	X
5	Amboina Wood	Akasia	*Pterocarpus indicus*	X	X	-
6	Flame of Forest	Angsana	*Delonix regia*	X	X	-
7	-	Flamboyan	*Samanea saman*	X	-	-
8	Mahogani	Kihujan	*Swietenia macrophylla*	-	-	X
9	-	Mahoni	*Hibiscus tiliaceus*	X	X	-
10	-	Waru Laut	*Erythrina vanegata*	X	X	-
11	-	Dadap Laut	*Pluchea indica*	X	X	-
12	-	Bluntas	*Eupatorium palescens*	X	X	-
13	Wild Cane	Kinnyuh	*Sacharrum spontaneum*	X	-	-
14	-	Gelagah	*Derris heterophylla*	X	-	-
15	-	kitower	*Mimosa sp.*	X	X	-
16	-	Putri Malu	*Breynia sp.*	X	-	-
17	-	Nenasian	*Acrostichum aureum*	X	-	-
18	Bread Fruit	Warakas	*Artocarpus altilis*	-	-	X
19	Jack Fruit	Sukun	*Artocarpus heterophylus*	-	-	X
20	Cucumber Tree	Nangka	*Averrhoa bilimbi*	-	-	X
21	Bauhinia	Belimbing	*Bauhinia acuminata*	X	-	-
22	Java Almond	Daun kupu-kupu	*Canarium sommune*	-	-	X
23	Ipil-ipil	Kenari	*Leucaena leucocephala*	-	-	X
24	Vegetable Water Lettuce	Petai Cina Eceng	*Limnocharis flava*	-	X	-
25	Mango	Mangga	*Mangifera indicia*	-	-	X
26	-	Daruju	*Acanthus ilifolius*	-	X	-
27	Banana	Pisang	*Mimosa pudica*	-	-	X
28	Coconut	Kelapa	*Cocos nucifere*	-	-	X
29	Kangkong	Kangkung Laut	*Ipomoea pes caprae*	-	X	-

Remarks : A= Angke River Estuary Location
B= Cisadane River Estuary Location
C= Bogor Ciliwung-Cisadane Diversion Location
X= observed on site
- = not existing

Table 2. LIST OF THE SPECIES OF FAUNA IDENTIFIED IN THE SURVEY AREA

No.	English Name	Indonesian Name	Latin Name	Existence			Remarks
				A	B	C	
A	MAMMAL						
1	Squirrel	Tupai	*Tupaia glis*	-	-	X	tdl
2	Bat	Kelelawar	*Pteropus hypomelanus*	-	-	X	tdl
B	BIRDS						
1	Little Cormorant	Pecuk Padi	*Phalacrocorax niger*	X	X	-	dl
2	Oriental Darter	Pecuk Ular	*Anhinga melanogaster*	X	X	-	dl
3	Great Egret	Kuntul Besar	*Egretta alba*	X	X	-	dl
4	Plumed Egret	Kuntul Perak	*Egretta intermedia*	X	X	-	dl
5	Purple Heron	Cangak Merah	*Ardea purpurea*	X	X	-	dl
6	Grey Heron	Cangak Abu	*Ardea cinerea*	X	X	-	dl
7	Black-Crowned Night Heron	Kowak Maling	*Nycticorax nycticorax*	X	X	-	dl
8	Milky Stork	Bluwok	*Mycteria cinerea*	X	+	-	dl
9	Javan Pond Heron	Blekok	*Ardeola speciosa*	-	X	-	dl
10	Stork-billed King-fisher	Raja Udang	*Palargopis capensis*	X	X	-	dl
11	Blue-breasted Quail	Puyuh	*Cotumix chinensis*	X	X	-	tdl
12	Black-headed Ibis	Ibis Kepala Hitam	*Therskiornis melancephalus*	X	X	-	dl
13	Yellow-vented Bulbul	Cerucuk	*Pycnonotus goiavier*	-	X	X	tdl
14	Scaly-breasted Munia	Peking	*Lonchura punctulata*	X	X	X	tdl
15	Pied Fantail	Kipasan	*Rhipidura javanica*	X	X	-	tdl
16	White-Colored King-fisher	Cekakak	*Haleyon chloris*	X	X	-	dl
17	Magpie Robin	Kucica	*Copsychus saularis*	-	X	X	tdl
18	Bar-winged Prinia	Prenjak	*Prinia familiaris*	X	X	X	tdl
19	Black Drongo	Srigunting	*Discurus macrocercus*	X	X	-	dl
20	Spotted Dove	Tekukur	*Streptopelia chinensi*	X	X	X	tdl
21	Black-Naped Oriole	Kepodang	*Oriolus chinensis*	X	X	-	tdl
22	Common Kingfisher	Raja Udang	*Alcedo attis*	X	X	-	dl
23	Olive-Backed Sunbird	Burung Madu	*Nectarinia jugularis*	X	X	X	dl
24	Brahminy Kite	Elang Bondol	*Haliastur indus*	X	X	X	dl
25	Eurasian Tree Sparraw	Burung Gereja	*Passer montanus*	-	-	X	tdl
26	House Swift	Layang-layang	*Apus affinis*	X	X	X	tdl
27	Sooty-headed Bulbul	Kutilang	*Pycnonotus aurigaster*	X	X	X	tdl
C	REPTILE						
1	Python	Ular Sawah	*Phyton reticulatus*	+	+	-	dl
2	Frog	Katak Sawah	*Rana cancrivora*	X	X	-	tdl
3	Frog	Kodok	*Bufo bipurcatus*	X	X	-	tdl
4	Lizard	Biawak	*Varanus salvator*	+	+	-	dl
5	Iguana	Kadal	*Mabouya multifasciata*	X	X	X	tdl

Remarks : A= Angke River Estuary Location
B= Cisadane River Estuary Location
C= Bogor Ciliwung-Cisadane Diversion Location
X= observed on site
- = not existing
+ = reported to exist
dl = protected
tdl = not protected

Bases for the Stipulation of Protected Types
1) SK Mentan Number 421/Kpts/Um/8/1970
2) SK Mentan Number 66/Kpts-II/73
3) SK Mentan Number 247/Kpts/Um/4/1979

Table 3 PROTECTED SPECIES IN INDONESIA (1/3)

English Name	Latin Name	Indonesian Name
a. Mammal		
Spiny Anteater	Zaglossus bruijni	landak Irian/Nokdiak
Wallaby	Dorcopsis muelleri	Kanguru Tanah
Ornate Tree Kangaroo	Dendrolagus goodfellowi	Kanguru Pohon
Unicolored Tree Kangaroo	Dendrolagus dorianus	Kanguru Pohon
Dusky Tree Kangaroo	Dendrolagus ursinus	Kanguru Pohon
Grizzled Tree Kangaroo	Dendrolagus inustus	Kanguru Pohon
Red Legged pademelon	Thylogale stigmatica	Kanguru Tanah
Dusky Pademelon	Thylogale bruijni	Kanguru Tanah
Flying Lemur	Cynocephalus variegatus	Kubung/Tando
Slow Loris	Nycticebus coucang	Malu-malu
Tarsier	Tarsius bancanus	Binatang Hantu/Singapuar
Orang Utan	Pongo pygmaeus	Orang Hutan/Mawas
Kloss Gibbon	Hylobates agilis	Jawa-jawa
Dark handed Gibbon	Hylobates agilis	Ungka
Silvery Gibbon	Hylobates moloch	Owa
Grey Gibbon	Hylobates muelleri	Klampiau
White Handed Gibbon	Hylobates lar	Serudung
Proboscis Monkey	Nasalis larvatus	Kahau
Crested Celebes Macaque	Macaca nigra	Monyet Diha
Booted Macaque	Macaca brunnescens	Monyet Buntung
Moor Macaque	Macaca maura	Monyet Dare
Tonkean Macaque	Macaca tonkeana	Monyet Digo
Mentawai Pigtailed Macaq	Macaca pagensis	Bokkoi/Beruk Mentawai
Mentawai langur	Presbytis potenziani	Joja/Lutung Mentawai
Maroon Leaf Monkey	Presbytis rubicunda	Lutung Merah
Banded Leaf Monkey	Presbytis thomasi	Rungka/Kedih
Javan Leaf Monkey	Presbytis frontata	Lutung Surili
White Fronted leaf Monke	Presbytis frontata	Lutung Dahi Putih
Pigtailed Langur	Simias concolor	Simakobu/Simpai/Mentawai
Scaly Anteater/Pangolin	Manis javanica	Trenggiling
Three-striped Ground Squi	Lariscus insignis	Bajing Tanah/Tupai Tanah
Black Giant Squirrel	Ratufa bicolor	Jelarang
Spotted Giant Flying Squir	Petaurista elegans	Cukbo/Bajing terbang
Red Tailed Flying Squirrel	Lomys horsfieldi	Bajing terbang/Ekor merah
Sumatran Shorthead Rabbit	Nesolagus netscheri	Kelinci Liar Sumatera
Four-striped Ground Squir	Lariscus hosei	Bajing Tanah/Bergaris Empat
Spotted Cuscus	Phalanger maculatus	Kuskus
COmmon Phalanger	Phalanger orientalis	Kuskus
Bear Phalanger	Phalanger ursinus	Kuskus
Celevas Phalanger	Phalanger celebensis	Kuskus
Black Spotted Phalanger	Phalanger atrimaculatus	Kuskus
Gray Phalanger	Phalanger gymnotis	Kuskus
Porcupine	Hystrix brachyura	Landak
Malay Stink Badger	Mydaus javanensis	Sigung/Teledu
Hognose Badger	Arctonyx collaris	Pulusan
Malayan Sun Bear	Helarctos malayanus	Beruang madu
Otter Civet	Cynogale bennetti	Musang Air
Banded Linsang	Prionodon linsang	Musang Congkok
Celebes Palm Civet	Macrogalidia musschenbroekii	Musang Sulawesi
Binturong	Arctictis binturong	
Javan Tiger	Panthera tigris sondaica	Harimau Jawa
Sumatran Tiger	Panthera tigris sumatrae	Harimau Sumatera
Leopard Panther	Panthera pardus	Macan Kumbang/Macan Tutul
Clouded Leopard	Neofelis nebulosa	Harimau Dahan
Leopard Cat	Felis bengalensis	Kucing Hutan/Meong Congkok
Marble Cat	Felis marmorata	Luwuk
Bornean Bay Cat	Felis badia	Kucing Merah
Golden Cat	Felis temmincki	Kucing Emas
Flat headed Cat	Felis planiceps	Kucing Dampak
Fishing Cat	Felis viverrinus	Kucing Bakau
Asiatic Wild Dog	Cuon alpinus	Ajag
Asian Elephant	Elephas maximus	Gajah
Malay Tapir	Tapirus indicus	Tapir/Cipan/Tenuk
Sumatran Rhino	Dicerorhinus sumatrensis	Badak Sumatera
Babyrusa	Babyrousa babyrussa	Babi Rusa
Javan Rhino	Rhinoceros sondaicus	Badak jawa
Deer	Cervus timorensis	Rusa
Sambar	Cervus unicolor	Sambar
Bawean/Kuhl's Deer	Hyelaphus kuhlii	Rusa Bawean
Barking Deer	Muntiacus muntjak	Kijang

English Name	Latin Name	Indonesian Name
Smaller Mouse Deer	Tragulus javanicus	Kancil/Pelanduk
Large Mouse Deer	Tragulus napu	Napu
Banteng	Bos javanicus	Banteng
Lowland Anoa	Bubalus depressicornis	Anoa Dataran Rendah
Highland Anoa	Bubalus quarlesi	Anoa Pegunungan
Sumatran Serow	Capricornis sumatraensis	Kambing Sumatera
Plumbeous Dolphin	Sotalia plumbea	Lumba-lumba Tanah
Indonesian White Dolphin	Sotalia borneensis	Lumba-lumba Borneo
Chinese White Dolphin	Sotalia chinensis	Lumba-lumba Cina
Rough Toothed Dolphin	Steno bredanensis	Lumba-lumba Gigi Kasar
Malaya Dolphin	Stenella malayana	Lumba-lumba Malaya
Common Dolphin	Delphinus delphis	Lumba-lumba Delpis
Red Pellied Dolphin	Delphinus roseiventris	Lumba-lumba Perut Merah
Irrawady Dolphin	Orcaella brevirostris	Lumba-lumba Irawadi
Bottle Nose Dolphin	Tursiops spp.	Lumba-lumba Botol
Mahakam Dolphin	Orcella sp.	Pesut
Bottle Nosed Grampus	Grampus griseus	Lumba-lumba Grampus
Little Killer	Peponocephala electra	Lumba-lumba Pemangsa Kecil
Cuvier's Whale	Ziphius cavirostris	paus paruh Angsa
Black Finless Porpoise	Neophocaena phocaenoides	Lumba-lumba Tak Bersirip Punggung
Blue Whale	Balaenoptera musculus	Paus Biru
Fin/Razorback Whale	Balaenoptera physalus	Paus Bersirip
Humpback Whale	Megaptera novaeangliae	Paus Bongkok
Dugong	Dugong dugon	Duyung
Whale's (all species)	Cetacea	Paus
Celevas Crested Macaque	Cynopithecus niger	Monyet Hitam Sulawesi
b. Bird		
English Name	Latin Name	Indonesian Name
Dwarf Cassowary	Casuarius bennetti	kasuari Kerdil
Double Wattled Cassowar	Casuarius casuarius	Kasuari Gelambir Ganda
Single Wattled Cassowary	Casuarius unappendiculatus	Kasuari Gelambir Tunggal
Australia Pelican	Pelecanus conspicillatus	Undan Kacamata
Eastern White Pelican	Pelecanus onocrotalus	Undan Putih
Spot Billed Pelican	Pelecanus roseus	Undan Paruh Botol
Abbott's Booby	Sula abbotti	Angsa Batu Abotti
Blue Faced Booby	Sula dactylatra	Angsa Batu Muka Biru
Browned Booby	Sula leucogaster	Angsa Batu Coklat
Red Footed Booby	Sula sula	Angsa Batu kaki Merah
Oriental Darter	Anhinga melanogaster	Pecuk Ular
Christmas Island Frigate B	Fregata andrewsi	Burungyang P.Christmas
Greater Egret	Egretta alba	Kuntul Besar
Lesser Egret	Egretta intermedia	Kuntul Sedang
Little Egret	Egretta garzetta	Kuntul Kecil
Chinese Egret	Egretta eulophotes	Kuntul Cina
Pacific Reef Egret	Egretta sacra	Kuntul Karang
Cattle Egret	Bubulcus ibis	Kuntul Kerbau
Rufous Night Heron	Nycticorax caledonicus	Kowak merah
Wooly Necked Stork	Ciconia episcopus	Bangau Hitam
Milky Stork	Ibis cinereus	Bluwok Putih
Lesser Adjutant Stork	Leptoptilos javanicus	Bangau Tongtong
Painted Stork	Ibis leucocephalus	Bluwok Berwarna
Black Headed Ibis	Threskiornismelanocep	Ibis Putih Kepala Hitam
White Shouldered Ibis	Pseudibis davisoni	Ibis Bahu Putih
Glossy Ibis	Plegadis falcinellus	Roko-roko Ibis Hitam
Shikra Goshawk	Accipiter badius	Alap-alap
Moluccan Sparrow Hawks	Accipiter erythrauchen	Alap-alap Berkalung
Moluccan Sparrow Hawks	Accipiter erythrauchen	Alap-alap Maluku
Brown Goshawk	Accipiter fasciatus	Alap-alap Coklat
Celebes Crested Goshawk	Accipiter griseiceps	Alap-alap Sulawesi
White Headed Sparrow Ha	Accipiter leucogrammus	Alap-alap Kepala Putih
Black Mantled Sparrow H	Accipiter melanochlamys	Alap-alap Punggung Hitam
Mayer's Goshawk	Accipiter meyerianus	Alap-alap Meyer
Celebes Little Sparrow Ha	Accipiter nanus	Alap-alap Kecil Sulawesi
White Goshawk	Accipiter novaehollandiae	Alap-alap Putih
Grey Headed Sparrow Ha	Accipiter poliocephalus	Alap-alap Kepala Kelabu
Vinous Breasted Sparrow	Accipiter rhodogaster	Alap-alap Sulawesi
Chinese Goshawk	Accipiter soloensis	Alap-alap Cina
Crested Goshawk	Accipiter trivirgatus	Alap-alap Jambul
Spot-tailed Sparrow Hawk	Accipiter trinotatus	Alap-alap Ekor Bintik

English Name	Latin Name	Indonesian Name
Asiatic Sparrow Hawk	Accipiter virgatus	Alap-alap Burung
Crested Lizard Hawk	Aviceda jerdoni	Alap-alap Kadal Jambul
Cuckoo Falcon Hawk	Aviceda subcristata	Alap-alap Kilak
Grey Faced Buzzard	Butastur indicus	Elang Kelabu
Cinnamon Winged Buzzard	Butastur liventer	Elang Coklat
Waters Marsh Harrier	Circus aeruginosus	Elang Rawa
Spotted Harrier	Circus assimilis	Elang Tutul
Black Winged Kite	Elanus caeruleus	Elang Tikus
Pied Harrier	Circus melanoleucos	Elang Cina
White bellied Sea Eagle	Haliaeetus leucogaster	Elang Laut Perut Putih
Brahminy Kite	Haliastur indus	Elang Bondol/Wulung
English Name	Latin Name	Indonesian Name
Whistling Kite	Haliastur sphenurus	Elang Siul
New Guinea Harpy Eagle	Harpyopsis novaeguineae	Elang Irian
Hawk Eagle	Henicopernis longicauda	Elang
Raffous Bellied Eagle	Hieraaetus kienerii	Elang Kecil
Little Eagle	Hieraaetus morphnoides	Elang Kecil Australi
Grey Headed Fishing Eagl	Ichthyophaga ichthyaetus	Elang Laut Kelabu
Lesser Fishing Eagle	Ichthyophaga nana	Elang Laut Kecil
Black Eagle	Ictinaetus malayensis	Elang Jambul Hitam
Bat Hawk	Machaerhamphus alcinus	Alap-alap Kelelawar
Doria' Goshawk	Megatriorchis doriae	Alap-alap Doria
Black Kite	Milvus migrans	Alap-alap Malam
Parred Honey Buzzard	Pernis celebensis	Alap-alap Belang
Asiatic Honey Buzzard	Pernis ptilorhynchus	Alap-alap Madu
Crested Serpent Eagle	Spilornis cheela	Elang Ular
Celeban Serpent Eagle	Spilornis rufipectus	Bido Sulawesi
Andaman Serpent Eagle	Spilornis elgini	Bido Andaman
Java Hawk Eagle	Spizaetus bartelsi	Elang Jawa
Changeable Hawk Eagle	Spizaetus cirrhatus	Elang Hitam
Hawk Eagle	Spizaetus gurneyi	Elang Gurney
Hawk Eagle	Spizaetus nipalensis	Elang Sulawesi
Black and White Hawk Ea	Spizaetus alboniger	Elang Hitam Putih
Celebes Short-crested Hawk Eagle	Spizaetus lanceolatus	Elang Sulawesi Jambul
Wallace's Hawk Eagle	Spizaetus nanus	Elang Bilalon/Elang Wallac
Wedge Tailed Eagle	Aquila audax	Garuda Australia
Gurney's Eagle	Aquila gurneyi	Garuda Irian
Osprey	Pandion haliaetus	Elang Ikan
Peregrine Falcon	Falco peregrinus	Sikap Elang
Oriental Hobby	Falco severus	Alap-alap Macan
Common Kestrel	Falco tinnunculus	Alap-alap
Little Falcon	Falco longipennis	Alap-alap Kecil
ankeen Kestrel	Falco cenchroides	Alap-alap Irian
Spotted Kestrel	Falco moluccensis	Alap-alap Maluku
Black Legged Falconet	Microhierax fringillarius	Elang Belalang
Bornean Falcon	Microhierax latifrons	Elang Kecil Borneo
Maleo	Macrocephalon maleo	Maleo
Incubator Bird	Megapodius freycinet	Burung Gosong
Waffled Brush/Incubator B	Megapodius arfakianus	Burung Gosong
Brya's Brush/Incubator Bir	Megapodius bruijnii	Burung Gosong
Molluccan Scrub Hen	Eulipoa wallacei	Burung Gosong
Incubator Bird	Megapodius freycinet affin	Gosong
Incubator Bird	Megapodius reinwardt	Gosong
Incubator Bird	Megapodius tenimberensis	Sepong
Black Billed Brush	Talegalla fuscirostris	Iamur
Brown Collared Brush Tur	Talegalla jobiensis	Ungrun
Great Argus Pheasant	Argusianus argus	Kuau
Green Peafowl	Pavo muticus	Merak
Bulwer's Wattled Pheasant	Polyplectron malacense	Merak Kerdil
Sarus Crane	Grus antigone	Jenjang
Celebes Raila	Aramidopsis plateni	Mandar Sulawesi
Javan Wattled Lapwing	Vanellus tricolor	Trulek Jawa
Asia DOwitcher	Limnodromus semipalmatus	Blekek Asia
English Name	Latin Name	Indonesian Name
Burnaken Curlew	Numenius arquata	Gegajahan Besar
Wimbrel	Numenius phaeopus	Gegajahan Sedang
Curlew	Numenius madagascariensis	Gegajahan Paruh Besar
Little Curlew	Numenius minutus	Gegajahan Kecil
Spotted Greenshank	Tringa guttifer	Trinil Asia

