

ENVIRONMENTAL MANAGEMENT EFFORT (UKL) AND ENVIRONMENTAL MONITORING EFFORT (UPL)

**RAJAMANDALA 47 MW
HYDRO ELECTRIC POWER PLANT (HEPP)
WEST BANDUNG AND CIANJUR REGENCY**

WEST JAVA PROVINCE



January, 2012



PEMERINTAH PROVINSI JAWA BARAT
BADAN PENGELOLAAN LINGKUNGAN HIDUP DAERAH
BPLHD

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Bandung, 4 Januari 2012

Nomor : 660.1/ 41 /I/2012
Sifat : Biasa
Lampiran : 1 (satu) berkas dokumen
Perihal : Rekomendasi atas Upaya Pengelolaan Lingkungan (UKL) dan Upaya Pemantauan Lingkungan (UPL) Rencana Kegiatan Pembangunan PLTA Rajamandala 47 MW di Kab. Bandung Barat dan Cianjur

Kepada
Yth. Konsorsium PT. Indonesia Power – Kansai
Electric Power Co. Inc.
Jl. Jend. Gatot Subroto Kav. 18
di

JAKARTA

Menindaklanjuti surat Saudara Nomor : 007/DEC/RJM/2011 tanggal 23 Desember 2011 perihal Penyerahan Dokumen Perbaikan UKL-UPL PLTA Rajamandala 47 MW, dan memperhatikan risalah hasil rapat Nomor : 660.1/4.631/I/2011 tanggal 14 Nopember 2010 yang dilakukan melalui rapat pada tanggal 10 Nopember 2011 dan rapat Tim Teknis pada tanggal 20 Desember 2011 serta setelah melakukan evaluasi terhadap hasil perbaikan atas dokumen dimaksud, maka terhadap dokumen UKL-UPL untuk Rencana Kegiatan Pembangunan PLTA Rajamandala 47 MW yang berlokasi di Kabupaten Bandung Barat dan Cianjur tersebut secara teknis dapat **disetujui**, dengan memperhatikan hal-hal sebagai berikut :

1. UKL-UPL yang telah disetujui tersebut merupakan bagian yang tidak terpisahkan dari surat rekomendasi ini dan menjadi acuan bagi penanggungjawab kegiatan dalam menjalankan kegiatannya dengan tetap berpedoman pada peraturan perundangan yang berlaku;
2. Apabila terjadi pemindahan lokasi kegiatan, desain, proses, kapasitas, bahan baku dan/atau bahan penolong atas usaha dan/atau kegiatan, terjadi bencana alam dan/atau yang lainnya yang menyebabkan perubahan lingkungan yang sangat mendasar baik sebelum maupun saat pelaksanaan kegiatan, maka penanggungjawab kegiatan wajib menyusun dokumen UKL-UPL atau AMDAL baru sesuai ketentuan peraturan perundang-undangan yang berlaku;
3. Penanggungjawab kegiatan Konsorsium PT. Indonesia Power – Kansai Electric Power Co. Inc. wajib melakukan seluruh ketentuan yang tercantum dalam dokumen UKL-UPL dan bertanggungjawab sepenuhnya atas pengelolaan dan pemantauan dampak lingkungan dari kegiatan yang dilakukannya;
4. Penanggungjawab kegiatan Konsorsium PT. Indonesia Power – Kansai Electric Power Co. Inc. wajib melaporkan pelaksanaan upaya pengelolaan dan pemantauan lingkungan hidup yang tercantum dalam dokumen UKL-UPL tersebut kepada instansi pengelola lingkungan hidup dimana kegiatan tersebut berada serta instansi sektor terkait (termasuk instansi pemberi izin) setiap 6 (enam) bulan sekali terhitung sejak diterbitkannya surat rekomendasi ini.
5. Selanjutnya Dinas/Instansi terkait akan melakukan pengawasan terhadap pelaksanaan ketentuan-ketentuan yang wajib dilakukan oleh penanggungjawab kegiatan yang tercantum dalam perizinan sebagaimana dimaksud.

Demikian persetujuan ini diberikan untuk dipergunakan sebagaimana mestinya dan untuk dilaksanakan sebaik-baiknya.

KEPALA BPLHD PROVINSI JAWA BARAT,



Dr. Ir. SETIAWAN W. Dipl. S.E.M. Eng.
Pembina Utama Muda
NIP. 196308261990011001

Tembusan disampaikan kepada Yth. :

1. Bapak Gubernur Jawa Barat (sebagai laporan).
2. Kepala Dinas Energi dan Sumber Daya Mineral Provinsi Jawa Barat.
3. Kepala Kantor Lingkungan Hidup Kab. Bandung Barat.
4. Kepala Kantor Lingkungan Hidup Kab. Cianjur.

Rajamandala 47 MW HEPP UKL-UPL Study
West Bandung and Cianjur Regency - West Java Province

PREFACE

PREFACE

In order to meet the electrical energy demand growth, especially in West Java Area and in order to improve reliability in electricity, then PT. Indonesia Power, a subsidiary of PT PLN (Persero) in collaboration with KANSAI Electric Power Co., Inc., Rajamandala HEPP development plan, with a capacity of 47 MW, located in Cihea Village, Haurwangi Subdistrict Cianjur Regency and Rajamandala Kulon Village, Cipatat Subdistrict, West Bandung Regency, West Java Province. This development plan can have an impact on environment around the building, so it required an environmental study.

Based on Regulation of Environment Ministry No. 11 of 2006, development plans of Rajamandala 47 MW HEPP is not required to be completed with EIA documents. However, those activity shall completed with Environmental Management Efforts (UKL) and Environmental Monitoring Efforts (UPL) documents, which refers to Environmental Ministry Regulation No. 13 of 2010 concerning Environmental Management Effort and Environmental Monitoring Efforts and Commitment Statement management and Environmental Monitoring.

Finally, we appreciate to all parties who helped us to prepare of these documents. Hopefully this document provide benefits to parties and stakeholders in environmental management.

Jakarta, December 2011

On Behalf of Consortium PT. Indonesia Power –
Kansai Electric Power Co. Inc

DIRECTOR OF DEVELOPMENT AND COMMERCIAL
PT. INDONESIA POWER

INDONESIA
POWER
SUPANGKAT IWAN SANTOSO

Rajamandala 47 MW HEPP UKL-UPL Study
West Bandung and Cianjur Regency - West Java Province

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CHAPTER 1

INITIATOR IDENTITY



Chapter 1

INITIATOR IDENTITY

1.1. Background

In order to reduce use of fuel oil at power plants owned by PT PLN (Persero), and to be able to meet needs of electrical energy continues to rise, government has set a national energy policy of Republic of Indonesia through Presidential Regulation No. 5 Year 2006 on National Energy Policy. Priorities are reflected in development program of 10,000 MW, of which 70% of the plan are met through development of renewable energy.

Construction of hydroelectric power is one of priority Government of Republic of Indonesia in search of alternative energy sources. These efforts in line with policy of diversification of energy, petroleum savings efforts and need for electricity is increasing in Indonesia, particularly in Java. One source of renewable energy and has potential of vast natural resources at Indonesians who have not been utilized as a primary energy source for purposes of Hydro power plant is energy. Hydro energy potential which is owned by the Indonesians are very large, while utilization as primary energy for purposes of generating only about 6% of the potential that exists

In 2003 have been prepared in UKL-UPL Rajamandala 30 MW HEPP, which has received approval from the Head of BPLHD West Java Province Number 1216/060/IP/2004. However, existence of some economic and technical considerations, then PT. Indonesia Power, a subsidiary of PT. PLN (Persero) in cooperation with KANSAI Electric Power Co., Inc. Plan back to build Hydroelectric Power Plant (HEPP) Rajamandala with 47 MW capacity, located in Cihea Village and Rajamandala Kulon Village.

Referring to Regulation of Environment Minister No. 11 of 2006 on Types of Business Plan and/or Activity Equipped With Mandatory Environmental Impact Analysis, activities are not required to perform environmental impact analysis, because it has a capacity of less than 50 MW to arrange study Environmental Management Efforts (UKL) and Monitoring environment Efforts (UPL).

1.2. Initiator Identity

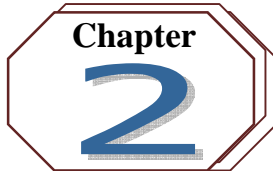
- a) Institution name : Consortium PT. Indonesia Power – Kansai Electric Power Co.
- b) Address : Jl. Jenderal Gatot Subroto Kav. 18 Jakarta 12950
- c) Phone : (021) 5267666 (Hunting)
- d) Fax : (021) 5250824 – (021) 5262627

1.3. UKL-UPL Compiler Identity

- a) Consultant : PT. Kwarsa Hexagon
- b) Address : Jl. Rancabolang No. 36 Bandung 40286
- c) Telephon : (022) 7562107 (Hunting)
- d) Fax : (022) 7502183
- e) Study Compiler Team :
 - Team Leader : Sulaeman, MT
 - Planology Expert : Budhi Darmawan, ST
 - Geology Expert : Ir. Sutarno
 - Biology Expert : Nurlaela, S.Si
 - Electro Expert : Teguh Arfianto, ST
 - Socio-Economic-Cultural Expert : Much Anwar, SE
 - Public Health Expert: Dr. Sony Adam

CHAPTER 2

BUSINESS PLAN AND/OR ACTIVITY



Chapter 2

BUSINESS PLAN AND/OR ACTIVITY

2.1. Name of business plan and/or activities

The name of activity plan development is Rajamandala 47 MW Hydro Electric Power Plant (HEPP).

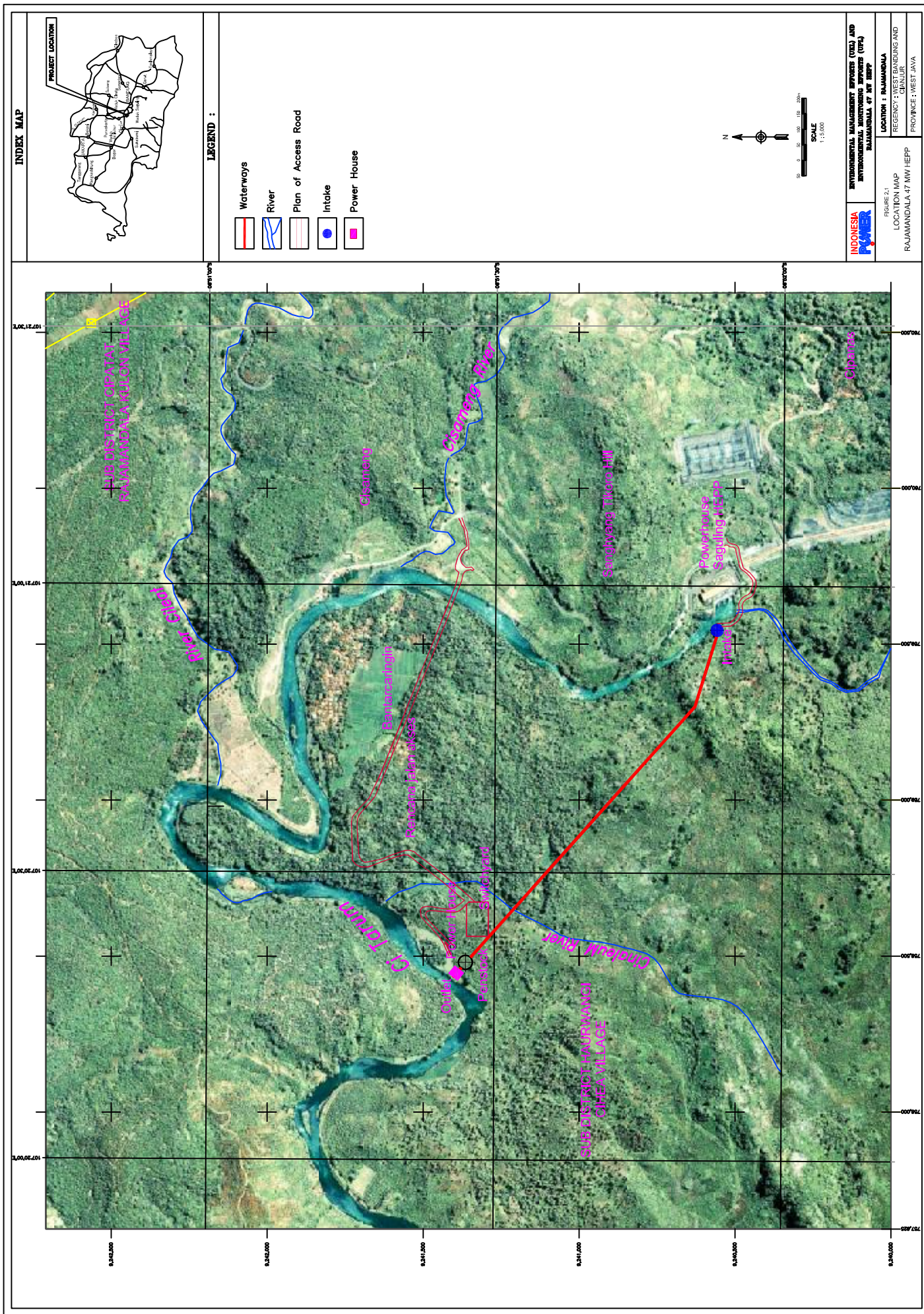
2.2. Location of business plan and/or activities

Location plan of development activities Rajamandala 47 MW Hydro Electric Power Plant in the administration, namely:

- Kampung : Cisameng and Bantarcaringin
- Village : Rajamandala Kulon and Cihea
- Sub-District : Cipatat and Haurwangi
- District : West Bandung and Cianjur
- Province : West Java

The distance from Bandung city is about 60 km (**Figure. 2.1.**). Site Project can be reached from Bandung city with four wheel drive vehicles, for approximately 2 hours by road paved Saguling HEPP conductivity.

Area land for development activities Rajamandala 47 MW Hydro Electric Power Plant (HEPP) is approximately 26.7 Ha of land, including for temporary facilities, intake area, headrace, powerhouse, outlet areas, disposal areas and access road.



2.3. Scale of business and/or Activities :

a. Main components of Rajamandala Hydro Electric Power Plant (HEPP)

▪ Capacity of Plant

Types of Hydro Electric Power Plant to be constructed, is water way type with an installed capacity of 47 MW generated by one turbine unit, which is driven by flow of water delivered from outlet of Saguling Hydro Electric Power Plant along ± 1.2 km with a maximum discharge is $168 \text{ m}^3/\text{sec}$. Energy generated will be channeled through 150 kV Transmission Line to 150 kV toward SUTT of Cigereleng-Cianjur. Generating capacity, discharge plan and elevation of water level in intake and outlet can be seen in **Table 2.1**

Table 2.1. Generating capacity, discharge and water level elevation

No.	Description	Size
1	Maximum capacity	47 MW
2	The maximum water discharge	$168 \text{ m}^3/\text{sec}$
3	Effective Head	31.7 meter
4	The annual generation capacity	181 GWh
5	Water level at intake	Elevation 253,500 meter
6	Water level at outlet	Elevation 219,500 meter

Source : PT. Indonesia Power, 2011

▪ Weir

The weir will be constructed just downstream of the outlet of the Saguling HEPP on the right bank of the Citarum river to take the water from the Citarum river into the intake for power generation. The weir will have the outlet facility to release the compensation flow discharge to the downstream. Description of weir can be seen in **Table 2.2.**

Table 2.2. Description of weir

No	weir	Size
1	Type	Floating type
2	Width	55.9 m
3	Height	4.7 m
4	Length	15.5 m

Source : PT. Indonesia Power, 2011.

▪ Intake

The intake will be constructed on the left bank of the Citarum river to take the water from the Citarum river into the waterway for power generation at the Plant. The intake will have the function to steadily draw the maximum discharge of $168 \text{ m}^3/\text{sec}$. The intake will be designed so that the intake

stability can be secured in both flood case and earthquake case, and will be constructed on foundation with sufficient bearing strength. At the front of the intake, a trash-rack(s) will be installed to prevent any driftwood, trash, etc. from flowing into the headrace tunnel. An intake gate(s) will also be installed at the downstream of the trashrack(s). Description of intake can be seen in **Table 2.3**.

Table 2.3. Description of intake

No	intake	Dimensi
1	Width	11,1 – 32,2 m
2	Height	8.4 – 11,3 m
3	Length	32,6 m

Source : PT. Indonesia Power, 2011.

■ Headrace

The headrace will be constructed between the intake and the head tank. The headrace will consist of the headrace tunnel section and the open channel section. The water taken from the intake will flow through the headrace tunnel and the open channel to the head tank. The headrace tunnel will be a non-pressure tunnel type. The size of the headrace tunnel will be designed so that the maximum design discharge of 168m³/sec can flow steadily in non-pressure condition. And tunnel support works will be done by such as shotcrete, rock bolts and H-section steel supportings.

Description of headrace can be seen in **Table 2.4**.

Table 2.4. Description of headrace

	No	headrace	Size
Tunnel	1	Type	Non pressure
	2	Length	1,076 m
	3	Internal height	8.5 m
	4	Internal width	8.6 m
Open channel	5	Length	94.4 m
	6	Internal height	8.8 - 8.9 m
	7	Internal width	8.6 m

Source : PT. Indonesia Power, 2011.

■ Headtank

The head tank will be constructed between the headrace and the penstock. The head tank will have the function to regulate the difference of water volume between the amount of inflow into the head tank through the headrace and the amount of outflow from the head tank to the penstock in

response to the load fluctuation. The head tank will also have enough water surface area to maintain stable water level for the automatic water level regulation system using the water level detector at the head tank. The entrance of the penstock will be designed so as to maintain smooth inflow into the penstock and to prevent adverse influence to the penstock and water turbine due to air entraining. The head tank will have a sand drain valve to drain the soil and sand deposited on the bottom of the head tank. At the entrance of the penstock, a trashrack(s) will be installed. Description of head tank can be seen in **Table 2.5**.

Table 2.5. Description of head tank

No	Head tank	Dimensi
1	Type	Side channel spillway
2	Width	11.1 - 29.5 m
3	Height	10.4 - 21.8 m
4	Length	106.5 m

Source : PT. Indonesia Power, 2011.

■ Penstock

The penstock will be constructed between the head tank and the powerhouse. The penstock will have appropriate watertightness. The penstock will be designed to resist against internal pressure produced by hydrostatic water head, up-surfing plus pressure rise due to water hammer. Description of headrace can be seen in **Table 2.6**.

Table 2.6. Description of penstock

No	Penstock	Size
1	Internal diameter	15.0 m
2	Length	41.2 m

Source : PT. Indonesia Power, 2011.

■ Powerhouse

The powerhouse will be constructed on the left bank of the Citarum river at the upstream of the Cirata reservoir. The powerhouse will be designed to accommodate one (1) turbine and generator unit. The powerhouse will be built on sound rock foundation with sufficient bearing strength. The ground floor level of the powerhouse will be determined in order to avoid inundation. Excavated slopes around the powerhouse will be protected to maintain slope stability as a permanent structure. The substructure of the powerhouse will not allow serious water leakage which causes problems in

operation and maintenance of the powerhouse. Enough space for operation and maintenance will be allocated around the powerhouse. Description of powerhouse can be seen in **Table 2.7.**

Table 2.7. Description of powerhouse

No	Powerhouse	Size
1	Type	Semi Underground
2	Width	28.0 m
3	Height	19.0 m
4	Length	35.3 m

Source : PT. Indonesia Power, 2011.

■ Tailrace

The tailrace will be a part of the waterway necessary to discharge the water from the draft tube to the Citarum river. After power generation, the water is released to the Citarum river through tailrace. The tailrace will have the stop-logs for maintenance work. Description of tailrace can be seen in **Table 2.8.**

Table 2.8. Description of tailrace

No	Tailrace	Size
1	Type	Tunnel
2	Internal width	7.5 - 11.9 m
3	Internal height	5.6 – 7.5 m
4	Length	22.0 m

Source : PT. Indonesia Power, 2011.

■ Electrical Equipment

A Turbine used to Rajamandala 47 MW HEPP is vertical shaft Kaplan type. A Generator is a vertical shaft type Generator 3 phase AC Synchronous generator. Description of a turbine and a generator can be seen in **Table 2.9.**

Table 2.9. Description of a turbine and a generator

1	Turbine	Type	Vertical shaft Kaplan
		Number	1
2	Generator	Type	Vertical shaft 3 fase AC Synchronous generator
		Number	1

Source : PT. Indonesia Power, 2011.

b. Supporting components of Rajamandala HEPP

▪ Acces road

There will be following two (2) routes for the access roads:

- Existing road – Saguling power station – Intake;

The route will be selected so as to minimize adverse impacts to the existing facilities, farmland and daily life of the surrounding local people due to widening and/or construction of new roads.

- Existing road – Powerhouse, Tailrace outlet, Switchyard, etc.

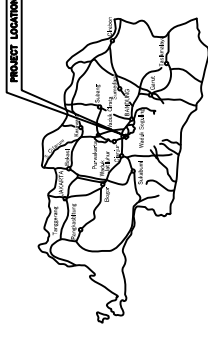
The route up to each permanent structure to be required for operation and maintenance after Commercial Operation Date will be constructed. The route will be planned so as to minimize adverse impacts to the existing facilities, farmland and daily life of surrounding local people due to widening and/or construction new roads.

The access road will be safe for the transportation for construction, operation and maintenance of the power station. Plan access road can be seen in Figure 2.3.

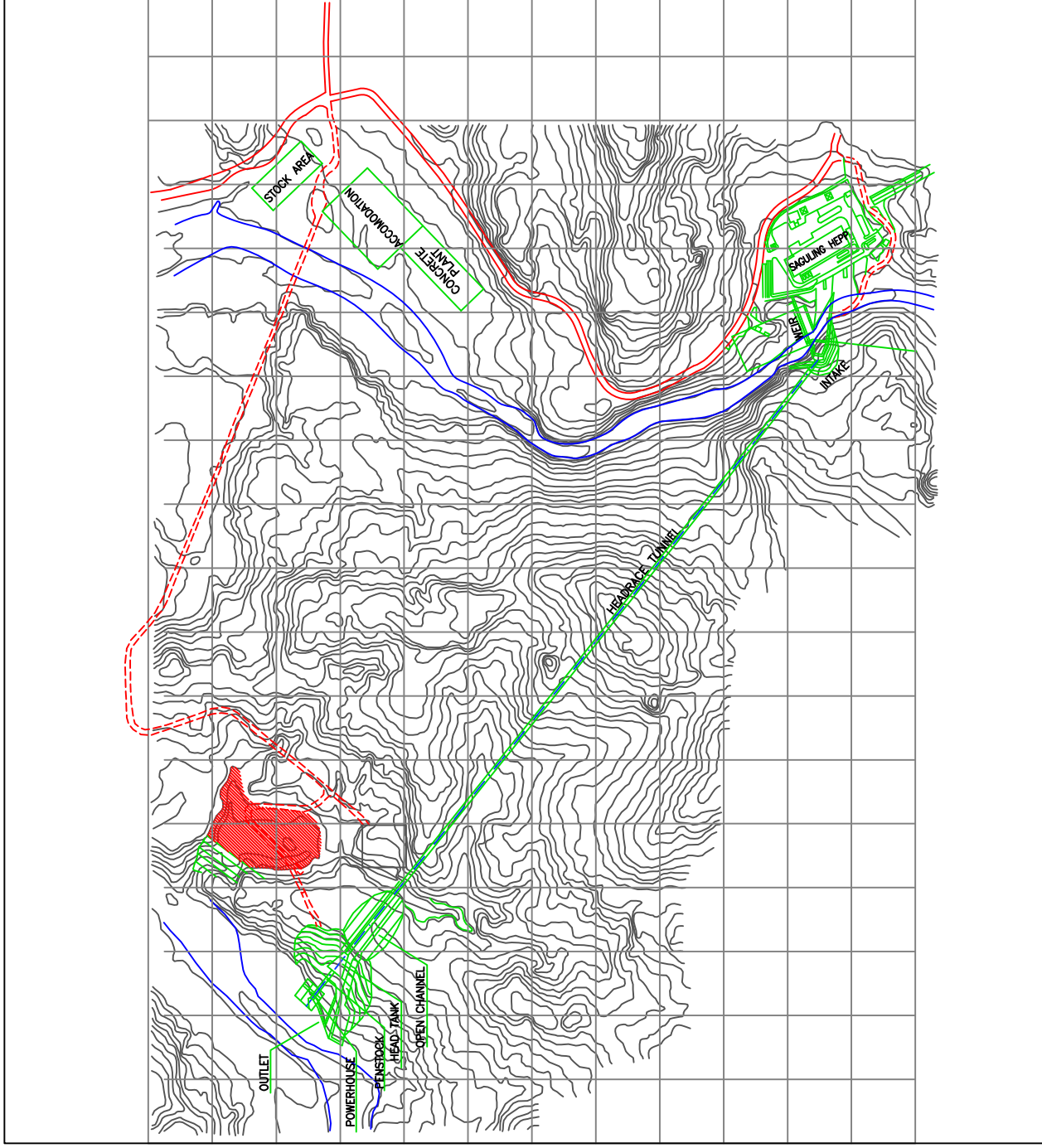
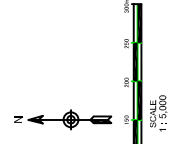
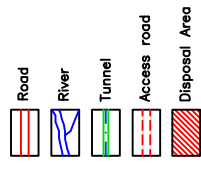
▪ Project Office/Base camp

Project office / Base camp for Consortium PT. Indonesian Power – Kansai Electric Power Co. and contractors staff during construction activities will be located near location of activities. Figure general plan Rajamandala 47 MW HEPP development can be seen in **Figure 2.2**, while the elongated pieces can be seen in **Figure 2.3**.

MAP INDEX

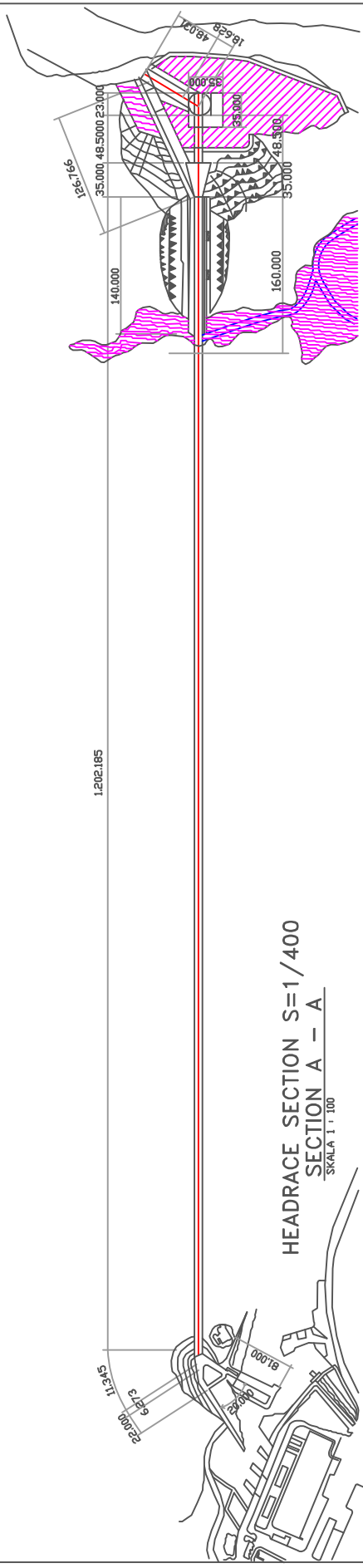


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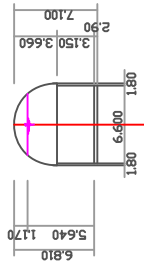


INDONESIA
RAJAMANDALA 47 MW HEPP
ENVIRONMENTAL MONITORING EFFORTS (UPL)

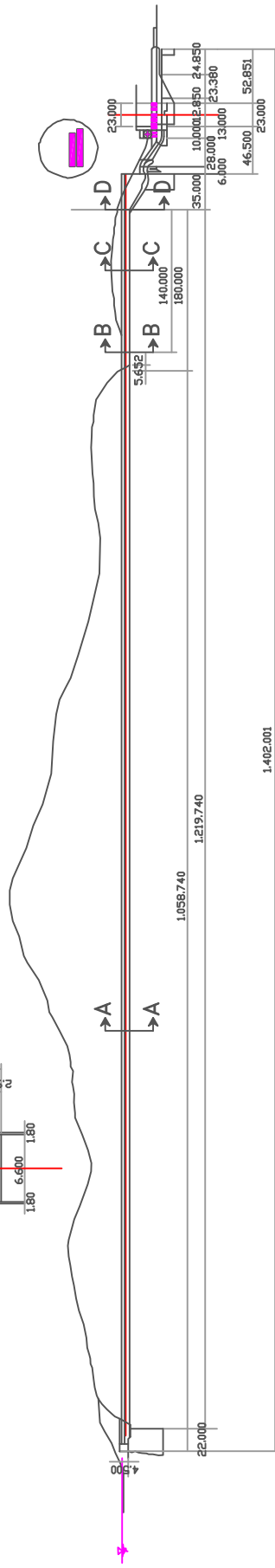
FIGURE 22
LAY OUT
RAJAMANDALA 47 MW HEPP
LOCATION : RAJAMANDALA
REGENCY : WEST BANDUNG AND
CILIKUR
PROVINCE : WEST JAVA



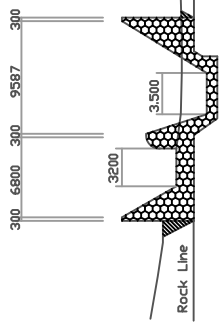
HEADRACE SECTION S=1/400
SECTION A - A
SKALA 1 : 100



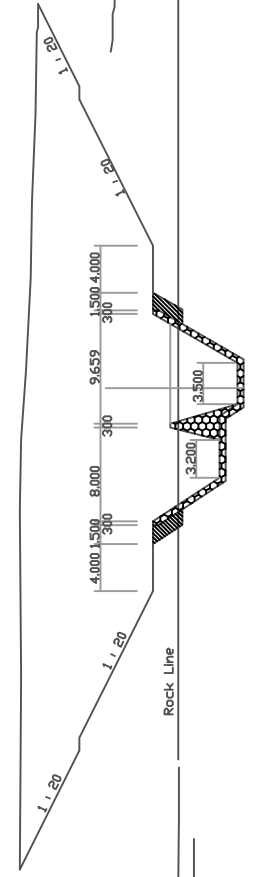
WATERWAY LONGITUDINAL SECTION s=1/4.000



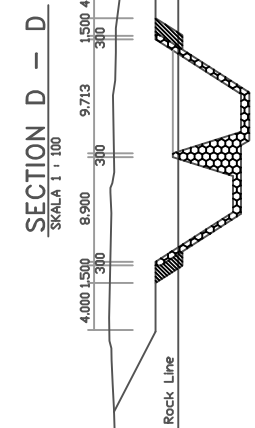
WATERWAY SECTION s=1/500



SECTION B - B
SKALA 1 : 100



SECTION C - C
SKALA 1 : 100



SECTION D - D
SKALA 1 : 100

	ENVIRONMENTAL MANAGEMENT EFFORTS (UML) AND ENVIRONMENTAL MONITORING REPORTS (UPL)	
	RAJAMANDALA 47 MW HEPP	
	LOCATION : RAJAMANDALA	FIGURE 2.3
	REGENCY : WEST BENGALURU AND RAJAMANDALA 47 MW HEPP PROVINCE : WEST JAVA	ELONGATED PIECES RAJAMANDALA 47 MW HEPP CINAJUR

2.4. Components Outline of Business Plan and/or Activities

An outline of activity plan phases for Rajamandala 47 MW HEPP is divided into three phases activities, namely of pre-construction phase, construction phase and operational phase.

a. Pre-construction Stage

At this phase activities carried out in general non-physical activities such as field surveys, to study architecture, engineering feasibility, environmental feasibility studies and land acquisition. Some of above activities will involve relevant agencies such as Government of West Bandung Regency and Cianjur Regency, National Land Agency, Corps of Forestly and, Corps Resources and Water.

Communities affected arable land release will be resolved by compensation for land, buildings and plant on it through consultation between the proponent, owner / tenant of land as well as government officials. The number of people affected landowners owned the land acquisition by about 42 head of the Family. The plan area of land required for Rajamandala HEPP can be seen in **Table 2.10**.

Table 2.10. Plan of Land Used For Rajamandala HEPP

No	Name	Plan of Use	Administrative Area	Land Area (Ha)	Name of Land Owner	Land Use
1	Temporary Facilities	Concrete Plant Accomodation Stock Area	Cipatat Sub District, West Bandung Regency	5,3	PT. PLN	Moor Field
2	Intake Area	River Excavation Cutting and Slop Protect Weir Intake Stucture	Cipatat and Haurwangi Sub District, West Bandung and Cianjur Regency	0,8	PERUM PERHUTANI	Mixed garden
3	Headrache	Cutting and Slope Protect Open Channel Tunnel	Haurwangi Sub District Cianjur Regency	1,9	PERUM PERHUTANI PERUM PERHUTANI Village Land	Mixed garden
4	Powerhouse Area	Cutting and Slope Protect Spillway Headtank Penstock Powerhouse	Haurwangi Sub District Cianjur Regency	6,0	Village Land PERUM PERHUTANI PERUM PERHUTANI Village Land Village Land	Mixed gardens and Rice fields
5	Disposal Area	Filling	Haurwangi Sub District, Cianjur Regency	5.9	Land owned by citizens	Mixed Garden and Rice Field
6	Access Road	Access Road	Cipatat and Haurwangi Sub District, West Bandung and Cianjur Regency	6.8	Land owned by citizens	Mixed Garden, Yard and RiceField

Source : Kansai Electric Power Co.,Inc, 2011

b. Construction Stage

In construction Stage, activities undertaken are:

■ Labor Mobilization

Labor Mobilization will be recruited before execution of construction activities. Temporary housing for arrivals workers will built a basecamp around project site. Recruitment of labor needed during construction activities, especially for workers who meet criteria required and needed to be optimized from locals people .

Amount of labor mobilized is around 250 person, mostly using local people as follows:

- i. Mobilization of equipment and construction materials as many as 21 person with details :
 - Coordinator : 2 person
 - Civil Supervisor : 1 person
 - Supervisors elmek : 2 person
 - Driver : 2 person
 - Security : 4 person
- ii. Base camp construction and road carrying as many as 31 person with details :
 - Supervisors : 1 person
 - Vulcan : 4 person
 - Tailor Dig : 8 person
 - Carpenter : 8 person
 - Tailor of conveyance : 10 person
- iii. Construction of weir and intake as many as 75 person, comprising :
 - Technical Power : 4 person
 - Supervisors : 2 person
 - Tailor Dig : 12 person
 - Carpenter : 6 person
 - Vulcan : 4 person
 - Tailor the wall : 8 person
 - Power begisting : 4 person
 - Power foundry : 27 person
 - Operator vibrator : 8 person
- iv. Construction of Powerhouse and Tailrace as many as 95 person, comprising:
 - Technical Power : 4 person

- Supervisor : 3 person
 - Power begesting : 8 person
 - Power foundry : 30 person
 - Operator vibrator : 10 Person
 - Tailor the wall : 12 person
 - Tailor Dig : 20 person
 - Carpenter : 8 person
- v. Transportation and Stockpiling Soil Former mining as many as 28 person, comprising :
- Supervisors : 2 person
 - Driver : 4 person
 - Operator tools : 2 person
 - Tailor dig : 12 person
 - Tailor of conveyance : 8 person

▪ Mobilization of Equipment and Construction Materials

Most of major equipment for construction of Rajamandala HEPP be imported from outside project site. Equipment will be transported to project site by truck or trailer through main streets of Rajamandala and UBP Saguling HEPP.

Type of equipment used, are *Excavator* (back hoe), *Wheel loaders*, *dum truck* transporters, etc. Equipment is imported only once to the project site. Meanwhile, construction material composed of electrical components and buildings, among others turbine, sand, stone, cement, iron concrete, steel plate.

Mobilization of heavy equipment will be implemented in accordance with procedures and construction schedules and work plans from contractor. The work will take place at all times of a construction work. Heavy equipment is expected to be used and capacity of each tool to be used in project construction activities are as listed in **Table 2.11**.

Tabel 2.11 Capacity Used Equipment

No.	Types of Tools	Capacity
1	Back Hoe	1.50 m ³
2	Bulldozer	1.25 m ³
3	Road Roller	8-10 Ton
4	Vibro Roller	6-8 Ton
5	Grader	2.00 m ³
6	Crane	10 Ton
7	Drill	-
8	Mollen	5.00 m ³

No.	Types of Tools	Capacity
9	Vibrator	-
10	Dump Truck	10 m ³
11	Pneumatic Tyre Roller	8-10 Ton
12	Tandem Roller	8-10 Ton
13	Asphalt Mixing Plant	50 Ton/jam

Source : PT. Indonesia Power, 2011.

■ Development of basecamp and Access Road

Access Road construction will begin with maturation of land vegetation clearing, stripping land and soil grating. This activity will include clearing vegetation, cutting trees and shrubs located on land that will be Access road. Next job is a series of maturation of land that is peeled hardening using a grinding machine which is then followed by road construction and paving road.

The length of road conductivity (access road) which is planned for 1.3 km, with a pavement width for an access road planned for 4.00 meters and has a wide shoulder that planned the left side and right side of 1.00 meters. In the administration plans to build access roads into two Regencies namely West Bandung Regency and Cianjur regency, where along ± 100 meters there are in West Bandung Regency.

As a means of Employment accommodation during construction activities will be erected a temporary building. Temporary building which includes office and basecamp will be erected on land that is located around site project.

■ Civil Construction

Construction of Weir and Intake

The function of intake is to capture water from river which has been elevated by weir. Weir to be constructed using a floating type with the width of 55.9 meters x the height of 4.7 meters x the length of 15.5 meters. As for intake is a horizontal type with the width of 11.1 - 32.2 meters x the height of 8.4 - 11.3 meters x the length of 32.6 meters and located on the left bank of Citarum River.

Construction of Headrace Tunnel and Penstock

Waterways (headrace tunnel) will be built at below ground. Thus headrace tunnel is an underground tunnel lined horseshoe-shaped reinforced concrete.

In the implementation of construction of water channels (headrace tunnel) will use Drilling Blashting Methods in which impact of noise, vibration and fly rock

can be suppressed as well as referring to ISO 03-6460.3-2000 about Tunnel. Things that must be considered in Tunnel among others:

- Communication equipment

Communications equipment should be available to workers who work at working can communicate about materials and equipment needed and provide a warning against dangers that are not expected as well as receive important instructions. System is taken depends on size and length of tunnel, number of workers in tunnel and tunnel system, potential risk and speed implementation. Inside tunnel larger and longer faster communication is indispensable. Signaling system with a bell or light colored adequate for routine communications, such as demand segment lining or other material that should be immediately sent to advance work.

- Noise level

Very high-intensity sound can deafen and cause direct damage to the ear. At lower intensities, voice that rang continuously can cause deafness, although its intensity can still be tolerated. Figures maximum equivalent continuous sound level (LEQ) is based on 8 hours/day, set at 90 dB(A) for unprotected ears, in certain circumstances amounting to 135 dB and for an irregular sound of 150 dB. Above these limits ear protectors should be used.