Table 4 PROTECTED SPECIES IN INDONEASIA (2/3)

English Name	Latin Name	Indonesian Name
b, Bird		
Black Winged Stilt	Himantopus himantopus	Trulak Lidi
Great Reef Thick Knee	Esacus magnirostris	Wili-wili
Chinese Crested Tern	Sterna zimmermani	Dara Laut Berjambul
Brown Noody	Anous stolidus	Camar Coklat
White Capped Noody	Anous minutus	Camar Kerudu Putih
Black Noody	Anous tenuirostris	Camar Hitam
Whiskered Tern	Chlidonias hybrida	Dara Laut Kumis
Black Tern	Chlidonias niger	Dara Laut Sayap Hitam
White Winged Tern	Chlidonias leucopterus	Dara Laut Sayap Putih
Gull Billed Tern	Gelochelidon nilotica	Dara Laut Paruh Hitam
White Tern	Gygis alba	Camar Putih Mata Cincin
Little Tern	Sterna albifrons	Dara Laut Kecil
Briddled Tern	Sterna anaethetus	Dara Laut Kendal
Lesser Crested Tern	Sterna bengalensis	Dara Laut Jambu Kecil
Greater Crested Tern	Sterna bergii	Dara Laut Jambu Besar
Roseate Tern	Sterna dougallii	Dara Laut Dougalis
Sooty Tern	Sterna uscata	Dara Laut Hitam
Common Tern	Sterna hirundo	Dara Laut Hirunda
Black Naped Tern	Sterna sumatrana	Dara Laut Tengkuk Hitam
Nicobar Pigeon	Caloenas nicobarica	Junai Emas
Grounded Pigeon	Coura scheepmaken	Mambruk Skop Maken
Grounded Pigeon	Goura cristata	Mambruk Biasa
Victoria Crowded Pigeon	Goura victoria	Mambruk Viktoria
Greater Sulphur Crested Cockatoo	Cacatua galerita	Kakatua Putih Besar/ Jambul Kuning
Eclectus Parrot	Lorius roratus	Payap
Celebes Spotted Hanging Parrot	Loriculus exilis	Serindit Sulawesi
Black Naped Lory	Lorius domicellus	Nuri Merah Kepala Hitam
Black Capped Lory	Lorius lory	Nuri Merah Kepala Hitam Dada Biru
Palm Cockatoo	Probosciger aterrimus	Kakatua Raja/Kakatua Hitam
Peacquet's Parrot	Psittrichas fulgidus	Kasturi Raja
Muller's Parrot	Tanygnathus sumatranus	Nuri Sulawesi
Ornate Lorikeet	Trichoglossus ornatus	Kasturi Sulawesi
Biak Scops Owl	Otus manadensis beccarii	Celepuk Biak
Diardi's Trogon	Harpactes diardii	kasumba
Scarlet Rumped Trogon	Harpactes duvaucelii	Kasumba Punggung Ungu
Red Head Trogon	Harpactes erythochephalu	Kasumba kepala Merah
Red Naped Trogon	Harpactes kasumba	kasumba Merah
Orange Breasted Trogon	Harpactes oreskios	Kasumba Dada Oranye
Cinnamon Rumped Trogo	Harpactes orrophaeus	Kasumba Tunggang Cinnamas
Blue Tailed Trogon	Harpactes reinwardtii	Kasumba Ekor Biru
White Head's Trogon	Harpactes white headi	Kasumba kalimantan
River Kingfisher	Alcedo atthis	Raja UdanSungai
Small Blue Kingfisher	Alcedo coerulescens	Raja Udan Biru kecil
Brand Zoned Kingfisher	Alcedo euryzona	Raja Udan Biru
Malaysian Kingfisher	Alcedo meninting	Raja Udan Kerantung
Azure Kingfisher	Ceyx azurea	Raja Udan Biru
Indian Forest Kingfisher	Ceyx erithacus	Raja Udan Kuku Tiga
Celebes Pygmy Kingfishe	Ceyx fallax	Raja Udan Kerdil Sulawesi
Dwarf Kingfisher	Ceyx lepidus	Raja Udan Elok
Little Kingfisher	Ceyx pusillus	Raja Udan Kechil
Malay Forest Kingfisher	Ceyx rufidorsus	Raja Udan Hutan Punggung Merah
Celebes Blue Eared Kingf	Cittura cyanotis	Raja Udan Sulawesi Telinga Biru
Shovel Billed Kingfisher	Clytoceyx rex	Raja Udan Paruh Sendok
Red Bellied Oread Kingfi	Dacelo gaudichaudi	Raja Udan Besar Paruh Mera
Blue Winged Kookabura	Dacelo leachii	Raja Udan Irian Sayap Biru
Aru Giant Kingfisher	Dacelo tyro	Raja Udan Aru Besar
Kingfisher	Halcyon australasia	Raja Udang Timur
Kingfisher	Halcyon funebris	Raja Udang
Kingfisher	Halcyon fulgidus	Raja Udan
Kingfisher	Halcyon princeps	Raja Udan
Kingfisher	Halcyon lazuli	Raja Udan
Kingfisher	Tanysiptera dane	Raja Udan
White Collared Kingfishe	halcyon chloris	Raja Udan Kalung Putih
Chestnut Collared Kingfis	Halcyon concreta	Raja Udan Kalung Coklat

English Name	Latin Name	Indonesian Name
Red Kingfisher	Halcyon coromanda	Raja Udan Merah
Javan Kingfisher	Halcyon cyanoventris	Raja Udan Biru Jawa
Forest Kingfisher	Halcyon macleavi	Raja Udan Hutan
Mountain Yellow Bellied Kingfisher	Halcyon megarhynchus	Raja Udan Punggung Paruh Kuning
Moluccan Kingfisher	Halcyon monacha	Raja Udan
Blue Black Kingfisher	Halcyon nigricyanea	Raja Udan Biru hutan
Black Capped Kingfisher	Halcyon pileata	Raja Udan Kuduk hitam
White Throated Kingfisher	Halcyon smyrnensis	Raja Udan Leher Putih
Sacred Kingfisher	Halcyon sancta	Raja Udan
White Headed Kingfisher	Halcyon saurophaga	Raja Udan Kepala Putih
Lesser Yellow Billed Kingfi	Halcyon torotoro	Raja Udan Paruh Kuning Kec
Banded Kingfisher	Lacedo pulchella	Raja Udan Pita
Hook Billed Kingfisher	Melidora macrorhina	Raja Udan Paruh Bengkok
Stork Billed Kingfisher	Pelargopsis capensis	Raja Udan Paruh Bango
Black Bellied Kingfisher	Pelargopsis melanorhynch	Raja Udan Perut Hitam
Numfor Paradise Kingfisher	Tanysiptera carolinae	Raja Udan Numfor
Kofiau Paradise Kingfisher	Tanysiptera ellioti	Raja Udan Kafiau
Common Paradise Kingfishe	Tanysiptera galatea	Raja Udan Ekor Panjang
Aru Paradise Kingfisher	Tanysiptera hydrocharis	Raja Udan Aru
Pint Breasted Paradise King	Tanysiptera nympha	Raja Udan Kemerah merahan
Biak paradise Kingfisher	Tanysiptera riedelii	Raja Udan Biak
White Tailed Paradise King	Tanysiptera sylvia	Raja Udan Ekor Putih
Brown Backed Paradise Kin	Tanysiptera danae	Raja Udan Punggung Coklat
Hornbill	Rhyticeros cassidix	Rangkok Buton
Hornbill	Rhyticeros coronatus	Kangkareng
Sumba Hornbill	Rhyticeros everetti	Rangkok Sumba
Wrinkled Hornbill	Rhyticeros leucocephalu	Burung Tahun
Blyth's Hornbill	Rhyticeros plicatus	Burung Lipat
Wreated Hornbill	Rhyticeros undulatus	Enggang Musim
White Crowned Hornbill	Berenicornis comatus	Enggang Jambul Putih
Bushy Crested Hornbill	Anorrhinus galeritus	Enggang Konde
Black Hornbill	Anthracoceros malayanus	Enggang Hitam
Great Pied Hornbill	Anthracoceros malabaric	Rangkok Kecil
Rhinoceros Hornbill	Buceros rhinoceros	Rangkok Badak
Great Hornbill	Buceros bicornis	Rangkok Papan
Helmeted Hornbill	Rhinoplax vigil	Enggang Gading
Papuan Hornbill	Rhyticeros plicatus	Rangkok Irian
Celeves Hornbill	Penelopides exarhatus	Rangkok Sulawesi
Brown Throated Barbet	Megalaima corvina	Maruiu
java barbet	Megalaima javensis	Tulum Tumpuk
Blue Crowned barbet	Megalaima armillaris	Cangkarang
Blue Headed Pitta	Pitta baudi	Paok Kepala Biru
Giant Pitta	Pitta brachyura	Paok Sayap Biru
Red Breasted Pitta	Pitta caerulea	Paok Besar Biru
Garnet Pitta	Pitta erythrogaster	Paok Dada Merah
Bandel Pitta	Pitta granatina	Paok Garnet
Greater Pitta	Pitta maxima	Paok Halmahera
Moluccan Blue	Pitta moluccensis	Paok Maluku
Schneider's Pitta	Pitta schneideri	Paok Schneideri
Hooded Pitta	Pitta sordida	Paok Topi
Bar Banded Pitta	Pitta arcuata	Paok Biru
Hoary pitta	Pitta versicolor	Paok
Rueck's Blue Flycatcher	Muscicapa rueckii	Burung Kipas Biru
Pied Fantail	Rhipidura javanica	Burung Kipas
Red Tailed Fantail	Rhipidura phoenicura	Burung Kipas Ekor Merah
White Bellied Fantail	Rhipidura euryura	Burung Kipas Gunung
Pygmy Tit	Psaltria exilis	Gelatik Kecil
Duyvenbode's Sunbird	Aethopyga doyvenbodei	Burung Madu Sagir
Khul's Sunbird	Aethopyga exmalis	Burung Madu
Scarlet Sunbird	Aethopyga mystacalis	Burung Madu Merah
Crimson Sunbird	Aethopyga siparaja	Burung Madu Merah Jingga
Brown Throated Sunbird	Anthreptes malacensis	Burung Madu
Red Checked Sunbird	Anthreptes rhodolaema	Burung Madu/jantingan
Ruby Checked Sunbird	Anthreptes singalensis	Burung Madu Pipi Merah
Grey Breasted Spiderhunter	Arachnothera affinis	Burung Jantung Kelabu
Lesser Yellow Eared Spider	Arachnothera chrysogeny	Burung Jantung Kecil
Thick Billed Spiderhunter	Arachnothera crassirostris	Burung Jantung Paruh Tebal
Greater Yellow Cared Spid	Arachnothera flavigaster	Burung Jantung Besar
Long Billed Spiderhunter	Arachnothera robusta	Burung Jantung Besar
Little Spiderhunter	Arachnothera longirostris	Burung Madu

English Name	Latin Name	Indonesian Name
Purple Naped Sunbird	Nectarinia hypogrammica	Burung Madu Kuduk Ungu
Purple Throated Sunbird	Nectarinia sperata	Burung Madu Tenggrokan Ungu
Copper Throated Sunbird	Nectarinia chalcostetha	Burung Madu Tenggrokan
English Name	Latin Name	Indonesian Name
Yellow Breasted Sunbird	Nectarinia jugularis	Burung Madu Kuning
Black Sunbird	Nectarinia sericea	Burung Madu Hitam
Javan Grey Throated Wh	Lophozosterops javanicus	Burung Kacamata Leher A
Rufous Breasted Honey E	Conopophila albogularis	Burung Madu Dada Coklat
Blue Faced Honey Eater	Entomyzon cater	Burung Madu Mata Biru
White Eye Honey Eater	Glycichaera fallax	Burung Madu Mata Putih
White Eared Honey Eater	Lichmeraalboauricularis	Burung Madu Kuping Putih
Honey Eater	Lichmera flavicans	Burung Madu
Plain Olive Honey Eater	Lichmera argentauris	Burung Madu Hijau
Honey Eater	Lichmera deningeri	Burung Madu
Brown Honey Eater	Lichmera indistincta	Burung Sedap Madu Cokla
Lombok Honey Eater	Lichmera lombokia	Burung Madu Lombok
Honey Eater	Lichmera monticola	Burung Madu
Honey Eater	Lichmera notabilis	Burung Madu
Honey Eater	Lichmera squamata	Burung Madu
Belford's Honey Eater	Melidectes belfordi	Burung Madu Belford
Sooty Honey Eater	Melidectes fuscus	Burung Madu
White Fronted Honey Eat	Melidectes leucostephes	Burung Madu Muka Putih
Mid Mountain Honey Eat	Melidectes achromelas	Burung Madu Gunung
Long Bearded Honey Eat	Melidectes princeps	Burung Madu Kumis
Short Bearded Honey Eat	Melidectes nouhuysi	Burung Madu Kumis
Lrmmenen Bearded Honey	Melidectes torquatus	Burung Madu Dada Coklat
Long Billed Honey Eater	Melidectes megarhynchus	Burung Madu
White Marked Honey Eat	Meliphaga albonotata	Burung Madu Bercak Putih
Mersic Honey Eater	Meliphaga analoga	Burung Madu
Puff Bathed Honey Eater	Meliphaga aruensis	Burung Madu
Yellow Oadep Honey Eat	Meliphaga flavirictus	Burung Madu Kuning
Slender Billed Honey Eat	Keliphaga gracilis	Burung Madu Paruh Langsi
Large Spot Breasted Honey Eater	Meliphaga mimikae	Burung Madu Besar
White Eared Honey Eater	Meliphaga montana	Burung Madu Telinga Puti
Small Spot Breasted Honey Eater	Meliphaga orientalis	Burung Madu Dada Tutul
Singing Honey Eater	Meliphaga virescens	Burung Madu
Common Melipetes	Meliphaga fumigatus	Burung Madu
Arfak Melipetes	Meliphaga gymnops	Burung Madu Arfak
Celebes Honey Eater	Myza celebensis	Burung Madu Sulawesi
Honey Eater	Myza sarasinorum	Burung Madu
Mountain Red Headed Honey Eater	Mysomela adolphinae	Burung Madu Gunung Mer
Honey Eater	Mysomela blasii	Burung Madu
Red Honey Eater	Myzomela cruentata	Burung Madu Merah
Mangrove Red Headed Honey Eater	Mysomela erythrocephala	Burung Madu Rawa
Red Spot Honey Eater	Mysomela eques	Burung Madu
Honey Eater	Mysomela kuehni	Burung Madu
Black Honey Eater	Mysomela nigrita	Burung Madu Hitam
Dusty Honey Eater	Mysomela obscura	Burung Madu
Black and Red Honey Eat	Mysomela rosenbergii	Burung Madu Hitam Mera
Honey Eater	Mysomela sanguinolenta	Burung Madu
Honey Eater	Mysomela vulnerata	Burung Madu
Pigmy Honey Eater	Oedistoma pygmae	Burung Madu Pigmi
Honey Eater	Oedistoma iliolophum	Burung Madu
Orange Checked Honey E	Oreornis chrysogenys	Burung Madu Pipi Merah
Obscure Honey Eater	Oreornis abscurus	Burung Madu
Brass's Friar Bird	Philemon brassi	Burung Madu
Noisy/Friar bird	Philemon buceroides	Burung Madu Hitam
Yellow Throated Friar bir	Philemon citreogularis	Burung Madu Besar/Cikus
Friar Bird	Philemon fuscicapilus	Burung Madu Besar Kerongkongan Kuning
Grigolo Friar Bird	Philemon gilolensis	Burung Madu Besar
Timor Friar Bird	Philemon inornatus	Burung Madu Besar
Meyer's Friar Bird	Philemon meyeri	Burung Madu Besar
Moluccan Friar Bird	Philemon molluccensis	Burung Madu Besar Maluk
New Guinea Friar Bird	Philemon novaeguineae	Burung Madu Besar Irian
Seram Friar Bird	Philemon subcorniculatus	Burung Madu Besar Seram

Table 5 PROTECTED SPECIES IN INDONESIA (3/3)

English Name	Latin Name	Indonesian Name
b. Bird		
Honey Eater	Ptiloprora erythropleura	Burung Madu
Red Backed Honey Eater	Ptiloprora guisei	Burung Madu Punggung Merah
Meek's Streaked Honey Ea	Ptiloprora meekiana	Burung Madu Bergaris
Honey Eater	Ptiloprora perstriata	Burung Madu
Leaden Honey Eater	Ptiloprora plumbea	Burung Madu
Grey Honey Eater	Pycnopygius cinereus	Burung Madu Kelabu
Brown Honey Eater	Pycnopygius ixoides	Burung Madu Coklat
Yellow Billed Honey Eate	Toxorhamphus novaeguineae	Burung Madu Paruh
Slaty Chinned Long	Toxorhamphus poliopterus	Burung Madu Pipi Kelabu
Streak Capped Honey Eate	Trygygus stictocephalus	Burung Madu Kerudung Bersp.
Grey Billed Long Bill	Toxorhamphus iliolophus	Burung Madu Pera
Mountain Straight Billed Honey Eater	Timeliopsis fulvigula	Burung Madu Gunung
Lowland Straight Billed Honey Eater	Timeliopsis griseigula	Burung Madu Paruh Lurus
Modest Honey Eater	Ramsayornis modestus	burung Madu Sederhana
Nias Talking Mynah	Gracula religiosa robusta	Beo Nias
Rothschild's Starling	Leucopsar rothschildi	Jalak Putih Bali
Black Winged Starling	Sturnus melanopterus	Jalak Putih
White Eared Cat Bird	Ailuroedus buccoides	Burung Kucing Telinga Putih
Black Eared Cat Bird	Ailuroedus melanotis	Burung Kucing Telinga Hitam
Gardener Tared Bower Bi	Amblyornis inornatus	Burung Serupahi
Yellow Fronted Golden Bowerd Bird	Amblyornis flavifrons	Burung Namdur Jambes
Crested Gardener Tared Bower Bird	Amblyornis macgregoriae	Burung Namdur Jambul
Archbold's Bower Bird	Archboldia papuensis	Burung Namdur Hitam
Brown Breasted Bower Bi	Chlamydera cerviniventris	Burung Namdur Coklat
Lauterbach's Bower Bird	Chlamydera lauterbachi	Burung Namdur Kuning Merah
Golden Bower Bird	Sericulus aureus	BurungNamdur Emas
Arfak Astrapia Bird of Par	Astrapia nigra	Burung Dewata Ekor Panjang
Splended Astrapia Bird of Paradise	Astrapia splendidissima	Burung Dewata
King Bird of Paradise	Cicinnurus regius	Burung Raja
Magnificent Bird of Paradi	Diphyllodes magnificus	Burung Dewata Raja Kecil
Waigeo Bird of Paradise	Diphyllodes republica	Burung Dewata Waigeo
Black Sickle Billed Bird o Paradise	Drepanornis albertisi	Burung Dewata Paruh Panjang
Black Sickle Billed Bird o Paradise	Epimachus fastosus	Burung Dewata Paruh Sabit Hitam
White Sickle Billed Bird o Paradise	Drepanornis bruijnii	Burung Dewata Paruh Sabit Putih
Brown Sickle Billed Bird Paradise	Epimachus meyeri	Burung Dewata Paruh Sabit Coklat
Wattle Billed Bird of Para	Loboparadisea sericea	Burung Dewata Berpial
Superb Bird of Paradise	Lophorina Superba	Burung Dewata Superba
Loria's Bird of Paradise	Loria loriae	Burung Dewata Loria
Paradise Crows	Lycocorax pyrrhopterus	Burung Gagak Surga
Macgregor's Bird of Parad	Macgregoria pulchra	Burung Dewata Topeng
Jobi Manucode	Manucodia ater	Burung Dewata Jobi
Crinkled Collared Manuco	Manucodia chalybatus	Burung Dewata Hijau
Gloss Wattled Manucode	Manucodia ater	Burung Dewata
Long Tailed Paradigalla	Paradigalla carunculata	Cendrawasih Berpial
Short Tailed Paradigalla	Paradigalla brevicauda	Cendrawasih Berpial Ekor Pendek
Greater Bird of Paradise	Paradisaea apoda	Cendrawasih Kuning Besar
Lesser Bird of Paradise	Paradisaea minor	Cendrawasih Kuning Kecil
Red Bird of Paradise	Paradisaea rubra	Cendrawasih Merah
Count Raggi's Bird of Para	Paradisaea raggiana	Cendrawasih Jingga
Queen Carola's Sawwaret Bi Paradise	Paradisaea coerulea	Burung Dewata Bulu Emas Putih
Afrak Six Wired Bird of p	Parotia sefilata	Burung Dewata Bulu Enam
Enamelled Bird of Parad	Pteridophora alberti	Burung Dewata Pembawa Puy
Trumpet Bird	Phonygammus keraudrenii	Burung Dewata Trumpet
Magnificent Rifle Bird	Ptiloris magnificus	Cendrawasih Memenjat
Twelve Wired Bird of Par	Seleucidis melanoleucus	B.D.Duabelas Kawat