Noise can be reduced by installing sound dampening equipment that is relatively distant from workers by using a silencer cover. All aspects must be carefully considered before equipment is installed. If screening or acoustic absorbers are used, then risk of fire and ventilation requirements must be carefully calculated. Periodic maintenance of equipment by replacing or repairing damaged parts can contribute in reducing handling noise. If sound can not be reduced to safe levels, ears should be protected with the use of adequate protective. The best type of hearing protectors depends on conditions, whether use of certain workers on shift work or to work a short while. Equipment including temporary earplugs, earplugs permanent, headband with a layer of rubber, gloves and ear protectors are specially sensitive to amplitudes. Ear protectors must be worn and fitted individually trained persons. Hygiene in its use is an important factor.

- Entrance to tunnel

If used a permanent tunnel, lining design should be considered as a permanent job. If tunnels are built using structural support while temporary, then the building must be treated as a temporary job. Size of

tunnel should be sufficient to cope with emergency situations that may occur.

On a larger tunnel, diesel truck can be used to transport material ingredients. Greater distance required between a truck with people, equipment and walls of the tunnel compared to rail vehicles. Roads should be clearly defined with signs line. As in diesel locomotive, special attention should be given to the reduction of exhaust gases and ventilation systems. Trucks should not be used on slopes steeper than 1:10, except on special conditions. At the time the charge was poured out, the truck should be in a flat position and the driver out of the cabin.

Each truck shall be equipped with the equipment, as follows:

- (a) Gawar tool that can be sounded;
- (b) Two white headlights that have a visibility of 60 m;
- (c) Two red taillights can be seen at a distance of 60 m;
- (d) The braking system is fairly reliable, especially on a hill that can be easily operated by the driver;
- (e) The hand brake capable of holding a fully loaded vehicle on a hill;
- (f) Windbreaks should be equipped with cleaning tools;

Each truck is the responsibility of a competent driver, someone who has a relevant heavy vehicle driver's license. Motorists should check the charge and if necessary, flattening it before leaving the place of loading.

Vehicles used in the tunnel must be parked in a state of the engine is turned off in low gear position or reverse gear. When used more than one truck in lane one-way street must be equipped with signs to arrange it so efficient. This may be done by using a telephone or radio, depending on the complexity of the road network system.

- Installation of electricity

In tunnel work, additional protection against risk of electric shock, fire and explosion, security people and workers become very important, depending on continuity of electricity supply, especially those related to lighting, pumping, ventilation and air-pressure

The importance of each job and time to decide the supply depends on the condition of the tunnel as well as methods of implementation. Backup power generators need to be prepared which is connected to the main connective. Key mover and the electrical circuit must be designed in such a way that the circuit is important is not broke, when another series of

broken or damaged. All electrical circuits must be isolated, resulting in the installation, maintenance and repairs can be done safely.

In tunnel that has been or is being done through soil that contains lots of methane or other flammable gases, all electrical equipment used in the tunnel should be created, installed and protected against danger of explosion. Electrical equipment should be insulated to protect against flammable gases.

On use of explosives, hazards that may occur is when initial ignition of electric detonators during charging and penyambungannya. Before detonators and explosives placed on face of work, all the lighting and the circuit should be withdrawn at a safe distance from working face and must be switched off or isolated. Safe distance depends on surrounding environment, including drilling equipment and other equipment as well as other barriers upfront work.

Headrace tunnel to be built using non-pressure type with a size of 1075.96 meters closed channel (tunnel) and 94.356 meters of open channel (open channel). As for headtank using side channel spillway type with width ~ 10.7 meters 30.8 meters x 11.0 meters height ~ 22.7 meters x 94.1 meters long.

Penstock pipeline to be built is located in basement with plated steel construction. Type to be used is the size of the underground type $\varnothing = 9$ meters long 48.4 meters in thickness = 17 mm.

Construction of Powerhouse and Tailrace

Construction of powerhouse equipped with supporting facilities, such as break rooms, service room, bathroom, control room and kitchen. Type of house plant that is used is semi-underground building with a length of 35.3 meters x 27.0 meters wide and 19.0 meters high.

Tailrace will be designed to drain water with a small angle to existing river flow, so as to avoid crushing opposite side of river. This type of channel used is an *open channel* and planned length of 48.0 meters by 10.3 meters ~ 44.3 width and 10.3 meters high.

The upper limit cultivated until tailwater elevation 219.500 meters so as to achieve these conditions will be dredging river along ± 1 km from *tailrace* to downstream. Depth of dredging river bed is estimated up to 2 meters from existing riverbed, with an average width of 100 meters. Volume of material

forecasted to reach dig is 200,000 m³. Materials used will dumped in disposal areas.

- Transportation and Former Landfill Excavation

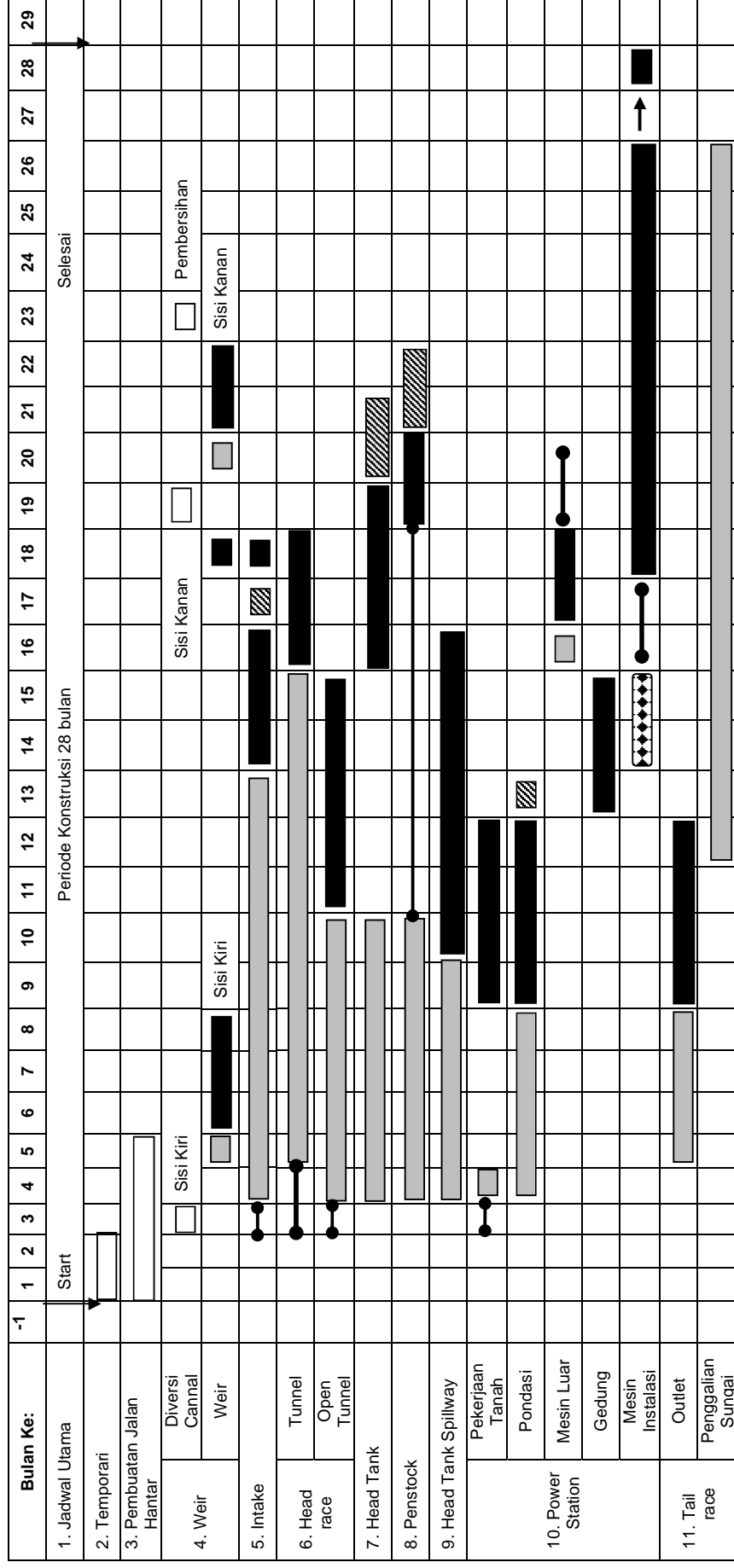
Materials resulting from construction activities, such as land clearing, maturation of land, making foundation, making waterways and other activities, will be used as backfilling and rest will be dumped near location of *head tank*, with an area of about 50,000 m². Transporting using dum truck and not crossing the residential areas. Plan for landfill can be reached by Access Road. After landfill will soon be given top soil and green land area with perennials.

- Release of Employment

Most employment recruited at beginning of construction activities, will be dismissed at construction phase. Termination of employment is different from termination of employment elsewhere (e.g. factories). People who work on projects already know that work they are doing is temporary and takes place in schedule so that they have prepared beforehand. Nevertheless release of employment will affect residents because it will lower income level of residents around project site. During construction phase they used to obtain additional income from their jobs as project workers and traders.

Schedule (tentative) plan to build Rajamandala 47 MW HEPP can be seen in **Table 2.12**.

Tabel 2.12. Jadwal Rencana Konstruksi Pembangunan PLTA Rajamandala



Sumber : The Feasibility Study on the Rajamandala HEPP in the Republic of Indonesia

Keterangan:

-  Penggalian
-  Backfill
-  Pembukaan dan Pembersihan Lahan
-  Tabung Draft
-  Test dengan menggunakan air

c. Operational Stage

At this phase of Rajamandala HEPP will start producing electricity with a capacity of 47 MW. The activities undertaken are :

- **Operation Of Plant**

Operation of Rajamandala 47 MW HEPP will require water from Saguling reservoir through discharge tailrace Saguling HEPP with maximum discharge 168 m³/second, with the energy that would be generated by 47 MW. Rajamandala Hydroelectric operating system using system peakload which can operate at above 60 m³/det discharge.

After turning turbine at powerhouse water will be returned to Citarum River. Energy of 47 MW will be used to supply electricity demand in West Java will support interconnection of system in addition to Java - Bali.

- **Maintenance of facilities and infrastructure**

These maintenance activities include maintenance of Hydro Electric Power Plant. The activities undertaken are:

- ✓ Maintenance of installation. This activity is an activity regularly to ensure the performance of turbines, generators, control devices and others.
- ✓ Activities overhaul to turbine, generator and other electrical components on a regular basis.
- ✓ Removal of sand from head tank regularly, and receiving it into the locations where water is not allowed carrying over into Citarum River.

2.5. Environmental Baseline

a. Chemistry – Physical Components

- Climate
 - Rainfall

Rainfall average monthly during years 2005 - 2010 at study area, ranges between 101.4 mm in 2005 and the highest was 281.5 mm which occurred in 2010. Rainfall Data can be seen in **Table 2.13**.

Table 2.13. Rainfall at study area and surrounding areas during 2005 - 2010.

No	Month	Rainfall (mm)					
		Years					
		2005	2006	2007	2008	2009	2010
1	January	150.4	78.0	177.2	191.1	220.5	349.8
2	February	268.3	96.9	391.6	155.9	284.0	397.5
3	March	185.9	91.5	206.4	333.8	319.6	506.2
4	April	119.3	231.3	388.7	264.0	214.2	188.5
5	May	21.1	131.3	106.8	65.6	188.8	315.7
6	June	81.3	34.1	113.4	25.8	113.6	136.2
7	July	46.0	20.4	23.7	4.0	16.9	127.7
8	August	19.7	14.6	18.4	37.9	15.9	175.2
9	September	40.0	15.0	52.5	58.7	55.2	318.8
10	October	80.3	44.3	181.7	216.5	166.9	232.6
11	November	96.0	78.1	309.0	431.2	284.8	319.6
12	December	108.2	459.7	362.6	338.5	238.4	310.5
Maximum		268.3	459.7	391.6	431.2	319.6	506.2
Minimum		19.7	14.6	18.4	4	15.9	127.7
Average		101.4	107.9	194.3	176.9	176.6	281.5

Source : UBP Saguling, 2011

- Humidity

Humidity is monthly average in period years 1994 - 2003 ranged between 81.8% which occurred in January to 85.0% in October. (**Table 2.13.**)

Table 2.14. Monthly Average Air Humidity in the Region

Month	Air Humadity (%)		
	Maximum	Minimum	Average
January	89	71	81.8
February	90	71	83.0
March	89	74	83.1
April	89	74	83.3
May	89	74	83.0
June	89	74	83.2
July	89	69	82.9
August	88	70	82.6
September	89	72	84.2
October	89	77	85.0
November	90	74	84.9
December	89	74	84.0
Yearly Average			83.4

Source: Dam Control Center (DCC) Statuion of UBP Saguling

■ Air Quality and Noise

To know description of ambient air quality and noise location plan for Rajamandala 47 MW HEPP and its surroundings, air sampling performed directly on third measurement point is at powerhouse site plan, location plan in Bantarcaringin Village and weir/intake Rajamandala 47 MW HEPP. Measurement of contaminants (pollutants) in air made to the gas sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), hydrogen sulfide gas (H₂S), lead and dust content. At time of measurement of wind speeds ranged from 0.2 to 3.1 m/sec. The results of air quality and noise analysis are presented in **Table 2.15**.

Table 2.15. Measurement Results of Air Quality and Noise

No	Parameter	Unit	Analytical Results			Quality Standard
			U-1	U-2	U-3	
1.	NO ₂ (Nitrogen Dioksida)	µg/Nm ³	29.7	30.92	37.56	150
2.	SO ₂ (Sulfur Dioksida)	µg/Nm ³	28.92	25.41	27.08	365
3.	CO (Karbon Monoksida)	µg/Nm ³	541.92	541.06	629.48	10,000
4.	H ₂ S (Hidrogen Sulfida)	µg/Nm ³	2.86	2.59	4.31	24
5.	TSP (Dust)	µg/Nm ³	113.98	115.92	113.39	230
6.	Pb (Timah Hitam)	µg/Nm ³	0.58	0.78	-	50
7.	Noise	dBA	51.4	43.9	53.5	55
8.	Weather conditions:					
	a. Temperature	°C	29.4	32.6-32.8	34.4	-
	b. Humidity	%	48	41-50	41	-
	c. Wind speed	m/sec	0.4-1.2	0.3-1.3	0.2-3.1	-
	d. Wind direction	-	West	West	West	-
	e. Weather	-	Fine	Fine	Fine	-

Source : Measurement Results, 2011.

Description :

Ambient air quality standards based on Government Regulation No.41 of 1999.

U-1 : Bantarcaringin Village

U-2 : Powerhouse Plan

U-3 : Weir/intake Plan

Results of measurements made at three locations, actual parameters measured NO₂ ranged from 29.7 µg/Nm³ up to 37.56 µg/Nm³. Parameters measured SO₂ ranged from 25.41 µg/Nm³ up to 28.92 µg/Nm³. From results of measurement of H₂S parameters measured at site plan weir / intake of 4.31 µg/Nm³ and on-site powerhouse plan for 2.59 µg/Nm³. Content of H₂S was decreased by 66.41%, a decrease of H₂S in powerhouse site plan due to turbulence of water flow, so that it comes in contact with air.

Noise measurements level in three locations ranged from 43.9 dBA to 53.5 dBA. The highest noise contained in location of U-3 is a plan location of

weir/intake of 53.5 dBA and the lowest noise contained in powerhouse plan of 43.9 dBA. When compared with the standard noise level based on Decree of Environment Minister No. Kep 48/MENLH/11/1996, said that for maximum settlement is 55 dBA. Results of measurements at three locations indicate noise does not exceed noise level standard.

From measurements results, all parameters are still below to allowable quality standards. Air quality measurements and noise due to location of an activity plan area is overgrown with trees & plants cultivation and distance to industrial areas and highways far enough, so that Source of potential air pollution at project site is relatively absent. Likewise, there is no noise other than roar of water, in Saguling HEPP powerhouse.

■ Hydrology

Based on data obtained from UBP Saguling year 2011, towards realization of Citarum River water discharge from Nanjung River, has an average discharge between 48.92 m³/sec to 139.40 m³/sec.

From data obtained during period of 5 years (2005-2010), amounting to 261.87 m³/sec maximum discharge occurring during period of 2010. Minimum water flow into Nanjung River at this period occurred in 2006 of 3.67 m³/sec. Realization data of discharge water entering Nanjung River to Saguling HEPP can be seen in Table 2.15.

Table 2.16. Debit Relization Of Nanjung, Saguling HEPP

No	Month	Water Debit (m ³ /sec)					
		Year					
		2005	2006	2007	2008	2009	2010
1	January	94.75	96.54	46.24	70.49	66.03	130.30
2	February	176.14	132.34	134.23	55.70	119.06	252.62
3	March	154.05	49.61	85.32	59.86	145.52	261.87
4	April	140.39	94.50	174.28	121.12	122.59	124.73
5	May	54.50	58.97	81.28	48.20	96.42	143.81
6	June	54.20	21.47	50.14	20.16	78.40	77.98
7	July	32.21	8.70	19.23	10.50	21.28	57.20
8	August	15.86	4.61	7.81	12.91	10.64	58.35
9	September	22.55	3.67	7.97	9.59	12.36	140.09
10	October	33.25	6.05	146.40	21.73	36.55	103.21
11	November	42.86	10.44	96.41	143.17	81.78	149.45
12	December	84.73	100.15	126.37	141.89	77.02	173.23
	Maximum	176.14	132.34	174.28	143.17	145.52	261.87
	Minimum	15.86	3.67	7.81	9.59	10.64	57.2
	Average	75.46	48.92	81.31	59.61	72.30	139.40

Source : UBP Saguling, 2011

▪ River Water Quality

Sampling of river water quality measurements carried out at 4 locations namely at Powerhouse Plan of Rajamandala HEPP. Cileat River, Cisameng River and Weir/intakes Plan of Rajamandala HEPP. Results of examination of river water quality can be seen in Table 2.17.

Table 2.17. Results Measurement of River Water Quality in Study Areas

No	Parameter	Unit	Quality Standard	Locations			
				S-1	S-2	S-3	S-4
I.	Physical						
1.	Temperature	°C	-	27.5	31.5	29.4	27.5
2.	TDS	mg/L	1000	274	239	357	269
3.	Electrical Conductivity	µs/cm	2250	391	342	510	384
II.	Chemistry						
1.	pH	-	6.5-9.0	7.57	7.97	7.66	7.02
2.	BOD	mg/L	6	13	11	10	7.8
3.	COD	mg/L	10	20	16	16	12
4.	Oksigen terlarut (DO)	mg/L	>3	5.8	6.5	5.4	2.0
5.	Nitrat	mg/L NO ₃	10	1.873	0.602	0.602	1.444
6.	Nitrit	mg/L NO ₂	0.06	0.253	0.009	0.009	0.013
7.	Ammonia	mg/L NH ₃	0.02	2.285	0.655	0.655	2.610
8.	Air Raksa (Hg)	mg/L	0.001	0.06	0.06	<0.06	0.06
9.	Arsen (As)	mg/L	0.05	0.0002	0.0002	<0.0001	0.0002
10.	Kobalt (Co)	mg/L	0.2	<0.001	0.017	<0.001	<0.001
11.	Selenium (Se)	mg/L	0.01	<0.001	<0.001	<0.001	<0.001
12.	Kadmium (Cd)	mg/L	0.01	<0.0001	<0.0001	<0.0001	<0.0001
13.	Kromium total (Cr)	mg/L	0.05	<0.001	<0.001	<0.001	<0.001
14.	Nickel	mg/L	0.5	<0.001	<0.001	<0.001	<0.001
15.	Copper (Cu)	mg/L	0.02	0.069	0.072	0.053	0.093
16.	Zinc (Zn)	mg/L	0.02	0.046	0.032	0.017	0.009
17.	Iron(Fe)	mg/L	5	0.097	0.155	<0.005	0.41
18.	Reciprocal (Pb)	mg/L	0.03	<0.01	<0.01	<0.01	<0.01
19.	Clorida (Cl ⁻)	mg/L	600	13.38	2.57	9.27	13.89
20.	Fluorida (F)	mg/L	1.5	0.36	0.39	0.29	0.36
21.	Sulfat (SO ₄)	mg/L	400	39.95	33.3	38.33	46.39
22.	Klorin bebas (Cl ₂ -)	mg/L	0.003	-	-	-	-
23.	Sianida	mg/L	0.02	0.001	0.01	<0.001	<0.001
24.	Sulfida (H ₂ S)	mg/L	0.002	<0.02	<0.02	<0.02	<0.02

Source : Primary Data, 2011

Remarks:

Quality standard by West Java Governor Decree No. 39 Year 2000 Appropriation Water Group B, C, D

S-1 : Location Powerhouse, Citarum River Water (06°51'44,4" S dan 107°20'31,1" E)

S-2 : Cileat River Estuary (06°50'987" S dan 107°20'771" E)

S-3 : Cisameng River Estuary (06°51'404" S dan 107°21'094" E)

S-4 : Location Plan Weir / Intake, Water Citarum River (06°51'845" S dan 107°20'949" E)

From results of Laboratory analysis found a levels of physical parameters, the substance dissolved solids in all locations still meet quality standard based on Decree Governor of West Java Province No. 39 Year 2000 Appropriation Water Group B, C, D.

Results measurements of chemical parameters, levels of BOD, COD, ammonia, mercury (Hg), Sulfide (H₂S) and cadmium (Cd) in all measurement locations has exceeded standard value that is determined based on Decree Governor of West

Java Province No. 39 Year 2000 Appropriation Water Group B, C, D. Height measurements of these parameters probably derived from Community activities who use river as a waste disposal site.

■ Well Water Quality

To determine quality of wells water around Cisameng and Bantarcaringin Village, well water quality measurements were taken at 5 locations. Well water quality parameters measured consisted of physical parameters, chemical parameters and microbiological parameters. Measurement data results of well water quality can be seen in **Table 2.18**.

Tabel 2.18. Measurement results of Well Water Quality in Bantarcaringin and Cisameng Villages

No	Parameter	Unit	Quality Standard	Location				
				AS-1	AS-2	AS-3	AS-4	AS-5
I.	PHYSICAL							
1	Odor	-	-	No Smell	No Smell	No Smell	No Smell	No Smell
2	Temperature	°C	±					
3	TDS	mg/L	1500	337	314	490	366	385
4	turbidity	NTU	25	0.03	0.03	0.45	0.98	14.2
5	Electrical Conductivity	µs/cm	-	481	448	700	523	550
II.	CHEMISTRY							
1	pH	-	6.5-9.0	6.51	6.65	6.9	7.17	6.84
2	Iron (Fe)	mg/L	1.0	<0.005	0.060	0.408	0.524	0.946
3	Fluorida (F)	mg/L	1.5	0.192	0.099	0.279	0.296	0.262
4	Hardness	mg/L CaCO ₃	500	189.2	206.9	285.7	211.8	208.8
5	Klorida (Cl)	mg/L	600	9.27	7.21	5.15	7.21	9.78
6	Mangan (Mn)	mg/L	0.5	<0.05	0.05	0.094	0.428	0.094
7	Nitrat	mg/L NO ₃	10	1.98	2.65	0.074	1.26	0.589
8	Nitrit	mg/L NO ₂	1.0	0.002	0.002	<0.0005	1.20	0.002
9	Sulfat (SO ₄)	mg/L	400	34.27	34.27	58.43	26.20	50.99
10	MBAS	mg/L	0.5	<0.05	<0.05	<0.05	0.170	0.097
11	Zat Organik (KMnO ₄)	mg/L	10	1.17	1.46	5.85	11.12	4.97
III.	MIKROBIOLOGI							
1	Coliform	jml/100 ml	50	240	11000	2400	2400	11000
2	E. Coli	jml/100 ml	0	93	4600	460	1100	930

Source : Measurement Result. 2011

Remarks :

No quality standards based Permenkes. 416/MenKes/PER/IX/1990. regarding Water Quality

AS-1: Water Wells residents in Bantarcaringin Village

AS-2: Water Wells residents in Bantarcaringin Village

AS-3: Water Wells residents in Cisameng Village

AS-4: Water Wells residents in Cisameng Village

AS-4: Water Wells in Breeding Population UBP Saguling

Analysis of well water quality of population in 5 locations, shows that in general physical and chemical parameters measured meet quality standard based on Healthy Minister Regulation No 416/MENKES/Per/IX/1990, regarding Water Quality, except nitrite and organic substance in Cisameng well village residents with content of each is 1.20 mg/L and 11.12 mg/L.

The number of Coliform from five measurement locations ranged from 240 jml/100 ml to 11,000 jml/ 100ml. Number of highest coliform found in Bantarcaringin Kampong and wells nursery UBP Saguling population amounting to 11,000 Jml/ 100ml. Parameters of E. coli at five locations between 93 Jml/ 100ml measurements showed values up to 4,600 Jml/ 100ml. When viewed Coliform and E.coli under Permenkes No. 416/MENKES/Per/IX/1990 parameters of five measurement locations has exceeded allowable quality standards. The highest content of coliform and E. coli is possible because population is not done well against well wall hardening (waterproof), so as contamination of well water with domestic wastewater mainly from MCK (Bath, Toilet, Wash) activity.

- Regional Geology

In accordance with Final Report for Stage II of Citarum Hydro Electric Feasibility Study prepared by NEWJEC, 1978, and surrounding geology Rajamandala area are as follows:

In physiographic location TNA Rajamandala HEPP located in western hills Rajamandala row. Geological formations of this area is composed by the Paleogene and Tertiary Formations Neogen. Both are facies sedimentary and volcanic facies. Tertiary Formansi is further divided into five formations, namely:

1. Formation Rajamandala
2. Formation Lower Citarum
3. Formation Upper Citarum A
4. Formation Upper Citarum B
5. Formation Upper Citarum C

Formation name and Citarum Rajamandala taken from Geological Map published by the Geological Survey of Indonesia (GSI, 1972) and named A, B and C are added, to further facilitate understanding of geological conditions of this area.

These formations, have a relationship with one another in harmony, but are not in tune covered by a thick sediment of lake in Southeast/S-E project area. Geological characteristics of this area is the presence of limestone formations that form a row of hills Rajamandala and andesite intrusion that breaks through the Tertiary formations in SouthWest/S-W region. Sequence stratigraphy of this area as shown in Table 2.19.

Table 2.19. Regional Stratigraphy Saguling HEPP Dams Area and Surrounding

Geology Age		Formation		Facies	Information
Crater	Pleistocene	Lake sediment		Somewhat cement, gray or smoke-colored sandstone-tuff and tuff breccia, tuff, tuff mudstone, conglomerate and black clay	Inundation areas, location of dams upstream and downstream.
		Andesite		Andesite and andesite agglomerate	Rock quarry site (coral G and G Masigit)
Tertiary	Pliocene	Formation C		Mudstone with thin layers of sandstone and silt tufaan	Dam site
		Formation B		Andesite, agglomerate, conglomerate, mudstone and limestone with pebble conglomerate	Damsite, Waterway, the borrow pit and pool area
	Miocene	Formation A		Napalan Mudstone, sandstone and mudstone interlude, conglomerate, sandstone and silt stone	Waterway
		Formation Cilang		interlude between sandstone and mudstone, conglomerate	inundation areas
		Formation Citarum	Upper	Agglomerates, interlude between sandstone and mudstone	Waterway
			Bottom	Conglomerate, sandstone breksian, compact sandstone, shale, siltstone, and sandstone napalan.	Surgetank, penstock, upstream powerhouse, underground powerhouse site, tailrace
	Oligocene	Formation Rajamandala		Limestone, mudstone, siltstone, and sandstone	Powerhouse downstream, middle, quarry site (G. Guha) and tailrace

General conditions of Tertiary formations is ENE with a slope of 100 ~ 500 toward SE. So along the river Citarum, top formations are found in upper and lower formations are in lower reaches of river.

Trend minor scale folds with NE direction in Tertiary formations occur due to movement of the earth's crust / crustal movements that occurred in the Late Moisen. These folds small effect on the existing geological structures in this area. Folds this locally produced monoclinic structure with a slope of ramps to the south.

Two major scale thrust faults observed in the contact area between formations Rajamandala and formation Citarum, in addition to some fault in same direction found, both in formation Rajamandala and formation Citarum.

Normal Faulting other major scale with NS and NE encountered cut formation Rajamandala and formations Citarum.

Fault with ENE direction and minor scale folds cut by a fault with a NNE direction. This means that the NNE fault was younger. As a result of NNE and ENE fault, area around Cipanas village divided into several blocks. The movement of block

occurred before Pliocene and not again until crater, this is evidenced by absence of fault is found in old crater lake sediments.

▪ Local Geology

Constituent rocks encountered in area of Rajamandala HEPP plan consists of limestone and clay are both included Stone formations Rajamandala and alternation of sandstone and shale formations Citarum. Rock formations are covered by talus deposits or terrace. At the bottom of both rocks are encountered sandstone and shale from formation breksian Citarum.

In some places rocks are so weathered and sheared / shattered, hence can not be distinguished with soil surface and limestones that are hard, but were encountered due to dissolution cavities in layers. One of the cavity in rock is growing as river below surface, known as Sanghiang Tikoro.

Sanghiang Tikoro is located on downstream side weir plan Rajamandala HEPP. From previous studies, it is unknown / found a place where river beneath surface of this surface. As shown in the picture below:



Stratigraphic location of project as well as geological conditions for location of main building structure Rajamandala 47 MW HEPP can be seen in **Table 2.20**.

Table 2.20. Stratigraphy Project Location and Structure of Main Building HEPP

Time		Formation	Symbol		Lithology	Main Structure HEPP
Quaternary		River sediment	Al		Gravel, sand, silt	Weir, tailrace
		Talus sediment	dt		Gravel, sand, silt	Intake
		Terrace deposit-2	Te2		Gravel, sand, silt	Open channel
		Terrace deposit-1	Te1		Gravel, sand, silt 20-45 m from bottom of river	Weir, intake, powerhouse
Neogene	Miocene	Citarum	Mtb	Tb	tuff breccia	Downstream end of headrace tunnel
			Mts	Cl	Stone, clay	Open channel, penstock, powerhouse
				Si	Stone-silt	
				Bs	Sandstone breccia	
				Ss	sandstone	
Paleogene	Oligocene	Rajamandala	Oml	Ls	Limestone	Weir, intake, headrace tunnel

Source: River Cross Sectional Survey and Geological Survey For Feasibility Study Regarding The Rajamandala HEPP

- **Geology Structure**

Regionally, local geological structure project and surrounding consists of:

- Structure folds (syncline & anticline), extending from northeast to southwest.
- Faulting up, extending from northeast to southwest.
- Faulting up, extending from north-south and northwest-southeast.
- Normal Faulting, with a varied landscape.
- Faulting and fault ride normally found at project site.

- **Seismicity**

Based on seismic map of area for building construction according to western part of Indonesia area Beca Carter Hollings and Farmer Ltd. (1918), study area is located in Seismic Zone 4 or included into region with risk of superficial/moderate. In its major constituent rock mud silt and clay susceptible to changes in water content. Lithology period inflates and behave as if mass of liquid water content increases and shrink when moisture content is reduced.

- **Tunnel Excavation**

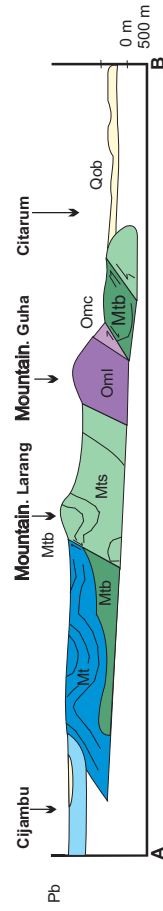
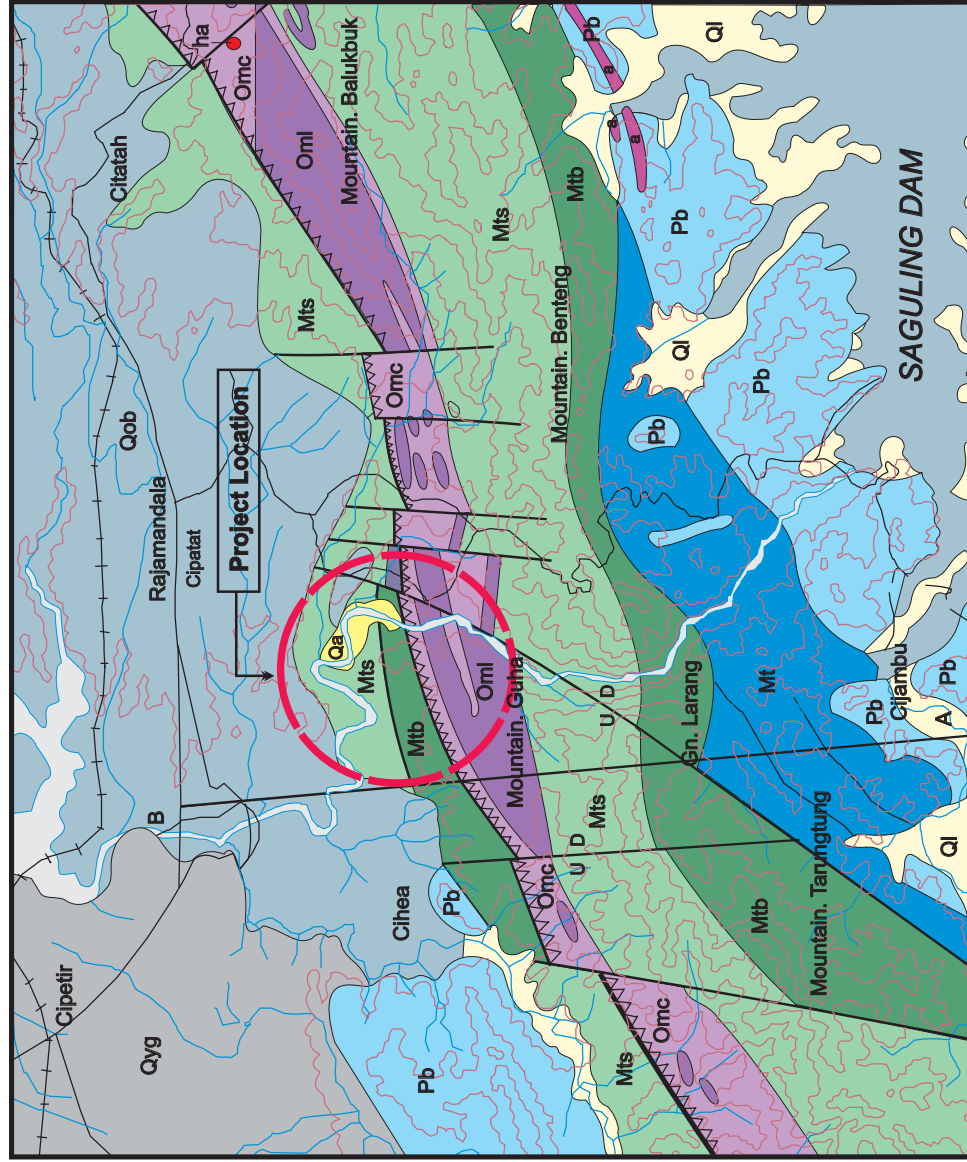
Tunnel excavation for the construction of Rajamandala HEPP, plans to use DWM (Drilling Blasting Methods). With this method used dynamite as tunnel excavation material.

Use of dynamite explosive adapted to pre-planned pattern to achieve expected Blasting Ratio.

Impacts resulting from this explosion is Vibration, Flyrock and noise.

Direction that is transverse tunnels from east to west, while residential areas located on the north tunnel.

Impact vibration will be felt small-scale in settlement, and impact of Flyrock will have no effect on residential population, because all blasting activities, are in tunnel excavation and material produced is not more than progress of 1 (One) meter excavation and will be collected in advance (Blasting face). On other, impact of Noise will spread towards tunnel mouth facing towards east and west, not towards settlements.



Legend :

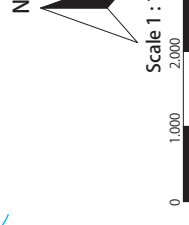
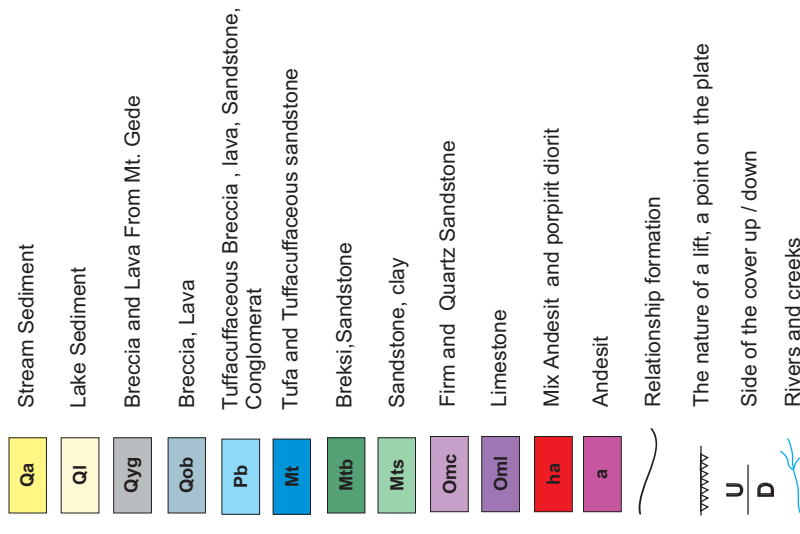


Figure 2.4
GEOLOGICAL REGIONAL MAP
RAJAMANDALA AND SURROUNDINGS

Source : Geological Research and Development Center, 1972

- **Space, Land and Soil**

- **Spatial And Regional Planning (RTRW) of West Bandung Regency**

Based on Spatial and Regional Planning (RTRW) Cianjur Year 2013 to 2031, Development plans Rajamandala 47 MW HEPP in Haurwangi Sub District included into plan of the Network Systems Energy / Electricity.

Energy network system plan in Cianjur consists of a network plan of electric power, electric power transmission network plans and plans for alternative energy. Haurwangi Sub District has development of alternative energy plans, name are Hydro Electric Power Plan development.

- **Spatial Planning And Regional Plan (RTRW) of Cianjur Regency**

Based on Spatial and Regional Planning (RTRW) year 2009-2029 West Bandung regency, service center system plan consists of PKN, PKW and PKL that are stay on Regency as well as other centers within Regency which consists of PPK (Area Service Center) whose function is to serve Sub District-scale activities or several villages as well as PPL (Center for Environmental Services) that function to serve scale of inter-village activities. In addition Area Service Center (PPK) is center of activity that can later be promoted as PKL (with the notation PKLp).

Based on this, Cipatat Sub-District entered into Area Service Center (PPK) whose function is to serve Sub District-scale activities or several villages.

Spatial structure plan map West Bandung Regency Year 2009-2029 can be seen in **Figure 2.6**



- Land Use

Site plans of Rajamandala 47 MW HEPP located in Cihea Village, Haurwangi Sub District, Cianjur Regency and Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency. Use of land in Cihea village and Rajamandala Kulon Village, consisting of wetland, terrestrial land (Plantation, yards, offices, cemeteries, residential) with a total area of 2.667,14 ha. With a total land area of 1,499,69 ha and 1.167,45 ha of rice field land. As shown in **Table 2.21**.