English Name	Latin Name	Indonesian Name
Wallace's Standar Wing	Semioptera wallacei	Burung Plat
Fasus Label Long Tail	Pseudastrapia lobata	Burung Dewata Ekor Panjang
Elliot's Bird of Paradise	Astrapimachus ellioti	Burung Dewata Elliot
Java Nus Babler	Alcippe pyrrhoptera	Brecet Wergan
Spotted Sabag	Crocias albonotatus	Burung Matahari
Red Fronted laughing Thru	Garrulax rufifrons	Burung Kuda
White Breasted Tree Babler	Stachyris grammiceps	Burung Tepus Dada
Pearl Cheek Tree Babler	Stachyris melanothorax	Burung Tepus Pipi Perak
Whitewinged Wood Duck	Cairina scutulata	Itik Liar
Rueck's Blue Flycatcher	Niltava ruecki	Burung Kipas Biru
Milky Stork	Mycteria cinerea	Bangau Putih Susu/Bluwok
Javan Wattled Plover/ Sunda Plover	Vanellus macropterus	Trulek jawa/Trulek Ekor Putih
Imperial Pigeon	Ducula whartoni	Pergam Raja
Biak Cape Owl	Otus beccarii	Burung Hantu Biak
Painted Stork	Mycteria leucocephala	Bluwok Berwarna
Grey-throated White Eye	Lophozosterops javanica	Burung Kaca Mata
c. Reptile		
River Terrapin	Batagur baska	Tuntong
Aquatic Tortoise	Orlitia borneensis	Kura-kura
Irian Tortoise	Carettochelys insculpta	Kura-kura Irian
New Guinea Snapper	Elseya novaeguineae	Kura-kura Irian Leher Pendek
Long Necked Tortoise	Chelodina novaeguineae	Kura-kura Irian Leher Panjang
Leather Back Turtle	Dermochelys coriacea	Penyu Belimbing
Gray Olive Loggerhead	Lepidochelys olivacea	Penyu Ridel
Red Brown Loggerhead	Caretta caretta	Penyu Tempayan
Giant Fresh Water Turtle	Chitra indica	Labi-labi Besar
Siamese Crocodile	Crocodylus siamensis	Buaya Air Tawar Irian
New Guinea Fresh Water Crocodile	Crocodylus novaeguineae	Buaya Muara
Marsh Crocodile	Crocodylus porosus	Buaya Air Tawar Irian
Malayan Gavial/False Gav	Tomistoma schlegelii	Buaya Capit Senyu Long
Giant Chameleon	Gonyocephalus dilophus	Bunglon Sisir/Bunglon Raksasa
Pintailed Lizard	Hydrosaurus amboinensis	Soa-soa
Komodo Dragon	Varanus komodoensis	Biawak Komodo
Indian Water Monster	Varanus indicus	Biawak Maluku
Togian Monitor	Varanus salvator togianus	Biawak Togian
Brown Monitor	Varanus gouldii	Biawak Coklat
Grey Monitor	Varanus bengalensis	Biawak Abu-abu
Green Monitor Lizard	Varanus prasinus	Biawak Hijau
Timor Lizard	Varanus timorensis	Biawak Timor
Cantorus Lizard	Varanus borneensis	Biawak Kalimantan
Caller Skin Flapped Lizar	Chlamydosaurus kingi	Soa Payung
Giant Skink	Tiliqua gigas	Ular Kaki Empat
Rock Python	Python molurus	Sanca Bodo
Green Python	Chondropython viridis	Sanca Hijau
Timor Python	Python timorensis	Sanca Timor
d. Insect		
Birdwing Butterfly	Ornithoptera goliath	
Birdwing Butterfly	Ornithoptera paradisea	
Birdwing Butterfly	Ornithoptera chimaera	
Birdwing Butterfly	Troides curunda	
Birdwing Butterfly	Troides hypolitus	
Birdwing Butterfly	Troides haliphron	
Birdwing Butterfly	Troides rhadamantus	
Birdwing Butterfly	Troides andromache	
Birdwing Butterfly	Troides amphrysus	
Birdwing Butterfly	Troides plato	
Birdwing Butterfly	Troides riedeli	
Birdwing Butterfly	Troides helena	
Birdwing Butterfly	Troides vandepolli	
Birdwing Butterfly	Troides meoris	
Birdwing Butterfly	Troides criton	
Trogon Butterfly	Trogonoptera brookiana	
Nymph Butterfly	Cethosia myrina	
Birdwing Butterfly	Ornithoptera rotschildi	
Birdwing Butterfly	Ornithoptera tithonus	
Birdwing Butterfly	Ornithoptera priamus	

English Name	Latin Name	Indonesian Name
e. Fish		
Asian Bodalangue	Schleropages formosus	Peyang Malaya
Dawson River Salmon	Schleropages leichardti	Peyang Irian
Sentani Shark	Pristis sp.	Pari Sentani
Maninjau Loach	Homaloptera gymnogaster	Selusur Maninjau
Maninjau Loach	Puntius microps	Wader Goa
Maninjau Loach	Notopterus sp.	Belida Jawa
f. Coral		
Black Coral	Antiphates sp.	Akar Bahar/Koral Hitam
Giant Clam	Tridacna gigas	Kima Raksasa
Shortern Giant Clam	Tridacna derasa	Kima Selatan
Cina Clam	Hippopus porcellanus	Kima Cina
Saffron Coloured/Boring C	Tridacna crocea	Kima Kunia/Lubang
Scaly Clam	Tridacna squamosa	Kima Sisik
Small Giant Clam	Tridacna maxima	Kima Besar
Horse Hoof	Hippopus hippopus	Kima Tapak Kuda
Triton Trumpet	Charonia tritonis	Triton Terompet
Coconut Crab	Birgus latro	Ketam Kelapa
Horse Shoe Crab	Tachypleus gigas	Ketam Tapak Kuda
Giant Helmet Shell	Cassis cornuta	Kepala Kambing
Mother of Pearl	Trochus niloticus	Troka/Susu Bundar
Green Snail	Turbo marmoratus	Batu Laga/Siput Hijau
Pearly/Chambered Nautilu	Nautilus pompilius	Nautilus Berruang
King Crab	Tachypleus tridentatus	Mimi
g. Flora		
English Name	Latin Name	Indonesian Name
Fishtail Palm	Palmae (Family)	Serta Raja (& others)
Black Orchid	Orchidaceae (Family)	Anggrek Hitam (& others)
Larat Orchid/ Java's Slipper Orchid	Orchidaceae (Family)	Anggrek Larat (& others)
	Orchidaceae (Family)	Anggrek Bauat Berbulu/ (& others)
......	Araceae (Family)	Bunga Bangkai Jangkung/ & others
......	Apocynaceae (Family)	Pulai pandak
Rafflesia	Rafflesia spp.	Rafflesia/Bunga Padma
Balanophora	Balanophora spp.	Balanofora
Rhizanthes	Thismathes zippelii	Rasamas

Table 6 TRFFIC VOLUME OF CONSTRUCTION TRUK

Construction site	Excavation (m3)	Work days (days)	Excavation per day (m3/day)	Truck volume per day (trucks/day)	Truck volume per hour (trucks/hour)
Ciliwung Floodway	420,300	1,200	351	59	8
W.B.C	1,367,420	1,200	1,140	190	24
Cisadane river	825,000	1,200	688	115	15

Renark: Construction term ; 4 years, Work days per year ; 300 days, Work hours per day ; 8 hours
Capacity per truk ; 6 m3

Table 7. RESULT OF WATER QUALITY ANALYSIS MADE BY EIA

Sampling point		Western Banjir Canal				Cisadane River				Ciliwung River
		River improvement				River improvement			Tunnel outlet	Tunnel inlet
		Muara Kapuk	Tambora	Tanah Abang	Manggarai	Tanjung Burung	Kampung Kelor	Pasar Baru	Parung Jambu	Pulau Armin
Item	*Unit*									
1)A.Temp	℃	31.5	32	31	31	33	30	28	28	28
2)W.Temp	℃	28.5	28	29	29.5	30	30	28	25	23
3)Trasparency	m	0.70	0.83	0.89	2.80	2.85	0.78	1.71	1.00	1.00
4)Total Disolved Solids	mg/l	1040	182	330	142	2904	172	150	406	440
5)Discharge	m^3/sec									
6)pH	-	5.0	5.5	6.0	5.5	6.0	6.0	5.0	6.0	5.5
7)DO	mg/l	0.8	0.5	1.5	1.5	5.8	3.1	3.9	14.7	17.4
8)BOD5	mg/l	23.9	23.1	20.3	23.5	23.1	1.4	18.9	21.2	2.1
9)COD	mg/l	53.0	39.7	25.1	29.5	124.9	7.4	23.6	25.1	8.9
10)Chloride(Cl)	mg/l	512.25	30.13	23.04	17.73	1524.35	10.64	10.64	8.86	12.41
11)NH4-N	mg/l	0.320	0.369	0.336	0.241	0.138	0.221	0.162	0.676	0.705
12)NO2-N	mg/l	0.027	0.031	0.035	0.048	0.079	0.127	0.059	0.016	0.037
13)NO3-N	mg/l	0.148	0.178	0.528	0.425	0.645	0.598	0.732	0.237	0.103
14)T-N	mg/l	0.910	1.191	1.680	1.331	1.401	1.331	3.432	3.360	1.260
15)T-P	mg/l	0.248	0.171	0.323	0.098	0.034	0.153	0.051	0.276	0.116
16)Total Coliform	MPN/100ml	2400	2400	2400	2400	2400	2400	2400	1100	1100

Sampling point		Western Banjir Canal			Cisadane River			Ciliwung River
		River improvement			River improvement		Tunnel outlet	Tunnel inlet
		Muara Kapuk	Rawa Kepa	Manggarai	Tanjung Burung	Pasar Baru	Parung Jambu	Pulau Armin
Item	*Unit*							
1)Lead(Pb)	mg/l	0.656	0.492	0.410	0.738	0.902	0.410	0.328
2)Mercury(Hg)	mg/l x 10^{-3}	0.30	0.20	0.30	0.30	0.20	<0.01	<0.01
3)Arsenic(As)	mg/l	0.021	0.010	<0.001	<0.001	<0.001	0.010	0.006
4)Cadmium(Cd)	mg/l	<0.001	0.035	0.013	<0.001	<0.001	0.044	0.048
5)Cyanida(CN)	mg/l	0.108	0.058	0.075	0.087	0.079	0.042	0.045
6)Chrom hexavalent(Cr^{6+})	mg/l	0.002	0.003	0.003	0.002	0.002	0.002	0.002
7)PCB								
Arachlor Standard:								
1016	mg/l x 10^{-3}	-	tt	-	0.266	-	-	-
1221	mg/l x 10^{-3}	-	tt	-	tt	-	-	-
1232	mg/l x 10^{-3}	-	tt	-	tt	-	-	-
1242	mg/l x 10^{-3}	-	tt	-	tt	-	-	-
1248	mg/l x 10^{-3}	-	138.771	-	tt	-	-	-
1254	mg/l x 10^{-3}	-	tt	-	tt	-	-	-
1260	mg/l x 10^{-3}	-	tt	-	tt	-	-	-

Note: tt=unmeasurable

Table 8 WATER QUALITY STANDARD IN WEST JAVA PROVINCE

Parameter	Unit	Rank					
		A	B	C	D	B,C,D	C,D
Physical							
Odour	-	-	-	-	-	-	-
Total Dissolved Solid Substances	mg/l	1000	1000	1000	1000	1000	1000
Turbidity	NTU	5	-	-	-	-	-
Temperature	°C	Air Temp±3	Normal	Normal±3	Normal	-	-
Colur	TCU	15	-	-	-	-	-
Taste	-	Tasteless	-	-	-	-	-
Electrical Conductivity	umho/cm(25°C)	-	-	-	2250	2250	2250
Chemical							
Inorganic Chemical							
Mercury(Hg)	mg/l	0.001	0.001	0.002	0.005	0.001	0.002
Aluminium(Al)	mg/l	0.2	-	-	-	-	-
Arsenic(As)	mg/l	0.05	0.05	1.00	1.00	0.05	1.00
Boron(B)	mg/l	-	-	-	1.0	1.0	1.0
Barium(Ba)	mg/l	1.0	1.0	-	-	1.0	-
Iron(Fe)	mg/l	0.3	5.0	-	-	5.0	-
Fluoride(F)	mg/l	0.5	1.5	1.5	-	1.5	1.5
Cadmium(Cd)	mg/l	0.005	0.01	0.01	0.01	0.01	0.01
Cobalt(Co)	mg/l	-	-	-	0.2	0.2	0.2
CaCO3 Hardness	mg/l	500	-	-	-	-	-
Chloride(Cl)	mg/l	250	600	-	-	600	-
Free Chlorine	mg/l	-	-	0.003	-	0.003	0.003
Hexavalent Chromium (Cr+6)	mg/l	0.05	0.05	0.05	1.00	0.05	0.05
Manganese(Mn)	mg/l	0.1	0.5	-	2.0	0.5	2.0
Na(alkari salt)	%	-	-	-	60	60	60
Sodium(Na)	mg/l	200	-	-	-	-	-
Nickel (ni)	mg/l	-	-	-	0.5	0.5	0.5
NH4	mg/l	-	0.5	0.02	-	0.02	0.02
Nitrate-N	mg/l	10.0	10.0	-	-	10.0	-
Nitrite-N	mg/l	1.0	1.0	0.06	-	0.06	0.06
DO	mg/l	-	≧6.0	>3.0	-	>3.0	>3.0
Silver (Ag)	mg/l	0.05	-	-	-	-	-
pH		6.5~8.5	5.0~9.0	6.0~9.0	5.0~9.0	6.0~9.0	6.0~9.0
Selenium(Se)	mg/l	0.01	0.01	0.05	0.05	0.01	0.05
Zinc(Zn)	mg/l	5.0	58.0	0.02	2.0	0.02	0.02
Cyanide(Cn)	mg/l	0.1	0.1	0.02	-	0.02	0.02
Sulphate(SO4)	mg/l	400	400	-	-	400	-
Sulphide H2S	mg/l	0.05	0.1	0.002	-	0.002	0.002
Copper(Cu)	mg/l	1.0	1	0.02	0.2	0.02	0.02
Lead(Pb)	mg/l	0.05	0.10	0.03	1.00	0.03	0.03
Sodium Absorption Ratio(SAR)	mg/l	-	-	-	18	18	18
Residual Sodium Carbonate(RSC)	mg/l	-	-	-	1.25~2.50	1.25~2.50	1.25~2.50
Organic Chemical							
Aldrin and Dieldrin	mg/l	0.0007	0.017	-	-	0.017	-
BHC	mg/l	-	-	0.21	-	0.21	0.21
Benzene	mg/l	0.01	-	-	-	-	-
Benzo (a) pyrene	mg/l	0.00001	-	-	-	-	-
Chlodane (total-isomer)	mg/l	0.0003	0.003	-	-	0.003	-
Chloroform	mg/l	0.03	-	-	-	-	-
2,4 - D	mg/l	0.1	-	-	-	-	-
DDT	mg/l	0.03	0.042	0.002	-	0.002	0.002
Endrine	mg/l	-	0.001	0.004	-	0.001	0.004
Phenol	mg/l	-	0.002	0.001	-	0.001	0.001
Detergent	mg/l	0.5	-	-	-	-	-
1,2 - Dichloroethane	mg/l	0.01	-	-	-	-	-
1,1 - Dichloroethane	mg/l	0.0003	-	-	-	-	-
Heptachlor and Heptachlor epoxide	mg/l	0.003	0.018	-	-	0.018	-
Carbon Chloroform extract	mg/l	-	0.5	-	-	0.5	-
Hexachlorobenzene	mg/l	0.00001	-	-	-	-	-
Lindane	mg/l	0.004	-	-	-	-	-
Methoxychlor	mg/l	0.03	0.035	-	-	0.035	-
Oil and Grease	mg/l	-	none	1.0	-	none	1.0
Pentachlorophenol	mg/l	0.01	-	-	-	-	-
Organophosphte & Carbamate	mg/l	-	0.1	0.1	-	0.1	0.1
PCB	mg/l	-	none	-	-	none	-
Methylene Blue Active Sustance	mg/l	-	0.5	0.2	-	0.2	0.2
Toxaphene	mg/l	-	0.005	-	-	0.005	-
Total pesticide	mg/l	0.1	-	-	-	-	-
2,4,6-Trichlorophenol	mg/l	0.01	-	-	-	-	-
Organic Substances(KMnO4)	mg/l	10.0	-	-	-	-	-
Microbiological							
Faecal coliform bacteria	MPN/100ml	0	2000	-	-	2000	-
Total coliform bacteria	MPN/100ml	3	10,000	-	-	10,000	-
Radioactivity							
Gross Alpha Activity	Bq1	0.1	0.1	0.1	0.1	0.1	0.1
Gross Beta Activity	Bq1	1.0	1.0	1.0	1.0	1.0	1.0

Table 9 WATER QUALITY STANDARD IN JAKART CITY

Parameter	Unit	Rank			
		A	B	C	D
Physical					
Odour	-	Odourless	-	-	-
Total Dissolved Solid Substances	mg/l	1000	500	-	1000
Turbidity	NTU	5	-	-	-
Temperature	°C	Air Temp±3	Normal	Normal±3	Normal
Colur	TCU	15	-	-	-
Taste	-	Tasteless	-	-	-
Electrical Conductivity	umho/cm(25°C)	-	-	-	1000
Chemical					
Inorganic Chemical					
Mercury(Hg)	mg/l	0.001	0.0005	0.002	0.0005
Aluminium(Al)	mg/l	0.2	-	-	-
Arsenic(As)	mg/l	0.05	0.05	0.5	0.05
Boron(B)	mg/l	-	-	-	1.0
Barium(Ba)	mg/l	1.0	1.00	-	-
Iron(Fe)	mg/l	0.3	2.0	-	-
Fluoride(F)	mg/l	0.5	1.5	1.5	-
Cadmium(Cd)	mg/l	0.005	none	0.01	0.01
Cobalt(Co)	mg/l	-	-	-	0.2
Hardness (CaCO3)	mg/l	500	-	-	-
Chloride(Cl)	mg/l	250	250	-	-
Free Chlorine	mg/l	-	-	0.003	-
Hexavalent Chromium (Cr+6)	mg/l	0.05	none	none	0.05
Manganese(Mn)	mg/l	0.1	0.5	-	1.0
Na(alkari salt)	%	-	-	-	40
Sodium(Na)	mg/l	200	-	-	-
Nickel (Ni)	mg/l	-	-	-	0.05
NH4	mg/l	-	0.5	0.02	-
Nitrate-N	mg/l	10.0	5.0	-	-
Nitrite-N	mg/l	1.0	1.0	0.06	-
DO	mg/l	-	≧6.0	>3.0	-
pH		6.5~8.5	6.0~8.5	6.0~8.5	6.0~8.5
Selenium(Se)	mg/l	0.01	0.01	0.05	0.05
Zinc(Zn)	mg/l	5.0	1.0	0.02	1.0
Cyanide(Cn)	mg/l	0.1	0.05	0.01	-
Sulphate(SO4)	mg/l	400	50	-	-
Sulphide H2S	mg/l	0.05	0.1	0.002	-
Copper(Cu)	mg/l	1.0	0.05	0.02	0.1
Lead(Pb)	mg/l	0.05	0.05	0.03	0.05
Sodium Absorption Ratio(SAR)	mg/l	-	-	-	10.0
Residual Sodium Carbonate(RSC)	mg/l	-	-	-	1.25~2.50
Organic Chemical					
Aldrin and Dieldrin	mg/l	0.0007	0.017	-	-
BHC	mg/l	-	-	0.21	-
Benzene	mg/l	0.01	-	-	-
Benzo (a) pyrene	mg/l	0.00001	-	-	-
Chlodane (total-isomer)	mg/l	0.0003	0.003	-	-
Chloroform	mg/l	0.03	-	-	-
2,4 - D	mg/l	0.1	-	-	-
DDT	mg/l	0.03	0.042	0.002	-
Endrine	mg/l	-	0.001	0.004	-
Phenol	mg/l	-	0.002	0.001	-
Detergent	mg/l	0.5	-	-	-
1,2 - Dichloroethane	mg/l	0.01	-	-	-
1,1 - Dichloroethane	mg/l	0.0003	-	-	-
Heptachlor and Heptachlor epoxide	mg/l	0.003	0.018	-	-
Carbon Chloroform extract	mg/l	-	0.5	-	-
Hexachlorobenzene	mg/l	0.00001	-	-	-
Lindane	mg/l	0.004	0.056	-	-
Methoxychlor	mg/l	0.03	0.035	-	-
Oil and Grease	mg/l	-	none	0.5	-
Pentachlorophenol	mg/l	0.01	-	-	-
Organophosphite & Carbamate	mg/l	-	0.1	0.1	-
PCB	mg/l	-	none	-	-
Methylene Blue Active Sustance(surfactant)	mg/l	-	0.5	0.2	-
Toxaphene	mg/l	-	0.005	-	-
Total pesticide	mg/l	0.1	-	-	-
2,4,6-Trichlorophenol	mg/l	0.01	-	-	-
Organic Substances(KMnO4)	mg/l	10.0	-	-	-
Microbiologycal					
Faecal coliform bacteria	MPN/100ml	0	2000	-	-
Total coliform bacteria	MPN/100ml	3.0	10,000	-	-
Radioactivity					
Gross Alpha Activity	Bq/l	0.1	0.1	0.1	0.1
Gross Beta Activity	Bq/l	1.0	1.0	1.0	1.0

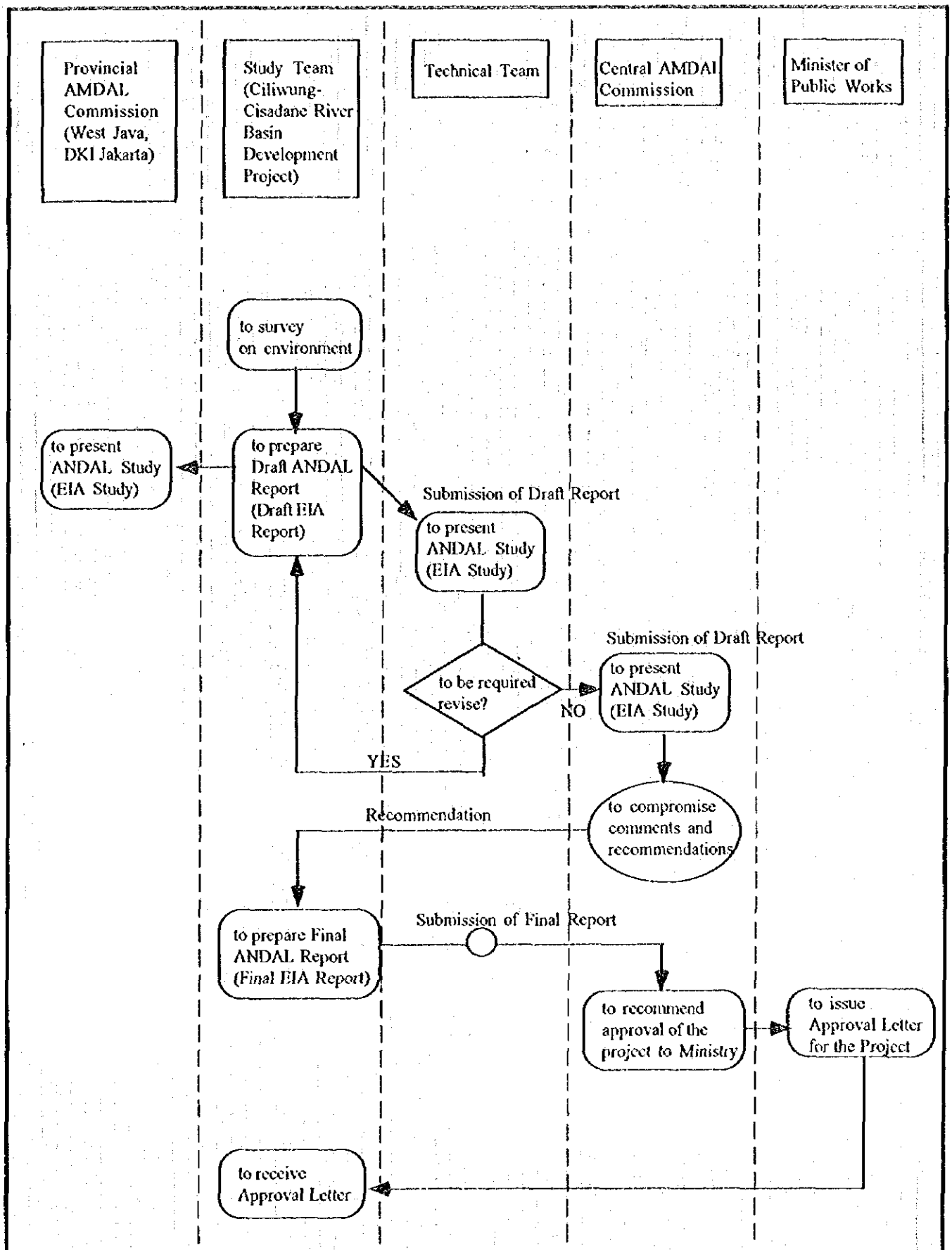


Figure 1 GOVERNMENT PROCEDURE FOR EXAMINATION OF EIA

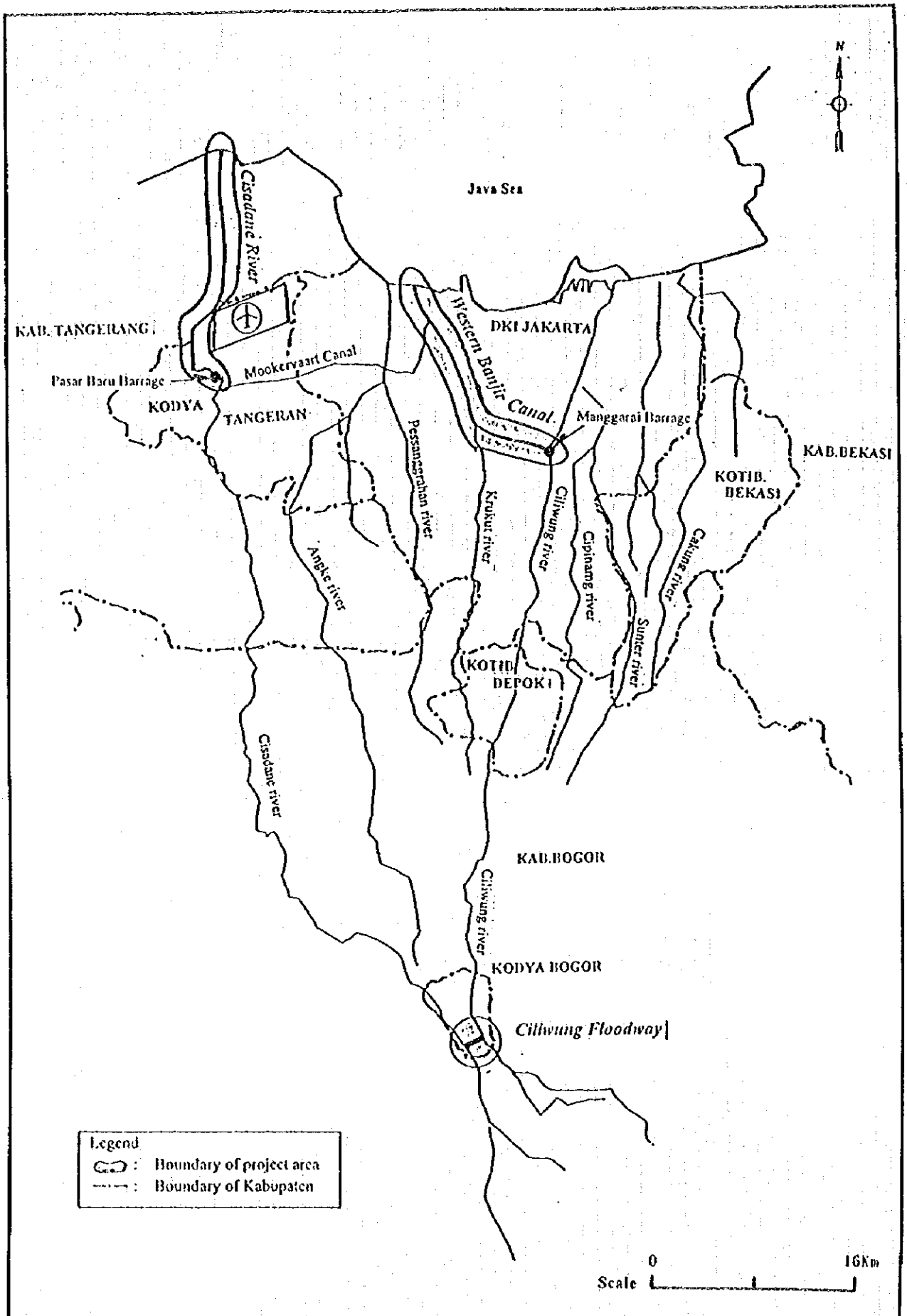


Figure 2 THE EIA STUDY AREA

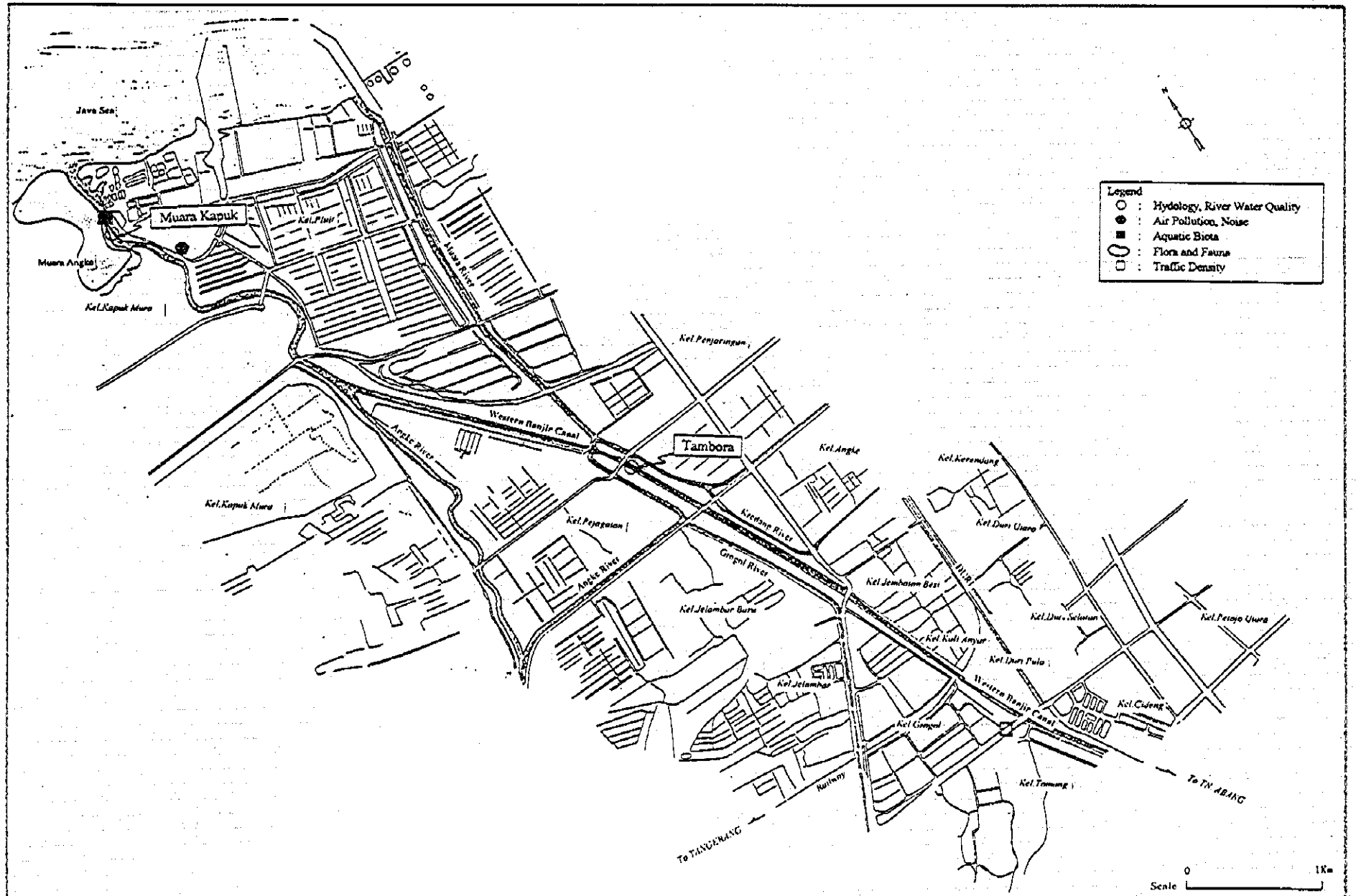


Figure 3 LOCATION MAP OF DATA COLLECTION (SAMPLING) IN THE WESTERN BANJIR CANAL (1/2)

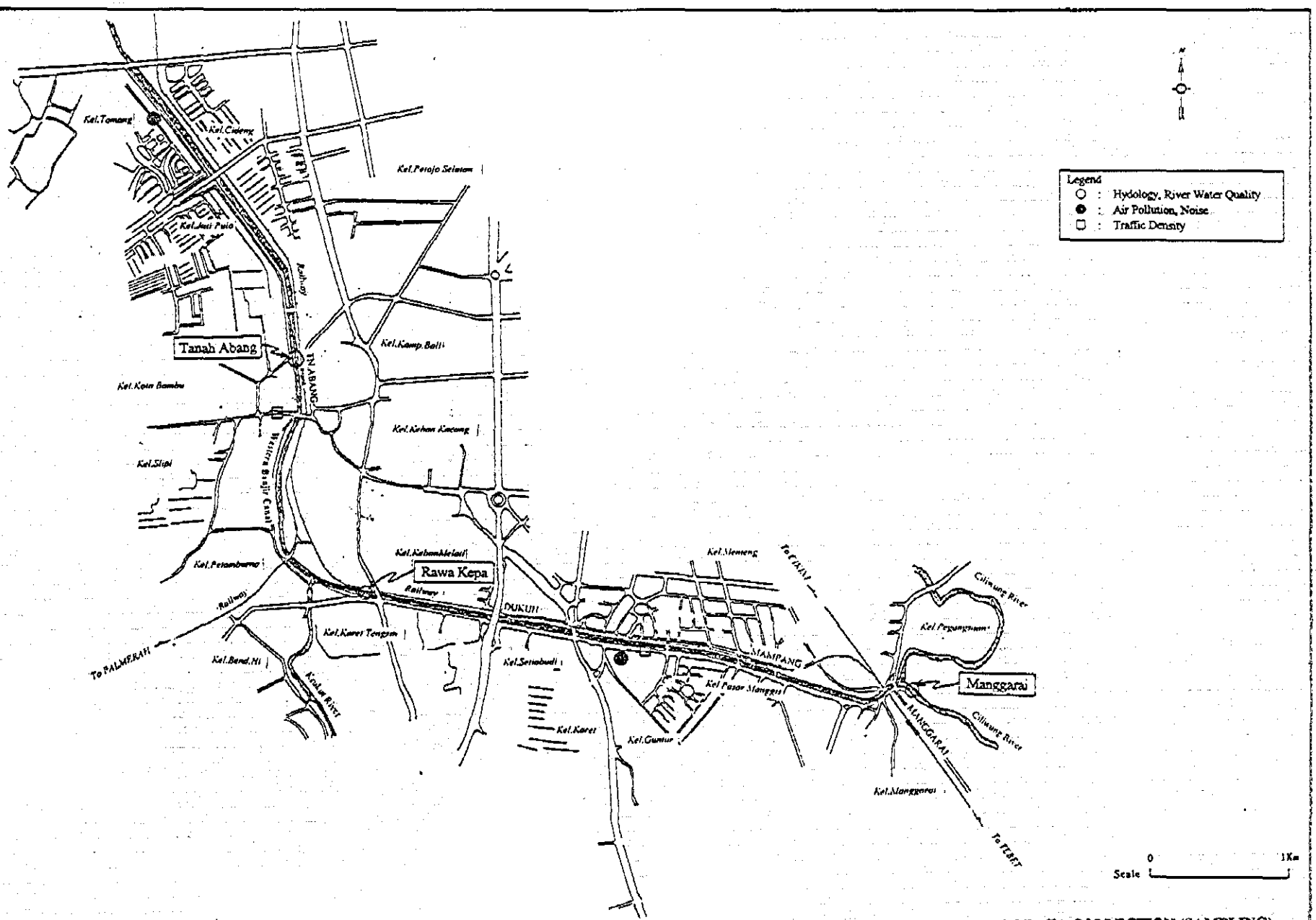


Figure 3 LOCATION MAP OF DATA COLLECTION (SAMPLING) IN THE WESTERN BANJIR CANAL (2/2)