Table 2.21. Land Use in the Village Cihea and Rajamandala Kulon

No	TYPE OF USE	CIHEA VILLAGE		RAJAMANDALA KULON VILLAGE		TOTAL	
		Area (ha)	%	Area (ha)	%	Area (ha)	%
1.	Rice Land	954,448	86,68	213,00	13,6	1.167,45	43,77
2.	Main Land	146,692	13,32	1.353,00	86,4	1.499,69	56,23
Total I + II		1,101,140	100	1.566,00	100	2.667,14	100

Source : Monograph of the Cihea Village and Rajamandala Kulon Village, 2010

Main land use in Cihea Village is 1,074.328 ha and 1,353.000 ha of Rajamandala Kulon village. Most dominant land use in Cihea Village dominated by settlement of 46.1% than plantation of 42.3%. Use of land in village is dominated by plantation in Rajamandala Kulon for 38.7% of total land use. Use of land for settlement of 21.00 hectares or 1.6%, while other uses of 716.00 ha (52.9%). Land use land in two villages in study area detail are presented in **Table 2.22**.

Table 2.22. Main Land Use In Every Village at Study Areas

No	Land use	Unit	Village			
			Cihea	%	Rajamandala Kulon	%
1.	Settlement	Ha	494.769	46.1	21.00	1.6
2.	Plantation	Ha	454.759	42.3	523.00	38.7
3.	Cemeteries	Ha	4.800	0.4	2.00	0.1
4.	Yard	Ha	60.00	5.6	90.00	6.7
5.	Offices	Ha	60.00	5.6	1.00	0.1
6.	Other	Ha	-	0.0	716.00	52.9
	Total		1,074.328	100	1,353.000	100

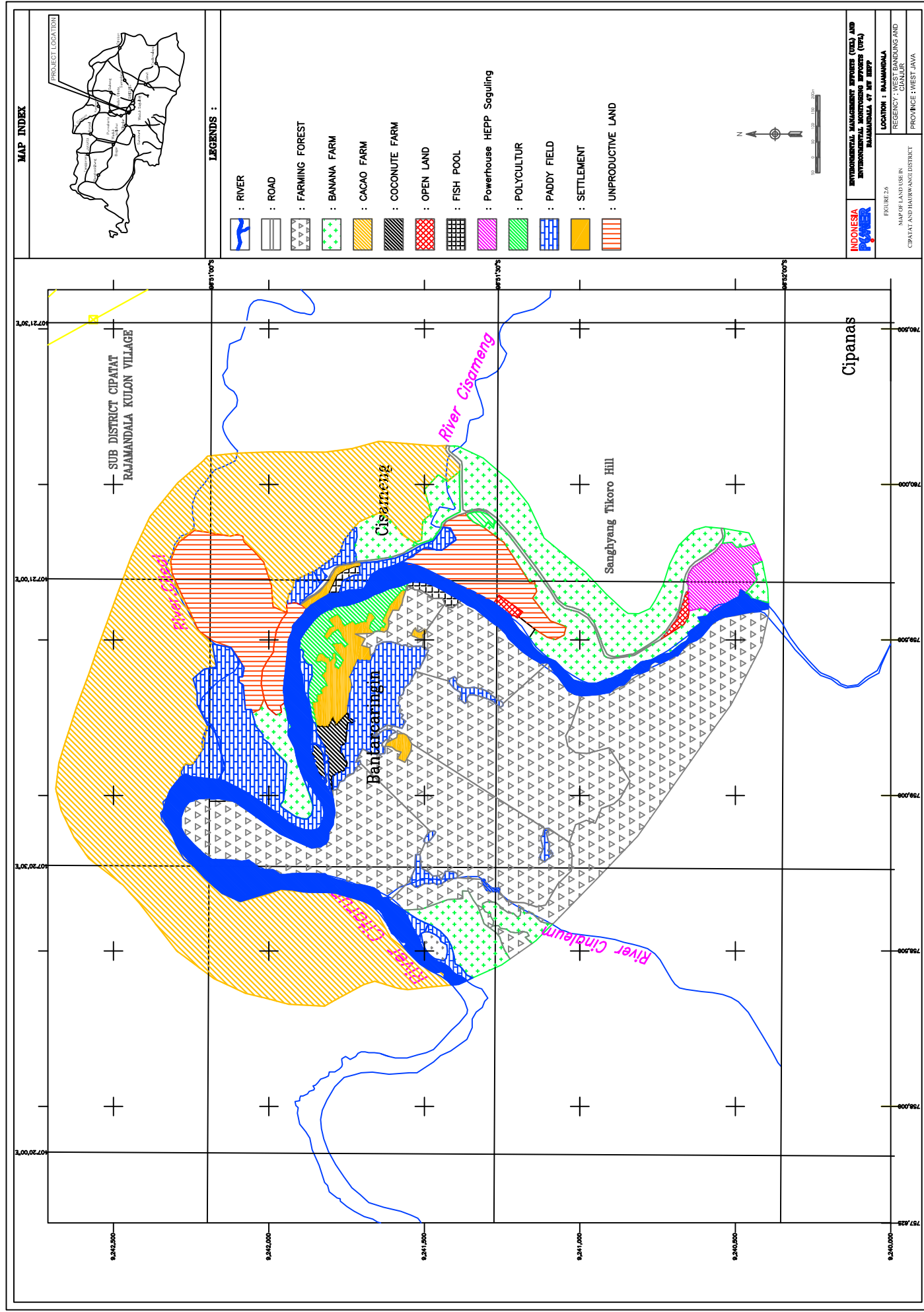
Source : Monograph of the Cihea Village and Rajamandala Kulon Village. 2010

Land area by type of irrigation for rice consists of irrigation technical, semi technical irrigation and rainfed. Haurwangi Subdistrict an irrigation district that has most extensive technical, amounting to 1,153.00 while the broad Ha irrigated rice fields that use technical ½ of 143.29 Ha. Vast rice fields using rain-fed systems in Haurwangi Sub District of 153.00 ha and in Cipatat Sub District of 213.905 Ha. Area of agricultural land by type of irrigation can be seen in Table 2.23.

Table 2.23. Agricultural Land Area by Type of Irrigation in Study Areas

No	Type	Unit	Sub District	
			Haurwangi	Cipatat
1.	Technical	Ha	1.153,00	850,862
2.	½ Technical	Ha	143,29	356,515
3.	Simple	Ha	-	-
4.	Rain fed	Ha	153,00	213,905
Total			1.449,29	1.421,282

Source : - Monografi Haurwangi Subdistrict, 2010
- Monografi Cipatat Subdistrict, 2010



b. Biological components

■ Flora

Location 1 at Plan of Weir and Intake

Vegetation around weir and intake location plan consists of riverside vegetation, with chocolate and banana gardens that are not maintained intensively. Vegetation growing on banks of river bottom consists of plants/shrubs and some woody plant species. Flora that grows around location of weir and intake can be seen in **Table 2.24**.

Table 2.24. Vegetation Around Intake and Weir Location

No	Local Name	Scientific Name	FR (%)	KR (%)	SDR (%)
1	Banana	<i>Musa paradisiaca</i>	9.3333	9.2784	9.30584
2	Teak	<i>Tectona grandis</i>	6.6667	5.1546	5.91065
3	Caringin	<i>Ficus benjamina</i>	8	4.1237	6.06186
4	Cherry	<i>Muntingia calabura</i>	5.3333	7.2165	6.27491
5	Ketepeng Cina	<i>Cassia alata</i>	5.3333	5.1546	5.24399
6	Cangkring	<i>Erithryna sp.</i>	5.3333	6.1856	5.75945
7	Mango	<i>Mangifera indica</i>	4	5.1546	4.57732
8	Mahogany	<i>Swietenia mahogoni</i>	4	5.1546	4.57732
9	Cangkudu	<i>Morinda oleifera</i>	4	3.0928	3.54639
10	Coconut	<i>Cocos nucifera</i>	4	4.1237	4.06186
11	Jengjen	<i>Albizia falcata</i>	4	5.1546	4.57732
12	Bamboo	<i>Bambusa sp.</i>	5.3333	2.0619	3.69759
13	Duren	<i>Durio zibenthinus</i>	5.3333	4.1237	4.72852
14	Reed	<i>Imperata cylindrica</i>	2.6667	6.1856	4.42612
15	Rafters	<i>Saccharum sp</i>	2.6667	4.1237	3.39519
16	Kirinyuh	<i>Chromolaena odorata</i>	1.3333	5.1546	3.24399
17	Jarong	<i>Stachytarpetta jamaicensis</i>	4	3.0928	3.54639
18	Kihurip	<i>Cosmos caudatus</i>	5.3333	4.1237	4.72852
19	Harendong	<i>Melastoma sp</i>	5.3333	7.2165	6.27491
20	Areuy Pucuk	<i>Poikilospermum suaveolens</i>	4	2.0619	3.03093
21	Kihapit	<i>Pilea sp.</i>	4	2.0619	3.03093
	Total		100	100	100

Source : Pimary Data, 2011

From the above data, the banana plant (*Musa paradisiaca*) is dominant compared to other plants, it can be seen from its SDR value that is equal to 9.30%, cherry (*Muntingia calabura*), and Harendong (*Melastoma sp.*)

Location 2 at Cisameng River Estuary

Cisameng River Estuary is an encounter between Cisameng River with Citarum River which is located after weir and intake location plan. Vegetation in surrounding area consists of rice paddies and riverside vegetation. In vicinity of this segment, there are some houses. The waters around the estuary is used by some residents to perform activities of daily living (MCK). Besides rice, plant species found around estuary are presented in **Table 2.25**.

Table 2.25. Vegetation at Cisameng River Estuary

No	Local Name	Scientific Name	FR (%)	KR (%)	SDR (%)
1	Banana	<i>Musa paradisiaca</i>	15.79	13.43	14.6112
2	Coconut	<i>Cocos nucifera</i>	12.28	14.93	13.603
3	Duren	<i>Durio zibenthinus</i>	5.263	5.97	5.61665
4	Cottonwoods	<i>Ceiba pentandra</i>	3.509	5.97	4.73946
5	Jengjen	<i>Albizia falcata</i>	7.018	10.45	8.73265
6	Toothless gum	<i>Arthocarpus communis</i>	8.772	7.463	8.11731
7	Mango	<i>Magifera indica</i>	10.53	8.955	9.74077
8	Bamboo	<i>Bambusa sp.</i>	7.018	7.463	7.24012
9	Tithonia	<i>Tithonia diversifolia</i>	5.263	5.97	5.61665
10	Babadotan	<i>Ageratum conyzoides</i>	14.04	7.463	10.7489
11	Paddy	<i>Oryza sativa</i>	10.53	11.94	11.2333
			100	100	100

Source : Pimary Data , 2011

From the table above shows that the Banana (*Musa paradisiaca*) has the highest SDR is equal to 14.61%, and Coconut (*Cocos nucifera*) at 13.6%, Rice (*Oryza sativa*) of 11.2%, and Babadotan (*Ageratum conyzoides*) amounting to 10.75 %.

The existence of tree above proficiency level that is quite dominant is inseparable from economic value owned by tree, that is, as benefits of fruit, wood construction materials, and other benefits such as those owned by coconut palms (*Cocos nucifera*) as a multifunctional plant.

Location 3 in Cisameng Village

Most of houses in Cisameng Village have no yard. However, some houses have a lot of overgrown garden plants and perennials below. Some types of plants found in yard of population including acacia, banana, cherry, Angsana,

Caringin, Papaya, and Cottonwoods. Analysis of vegetation can be seen in Table 2.26.

Table 2.26. Vegetation Yard in Cisameng Village

NO.	Indonesian Name	Scientific Name	FR	KR	SDR
1	jengjen	<i>Albizia falcata</i>	11.11	8.33	9.72
2	banana	<i>Musa paradisiaca</i>	18.52	45.00	31.76
3	mango	<i>Mangifera indica</i>	11.11	6.67	8.89
4	jackfruit	<i>Artocarpus heterophylla</i>	11.11	10.00	10.56
5	angsana	<i>Pterocarpus indicus</i>	7.41	5.00	6.20
6	Caringin	<i>Ficus benjamina</i>	3.70	1.67	2.69
7	bamboo	<i>Bambusa sp.</i>	11.11	5.00	8.06
8	duren	<i>Durio zibenthinus</i>	3.70	3.33	3.52
9	coconut	<i>Cocos nucifera</i>	14.81	11.67	13.24
10	teak	<i>Tectona grandis</i>	3.70	1.67	2.69
11	cottonwoods	<i>Ceiba petandra</i>	3.70	1.67	2.69
Total			100	100	100
Shannon-Wiener Diversity Indexs				1.85	

Source : Pimary Data, 2011

Location 4 in Bantarcaringin Village

Yard in Bantarcaringin village has many planted with perennials/woody. Boundary between garden of one another can not be distinguished clearly. In addition to perennials there are also people who grow ornamental plants such as Nusaindah, bougainvillea, cosmos flowers, and others. The types of perennials that are in the Bantarcaringin village can be seen in Table 2.27.

Table 2.27. Vegetation Yard in Bantarcaringin Village

NO.	Indonesian Name	Scientific Name	FR	KR	SDR
1	mango	<i>Mangifera indica</i>	9.09	6.25	7.67
2	starfruit	<i>Averrhoa carambola</i>	6.06	2.50	4.28
3	jengkoi	<i>Archidendron sp.</i>	3.03	1.25	2.14
4	Petey	<i>Parkia speciosa</i>	6.06	3.75	4.91
5	banana	<i>Musa paradisiaca</i>	15.15	48.75	31.95
6	coconut	<i>Cocos nucifera</i>	12.12	10.00	11.06
7	soursop	<i>Anona muricata</i>	3.03	1.25	2.14
8	avocado	<i>Persea americana</i>	3.03	1.25	2.14
9	bayur		6.06	3.75	4.91
10	duren	<i>Durio zibenthinus</i>	6.06	2.50	4.28
11	rambutan	<i>Nephelium lappaceum</i>	6.06	2.50	4.28
12	papaya	<i>Carica papaya</i>	9.09	5.00	7.05
13	mahogany	<i>Sweitenia mahagoni</i>	3.03	2.50	2.77
14	coffee	<i>Coffea arabica</i>	9.09	5.00	7.05
15	brown	<i>Theobroma cacao</i>	3.03	3.75	3.39
Total			100	100	100
Shannon-Wiener Diversity Indexs				1.96	

Source : Pimary Data, 2011

Location 5 in Powerhouse Plan

Location plan of power house is located on banks of Citarum River with riverbank vegetation consists of garden vegetables (corn, beans, and soybeans), moor, Talun, cacao plantations, banana plantations and teak. In addition, there is one field in that location. Based on analysis of vegetation at site found that banana is most dominant species followed by SDR 36.52 to SDR 11.96 teak species.

Tabel 2.28. Vegetation at Powerhouse

NO.	Indonesian Name	Scientific Name	FR	KR	SDR
1	banana	<i>Musa paradisiaca</i>	20.00	53.04	36.52
2	teak	<i>Tectona grandis</i>	10.00	13.91	11.96
3	mango	<i>Mangifera indica</i>	10.00	1.74	5.87
4	Petey	<i>Parkia speciosa</i>	15.00	6.96	10.98
5	bamboo	<i>Bambusa sp.</i>	5.00	0.87	2.93
6	orange	<i>Citrus sp.</i>	5.00	2.61	3.80
7	jackfruit	<i>Artocarpus heterophylla</i>	15.00	14.78	14.89
8	duren	<i>Durio zibenthinus</i>	5.00	0.87	2.93
9	cottonwoods	<i>Ceiba petandra</i>	5.00	1.74	3.37
10	rambutan	<i>Nephelium lappaceum</i>	10.00	3.48	6.74
Total			100	100	100
Shannon-Wiener Diversity Indexs				1.51	

Source : Pimary Data, 2011

Location 6 Between Weir and Power house plan

This location is a hilly area with dominant vegetation like teak, bananas and shrubs. Based on analysis of vegetation diversity indices obtained in this relatively small site which is 1.15. It is caused by plant species found in this location is relatively small. Dominant type in this location is identity that has SDR 39.74 and SDR 30.41 of bananas.

The six locations of observation may not find a protected plant species are endangered or endemic plants.

Tabel 2.29. Vegetation in the Plan between Weir and Powerhouse

NO.	INDONESIAN NAME	SCIENTIFIC NAME	FR	KR	SDR
1	Teak	<i>Tectona grandis</i>	27.78	51.69	39.74
2	Banana	<i>Musa paradisiaca</i>	27.78	33.05	30.41
3	jengjen	<i>Albizia falcata</i>	5.56	0.85	3.20
4	mahogany	<i>Sweitenia mahagoni</i>	27.78	9.32	18.55
5	kaliandra	<i>Caliandra haemathocepala</i>	11.11	5.08	8.10
Total			100	100	100
Shannon-Wiener Diversity Indexs				1.12	

Source : Pimary Data, 2011

■ Fauna

In vicinity of location plan of intake weir and found several species of animals, from birds and reptiles. Reptile species found in vicinity of plan include monitor lizard (*Varanus salvator*), snakes, lizards (*Mabouia multifasciata*), and hap-hap (*Draco volans*). In addition, be some kind of birds are commonly seen among finches (*Lonchura leucogastroides*) and swallow.

Types of fauna found at Cisameng River consist of pets such as sheep and water buffalo (*Bubalus bubalis*). Bird species seen in this area namely turtledoves (*Streptopelia chinensis*), Toed, finches (*Lonchura leucogastroides*), Cucak Kutilang (*Pycnonotus aurigaster*), and Kapinis (*Collocalia sp.*).

Residents who live in Cisameng Kampong keeping livestock such as sheep and water buffalo (*Bubalus bubalis*). In addition, bird species population is maintained finches (*Pycnonotus aurigaster*) and Toed. Wild birds found in this area of finches (*Lonchura leucogastroides*), swallow, Toed, and turtledoves (*Streptopelia chinensis*).

Types of animals found in Bantarcaringin Kampong in general do not different with pets in Cisameng Kampong. While the wild animals found in this ward include wild boar (*Sus scrova*), otter (*Aonyx cinerea*), and Weasel (*Paradoxurus sp.*). Wild bird species found in this area are finches (*Lonchura leucogastroides*), kites (*Hirundo tahitica*), Toed and turtledoves (*Streptopelia chinensis*).

Types of fauna found in Power House site plan is wild boar (*Sus scrova*), ferrets (*Paradoxurus sp.*), otters (*Aonyx cinerea*), black eagle (*Ictinaetus malayensis*), kites (*Hirundo sp.*), Turtledoves, Toed, sparrow, bird glasses, Cinenen, and Anis. Types of reptiles including snakes, geckos, lizards and hap-hap.

While types of animals that exist between location of power house and weir plan is otters, raccoons, turtledoves, finches, and black eagle. Wild boar does not include wild animals are protected and endemic species, while black eagle, is including protected bird species.

■ Aquatic Biota

- Plankton

Plankton are drifting organisms that live in water with flow of water. Plankton can be divided into two groups, namely phytoplankton and zooplankton organisms including plants which are microscopic animals. In aquatic

ecosystems, phytoplankton is a plant that determines productivity of waters. In addition, phytoplankton can also be used as an indicator of aquatic environmental conditions change, for example, entry of pollutants into the waters of which can have an impact. Similarly, zooplankton.

Plankton cell growth and division is highly dependent on nutrients, including nitrate, phosphate and silicate. In the waters most of the oxygen produced by phytoplankton, so presence of plankton plays an important role in aquatic ecosystems as well as food-producing biota, water and oxygen for other living organisms.

Based on results of plankton enumeration, in study area, phytoplankton found as many as 21 species and 11 types of zooplankton (**Table 2.30**). According to Simpson's diversity index range between 0,709 to 0,843. This shows diversity of plankton in rivers in the study area are in good condition.

Table 2.30. Phytoplankton types found in study area

No	Types of Plankton	Number Of Individuals Per Liter			
		Location-1	Location -2	Location -3	Location -4
I. Phytoplankton					
1	<i>Spirogyra</i> sp.	594	231	1683	924
2	<i>Microcystis</i> sp.	330	-	-	33
3	<i>Navicula</i> sp.	2145	132	66	33
4	<i>Oscillatoria</i> sp.	165	165	99	66
5	<i>Chaetophora</i> sp.	33	99	-	-
6	<i>Draparnaldia</i> sp.	99	-	-	-
7	<i>Closterium</i> sp.	99	66	33	-
8	<i>Volvox</i> sp.	33	-	-	-
9	<i>Schizomeris</i> sp.	1683	165	330	-
10	<i>Chamaesiphon</i> sp.	-	99	-	-
11	<i>Cymbella</i> sp.	-	66	-	-
12	<i>Mougeotia</i> sp.	-	33	99	-
13	<i>Zygnemopsis</i> sp.	-	33	198	-
14	<i>Closteriopsis</i> sp.	-	33	-	-
15	<i>Characiopsis</i> sp.	-	-	33	-
16	<i>Tabellaria</i> sp.	-	-	264	-
17	<i>Surirella</i> sp.	-	-	132	-
18	<i>Fragilaria</i> sp.	-	-	132	-
19	<i>Mougeotiopsis</i> sp.	-	-	66	-
20	<i>Diatoma</i> sp.	-	-	297	-
21	<i>Phormidium</i> sp.	-	-	-	660
Total Phytoplankton		5214	1122	3432	1716
I.D. Simpson		0,707	0,875	0,727	0,486
II. Zooplankton					
1	<i>Cyclops</i> sp.	3036	561	-	2640
2	<i>Brachionus</i> sp.	231	66	-	165
3	<i>B. facaltis</i>	264	297	66	264
4	<i>Arcella</i> sp.	330	66	-	-
5	<i>Moinodaphina</i> sp.	231	33	-	363
6	<i>Phylodina</i> sp.	165	-	-	66
7	<i>Nauplii</i>	33	-	-	99
8	<i>Daphnia</i> sp.	33	-	-	33
9	<i>Chaos</i> sp.	-	33	66	-
10	<i>Centropvxis</i> sp.	-	-	33	-

No	Types of Plankton	Number Of Individuals Per Liter			
		Location-1	Location -2	Location -3	Location -4
11	<i>Bosmina</i>	-	-	33	-
Total Zooplankton		4323	1056	198	3696
I.D. Simpson		0,489	0,628	0,722	0,471
Total Plankton		9537	2178	3630	5412
I.D. Simpson		0,807	0,879	0,756	0,709

Source : Pimary Data, 2011

Remarks :

Location – 1 : Citarum River/ Powerhouse Location Plan on Rajamandala HEPP

(06°51'44,4" S dan 107°20'31,1" E)

Location – 2 : Cileat Estuary River (06°50'987" S dan 107°20'771" E)

Location – 3 : Cisameng Estuary River (06°51'404" S dan 107°21'094" E)

Location – 4 : Citarum River/ Intake Location Plan on Rajamandala HEPP

(06°51'845" S dan 107°20'949" E).

- Benthos

Makrofauna benthos is fauna that makes bottom waters as a habitat either sessile or free. Condition of waters river in study area which has a swift current, making habitat that is not so supportive of existence of benthos, so either type or population diversity is relatively low.

More types of benthos were found and index diversity according to Shannon-Wieners, presented in **Table 2.31**.

Table 2.31. Benthos types found in Study Areas

No	Makrobenthos Types	Number of Individual per m ²			
		Location – 1	Location – 2	Location – 3	Location – 4
1	<i>Melanoides</i> sp.	6	-	-	-
2	<i>Physa</i> sp.	16	-	-	-
3	<i>Lymnaea</i> sp.	-	4	4	-
4	<i>Brotia</i> sp.	-	6	4	-
5	<i>Hydropsyche</i> sp.	-	10	8	-
6	<i>Paratelfusa</i> sp.	-	6	-	-
7	<i>Macrobrachium</i> sp.	-	2	-	-
8	<i>Climacia</i> sp.	-	10	4	-
9	<i>Acroneuria</i> sp.	-	2	-	-
10	<i>Progomphus</i> sp.	-	2	12	-
11	<i>Anax</i> sp.	-	2	-	-
12	<i>Callibaetis</i> sp.	-	6	6	-
13	<i>Enallagma</i> sp.	-	-	8	-
14	<i>Chironomus</i> sp.	-	-	8	-
Total		22	50	54	0
Shanon-Wiener Indexs		0,585	2,124	2,00	0

Source : Pimary Data, 2011

Remarks:

Location – 1 : Citarum River/ Powerhouse Location Plan on Rajamandala HEPP

(06°51'44,4" S dan 107°20'31,1" E)

Location – 2 : Cileat Estuary River (06°50'987" S dan 107°20'771" E)

Location – 3 : Cisameng Estuary River (06°51'404" S dan 107°21'094" E)

Location – 4 : Citarum River/ Intake Location Plan on Rajamandala HEPP

(06°51'845" S dan 107°20'949" E).

Based on calculation of index value of diversity according to Shannon & Wiener, of four sites ranged from 0 (Citarum/intake location plan) to 2,124 (Cileat River Estuary). The highest diversity in Cileat River Estuary is possible because there are sufficient nutrients to support life benthos organisms, whereas low diversity index in Citarum River/intake location plan, shows that despite nutrient adequacy, but may also influence swift water currents.

- Nekton

The diversity of fish species in study area is obtained through direct surveys, inventories, and interviews with residents around site plan for Rajamandala 47 MW HEPP, where location which will be reduced water discharge.

Species of fish contained in them is Citarum river, tilapia, kebo tooth blackener / catfish, betok, eels and fish broom. The number and presence of fish in Citarum River highly dependent on water supply Saguling Reservoir. Data on fish species in Citarum River weir Rajamandala HEPP from the plan until Powerhouse Rajamandala can be seen in Table 2.32.

Table 2.32. Fish Type in Along Weir Rajamandala HEPP to Powerhouse Rajamandala Plan

No	Local Name	Scientific Name
1.	Benteur	<i>Puntius binotatus</i>
2.	Tagih	<i>Mystus nemurus</i>
3.	Kebogerang	<i>Mystus negriceps</i>
4.	Lais	<i>Lais hexanema</i>
5.	Lele	<i>Clarias bratachus</i>
6.	Lempuk	<i>Callichrous bimaculatus</i>
7.	Gabus	<i>Channa striatus</i>
8.	Mujair	<i>Oreochromis mosammbicus</i>
9.	Belut	<i>Monopterus albus</i>
10.	Betok	<i>Anabas testudineus</i>

Source : Primmmary Data, 2011

c. Social, Economic and Cultural Components

▪ Population

- Population Density

The largest population density in study area is Cipatat Sub-District, which is equal to 105 person/ha, while Sub-District of least population density

contained in Haurwangi Sub-District which amounted to 79 person/ha. As for Cihea Village with highest population density, which is equal to 14 person/ha and the least is Rajamandala Kulon village with the population density of 10 person/ha.

Detail the density population in the District and Village study area can be seen **Table 2.33.**

Table 2.33. Population Densities in Study Areas

No	Sub District / Village	Regional Area (ha)	Total Population	Population Density per ha
1	Haurwangi	43.358,89	54.560	79
	- Cihea	1.102,22	8.011	14
2	Cipatat	95.933,01	91.496	105
	- Rajamandala Kulon	1.527,00	15.769	10

Source : - Monograph of Haurwangi & Cipatat Sub District, 2010
- Monograph of Cihea & Rajamandalakulon Village, 2010

- Sex Ratio

In general, total number of residents in Rajamandala Kulon village is 15,769 persons, 4,048 men and 3,963 women, with a sex ratio of 94.92%. While population of Cihea Village is 8,011 persons, 4,048 men and 3,963 men, with a sex ratio of 97.90%. In detail, population figures by sex and sex ratio per village in the study area are shown in **Table 2.34.**

Table 2.34. Total Population By Sex and Sex Ratio

No	Village	Total Population			Sex Ratio (%)
		Male	Female	Total	
1.	Cihea	4,048	3,963	8,011	97.90
2.	Rajamandala Kulon	8,053	7,644	15,769	94.08

Source : Monograph of Cihea & Rajamandalakulon Village, 2010

- Population Structure by Age

Population group aged 60 years above is the largest number in study area that is equal to 3,114 persons or 13.10% and population group age 55 to age 59 years is least age group in study area that is equal to 918 persons. Learn population by age group in study area can be seen in **Table 2.35.**

Table 2.35. Total Population By Age Group in Study Area

No	Age Group	Village		Total	%
		Cihea	Rajamandala Kulon		
1	0 - 4 Year	630	1.166	1.796	7,55
2	5 - 9 Year	580	1.496	2.076	8,73
3	10 - 14 Year	691	1.804	2.495	10,49
4	15 - 19 Year	603	1.479	2.082	8,76
5	20 - 24 Year	487	1.318	1.805	7,59
6	25 - 29 Year	538	1.497	2.035	8,56
7	30 - 34 Year	542	1.260	1.802	7,58
8	35 - 39 Year	533	1.173	1.706	7,17
9	40 - 44 Year	484	833	1.317	5,54
10	45 - 49 Year	486	910	1.396	5,87
11	50 - 54 Year	446	792	1.238	5,21
12	55 - 59 Year	404	514	918	3,86
13	60 Year and Above	1.587	1.527	3.114	13,10
Total				23780	100

Source : Monograph of Cihea& Rajamandala kulon Village, 2010

- Population Structure by Education

In Cihea village, can be obtained information that number of buildings. In Elementary School Level there are 3 school buildings, 801 students and 31 teachers. And 2 boarding school buildings with 280 students and 13 teachers.

Likewise with Rajamandala Kulon Village which has 4 kindergarten buildings with 201 students and 10 teachers. At elementary school level there are 11 buildings with 2,986 students and 125 teachers. While at Senior Secondary School (SLTA) there are 2 buildings with 269 students and 23 teachers. In addition there are 4 Boarding schools with 232 students and 8 teachings.

More Data on Number of Buildings, Students, Teachers in study area presented in **Table 2.36**.

Table 2.36. Number of Schools, Students and Teachers in Study Area

No	Occupation	Village	
		Cihea	Rajamandala Kulon
I.	Schools		
	Kindergarten	-	4
	Elementary School	3	11
	Junior High School	-	-
	Senior High School	-	2
	College (D3)	-	-
	Boarding School	2	4
	Total	5	21

No	Occupation	Village	
		Cihea	Rajamandala Kulon
II.	Students		
	Kindergarten	-	201
	Elementary School	801	2,986
	Junior High School	-	-
	Senior High School	-	269
	College (D3)	-	-
	Boarding School	280	232
	Total	1,350	3,688
III.	Teachers		
	Kindergarten	-	10
	Elementary School	31	125
	Junior High School	-	-
	Senior High School	-	23
	College (D3)	-	-
	Boarding School	13	8
	Total	31	166

Source : Monograph of Cihea& Rajamandalakulon Village, 2010

Data in **Table 2.37** shows population by level of education. At level of Elementary School numbered 3,859 persons, while Junior High School amounted to 2,093 persons and level of Senior High School amounted to 2290 persons. At college level, Diploma graduates (D1 to D3) as much as 163 persons. And 164 persons who have passed Bachelor Degree (S1) to Doctor (S3) equal.

Table 2.37. Number of Population by Educational Level in Two Villages

No	Graduate	Cihea Village		Rajamandalakulon Village		Total
		Male	Female	Male	Female	
1	Kindergarten	-	-	-	-	-
2	Elementary School	81	69	1,666	2,043	3,859
3	Junior High School	89	61	975	968	2,093
4	Senior High School	11	8	1,371	900	2,290
5	College (D1 - D3)	-	-	89	74	163
6	College (S1-S2)	2	1	92	69	164
	Total	183	139	4,193	4,054	8,569

Source : Monograph of Cihea& Rajamandalakulon Village, 2010

▪ Social Economy

- Occupation

Occupations of local people in Cihea Village, and Rajamandala Kulon Village generally in field are agriculture, agricultural employers, traders and private sector employments. Total population by type of occupation in study area is dominated by agricultural sector that support employment for about

3,492 inhabitants. The composition of population in study area based occupations can be seen in **Table 2.38**.

Table 2.38. Total population by Type of Occupation

No	Occupation	Village		Total	%
		Cihea	Rajamandala Kulon		
1	Farmer	914	448	1,362	26.7
2	Hodge	1,226	904	2,130	41.90
3	Civil Server	12	144	156	0.30
4	Craftsmen	8	17	25	0.04
5	Merchant	15	207	222	4.36
6	Breeder	-	6	6	0.01
7	Military Staff	1	38	39	0.07
8	Private Sector Emp	23	83	105	2.06
9	Entrepreneur	27	787	814	16.01
10	Mechanic	-	25	25	0.04
11	Retired	86	113	199	3.91
Total				5,083	100

Source : Monograph of Cihea& Rajamandala kulon Village, 2010

- Employment Force

Population based Employment Force already employed in study area for 3,799 persons, with highest number is in Cipatat Village of 2,953 inhabitants. Largest number of Employment Force who have not worked there in Cipatat Village of 3,455 persons. Total Employment force is 7,775 persons in region study, where Cihea village is lowest Employment Force at least 1,367 inhabitants. Employment Force in region more studies are shown in **Table 2.39**.

Table 2.39. Total Population by Employment Force

No	Village	Employment Force		Total Employment Force
		Has Working	Not Working	
1.	Cihea	846	521	1,367
2.	Cipatat	2,953	3,455	6,408
Total		3,799	3,976	7,775

Source : Monograph of Cihea& Rajamandalakulon Village, 2010

■ Socio - Cultural

- Religion

Inter-religious harmony and religious communities in Haurwangi Sub District and Cipatat Sub District has been going pretty well, this condition is created from government actors, religious leaders and religious institutions in supporting creation of harmony and harmony of life based on mutual respect among peers and among fellow believers. Number places worship scattered

in Haurwangi Sub District are 95 building of Mosques, Violated/Langgar/Little Mosque is 263 buildings, 38 buildings of Muslim Boarding Schools and 111 buildings of Muslim Souncil. On the other hand, in Cipatat Sub-District there are 185 Mosque buildings and 397 Violated/Langgar/Little Mosque buildings. More data about places facilities of worship in Cipatat Sub-District and Haurwangi Sub-District can be seen in **Table 2.40**.

Table 2.40. Place of Worship in Haurwangi and Cipatat Sub-District

No.	Places of Worship	Haurwangi Sub-district	Cipatat Sub-district
1	Mosque	95	185
2	Violated/Langgar/Little Mosque	263	397
3	Muslim Boarding school	38	-
4	Muslim Souncil	111	-
Total		507	582

Source : Monograph of Haurwangi&Cipatat, Sub - Distric, 2010

While the number of places worship in Cihea village, there are 18 place of mosque and 88 place of Violated/Langgar/Little Mosque, as well as in Rajamandala Kulon Village that has 21 mosques and 41 places of Violated/Langgar/Little Mosque.

More data about places of worship facilities around study area can be seen in **Table 2.41**.

Table 2.41. Place of Worship Around Study Area

No.	Place of Worship	Rajamandala Kulon Village	Cihea Village
1	Mosque	21	18
2	Violated/Langgar/Little Mosque	41	88
3	Muslim Boarding school	-	-
4	Muslim Souncil	-	-
Total		62	106

Source : Monograph of Haurwangi & Cipatat, Sub - Distric, 2010

- Facilities and infrastructures

Facilities and infrastructures that exists around study area, in addition to health and education facilities have also been found in form of water facilities Dug wells/pumps & other supporting facilities and infrastructure. Description of facilities and infrastructures can be seen in **Table 2.42**.

Table 2.42. Environmental Facilities and Infrastructure in Study Areas

No	Opinion / Response	Total	(%)
1	The type of house occupied now?		
a.	House on stilts	34	35
b.	Semi Permanent	14	15
c.	Permanent	48	50
Total		96	100

No	Opinion / Response	Total	(%)
2	Source Water Used Net Daily?		
a.	PDAM (Water Management by Government)	0	0
b.	River	4	4.17
c.	Dug wells / pumps	92	95.83
	Total	96	100
3	Where is sewage disposal end of the channel?		
a.	Banished to ditch Straight to the river	0	0
b.	Septic tank	96	100
c.	Other	0	0
	Total	96	100
4	How to Waste Disposal Rubbish Existing Now?		
a.	Disposed By Neighbor Head	0	0
b.	Banished to the river	0	0
c.	Burn	96	100
d.	Disposed relocation	0	0
	Total	96	100

Source: Pimary Data, 2011

From **Table 2.42** above can be explained that 50% of respondents had a permanent house made of raw materials in form of bricks, sand and cement as its walls, and floor tiles as a base. 15% of respondents had a semi-permanent homes in some parts are not fully using raw material in form of bricks, sand and cement, nor is it entirely using wood as raw material. 35% of respondents had a house on stilts that almost most/all building materials made of wood. On other hand, all respondents (100%) acknowledge that Source of clean water used for drinking, cooking, washing and so forth comes from Dug wells/pumps, and they already have a septic tank for sewage disposal end of channel, as well as waste management systems carried out by burning.

- **Community Perceptions of Activity Plan**

Public perception and attitude towards plan of activities can be described, that 78% of respondents had been aware of this development plan Rajamandala 47 MW HEPP and 22% were found out at time of interview process is ongoing. 90% were aware by Surveyor who conduct survey, 10% are aware of rumors that grow in community (neighbors). Furthermore, 100% of respondents answered that greatest benefit from construction of Rajamandala HEPP projects is existence for employment and business opportunities are assessed will increase. On other hand, public views negative effects of Rajamandala HEPP development plan is use of Productive Land owned by residents (56%), environmental damage (23%), and rising crime (18%). Yet 100% of people agreed about Rajamandala 47 MW HEPP Project. They hopely about :

1. A sustainable social concern to community,

2. Land acquisition to be done by way of consultation between landlord directly by the proponent.
3. Can get involved in project (Employment from Local People)
4. Wherever possible, these action plans do not interfere with activity of agricultural population
5. In practice, please note condition and sustainability of environment surrounding project site
6. To be continue effort of water for public population

Table 2.43. Attitudes and Perceptions of Community Development Action Plan Rajamandala HEPP.