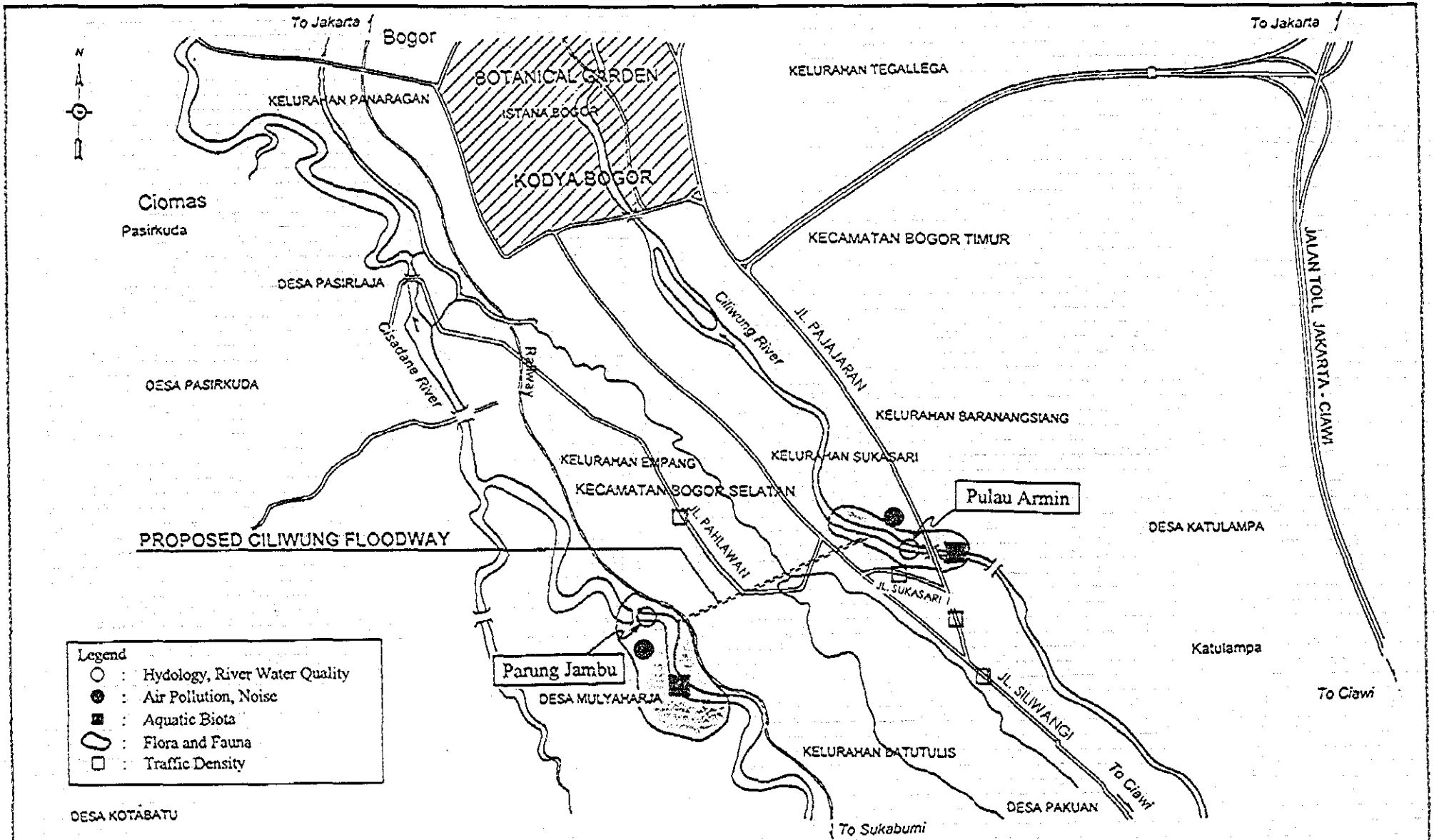


Figure 4 LOCATION MAP OF DATA COLLECTION (SAMPLING) IN THE CILIWUNG RIVER

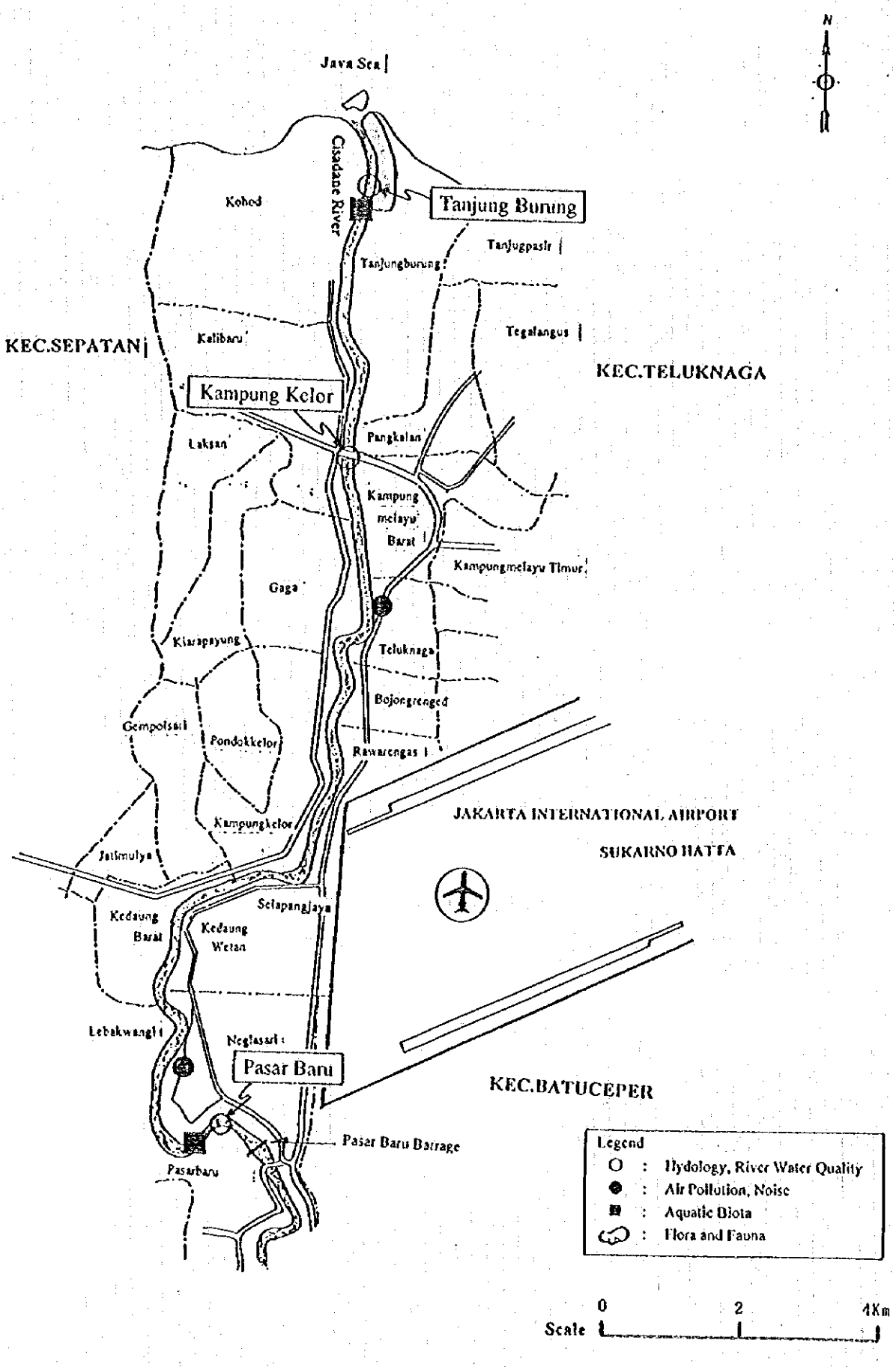
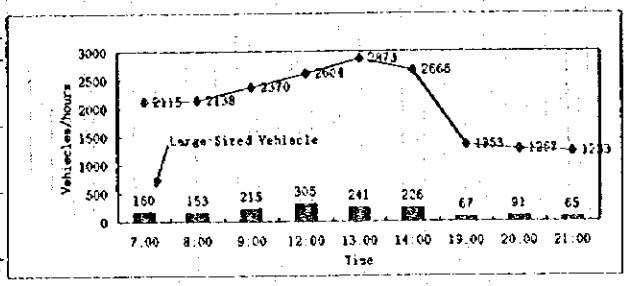


Figure 5 LOCATION MAP OF DATA COLLECTION (SAMPLING) IN THE CISADANE RIVER

Location : Jl. KS Tubun

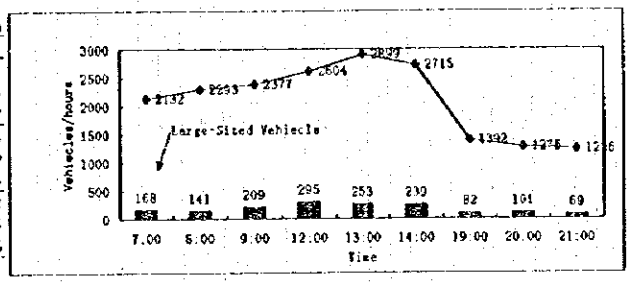
Date : 23 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1955	160	2115
8.00 9.00	1985	153	2138
9.00 10.0	2155	215	2370
12.00 13.0	2299	305	2604
13.00 14.0	2632	241	2873
14.00 15.0	2440	226	2666
19.00 20.0	1286	67	1353
20.00 21.0	1176	91	1267
21.00 22.0	1168	65	1233
ave.	1900	169	2069



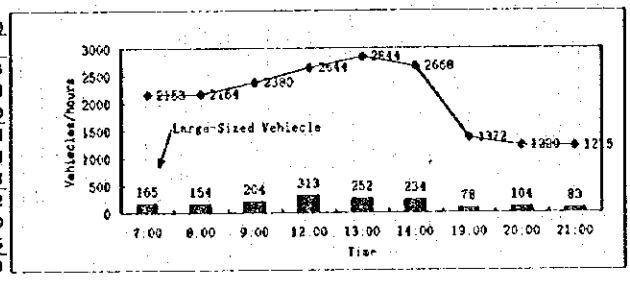
Date : 24 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1964	168	2132
8.00 9.00	2152	141	2293
9.00 10.0	2168	209	2377
12.00 13.0	2309	295	2604
13.00 14.0	2646	253	2899
14.00 15.0	2476	239	2715
19.00 20.0	1310	82	1392
20.00 21.0	1174	101	1275
21.00 22.0	1157	69	1226
ave.	1928	173	2101



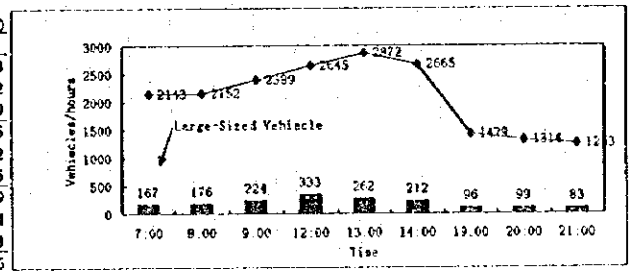
Date : 25 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1988	165	2153
8.00 9.00	2010	154	2164
9.00 10.0	2176	204	2380
12.00 13.0	2331	313	2644
13.00 14.0	2592	252	2844
14.00 15.0	2434	234	2668
19.00 20.0	1294	78	1372
20.00 21.0	1116	104	1220
21.00 22.0	1132	83	1215
ave.	1897	176	2073



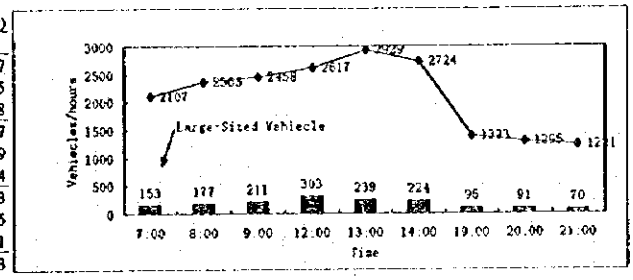
Date : 26 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1976	167	2143
8.00 9.00	1976	176	2152
9.00 10.0	2165	224	2389
12.00 13.0	2312	333	2645
13.00 14.0	2610	262	2872
14.00 15.0	2453	212	2665
19.00 20.0	1333	96	1429
20.00 21.0	1215	99	1314
21.00 22.0	1170	83	1253
ave.	1912	184	2096



Date : 27 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1954	153	2107
8.00 9.00	2188	177	2365
9.00 10.0	2247	211	2458
12.00 13.0	2314	303	2617
13.00 14.0	2691	238	2929
14.00 15.0	2500	224	2724
19.00 20.0	1297	96	1393
20.00 21.0	1204	91	1295
21.00 22.0	1151	70	1221
ave.	1950	174	2123



5days average (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1968	162	2130
8.00 9.00	2063	160	2223
9.00 10.0	2182	213	2395
10.00 13.0	2313	310	2623
11.00 14.0	2634	249	2883
12.00 15.0	2461	227	2688
13.00 20.0	1304	84	1388
14.00 21.0	1177	97	1274
15.00 22.0	1156	74	1230
ave.	1918	175	2093

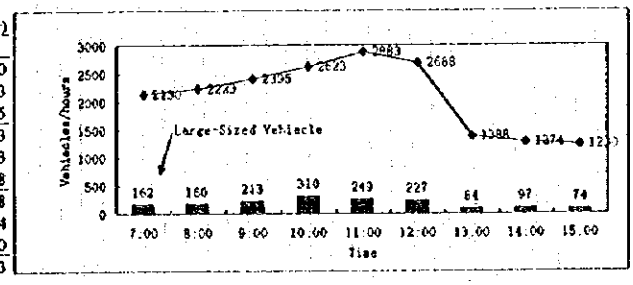
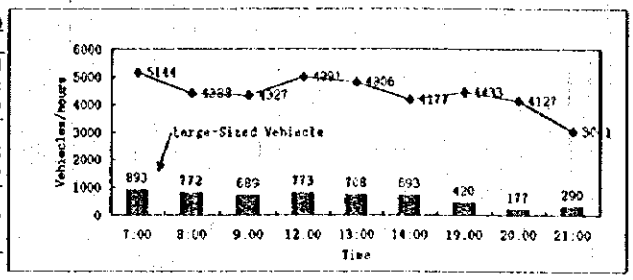


Figure 6. RESULT OF TRAFFIC DENSITY MEASUREMENT MADE BY EIA (1/7)

Location : Jl. Kyai Tapa

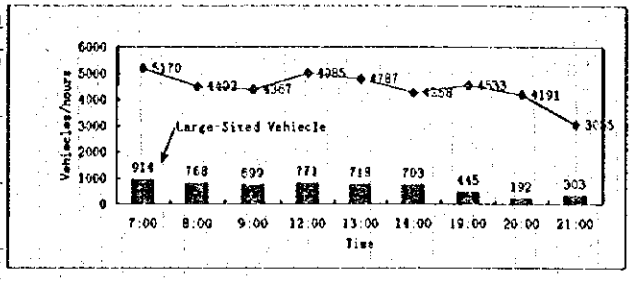
Date : 23 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	4251	893	5144
8.00 9.00	3616	772	4388
9.00 10.0	3638	689	4327
12.00 13.0	4218	773	4991
13.00 14.0	4098	708	4806
14.00 15.0	3484	693	4177
19.00 20.0	4013	420	4433
20.00 21.0	3950	177	4127
21.00 22.0	2751	290	3041
ave.	3780	602	4382



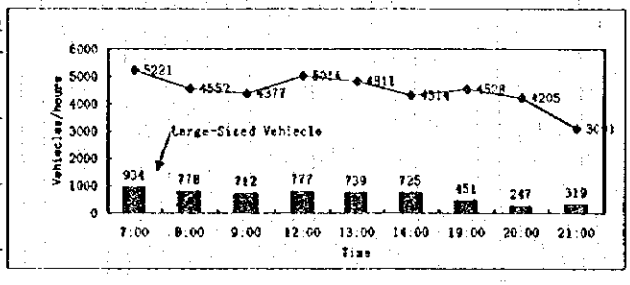
Date : 24 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	4256	914	5170
8.00 9.00	3724	768	4492
9.00 10.0	3668	699	4367
12.00 13.0	4214	771	4985
13.00 14.0	4069	718	4787
14.00 15.0	3555	703	4258
19.00 20.0	4088	445	4533
20.00 21.0	3999	192	4191
21.00 22.0	2752	303	3055
ave.	3814	613	4426



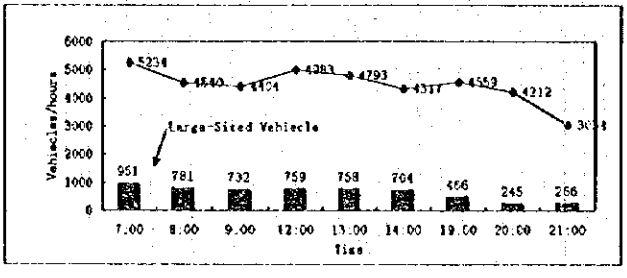
Date : 25 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	4287	934	5221
8.00 9.00	3774	778	4552
9.00 10.0	3665	712	4377
12.00 13.0	4237	777	5014
13.00 14.0	4072	739	4811
14.00 15.0	3589	725	4314
19.00 20.0	4077	451	4528
20.00 21.0	3958	247	4205
21.00 22.0	2772	319	3091
ave	3826	631	4457



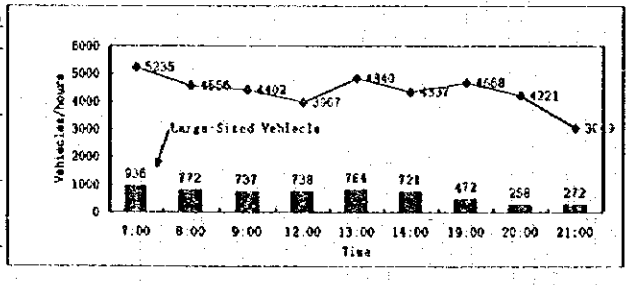
Date : 26 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	4283	951	5234
8.00 9.00	3759	781	4540
9.00 10.0	3672	732	4404
12.00 13.0	4224	759	4983
13.00 14.0	4035	758	4793
14.00 15.0	3613	704	4317
19.00 20.0	4093	466	4559
20.00 21.0	3967	245	4212
21.00 22.0	2768	266	3034
ave.	3824	629	4453



Date : 27 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	4299	936	5235
8.00 9.00	3784	772	4556
9.00 10.0	3665	737	4402
12.00 13.0	3229	738	3967
13.00 14.0	4056	784	4840
14.00 15.0	3616	721	4337
19.00 20.0	4196	472	4668
20.00 21.0	3963	258	4221
21.00 22.0	2777	272	3049
ave	3732	632	4364



5days average (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	4275	926	5201
8.00 9.00	3731	775	4506
9.00 10.0	3661	714	4375
12.00 13.0	4025	763	4788
13.00 14.0	4066	741	4807
14.00 15.0	3571	709	4280
19.00 20.0	4093	451	4544
20.00 21.0	3967	224	4191
21.00 22.0	2764	290	3054
ave	3795	621	4416

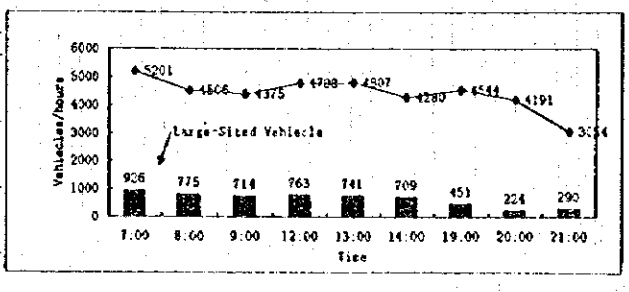
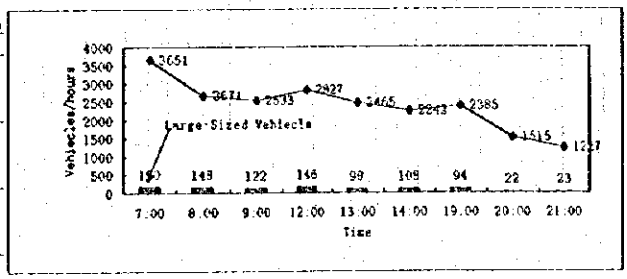


Figure 6. RESULT OF TRAFFIC DENSITY MEASUREMENT MADE BY EIA (2/7)

Location : Jl. Sultan Agung

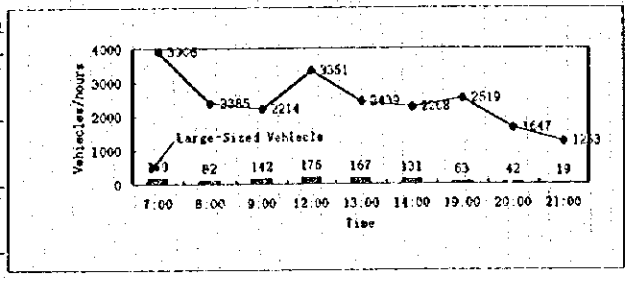
Date : 26 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	3481	170	3651
8.00 9.00	2523	148	2671
9.00 10.00	2411	122	2533
12.00 13.00	2681	146	2827
13.00 14.00	2367	98	2465
14.00 15.00	2134	108	2242
19.00 20.00	2291	94	2385
20.00 21.00	1493	22	1515
21.00 22.00	1204	23	1227
ave.	2287	103	2391



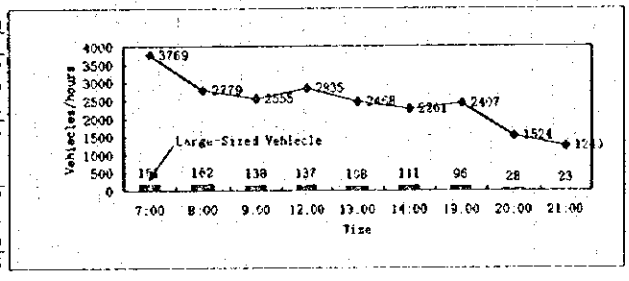
Date : 27 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	3746	160	3906
8.00 9.00	2303	82	2385
9.00 10.00	2072	142	2214
12.00 13.00	3175	176	3351
13.00 14.00	2272	167	2439
14.00 15.00	2137	131	2268
19.00 20.00	2456	63	2519
20.00 21.00	1605	42	1647
21.00 22.00	1234	19	1253
ave.	2333	109	2442



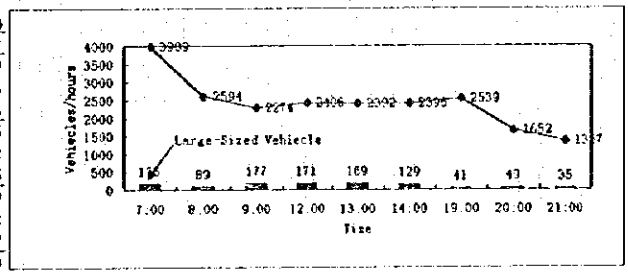
Date :30 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	3608	161	3769
8.00 9.00	2617	162	2779
9.00 10.00	2417	138	2555
12.00 13.00	2698	137	2835
13.00 14.00	2360	108	2468
14.00 15.00	2150	111	2261
19.00 20.00	2311	96	2407
20.00 21.00	1496	28	1524
21.00 22.00	1217	23	1240
ave.	2319	107	2426



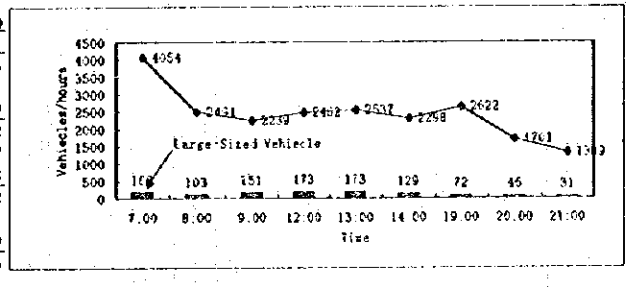
Date : 1 October 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	3814	175	3989
8.00 9.00	2505	89	2594
9.00 10.00	2097	177	2274
12.00 13.00	2235	171	2406
13.00 14.00	2223	169	2392
14.00 15.00	2267	129	2396
19.00 20.00	2498	41	2539
20.00 21.00	1603	49	1652
21.00 22.00	1322	35	1357
ave.	2285	115	2400



Date : 2 October 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	3886	168	4054
8.00 9.00	2388	103	2491
9.00 10.00	2088	151	2239
12.00 13.00	2289	173	2462
13.00 14.00	2364	173	2537
14.00 15.00	2169	129	2298
19.00 20.00	2550	72	2622
20.00 21.00	1655	46	1701
21.00 22.00	1278	31	1309
ave.	2296	116	2413



5days average (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	3707	167	3874
8.00 9.00	2467	117	2584
9.00 10.00	2217	146	2363
12.00 13.00	2616	160	2776
13.00 14.00	2318	143	2461
14.00 15.00	2170	122	2292
19.00 20.00	2420	74	2494
20.00 21.00	1572	37	1609
21.00 22.00	1252	26	1278
ave.	2304	110	2415

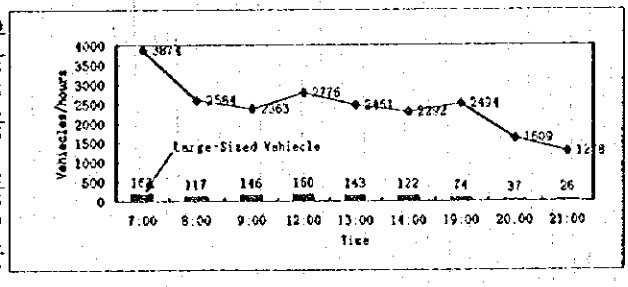
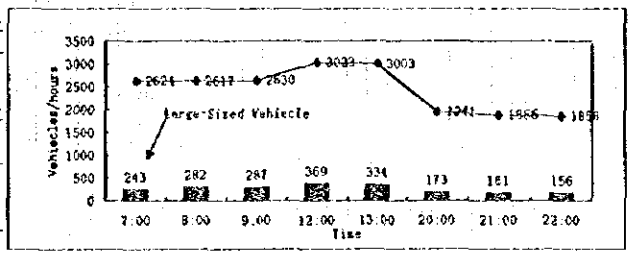


Figure 6. RESULT OF TRAFFIC DENSITY MEASUREMENT MADE BY EIA (3/7)

Location : Jl. Pajajaran Bogor

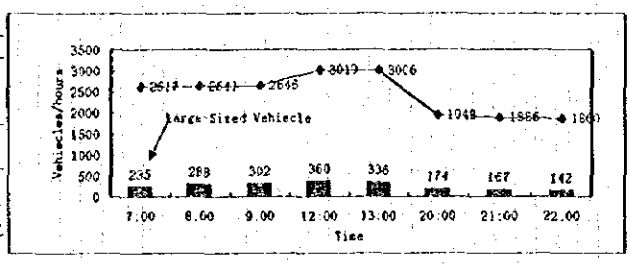
Date : 4 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	2381	243	2624
8.00 9.00	2335	282	2617
9.00 10.00	2343	287	2630
12.00 13.00	2654	369	3023
13.00 14.00	2669	334	3003
20.00 21.00	1768	173	1941
21.00 22.00	1724	161	1885
22.00 23.00	1702	156	1858
ave	2197	251	2448



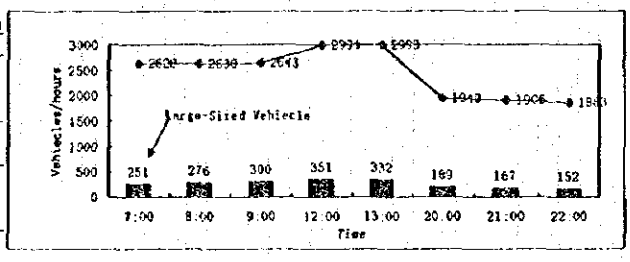
Date : 5 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	2382	235	2617
8.00 9.00	2353	288	2641
9.00 10.00	2344	302	2646
12.00 13.00	2659	360	3019
13.00 14.00	2670	336	3006
20.00 21.00	1774	174	1948
21.00 22.00	1719	167	1886
22.00 23.00	1718	142	1860
ave	2202	251	2453



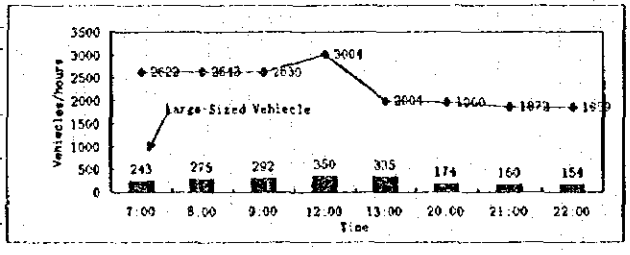
Date : 9 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	2377	251	2628
8.00 9.00	2354	276	2630
9.00 10.00	2343	300	2643
12.00 13.00	2643	351	2994
13.00 14.00	2661	332	2993
20.00 21.00	1760	189	1949
21.00 22.00	1739	167	1906
22.00 23.00	1711	152	1863
ave	2199	252	2451



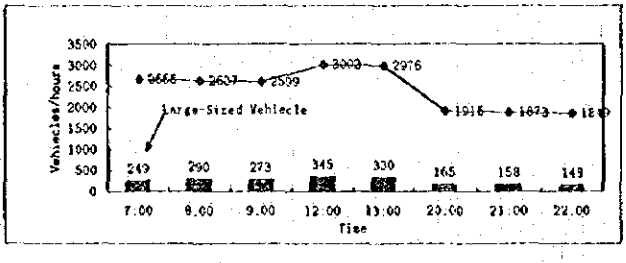
Date : 10 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	2379	243	2622
8.00 9.00	2368	275	2643
9.00 10.00	2338	292	2630
12.00 13.00	2654	350	3004
13.00 14.00	1669	335	2004
20.00 21.00	1786	174	1960
21.00 22.00	1712	160	1872
22.00 23.00	1705	154	1859
ave	2076	248	2324



Date : 11 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	2407	249	2656
8.00 9.00	2347	290	2637
9.00 10.00	2326	273	2599
12.00 13.00	2657	345	3002
13.00 14.00	2646	330	2976
20.00 21.00	1750	165	1915
21.00 22.00	1715	158	1873
22.00 23.00	1701	148	1849
ave	2194	245	2438



5days average (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	2385	244	2629
8.00 9.00	2352	282	2634
9.00 10.00	2339	291	2630
12.00 13.00	2653	355	3008
13.00 14.00	2464	333	2797
20.00 21.00	1768	175	1943
21.00 22.00	1722	162	1884
22.00 23.00	1707	151	1858
ave	2174	249	2423

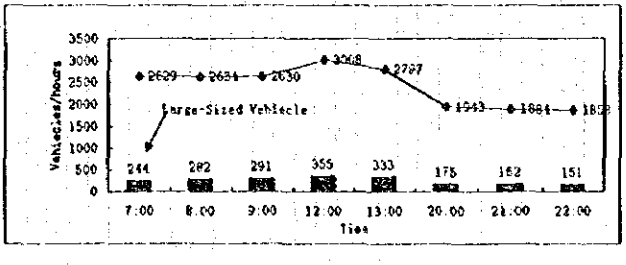
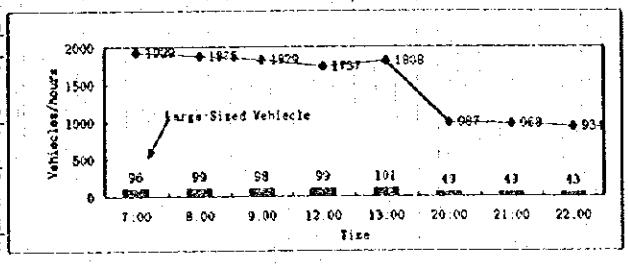


Figure 6. RESULT OF TRAFFIC DENSITY MEASUREMENT MADE BY EIA (4/7)

Location : Jl. Pahlawan Bogor

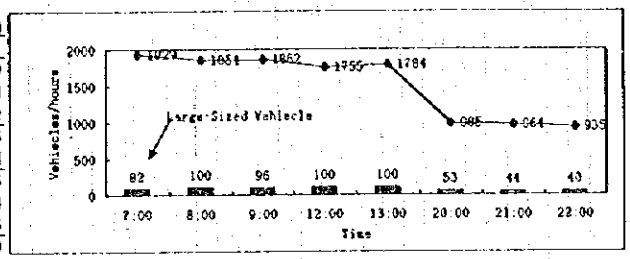
Date : 4 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1833	96	1929
8.00 9.00	1776	99	1875
9.00 10.0	1731	98	1829
12.00 13.0	1638	99	1737
13.00 14.0	1707	101	1808
20.00 21.0	938	49	987
21.00 22.0	919	49	968
22.00 23.0	891	43	934
ave.	1429	79	1508



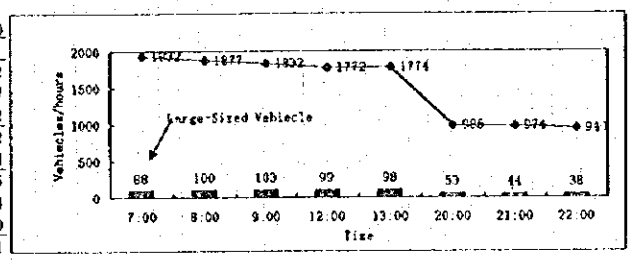
Date : 5 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1847	82	1929
8.00 9.00	1754	100	1854
9.00 10.0	1766	96	1862
12.00 13.0	1655	100	1755
13.00 14.0	1684	100	1784
20.00 21.0	932	53	985
21.00 22.0	920	44	964
22.00 23.0	895	40	935
ave.	1432	77	1509



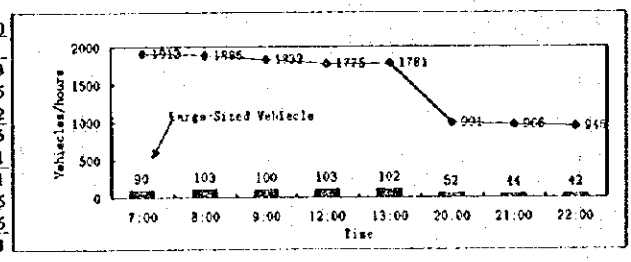
Date : 9 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1844	88	1932
8.00 9.00	1777	100	1877
9.00 10.0	1729	103	1832
12.00 13.0	1673	99	1772
13.00 14.0	1676	98	1774
20.00 21.0	932	53	985
21.00 22.0	930	44	974
22.00 23.0	902	38	940
ave.	1433	78	1511



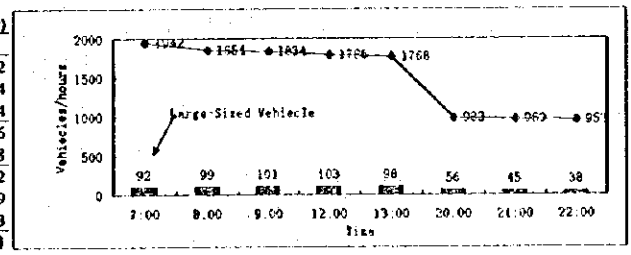
Date : 10 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1823	90	1913
8.00 9.00	1783	103	1886
9.00 10.0	1732	100	1832
12.00 13.0	1672	103	1775
13.00 14.0	1679	102	1781
20.00 21.0	939	52	991
21.00 22.0	922	44	966
22.00 23.0	904	42	946
ave.	1432	80	1511



Date : 11 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1850	92	1942
8.00 9.00	1755	99	1854
9.00 10.0	1733	101	1834
12.00 13.0	1683	103	1786
13.00 14.0	1670	98	1768
20.00 21.0	926	56	982
21.00 22.0	924	45	969
22.00 23.0	915	38	953
ave.	1432	79	1511



5days average (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1839	90	1929
8.00 9.00	1769	101	1870
9.00 10.0	1738	100	1838
12.00 13.0	1664	100	1764
13.00 14.0	1683	99	1782
20.00 21.0	933	52	985
21.00 22.0	923	45	968
22.00 23.0	901	41	942
ave.	1431	79	1510

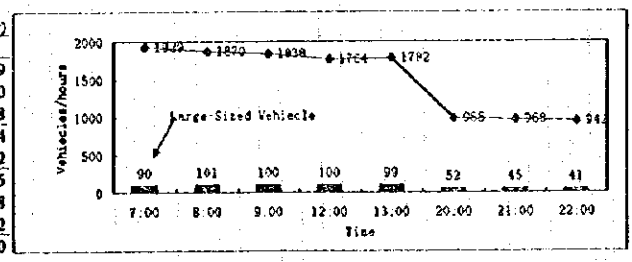
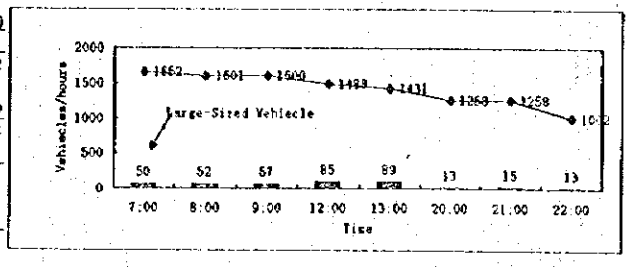


Figure 6. RESULT OF TRAFFIC DENSITY MEASUREMENT MADE BY EIA (5/7)

Location : Jl. Siliwangi Bogor

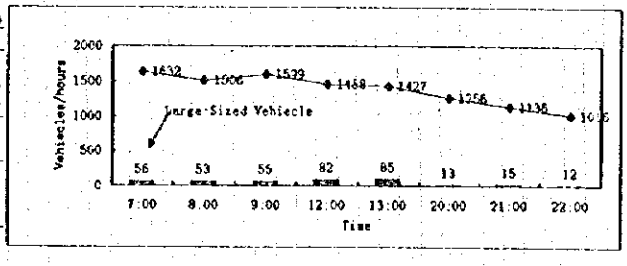
Date : 5 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1602	50	1652
8.00 9.00	1549	52	1601
9.00 10.0	1543	57	1600
12.00 13.0	1403	85	1488
13.00 14.0	1342	89	1431
20.00 21.0	1245	13	1258
21.00 22.0	1243	15	1258
22.00 23.0	989	13	1002
ave.	1365	47	1411



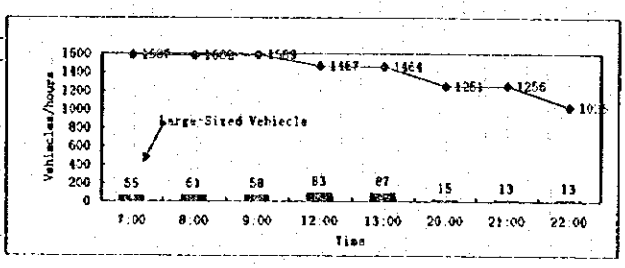
Date : 6 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1576	56	1632
8.00 9.00	1453	53	1506
9.00 10.0	1544	55	1599
12.00 13.0	1376	82	1458
13.00 14.0	1342	85	1427
20.00 21.0	1243	13	1256
21.00 22.0	1121	15	1136
22.00 23.0	1004	12	1016
ave.	1332	46	1379



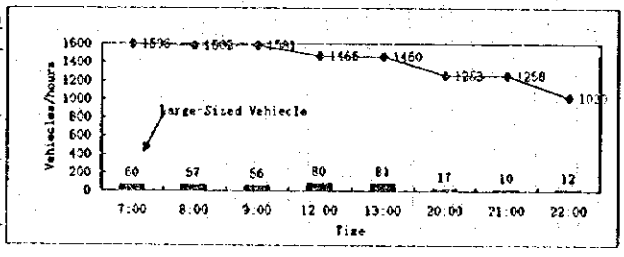
Date : 7 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1532	55	1587
8.00 9.00	1521	61	1582
9.00 10.0	1531	58	1589
12.00 13.0	1384	83	1467
13.00 14.0	1377	87	1464
20.00 21.0	1236	15	1251
21.00 22.0	1243	13	1256
22.00 23.0	1012	13	1025
ave.	1355	48	1403



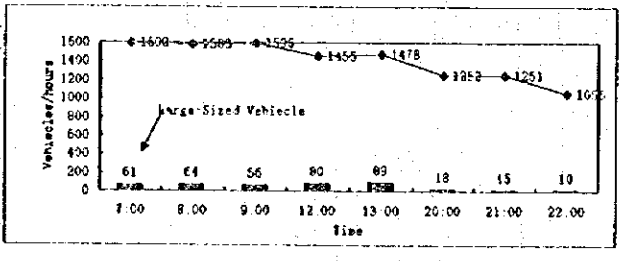
Date : 8 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1536	60	1596
8.00 9.00	1525	57	1582
9.00 10.0	1525	56	1581
12.00 13.0	1386	80	1466
13.00 14.0	1379	81	1460
20.00 21.0	1236	17	1253
21.00 22.0	1248	10	1258
22.00 23.0	1008	12	1020
ave.	1355	47	1402



Date : 9 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1531	61	1592
8.00 9.00	1519	64	1583
9.00 10.0	1540	56	1596
12.00 13.0	1375	80	1455
13.00 14.0	1389	89	1478
20.00 21.0	1234	18	1252
21.00 22.0	1236	15	1251
22.00 23.0	1045	10	1055
ave.	1359	49	1408



5days average (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	1556	56	1612
8.00 9.00	1514	57	1571
9.00 10.0	1537	56	1593
12.00 13.0	1385	82	1467
13.00 14.0	1366	86	1452
20.00 21.0	1239	15	1254
21.00 22.0	1218	14	1232
22.00 23.0	1012	12	1024
ave.	1353	47	1401

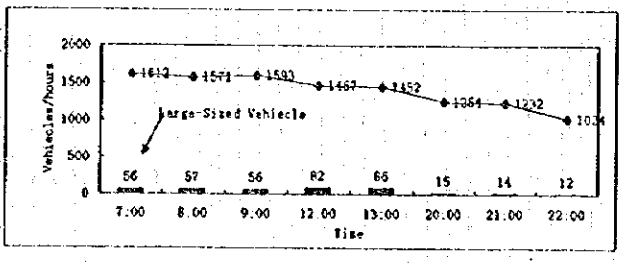
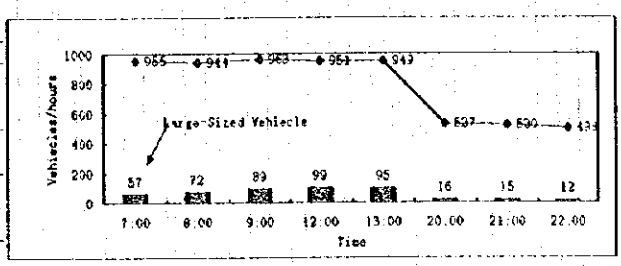


Figure 6. RESULT OF TRAFFIC DENSITY MEASUREMENT MADE BY EIA (6/7)

Location : Jl. Sukasari I Bogor

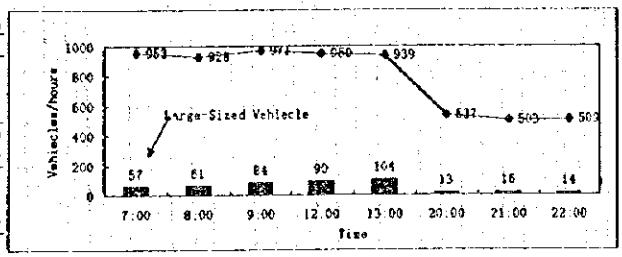
Date : 5 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	898	57	955
8.00 9.00	872	72	944
9.00 10.0	874	89	963
12.00 13.0	852	99	951
13.00 14.0	854	95	949
20.00 21.0	511	16	527
21.00 22.0	505	15	520
22.00 23.0	486	12	498
ave.	732	57	788



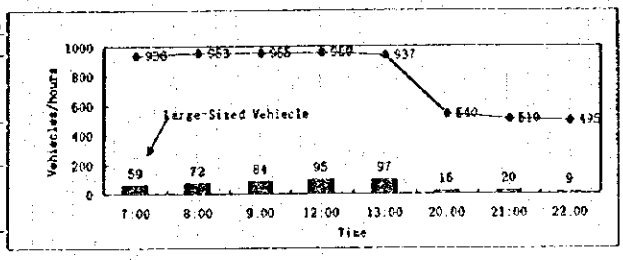
Date : 6 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	896	57	953
8.00 9.00	867	61	928
9.00 10.0	887	84	971
12.00 13.0	860	90	950
13.00 14.0	835	104	939
20.00 21.0	524	13	537
21.00 22.0	487	16	503
22.00 23.0	495	14	509
ave	731	55	786