No	Opinion by Respondents	Total	(%)
1	Are you Knowing the plans of Rajamandala HEPP development activities in surrounding your live environment?		
a.	Yes	74	78
b.	No	22	22
	Total	96	100
2	If you know, from whom you heard of plan such activities?		
a.	neighbor	10	10
b.	Government officials	-	-
c.	Officer or Employment Survey of Mining	86	90
d.	Other, please specify	-	-
	Total	96	100
3	According to your Comment, is a benefit citizens can grow because of this development?		
a.	Employment and Business Opportunities	96	100
b.	Helps Ease Business	-	-
c.	Assist Development	-	-
d.	Other Name ...	-	-
	Total	96	100
6	In addition Advantages, Which Are Obtained Disadvantages from activity of local people?		
a.	Environmental Degradation	22	23
b.	Productive Use of Land Owned Population	55	56
c.	Increased Crime	17	18
d.	Others	2	3
	Total	96	100
7	If So, Do You Agree With Activities Such?		
a.	Agree	96	100
b.	Disagree	-	-
c.	Not Answering	-	-
	Total	96	100

Source: Primary Data 2011

d. Public Health Components

The main health problems in Haurwangi Sub-district and Cipatat Sub-district is limited health infrastructure and limited total medical workers and leading medical health services provided to people deemed not maximized. Many people who experience pain, and often they are treated with traditional medicines. However if disease is felt not improved, residents who experienced pain will soon be treated to nearest health care institution with locations where his home is located. Disease that often affects population in Haurwangi Sub-District is a Tuberculosis disease, Mad/Stress, Asthma, Stroke, Lung. Further

tables on the types of illnesses suffered by communities around study area can be seen in **Table 2.44.** until **Table 2.46.**

Table 2.44. Types of Diseases Often in Areas Community Study

No.	Name Of Diseases	Total	%
1	Heart	9	7.4
2	Lever	3	2.4
3	Lungs	14	11.5
4	Cancer	2	1.6
5	Stroke	16	13.2
6	Diabetes Mellitus	3	2.4
7	Kidney	7	5.7
8	Crazy / strees	24	19.8
9	Tuberculosis	24	19.8
10	Asthma	17	14.0
11	Bile	2	1.6
TOTAL		121	100

Source : Monograph of Cipatat Sub-District, 2010

Table 2.45 and **Table 2.46** illustrates Total Facilities and Infrastructure health in study area. Where Cihea village there is 1 place health center and 10 places of Children Treatment, which consists of 8 people Shaman Maternity Trained, 1 midwife, 1 nurse, 2 Shaman Alternative Medicine, and Physicians Practice 10 people. While Rajamandala Kulon village there are 1 place Public Health Assistant, 1 place Polyclinic / Medical Clinic, 25 places of Children Treatment and 2 places of Physician Practice Office, with a total of 13 medical personnel there are 2 people General Practitioners, 7 people Shaman Maternity Trained, 3 people midwife and one healer of Alternative Medicine.

Table 2.45. Total of Health Facilities in Study Areas

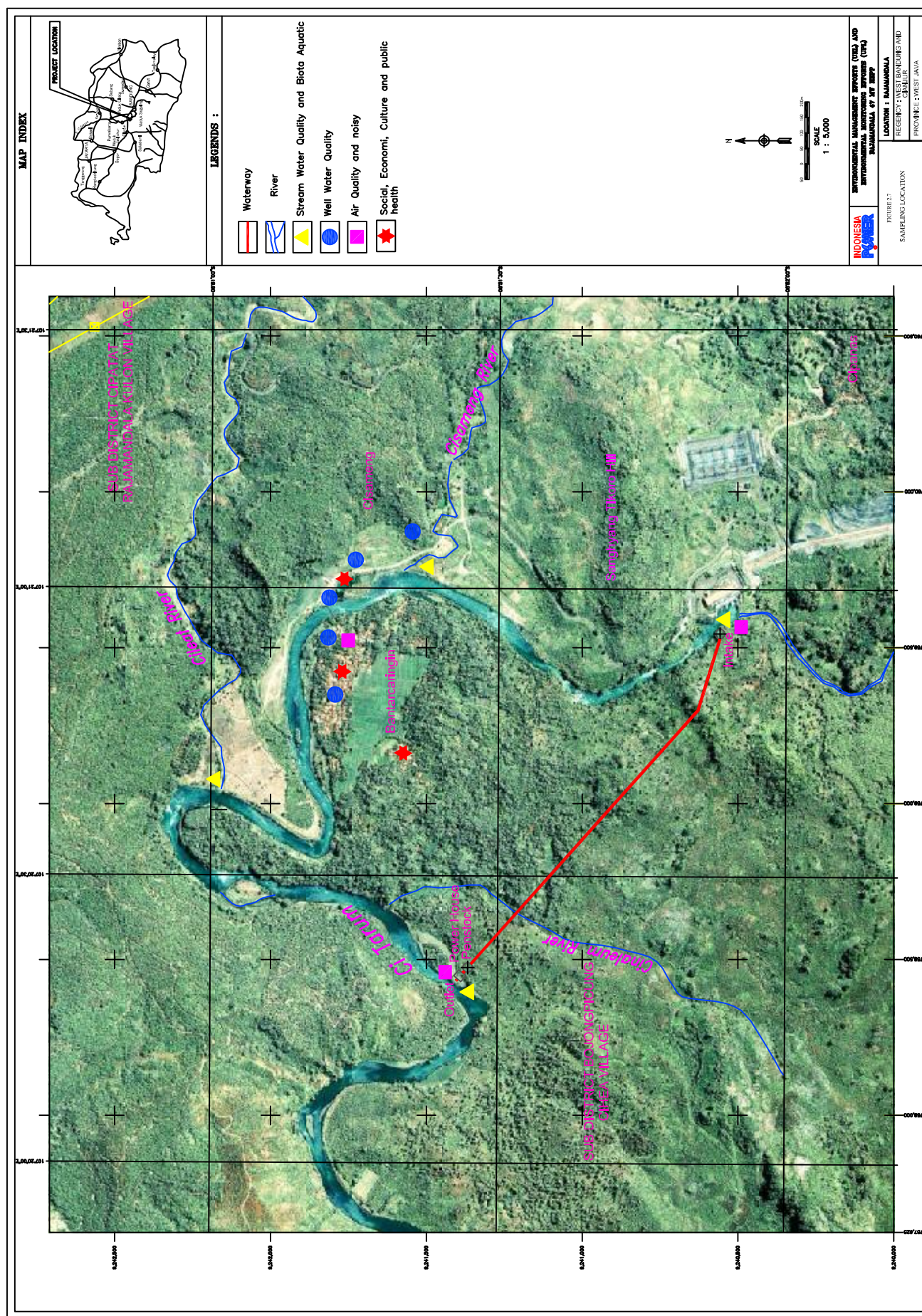
No.	Health Infrastructure	Rajamandala Kulon Village	Cihea Village
1	General Hospital	-	-
2	Health Centres	-	-
3	Public Health Assistant	1	1
4	Polyclinic / Medical Clinic	1	-
5	Children Treatment	25	10
6	Physician Practice Office	2	-
TOTAL		29	11

Source : Monograph of Haurwangi & Cipatat, Sub - Distric, 2010

Table 2.46. Total Health Facility Study Areas

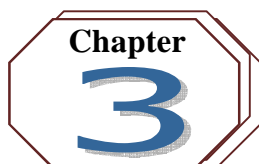
No.	Health Facility	Rajamandala Kulon Village	Cihea Village
1	General Practitioners	2	-
2	Shaman Maternity Trained	7	8
3	Midwife	3	1
4	Nurse	-	1
5	Shaman Alternative Medicine	1	2
6	Physicians Practice	-	10
TOTAL		13	22

Source : Monograph of Haurwangi & Cipatat, Sub - Distric, 2010



CHAPTER 3

ENVIRONMENTAL IMPACT WILL HAPPEN



Chapter 3

ENVIRONMENTAL IMPACT WILL HAPPEN

3.1. Pre Construction Stage

a. Field Survey

- Perception of community

Existence of Rajamandala 47 MW HEPP development activities will cause positive and negative impact on public perception. Positive impacts arise because of involvement of some local people in field survey, while community concern and anxiety appears as a negative impact.

Based on interview results with community around project of all respondents agreed with various expectations. Community expectations, among others regarding land acquisition in order to be discussions between land owner and project initiator without a lot of intermediaries, other than that in actual best to not interfere with agricultural activities and water endeavored to remain there for surrounding community. Expectations of society is not yet listed in plan of activities, so impact should be managed.

b. Procurement of land

- Population Income

Land acquisition is predicted impacts of changes income levels. Land used for HEPP is a land of UBP Saguling, Perhutani, village and community lands.

Existence of community-owned land acquisition for Rajamandala HEPP can trigger changes in livelihoods of majority community, so that people who previously livelihood as farmers' livelihoods will turn into traders, construction workers and so forth, without any educational background or skills are sufficient. So impact on revenue decline needs to be managed.

- **Public unrest**

Land acquisition activities significantly affect social unrest in around projects, particularly community-owned land affected by release. The potential emergence of public unrest among a discrepancy value of land compensation and lack of public understanding for mechanisms of land acquisition policies.

Process of compensation and determining value compensation done by following applicable procedures of land acquisition in accordance with mechanisms and regulations as well as on basis of an agreement between both parties which is between land owner and project proponent. Impact of land acquisition to community unrest needs to be managed.

3.2. Construction Stage

a. Procurement and mobilization of labor

- **Employment opportunities and try**

Rajamandala HEPP development activities requires no small amount of labor, especially unskilled workers. Potential for unskilled workers are not directly available in considerable amounts in study area.

Recruitment of manpower in construction phase may cause a positive impact, with participation of local residents who worked on this activity. For purposes of rough labor, residents in nearby villages potentially enough to participate worked. Duration of work is relatively long, it will also cause a positive impact, of received wages by local residents.

Residents who did not work projected to open up business opportunities such as: provision of basecamp for workers project, stalls selling snacks/weight, tire business, which will directly support needs of project workers. From interviews with locals as much as 100% of respondents wish to go to work, so impact should be managed.

- **Public unrest**

Community unrest around project site arising from habit of labor involved in construction activities is a group of labor brought about by project contractor and not from local area. If this issue is not addressed by implementing activities, then over time will lead to social unrest.

However, most of labor question remains will be brought from outside to remember not all jobs can be handled by local workforce.

The labor force that has not worked in Cihea Village and Cipatat Village of 3,976 person, in presence of construction activity is expected to absorb labor by 6.29%. From interviews to community around project site as much as 100% of respondents are generally willing to work on project.

- Morbidity

Procurement activities and mobilization of labor will absorb workforce entrants up to 250 people with assumption that skilled workers are not being met from local people. With presence of migrant workers is estimated negative impact on e morbidity due to possibility of outbreaks of infectious diseases, so impact should be managed.

- Environmental sanitation

Project site conditions will undergone much change. Especially in terms of environmental sanitation. One important factor in changing environmental sanitation is difference between habits of local workers and migrant workers. This will impact on public health around project site.

Amount of labor for construction of 250 people, amount of waste generation per person is estimated to 2.5 l/people/day, so that presence of workers is estimated waste generation of 0.6 m³/day. Impact of procurement workforce on waste to be managed.

b. Mobilization of equipment and construction materials

- Decrease in air quality

Mobilization activities equipment and construction materials is predicted to cause changes in air quality. This is due to mobility of construction materials transporter. Type of vehicle used in mobilization of equipment is moderate to heavy weight trucks. Increased intensity of vehicles through haul road would result in increased concentrations of dust, gas, CO, NO₂, and SO₂ in ambient air along road vehicles. To estimate increase magnitude of contaminants in ambient air as a result of increased number of motor vehicles, used Gauss equation for a line source.

Table 3.1. Predicted increase in ambient air pollutants

Parameter	Standard*)	Rona Awal			Improved prediction current activities		
		U-1	U-2	U-3	U-1	U-2	U-3
NO2 (Nitrogen Dioxide)	400	29.7	30.92	37.56	52.93	54.15	60.79
SO2 (Sulfur Dioxide)	900	28.92	25.41	27.08	33.15	29.64	31.31
CO (Karbon Monoxide)	30.000	541.92	541.06	629.48	554.41	553.55	641.97
TSP (Dust)	230	113.98	115.92	113.39	115.77	117.71	115.18

*) Based on PP RI No. 41 of 1999, concerning Air Pollution Control.

Remarks :

U-1 : Bantar Caringin Kampong, U-2 : Rajamandala Powerhouse plan, U-3 : Rajamandala weir/intake plan

Prediction of ambient air pollutants increase from three locations showed levels that still meet quality standards required by Government Regulation no. 41 of 1999, but construction activity is expected to last more than 2 years so that impact needs to be managed.

- Increased noise

Impact on noise, caused by mobilization of equipment and material activities of vehicles used. Sources of noise generated by use of such vehicles including intermittent type. Approach taken is sound emitted drawn vehicles average of 85 dBA at source, average vehicle speed is 40 km/hour, then noise distribution forecasts at time of mobilization activities equipment and materials at a distance of 20 m from source of 72.7 dBA and at a distance of 50 m from source of 68.3 dBA. Based on measurement results at three locations of measurement, noise level ranged between 43.9 dBA - 53.5 dBA, but construction activity is expected to last more than 2 years so it is predicted to increase intensity of noise, impact needs to be managed.

- Damage to roads and bridges

Activity mobilization of heavy equipment and construction materials is expected to cause negative impact to destruction of road infrastructure around project site. From observation of volume traffic around study area, namely UBP Saguling access road generally rare vehicles passing by, so a increase in traffic volume small expected. However, construction activity is expected to last long and the weight of vehicle is predicted to have an impact large enough to damage road, so the impact should be managed.

- Public unrest

Basically, equipment and material mobilization activities will have an impact on environment. The impact of social unrest emerged primarily as a result

impacts reduced of environmental quality (increased dust) as well as facilities and infrastructure in vicinity.

From measurement results in Bantarcaringin Kampong, dust content measured at $113.98 \mu\text{g}/\text{Nm}^3$, content will increase with number of vehicles and duration of construction in progress. Impact of public unrest against mobilization of equipment and construction materials need to be managed.

c. Access road construction

- Decrease in air quality

Access road construction activities which include land clearing, construction of road, and street pavement will cause air pollution, especially particulates. Land requirements for access roads is predicted of 6.8 ha, which is a mixture of gardens, fields and yards. Prior to paving, land clearing will be conducted from vegetation cover of land and buildings include process of digging Hide (cut and fill) to get desired elevation.

To estimate contribution of many contaminants from land clearing activities used box models with wind speeds of 1.08 m/sec, high atmospheric mixture of 1000 m. Emission factors used are for heavy vehicles is 3 units of bulldozer, 3 units of excavator, and 2 crawler units that operated 12 hours per day. Especially for particulate matter, apart from emissions of heavy equipment as well as from dust recirculation factor of open ground. Increasing concentration of dust in ambient air cut and fill activities in is forecasted $1,268 \mu\text{g}/\text{m}^3$, while activity of bulldozers, backhoes and crawler forecasted exhaust emissions contribute at $1.88 \mu\text{g}/\text{m}^3$ for dust, $3.21 \mu\text{g}/\text{m}^3$ for SO_2 , $9.96 \mu\text{g}/\text{m}^3$ for NO_x and $8.85 \mu\text{g}/\text{m}^3$ for CO. Such improvements if cumulative with average ambient concentrations remained below threshold required except for dust, so impact should be managed.

- Noise

Construction of access roads will be preceded with maturation land consists of excavation and embankment activities will be used where heavy equipment can be a source of noise. Heavy equipment used consists of dump trucks and backhoes. Average noise arising from heavy equipment at a distance of 15 meters from source ranged from 72-85 dBA (Canter, 1996), so noise level at access road construction activities at a distance of 25 m from source of 73.08 dBA and distance of 100 m from source of 54.90 dBA.

Based on measurement results of noise level in powerhouse plan 43.9 dBA and planned weir / intake 53.5 dBA, when viewed from standard of noise level standard for settlement does not exceed noise level (55 dBA). Distance of settlement from location activity \pm 500 m, but activity lasts about 6 months so that noise impacts should be managed.

- **Stability of slopes**

Clearing activities and maturation of land for access roads is expected to potentially impact occurrence of ground motion (avalanches). Symptoms of a landslide will occur mainly on steep slopes ($> 60^\circ$) due to activities of stripping, cutting or digging soil around it. With maturation of land in form of cut and fill ripening effect of land for roads carrying on slope stability necessary for management.

d. Civil Construction

- **Increased noise**

Existence of equipment activities cause an increase in noise at executed civil construction. Based on measurement results of noise levels at project site location in powerhouse plan of 43.9 dBA and weir/intake plan of 53.5 dBA. When compared with noise level standard based on Kep. MENLH. No. Kep 48/MENLH/11/1996, on Noise Level Standard, noise at project site does not exceed standard specified of noise level (55 dBA).

Smooth-blasting noise caused an estimated maximum of 84 dB (A) at a distance of 50 meters, with fly-rock speed a maximum of 2 Kine and arise mainly at beginning of tunnel manufacture. Noise level due to blasting at a radius of 500 meters from source of 64.05 dBA, so impact should be managed.

- **Erosion and sedimentation**

Civil construction activities consist of construction of weir and intake, headrace tunnel and penstock, and powerhouse and tailrace. Need of land for construction is estimated at 8.7 ha forecasted impact on increasing rate of erosion and sedimentation on water bodies in downstream location activity.

By using USLE formula approach, resulting erosion rate on existing conditions was 7.31 tons/year whereas during development of civil construction to be 29.26 tons/year.

- Decrease in water quality

Civil construction is predicted negatively impact to water quality, mainly river dredging activities. With soil excavation activities from river bottom, impacting on increased sedimentation and increased turbidity of river water.

Based on measurement results of water quality Citarum River in Rajamandala HEPP powerhouse plan of dissolved solids, obtained by concentration of 274 mg/L. When compared with quality standard based on West Java Governor Decree No. 39 of 2000, content of TDS measured still meets quality standard are permitted. However, activity lasted for 18 months, so impact should be managed.

- Stability of slopes

Blasting activities for construction of headrace tunnel and penstock will cause vibration and onset of bursts particles blasting (fly-rock). Blasting with a peak-particle velocity at 2 Kine will cause internal stress on existing structure approximately 1.96 kgf/cm^2 , lower than internal strength stress structure itself which is about 2.4 kgf/cm^2 . Thus resulting vibration on structure of surrounding buildings have a low impact intensity, however, impact needs to be managed as an anticipation.

- Flora

Civil construction activity is predicted to have an impact on flora, especially powerhouse location will be preceded by clearing of vegetation in gardens. Impact of these activities can reduce number of populations and species of plants around site. Land to be used for powerhouse is estimated at 6.0 ha, so impact of land clearing for powerhouse needs to be managed.

- Fauna

Civil construction activity is expected to have an impact on fauna. Impact that would occur from these activities is depressed types of animals that are sensitive to disturbance as a result of increased incidence of noise and dust levels. Magnitude of impacts that occur from civil construction to fauna of need for management.

- **Aquatic Biota**

Predicted impact on aquatic biota arising from civil construction activity that is river dredging leading to an enhancement of solids substances in Citarum River water that can inhibit light penetration needed for photosynthesis process and benthos habitat disturbance due to bottom water a closed sediment and mechanical disruption to gills of fish by solid substances in water. Impact of civil construction on aquatic biota need to be managed.

- **Public unrest**

Community unrest arise as a result of river water turbidity, especially residents who use Citarum River water for bathing and washing needs. From interviews with residents in study area, as much as 95.83% of respondents use water wells dug as a source of clean water everyday wear, yet most people use Citarum River water to irrigate their fields so that impact on construction civil on unrest community needs to be managed .

e. Landfill former quarry land

- **Planning, land and soil**

Impact of former landfill excavation activity is expected to cause a negative impact on space, land and soil. Former soil excavation volume estimated at 500,000 m³, area of land required for disposal area is 5.9 ha.

- **Flora**

Impact of excavation on former landfill is predicted negative on flora. This will cause a reduction in some types of flora, soil fertility and loss of habitat due to land for disposal area of 5.9 ha. From observation on flora in study area there are not that rare and protected flora, but to maintain habitat around site is necessary for management activities.

f. Release of labor

- **Decrease in income**

Impact from release of labor negatively assessed against income residents. This is due to reduced workforce will lead to reduced income residents who had been supplying daily needs of workers such as suppliers of food and

rent out basecamp for workforce. Impact from release of labor to decrease of income need to be managed.