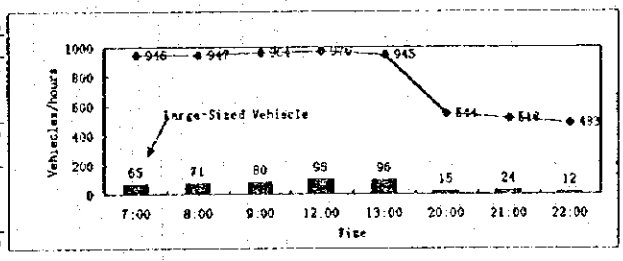
Date : 7 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	877	59	936
8.00 9.00	881	72	953
9.00 10.0	871	84	955
12.00 13.0	864	95	959
13.00 14.0	840	97	937
20.00 21.0	524	16	540
21.00 22.0	490	20	510
22.00 23.0	486	9	495
ave	729	57	786



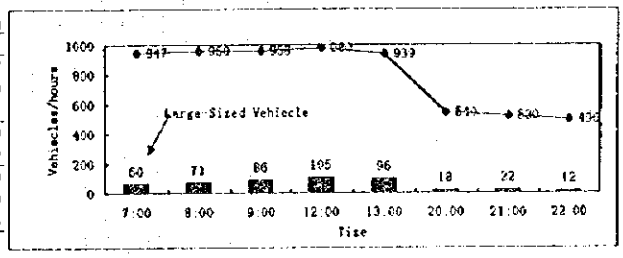
Date : 8 September 1996 (Unit: vehicles/hour)

Time	Automobile	Automobile	Total
7.00 8.00	881	65	946
8.00 9.00	876	71	947
9.00 10.0	884	80	964
12.00 13.0	872	98	970
13.00 14.0	849	96	945
20.00 21.0	529	15	544
21.00 22.0	494	24	518
22.00 23.0	471	12	483
ave.	732	58	790



Date : 9 September 1996 (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	887	60	947
8.00 9.00	889	71	960
9.00 10.0	872	86	958
12.00 13.0	875	105	980
13.00 14.0	843	96	939
20.00 21.0	522	18	540
21.00 22.0	498	22	520
22.00 23.0	484	12	496
ave.	734	59	793



5days average (Unit: vehicles/hour)

Time	Small-sized	Large-sized	Total
7.00 8.00	887	60	947
8.00 9.00	877	69	946
9.00 10.0	877	85	962
12.00 13.0	865	97	962
13.00 14.0	844	98	942
20.00 21.0	522	15	537
21.00 22.0	495	19	514
22.00 23.0	485	12	497
ave.	732	57	788

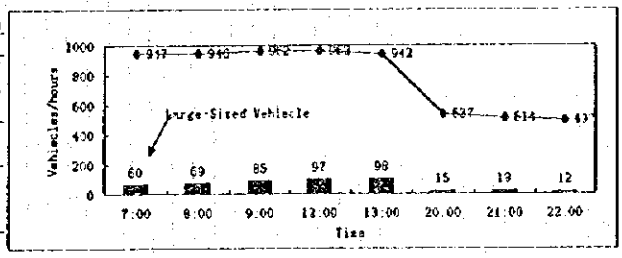


Figure 6. RESULT OF TRAFFIC DENSITY MEASUREMENT MADE BY EIA (7/7)

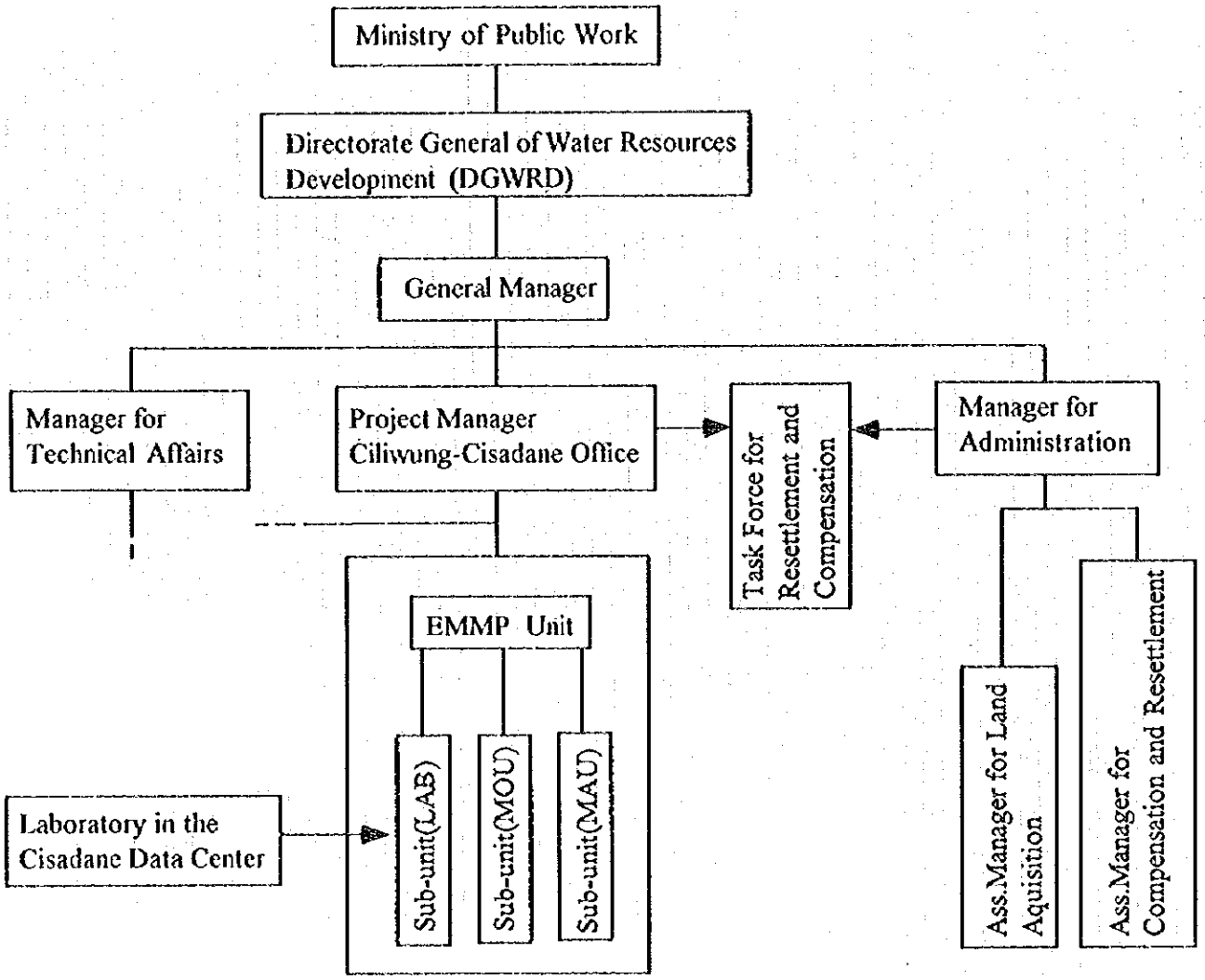


Figure 7 Proposed Organization Chart of EMMP

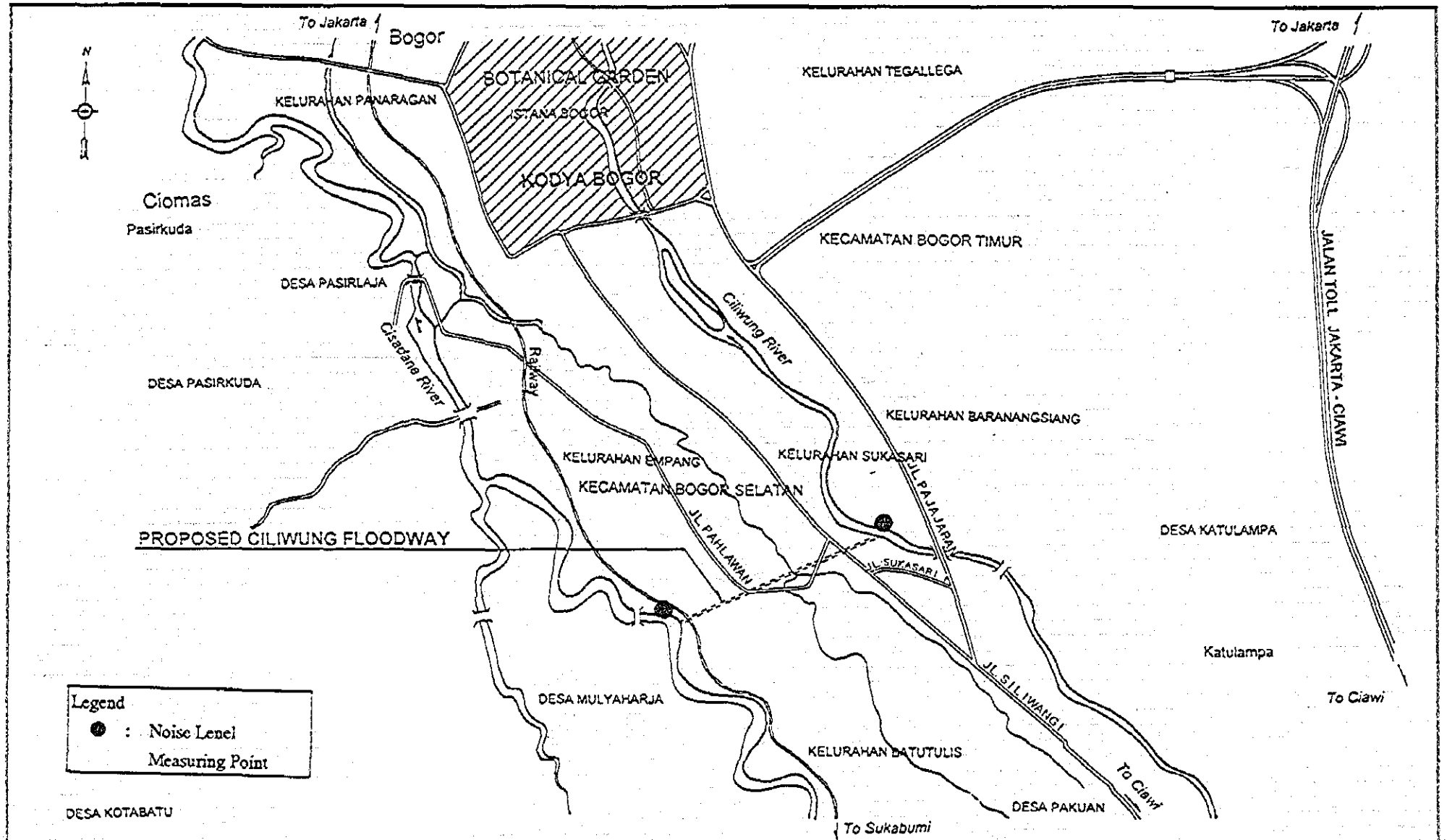


Figure 8. LOCATION MAP OF NOISE LEVEL MEASURING ON THE CONSTRUCTION STAGE (SHIELD WORK)

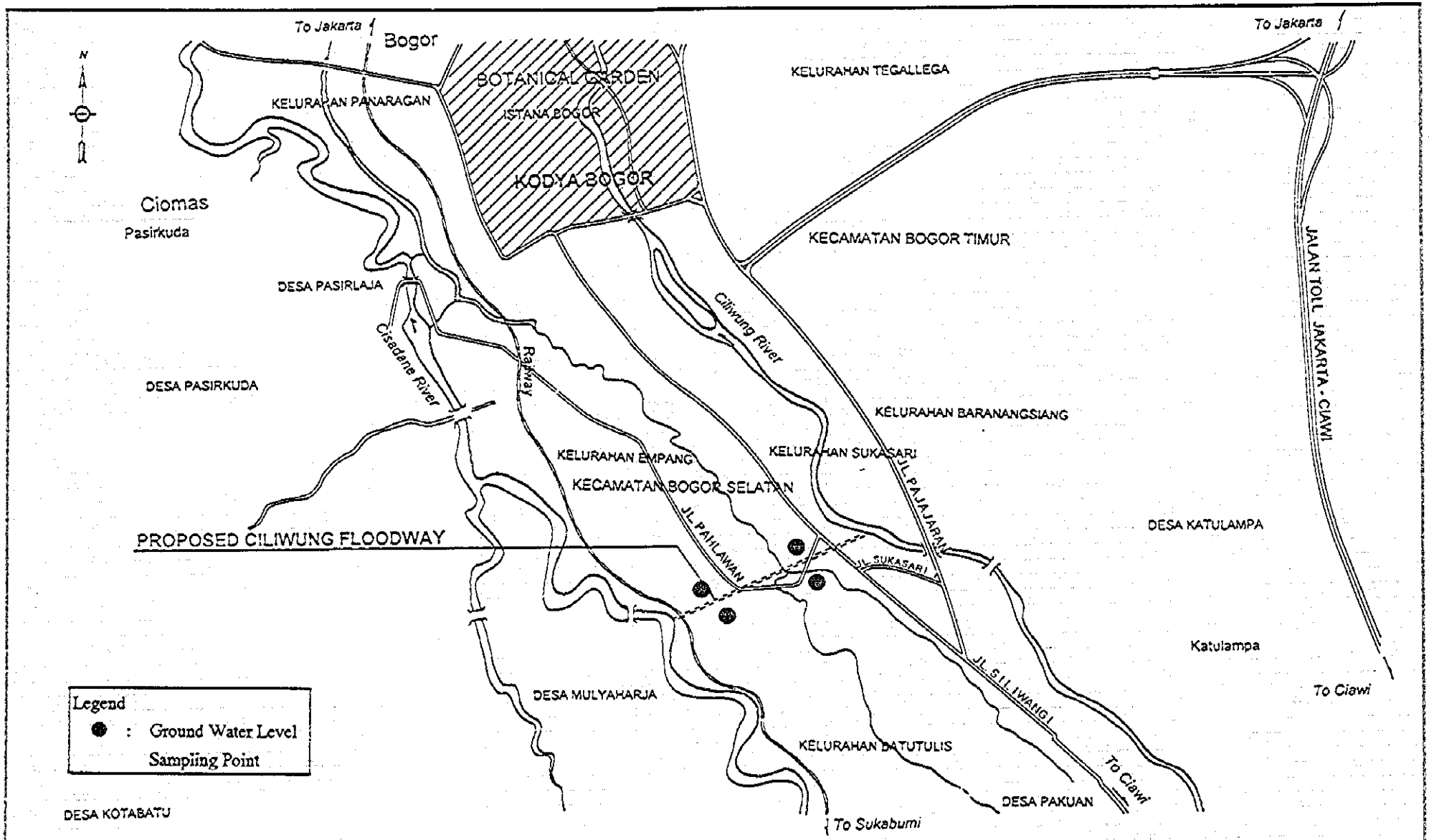


Figure 9. LOCATION MAP OF GROUND WATER LEVEL MEASURING

ANNEX 11

COMPREHENSIVE RIVER WATER MANAGEMENT PLAN

THE STUDY ON
COMPREHENSIVE RIVER WATER MANAGEMENT PLAN
IN
JABOTABEK

Annex 11 : Comprehensive River Water Management Plan

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1. GENERAL

Rapid development of the socio-economy in the JABOTABEK area has caused intensive urbanization and industrialization in the area beyond the speed of the improvement of river water management in the area. This has caused various problems of flood control, water resources development, and river water quality in the area.

The present study aims at preparation of comprehensive river water management plan in the area especially focusing on flood control aspect. The basic viewpoint is that the plan should be prepared in due consideration of the present situation of the basin and should be a comprehensive and long-term one.

The outline of the study is as the following:

- to conduct the field survey of the present situation of the area and the related facilities in the area,
- to review the present situation of river water management and river water monitoring system,
- to make a comprehensive river water management plan,
- to make facilities plan,
- to make cost estimate for the plan on master plan level, and
- to make recommendations.

2. PRESENT SITUATION ON RIVER WATER MANAGEMENT

2.1 Observation Facilities

Observation facilities on rainfall and water-level in the JABOTABEK area are as follows:

Ordinary rainfall gauging station (daily rainfall):	42 places
Automatic rainfall gauging station:	16 places
Ordinary water-level gauging station:	4 places
Automatic water-level gauging station:	16 places
Tide level gauging station:	2 places

These gauging stations are under the control of following institutions:

Rainfall

BMG	: Badan Meteorologi dan Geofisika
PDSA	: Pengembangan Data Sumber Air (PWSCC: Ciliwung-Cisadane River Basin Development Project)
IHE	: Institute of Hydraulic Engineering
PLTA	: Pembangkit Listrik Tenaga Air

Tide

Dinas Hidro - Oseanografi TNI - AL
P.T. (Persero) Pelabuhan Indonesia II

Water-level

PDSA	: Pengembangan Data Sumber Air
POJ	: Perum Otorita Jatiluhur

Other than these, data on weir site such as water-level, discharge and opening of gate are sent to POJ Bekasi in the eastern area, to PWSCC and DKI Jakarta in the central area and to Cabang DPU Tangerag (branch office of public work services of Tangerag) in the western area.

2.2 Operation Facilities

Field reconnaissance has been conducted to understand the present situation of the following operation facilities for flood control and/or river water utilization:

Cilemahabang weir	: Cilemahabang river
Cikarang weir	: Cikarang river
Bekasi weir	: Bekasi river
Katulampa weir	: Ciliwung river

Manggarai weir	: Ciliwung river
Karet weir	: Western Banjir Canal
Pondok Pinang weir	: Grogol river
Koneng weir	: Pesanggrahan river
Polor weir	: Angke river
Cengkareng weir	: Cengkareng floodway
Pasar Baru weir	: Cisadane river
Rancasumur weir	: Cidurian river

The locations of these facilities are shown in Figures 2.1 and 2.2. The structures of the facilities are shown in Figures 2.3 to 2.14. Here some are just shown by photos because the structure drawings are not available since they were constructed very long time ago. Available features of the facilities are shown in Table 2.1.

The following agencies extended cooperation and coordination for the data collection of these facilities:

Pengembangan Wilayah Sungai Ciliwung - Cisadane (PWSCC)
Perum Otorita Jatiluhur (POJ)
POJ Seksi Tarum Barat I, Bekasi
POJ Seksi Tarum Barat II, Bekasi
POJ Seksi Lemahabang, Lemahabang
Dinas PU DKI
Cabang Dinas PU Pengairan, Tangerang

The major features of the facilities are as follows:

(1) Cilemahabang Weir

1) Objectives	:	Irrigation
2) Management office	:	POJ Seksi Lemahabang
3) Monitoring station	:	Cibarusa 20 km upstream, travel time of flood is 5 hours.
4) Operation	:	Water-level on the upstream side is to be kept at certain level.
5) Others	:	Monitor TV is equipped in the house.

(2) Cikarang Weir

1) Objectives	:	Irrigation, Municipal water
2) Management office	:	POJ Seksi Tarum Barat II
3) Monitoring station	:	Not available
4) Operation	:	Water-level on the upstream side is to be kept at El.21.10m
5) Others	:	Never experienced full open of the gates

(3) Bekasi Weir

1) Objectives	:	Irrigation
2) Management office	:	POJ Seksi Tarum Barat I
3) Monitoring station	:	Pondok Gede 8 km upstream, travel time of flood is 2-3 hours.
4) Operation	:	Water-level on the upstream side is to be kept at certain

level.Sediment flushing is conducted sometimes.

5) Others : Never experience full open of the gates. Warning is given to residential area of Pondok Gede.

(4) Manggarai Weir

1) Objectives : Flushing
2) Management office : Dinas PU DKI
3) Monitoring station : Depok 35.5 km upstream, travel time of flood is 6-7 hours. Katulampa 32 km upstream of Depok, travel time of flood is 3 hours to Depok.
4) Operation : Possible to discharge to the Old Ciliwung up to 80 m^3/s in rainy season.
5) Others : Under the PWSCC but operation by DKI

(5) Karet Weir

1) Objectives : Flushing, Municipal water
2) Management office : Dinas PU DKI
3) Monitoring station : Manggarai weir 4.4 km upstream, Travel time of flood is 1 hour
4) Operation : Water-level on the upstream side is to be kept at 3.50m P.P to supply municipal water to Pejompongan treatment plant

(6) Pondok Pinang Weir

1) Objectives : Flushing
2) Management office : Dinas PU DKI
3) Monitoring station : Not available, but report to Jati Baru DKI
4) Operation : Full open during rainy season. The gate of Grogol river is to be closed but both should be fully opened in an emergency case.

(7) Koneng Weir

1) Objectives : Flushing, Irrigation
2) Management office : Dinas PU DKI
3) Monitoring station : Not available but report to Jati Baru
4) Operation : To be closed during dry season. To be fully opened during rainy season.
5) Others : Gates of Kneng II should be closed during dry season to supply flushing water and irrigation water to Sekretaris.

(8) Cengkareng Weir

1) Objectives : Flushing, Irrigation and as Salinity Barrier

2) Management office : PWSCC
3) Monitoring station : Not available, radio communication with DKI
4) Operation : To be fully opened during rainy season, and closed during dry season to supply flushing water and irrigation water to the right area
5) Others : Though gates are fully opened during rainy season, they are sometimes closed to prevent the encroachment of sea water.

(9) Pasar Baru Weir

1) Objectives : Irrigation, Municipal water
2) Management office : Cabang Dinas PU Pengairan, Tangerang
3) Monitoring station : Serpong 20 km upstream
4) Operation : Water-level on the upstream side is to be kept at 12.45m P.P
5) Others : Among 10 gates, only 2 gates are in a good condition.

(10) Rancasumur Weir

1) Objectives : Irrigation
2) Management office : Cabang Dinas PU Pengairan, Tangerang
3) Monitoring station : Not available
4) Operation : No operation gate

2.3 Information Management

The information treated in the area are:

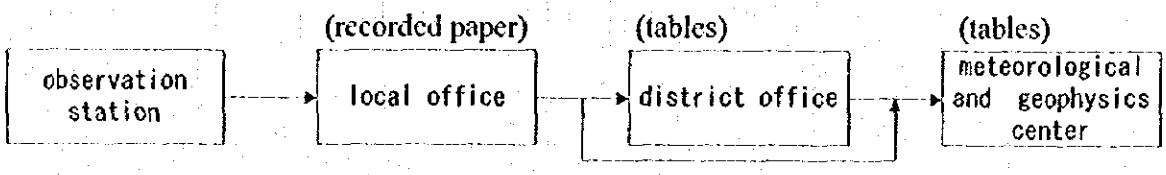
Hydrological information
- rainfall,
- water-level,
- tide

Facilities information
- opening of gates,
- intake water-level,
- discharge to the downstream

These information are managed by the agencies mentioned in sub-section 2.2 with the following flow :

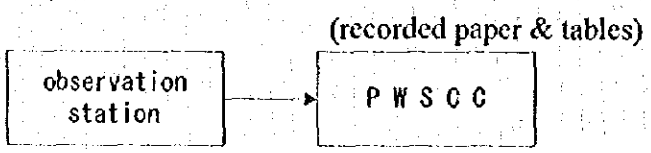
Rainfall (automatic)

BMG:

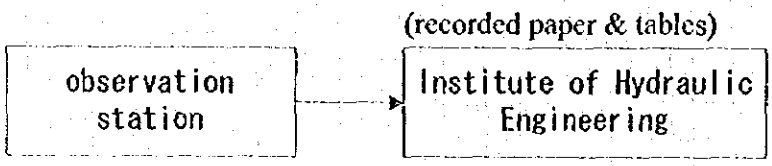


Badang Meteorogi dan Geofisika

PDSA:

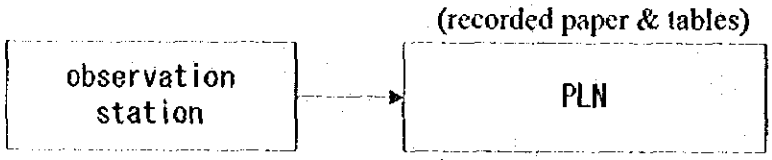


IHE:



Pusat Litbang Pengairan DPU

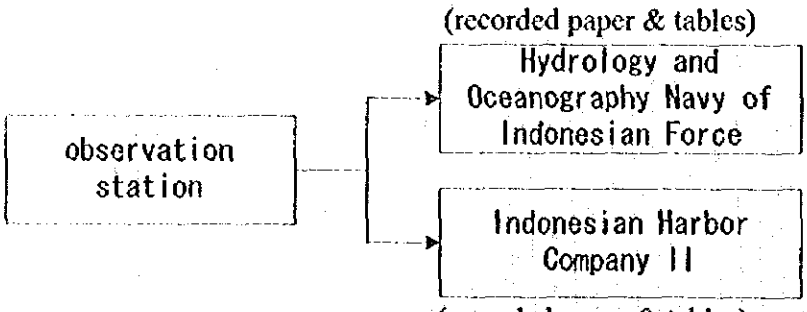
PLTA:



PLN Pusat

Tide:

Dinas Hidro - Oseanografi Tentara Negara Indonesia Angkatan Laut



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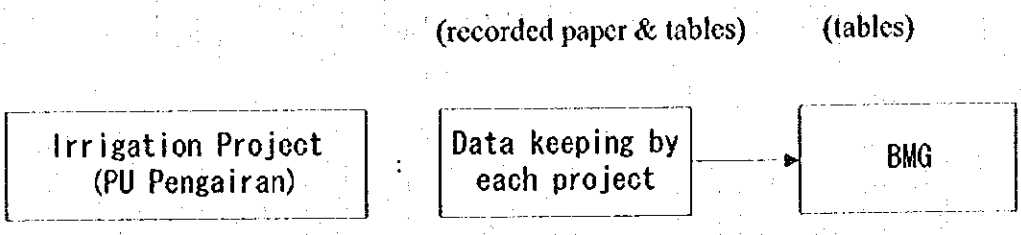
Daily Rainfall:



Water-level data recorded at observation stations of PDSA and POJ are sent to PWSCC too. In the eastern part of JABOTABEK, information about weirs are sent to POJ Bekasi from operation stations. In the central part of JABOTABEK, information about weirs are sent to PWSCC or DPU DKI respectively from the operation stations. In the western part of JABOTABEK, they are sent to Cabang DPU Tangerang from the operation stations.

2.4 High Water Management

(1) Communication

In the DKI Jakarta area, rivers and related facilities of the Angke to Cakung rivers are under the control of PWSCC and DPU DKI Jakarta separately.

In rainy season, both agencies set up flood monitoring and operation teams and both teams have close contact with each other through radio telephone. Communication system is set up as shown in Figure 2.15.

According to POL 1996 (Prosedur Operasi Laporan :PWSCC), rainy season is defined as the period from October 15,1995 to March 31,1996. The team of DKI Jati Baru is organized by 10 members and the members are on duty for 24 hours.

(2) Gate Operation

Gate operation in eastern area is under the control of POJ and that in western area is under the control of Cabang DPU Tangerang. The management of gate operation is determined as shown in Table 2.2.

The gate operation is conducted mainly under the principle that the water-level on the upstream side should be kept at certain level even during high flow. But gate opening is made in consideration of the carrying capacities in downstream reaches. Accordingly low-lying area along the river in upstream reaches may sometimes be inundated.

Cikarang and Bekasi weirs are very old facilities but still functioning though some leakage is found. These 2 weirs would not be fully opened in due consideration of the carrying capacities of the downstream reaches.

Lemahabang weir has been renewed recently and gate operation facilities are indoor but no staff gage is installed onto the weir. The water-level observation is conducted by using scale outdoors.

Gate operation of Manggarai weir and Karet weir is under the control of PWSCC but operation is presently conducted by DKI Jakarta.

Cengkareng weir gates are almost always fully opened during rainy season but are closed to prevent the sea water to flow to the upstream since the weir is located in the tidal reaches.

Pondok Pinang and Koneng weirs are fully opened during rainy season. Flushing gate of Pondok Pinang weir is opened recently because the discharge of the Pesanggrahan river are rather big.

Some gates of Pasar Baru weir among 10 gates are not functioning well.

2.5 Low Water Management

Low water management is presently conducted for the purpose of irrigation water supply, municipal and industrial water supply, and flushing water supply.

(1) Eastern Area

In the eastern area, the Lemahabang weir is for irrigation water supply. Cikarang weir and Bekasi weir are both for irrigation water supply, and municipal and industrial water supply. The operation of these weirs is conducted by the instruction of POJ Bekasi

(2) Central Area

In the central area, Katulampa weir is for Irrigation water supply, Manggarai weir is for flushing water supply, and Karet weir is for municipal and industrial water supply. Karet weir is operated to keep the water-level on the upstream side at 4.50m PP. to supply municipal and industrial water to Pejompongan Treatment Plant with the coordination of Manggrai weir. Manggarai weir is to supply maintenance flow of the old Ciliwung river but will not be opened when the water-level at Karet weir is below 4.50m P.P.

(3) Western Area

The following weirs are under the control of Cabang DPU Tangerang and the objectives of the weirs are as follows:

Pondok Pinang weir	: flushing water supply
Koneng weir	: flushing and irrigation water supply
Cengkareng weir	: flushing and irrigation water supply, and salinity barrier

Polor weir	: irrigation water supply
Pasar Baru weir	: irrigation, and municipal and industrial water supply
Rancasumur weir	: irrigation water supply

2.6 River Water Monitoring System

Establishment of Supervisory Control and Data Acquisition (SCADA) System is now underway for the purpose of flood control in the Ciliwung - Cisadane River Basin Development Project. As shown in Figure 2.16, this organization is furnished with 19 remote terminal units (RTU) and the Ciliwung - Cisadane River Basin Development Project is the master control station, and DGWRD is the monitoring station of this organization.

The remaining 17 stations other than the master control and the monitoring stations, consist of the following stations:

	Pumping station	Weir station	Water-level station
	Setiabudi Timur	Cakung	Lama Depok
	Setiabudi Barat	Sunter	Pesanggrahan
	Melati	Katulampa	
	Muara Angke	Manggarai	
	Pluit	Karet	
	Tomang	Cengkareng	
	Grogol		
	Rawakepa		
	Cideng		
Total	9	6	2

The master control station can monitor the situation of pumping stations and weirs, receive the data from the 17 stations and analyze the data. The master control station is equipped with display system of maps and graphs.

When this system is completed, it is possible to conduct the overall monitoring and control of these facilities, and the system would contribute much to the flood control in the area.

3. Proposed River Water Management Plan

3.1 Basic Principles of River Water Management

The functions of river are, not only the provision of safe flood route, provision of river water for the economic activities and human lives, but also the provision of amenity to the society by providing the open space and river water of proper water quality.

Terminology of river water management here is considered to be one of the aspects of river management. The basic objectives of river water management are, by proper operation of flow control facilities, to utilize the river water effectively for the society and to alleviate flood damages effectively.

For those objectives, information management, high flow management, low flow management, water quality management, and facilities management are needed.

(1) Information Management

Necessary information on rainfall, water-level, discharge, tide, river facilities and etc. for the purpose of river water management should be transmitted to a center, be processed, and be stored in a proper manner. Those information and data then should be displayed in a proper manner and then be transmitted to agencies concerned. In such a manner, management of necessary information and data should be centralized.

(2) High Flow Management

Forecast of high flow should be conducted and the necessary instructions based on the result of forecast should be given to operation offices of related facilities. At the same time, related information and data should be supplied to agencies concerned. These information and data would also be utilized for flood fighting activities.

(3) Low Flow Management

Accumulation of low flow data will contribute to planning formulation for appropriate water resources development. During a drought, forecast of low flow should be conducted and the necessary information and data should be supplied to related agencies and urgent countermeasure should be taken.

(4) Water Quality Management

Water quality has an important role not only for river water utilization but also for giving the amenity of river environment to the society along the river.

(5) Facilities Management

River area and related facilities should be properly maintained and operated to keep the

function of rivers, river water, and the related facilities properly.

To achieve the above-mentioned aspects, the following are also important aspects to take into consideration.

(6) Establishment of Overall Center

Overall center should be established for integrated management of river water management including the long-term keeping of hydrological data and operation information.

(7) Training

To assure the proper operation of facilities, training of operator should be conducted and operation manual should be prepared.

(8) Maintenance and Budget

To keep the proper function of facilities, repair and improvement should be periodically conducted. And for that purpose, appropriate budget should be obtained.

In the following sections, since this Study only focuses to the flood control aspect of river water management, low flow management and river water quality management are not included in the discussion.

3.2 River Water Monitoring System

3.2.1 Consideration to Existing Monitoring System

(1) Rainfall Gauging Station

Presently rainfall data observed are kept by respective agencies and there is no centralized data bank system in the area. And there is no data keeping system commonly established.

The observation network is still not enough in number and distribution. Especially gauging stations in the upstream basins of the Cikarang and the Cimanceuri rives are not enough.

(2) Water-level Gauging Station

Water-level gauging stations are mainly located in DKI Jakarta area. It is desirable to establish more stations in western area in future. The datum level of staff gauge at each station is not always clear.

There is no centralized data bank system in the area. There is no data keeping system commonly established.

(3) Discharge Observation Station

Discharge measurement has been conducted mainly during low flow. Data during high flow is rather insufficient. Cross-sectional profiles at discharge measurement sites are also insufficient.

(4) Monitoring System

SCADA System mentioned in the previous sub-section is now underway for establishment, but the coverage of the system is not enough for the whole JABOTABEK area.

3.2.2 Monitoring System

(1) Hierarchy

Overall monitoring system in JABOTABEK area should consists of a overall center, district centers, observation stations, and facilities stations.

The overall center should be at the Ciliwung - Cisadane River Basin Development Project (PIWSCC). District centers should be the eastern district center at DPU Bekasi, the central district center at PIWSCC, and the western district center at DPU Tangerang. Information transmission to DKI Jakarta should be conducted by the overall center.

The proposed locations of observation stations and facilities stations are shown in Figure 3.1. The hierarchy of the monitoring system is shown in Figure 3.2.

The functions of the centers and stations should be as follows:

1) Overall Center (PIWSCC)

Functions

Collection of data of the whole JABOTABEK area, process of collected data, data banking, monitoring of the operation of facilities, forecast of high flow, information, data and warning transmission to district centers and agencies concerned, and display of the situation, etc.

Facilities

Data communication control facilities, data bank facilities, computers for data display (EWS), computers for high flow forecast, data display panel, graphic display panel. telephone and facsimile, and radio communication equipment.

2) District Center (Bekasi, PIWSCC, Tangerang)

Functions

Monitoring of the information in the each area, data process, data banking, instructions to

Monitoring of the information in the each area, data process, data banking, instructions to facilities, and instructions to flood fighting teams.

Facilities

Data communication control facilities, data bank facilities, computers for data display (EWS), telephone and facsimile, and radio communication equipment, and ITV monitor.

3) Observation Station (rainfall, water-level)

Functions

Observation of rainfall and water-level, transmission of observed data to the district center

Facilities

Rainfall gauges, water-level gauges, and telemetering equipment

4) Facilities Station

Functions

Operation of facilities, monitoring of facilities situation, and transmission of situation to district center.

Facilities

Telephone and facsimile, radio communication equipment, and ITV monitor.

(2) Facilities

Necessaries facilities for river water monitoring are the observation facilities, communication facilities, operation facilities, and the management offices.

General view of facilities are shown in Figures 3.3.

Basic principles of the facilities are as follows:

1) Observation Facilities

Rainfall gauge and water-level gauge are of a type of automatic recorder and the data is to be transmitted to the district center by telemeter.

ITV is needed to be installed at the weir site where the gate operation is needed to monitor the situation of river water, gate operation, and the others.

For telecommunication between the stations and the centers, telecommunication facilities are needed to be installed.

3) Operation Facilities

Other than the operation facilities of gates, the operation facilities of monitoring system are needed for information collection, data keeping, data processing, display and others. The necessary functions are as follows:

a) Collection and keeping of data and information
b) Data process for supplement of lost data and for flood forecasting
c) Display of data and information
d) Transmission of collected data, information, and processed data.

(3) Cost Estimate

Rough cost estimate is conducted for the following:

a) cost of observation facilities
b) cost of telecommunication facilities
c) cost of operation facilities
d) cost of maintenance
e) cost of installation and construction
f) cost of miscellaneous including engineering services
g) construction cost

As shown in Table 3.1, the total cost is roughly estimated at about ¥1.46 billion.

3.3 Management of Flood Control Facilities

Flood control facilities should be properly operated to prevent the flood disaster or to mitigate the flood damage. The flood control facilities include dams, weirs, water gates, embankment, and others. For the management of those facilities, the following should be determined:

(1) Water-level Stages

Staging of river water-level should be determined as the indexes for various activities of flood fighting. The reporting level and warning level of river water-level should be determined basically based on the following:

Warning Level
- the water-level for the discharge corresponding to about half of the design flood

discharge,
- the water-level corresponding to 60% from the average low-flow level to HWL,
- the water-level corresponding to the probability of 1 in 3 years,
- the water-level corresponding to the elevation of berm of embankment.

Attention Level
- the water-level for the discharge corresponding to about 20% of design flood discharge,
- the water-level corresponding to the probability of 5 - 10 in one year,
- the water-level corresponding to the elevation of high-water channel.

(2) Operation Rule

Operation rule of facilities should be determined about the water-level/discharge to be the criteria for operation, operation method, inspection of facilities, observation of hydrological and hydraulic data, and others. The following should be taken into consideration:

1. operation water-level
2. operation method
    - operation rule during flood
    - operation rule during normal flow
    - reporting
3. warning system
    - execution of warning level activities
    - measures for warning level activities (members, observation, data collection)
    - call off the warning level activities
4. others
    - inspection/repair
    - observation
    - daily report

3.4 Management of Construction and Temporary Occupation in River Area

The management of river area is an important aspect of proper management of river water. In the river area, constructions, green belt, park approved by the river management authorities, and other many kinds of constructions are found. These should not obstruct the smooth flow of high flow in the river.

Among others, the following should be paid special attention from the view point of flood control:

1) Location and Dimensions of Bridge

Location and dimensions of bridge crossing the river have a close relation to the smooth flow of flood. Substantial principles on bridge construction should be established.

2) Occupation of River Area

Occupation of river area should not obstruct the smooth flow of flood. Since one of the functions of river is the provision of open space to the society especially in urban area where dense land use is dominant. It is said that open space in densely populated area has an important role for the soundness of society. River management authorities should have clear criteria to approve the occupation of river area and should periodically inspect the situation so that the occupation would not hinder the normal function of the river.

3) Sand Mining

Sand mining has an close relation not only with the low flow and river water quality, but also has an close relation to high flow since the river facilities may loose the foundation so easily depending the way and quantity of sand mining in the river. Accordingly the river management authorities should have criteria to approve the sand mining not only about the quantity but also the location, method and equipment, and about the duties for safe guard to local people.

3.5 Flood Fighting Activities

(1) Purpose

Purpose of flood control could not be achieved only by structural measures such as construction of embankment, dam, floodway and others.

Flood fighting activity is one of the important aspects of flood control and accordingly one of the important aspects of river water management. The purpose of flood fighting activities is to mitigate the flood damage to the possible minimum level.

Major components of flood fighting activities consist of the following:

1) to the resident

- transmission of flood related information
- establishment of readiness against flooding
- acceleration of flood fighting activities
- instructions for evacuation
- rescue activities for the victims

2) to the river facilities

- instructions about proper operation of facilities
- inspection of facilities about function and damage
- necessary activities to protect the embankment and other facilities against overflow, water penetration and scouring

(2) Information Transmission for Flood Fighting

For the timely and smooth execution of flood fighting activities, the following should be attained:

1) Information transmission should be conducted timely.
2) Correct information should be transmitted.
3) Transmission should be conducted in a short time and properly.

Agencies related to flood fighting activities should determine the measures and methods about the information transmission and should carry out the practice.

(3) Announcement on Flood Fighting

Announcement on flood fighting should be made to agencies related to flood fighting when the overall center of river water management judges that it is necessary to conduct flood fighting activities.

Types of announcement consists of the following:

1) stand by
2) preparation
3) dispatch
4) instruction
5) call off

(4) Evacuation

When it is necessary for the people residing riverine area to evacuate, the chief of local government or of the public organization should give instruction to the people to evacuate for the safety of the people.

The procedure and method should be determined and practice should be made beforehand.

3.6 Restriction of Land Use

Land to be restricted for use from the view point of flood control consists of the following:

- in the upstream basin,
- in the urban area,
- in the riverine area,
- in the land to be river area in the future,
- flood prone area

1) Upstream Basin

The land use restriction in the upstream basin should be conducted from the view point to suppress the increase of runoff. The river improvement in the downstream reaches become more and more difficult due to the land use intensification.

2) Urban Area

River area also plays an important role as disaster prevention area and urgent evacuation place. Accordingly the city planning should take into consideration of the role of the river area in urban area. Appropriate land use restriction should be made depending on the role of river area in the urban area.

3) Riverine Area

Land use restriction in riverine area should be conducted from the view point of above-mentioned role of river area and to keep the amenity role of the river area.

4) Area to be River Area in the Future

Any kind of construction in the area to be river area in the future should be executed after obtaining the approval of the river management authority so that future river construction is assured.

5) Flood Prone Area

Due to various circumstances, some flood control structures could not be constructed in due time and accordingly some area would remain as flood prone area. In such a case, land use restriction should be made to minimize the flood damage as much as possible.