3.3. Operational Stage

a. Operation Plant

- Decrease in water discharge

Predicted impacts arising from operation plant will be judged negatively due to reduced flow of water downstream of Citarum river after Rajamandala HEPP weir until Rajamandala HEPP powerhouse location plan. Discharge water from Saguling reservoir to operate the power plant of 224 m³/second while being used to operate Rajamandala power plant is 168 m³/second. Thus flow of water downstream Saguling HEPP will be reduced by 75% (224 m³/second - 168 m³/second). Weight impact of this operation is classified high or significant, however, the number of respondents based on interviews that use river water as a source of water is only 4.17% respondents and the majority use wells dug as water main is 95.83% of respondents.

- Decrease water quality

The impact of plant operation on water quality judged negatively due to a decrease in water quality downstream of Citarum River in Rajamandala weir HEPP to Rajamandala HEPP powerhouse primarily due to decreased water flow, so that the increase in BOD in domestic waste water from settlements - Bantarcaringin and Cisameng villages. Impact plant operation on water quality need to be managed.

- Facilities and infrastructure

Impact on operation of public facilities and infrastructure valued positively because it can use the access road Rajamandala HEPP by surrounding community, especially residents of Bantarcaringin Village who had only two wheels drive for accommodation facilities, so the impact should be managed.

- Employment opportunities and try

Impact of plant operation is expected to positively impact public perception. Besides going to increase revenue, opportunity to work and strive for the local population, will also improve the operation of other facilities such as

availability of facilities which will facilitate access roads they relate to other areas, in order to market their agricultural products or household industries which they open.

- Community Perception

Operation of Rajamandala HEPP harness flow of water coming out of tailrace Saguling HEPP way to move through the tunnel to be able rotate turbine. By operation of Rajamandala HEPP then discharge the water in the downstream Saguling HEPP Powerhouse up with Rajamandala HEPP powerhouse will decline. Reduced flow of water has created a negative public perception that ordinary people, especially utilizing the flow of water from Saguling HEPP for water sports (Rafting), so the impact should be managed.

b. Maintenance Facilities and Infrastructure

- Employment opportunities

Facilities and Infrastructure activities require maintenance some labor for cleaning dams and intake, carrier channel, penstock and powerhouse, overhaul overhaul activities for turbines, generators and other electrical components on a regular basis. Some parts, especially for non-electrical done by local labor. As for the maintenance of water resources, PLN will work with communities through community development. Operational maintenance of facilities and infrastructure will impact on employment opportunities.

- Community Perception

Maintenance of power generating HEPP facilities and infrastructure will lead to positive perceptions of the local population. This is due to be opening up the opportunity to work and strive for locals and the surrounding.

Table 3.2. Summary Impact of Rajamandala 46.6 MW Development Plan

No	Impact Source	Impact Type	Impact Size	Description
I	PRE-CONSTRUCTION STAGE			
1.	Field Survey			
	Community Perception	Existence of community is apprehensive about land compensation and reduced supply of water for rice fields	Society wants land acquisition process in order to be discussions between the proponent and the owner of land with water to try agricultural remain	
2.	Land Procurement			
	a) Community Income	Changes in people's livelihood	Changes in livelihoods of local communities without any educational background and skills	
	b) Public unease	Community concerns on land restitution	Process of determining compensation and compensation values follow the applicable procedures and the agreement of both parties	
II	CONSTRUCTION STAGE			
1.	Procurement and Labor Mobilization			
	a) Employment opportunities and seek	Opening of working opportunities and seek	From interviews to community around the project site, as much as 100% of respondents are generally willing to go as worker	
	b) Public unease	Existence of the migrant workers who came with the contractor	Amount of labor that can be absorbed by 6.29% of total labor force in the study area	
	c) Morbidity	Presence of immigrant workers who carry infectious diseases	Occurrence of outbreaks of infectious diseases due to migrant workers	
	d) Environmental sanitation	Amount of waste around project site due to workers	Number of domestic waste from workers is estimated at 0.6 m3/det.	
2.	Mobilization of equipment and construction materials			
	a) Air quality Decrease	High content of gas and dust in the air due to mobilization of construction materials	High content of gas and dust that exceeds the quality standard based on PP RI No 41 year 1999	
	b) Increased noise	Increased noise due to mobilization of material transport vehicles	Noise level at a distance at 20 m from the source of 72.7 dBA and the noise level exceeds the	

No	Impact Source	Impact Type	Impact Size	Description
			standard for residential	
	c) Damage to roads	Damage to roads, especially in path of mobilization of equipment and construction materials	Weight of vehicle is not in accordance with designation of road class	
	d) public unease	Concerns about increased noise and dust	Distance conductivity of project with residential street about 100 meters.	
	Access road construction			
3.	a) Air quality Decrease	Decrease in air quality and increased dust due to maturation of land for roads carrying	Content of gas and dust that exceeds the quality standard based on PP RI No 41 of 1999	
	b) Noise	Increased noise from equipment used for road construction conductivity	Distance conductivity of project with residential street about 100 meters.	
	c) Slopes stability	Occurrence of ground motion in the work plan due to the access road cut and fill	Existence of cut and fill, especially for steep slopes (> 60 °)	
	Civil construction			
4.	a) Increased noise	Increased noise due to blasting (blasting) for tunnel	Noise level due to blasting at a radius of 500 meters from the source of 64.05 dBA	
	b) Erosion and sedimentation	Increasing the rate of erosion and sedimentation dihilir location of activities	The rate of erosion of its original 7.31 tonnes / year to 29.26 tons / year	
	c) Water quality Decrease	Decline in water quality, especially turbidity	Measurable concentrations of TDS of 274 mg / l and construction is expected to last 18 months.	
	d) Slopes Stability	Emergence of avalanches due to blasting (blasting)	Blasting with a peak velocity of 2-particel Kine cause internal stress in the structure of 1.96 kgf/cm2	
	e) Flora	Cleaning vegetation to powerhouse and switchyard	Area of land to be used for powerhouse of 6.0 ha	
	f) Fauna	Loss of fauna habitat	Area of land to be used for powerhouse of 6.0 ha	
	g) Aquatic Biota	Decline in aquatic biota diversity index	Plankton diversity indices smaller than 1 individual / liter	
	h) public unease	Incidence of river water turbidity at downstream location of activities	Some people use Citarum river to irrigate their fields	

No	Impact Source	Impact Type	Impact Size	Description
5.	Former landfill excavation			
	a) Planning, land and soil	Changing land use to disposal area	Area of land for the disposal area by 5.9 ha.	
	b) Flora	Reduced number of flora	Area of land for the disposal area by 5.9 ha	
	Release of labor			
6.	a) Revenue Decrease	Reduced income residents who had participated in the project terlibat	Workers will be reduced gradually in accordance with the progress of the work	
III	OPERATIONAL STAGE			
1.	Operation of plant			
	a) Decrease water discharge	Reduced flow of water in hydropower weir downstream till powerhouse rajamandala	Discharge of water used for hydropower amounting 168 m3/second Rajamandala	
	b) Water Quality Decrease	High content of domestic sewage BOD due residents	Quality of river water quality standard exceeds the allowable	
	c) facilities and public utilities	Increased roads that can be used by people around	Existence of access roads to the Bantarcaringin village	
	d) Employment opportunities and try	Lack of job opportunities and strive towards a population of approximately	Number of locals population who absorbed as a freelancer	
	e) Community Perception	Emergence of a negative public perception	A decrease in water discharge at downstream hydroelectric powerhouse Saguling cause negative public perception that regular use of river water flow Citarum for water sports (Rafting)	
2.	Maintenance of facilities and infrastructure			
	a) Employment opportunities	Lack of job opportunities and strive towards a population of approximately	Number of locals population who absorbed as a freelancer	
	b) Community Perception	Positive public perception	Number of locals who absorbed as a freelancer	

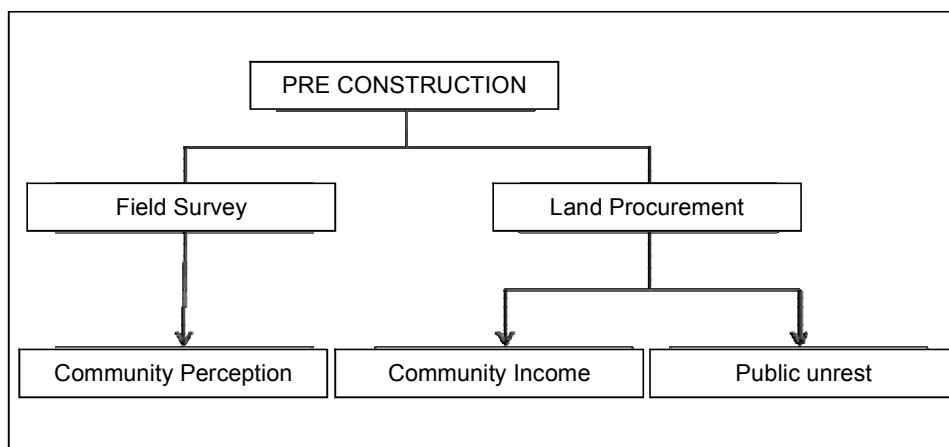


Figure 3.1. Flow chart of impact of development activities Rajamandala 47 MW HEPP at pre construction stage

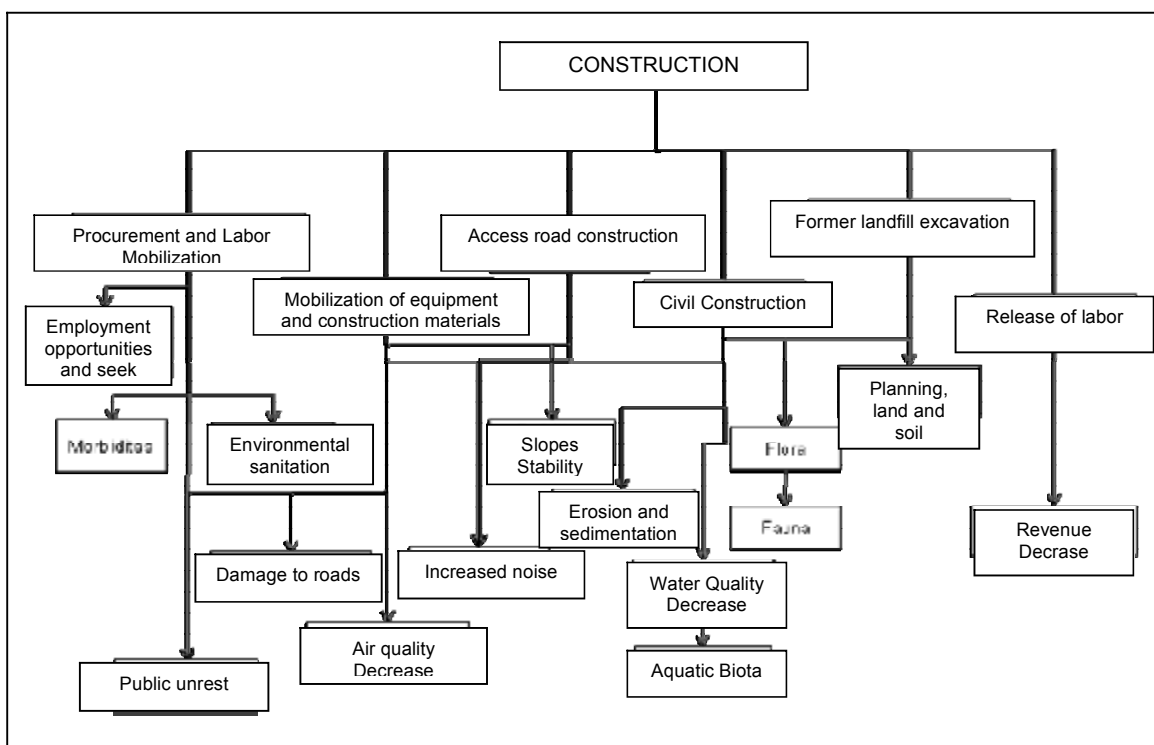


Figure 3.2. Flow chart of impact of development activities Rajamandala 47 MW HEPP at construction stage

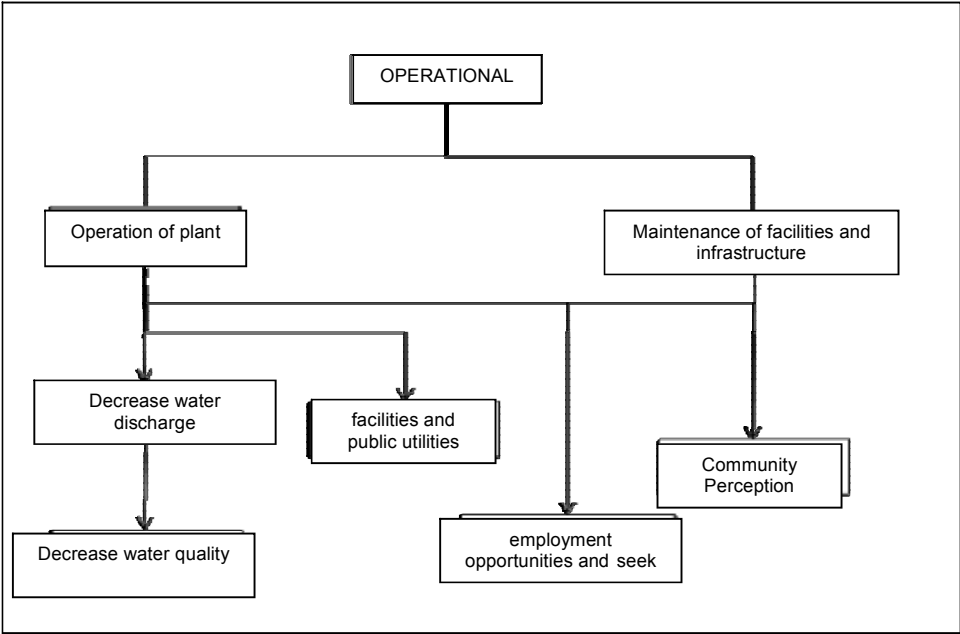


Figure 3.3. Flow chart of impact of development activities Rajamandala 47 MW HEPP at Operational stage

Rajamandala 47 MW HEPP UKL-UPL Study
West Bandung and Cianjur Regency - West Java Province

CHAPTER 4

ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

Chapter 4

ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

4.1. Environmental Management Program

Description of environmental management programs include source of impact, type of impact, Benchmark of Impact, environmental management efforts, implementation time management, location management, management institutions and environment supervisor. Summary of environmental management program can be seen in Table 4.1, while the map location of environmental management can be seen in Figure 4.1. and Figure 4.2.

4.1.1. Pre Construction Stage

1) Field Survey

a. Source of Impact

Source impacts from field surveys.

b. Type of impact

Existence public concern towards land compensation and reduced supply of water for rice fields.

c. Benchmark of Impact

Public unrest: number and frequency of public complaints on activity plan.

d. Environmental Management Efforts

■ Social Approach

- Conduct socialization on procedures and rules that apply regarding land acquisition for development implementation to public interest.
- Deliberation and approaches regarding compensation involving all parties concerned.

■ Institutional Approach

- Establish a public complaints place minimum level of Sub Districts to accommodate complaints from affected communities.

- To coordinate with Sub District apparatus and local villagers.

e. Locations of Environmental Management

Location management conducted in:

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Time of Management Implementation

Impact management is done once during field survey carried out.

g. Implementing Institutions of Environmental Management

Institution which carry out management activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

h. Supervisory Institutions Implementation of Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

i. Reporting Institutions for Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

2) Land Acquisition

a. Source of Impact

Source impacts from land acquisition in compensation values disagreements between proponent with public.

b. Type of impact

Field survey activities is predicted to have an impact on income levels and social unrest.

c. Benchmark of Impact

- Level of income: income levels prior to activities carried out.
- Public unrest: number and frequency of public complaints against activity plan.

d. Environmental Management Efforts

- Social Approach
 - Conduct socialization on procedures and rules that apply regarding land acquisition for implementation of development for public interest.
 - Deliberation and approaches regarding compensation involving all parties concerned.
- Institutional Approach
 - Establish a public complaints place minimum level of Sub Districts to accommodate complaints from affected communities.
 - To pay compensation according to agreement and regulations whose implementation in cooperation with local government.
 - To coordinate with Sub District apparatus and local villagers.

e. Locations of Environmental Management

Location management conducted in:

- Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Time of Management Implementation

Impact management is done once during procurement of land held.

g. Implementing Institutions of Environmental Management

Institution which carry out management activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

h. Supervisory Institutions Implementation of Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

i. Reporting Institutions for Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

4.1.2. Construction Stage

1) Procurement and mobilization of labor

a. Source of Impact

Source impacts from procurement activities and mobilization of labors.

b. Type of impact

- Employment opportunities and try to opening of job opportunities and business opportunity for people around.
- Public unrest on concerns of labor used is brought labor by contractors.
- Morbidity of migrant workers who carry infectious diseases.
- Environmental sanitation number of waste generation from project workers.

c. Benchmark of Impact

- Employment opportunities and try: number of local labor absorbed and variety of business types that appear.
- Public unrest: number of complaints from public before activity takes place.
- Morbidity: number of patients with infectious diseases before activity takes place.
- Environment sanitation: amount of waste before activity takes place.

d. Environmental Management Efforts

- Technology Approach
 - To prioritize workforce needs derived from local people.
 - Provide a waste facilities (trash cans, TPS, wheelie bin) and perform routines transporting waste from every corner location to be collected in polling.
 - Requires candidate to look clean bill of health workers from health care establishments are referenced.
 - Closes well of TPS/Polling to avoid overflow and swarms of flies.
- Social Approach
 - Appeal for migrant workers to understand and respect customs of local communities.
 - Pursue procurement needs of daily living migrant workers from local community.

- Conducting socialization to workers in order to dispose of waste done at a place that has been provided.
- Institutional Approach
 - Cooperating with local offices and local authorities in terms of manpower recruitment.
 - To coordinate with Department of Hygiene in handling of waste on-site activities
 - Cooperating with local Department of Health.
- e. Locations of Environmental Management

Location management conducted in:

 - Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
 - Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.
- f. Time of Management Implementation

Managing impact of procurement and mobilization of labor performed during the construction period lasts.
- g. Implementing Institutions of Environmental Management

Institution which carry out management activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.
- h. Supervisory Institutions Implementation of Environmental Management
 - Regional Environment Management Agency of West Java Province.
 - Environment Agency of West Bandung Regency.
 - Environment Office of Cianjur Regency.
 - Sub District and village apparatus in study area.
- i. Reporting Institutions for Environmental Management
 - Regional Environment Management Agency of West Java Province.
 - Environment Agency of West Bandung Regency.
 - Environment Office of Cianjur Regency.

2) Mobilization of equipment and construction materials

a. Source of Impact

Source impacts from equipment and mobilization construction materials of activities.

b. Type of impact

- Decrease in air quality, increased concentrations of dust in air, especially in access mobilization of construction materials.
- Increased noise, increased noise in mobilization path of construction materials.
- Damage to roads, road damage caused by mobilization of equipment and construction materials.
- Public unrest arises due to fears of increasing concentrations of dust and road damage.

c. Benchmark of Impact

- Decrease in air quality, Government Regulation of the Republic Indonesia Number 41 Year 1999 on Control of Air Pollution.
- Increased noise, Environment Minister Decree No. KEP-48/MENLH/XII/1996, on Noise Level Standard.
- Damage to roads, amount of damage to road before mobilization activities take place.
- Public unrest, frequency of complaints before activity takes place.

d. Environmental Management Efforts

- Technology Approach
 - Set type of heavy equipment and vehicles so as not to be forced to e location of activities, but material transported by small vehicles.
 - Using tub cover when transporting construction materials.
 - Conduct watering dusty road and through material transport vehicles, especially during dry season.
 - Projects vehicle speed restrictions, especially on driveway/street village that is a maximum of 40 km/hour or according to condition of village roads.
 - Improve road as soon as possible if there are damaged/collapsed.

- Social Approach

- To coordinate with Department of Transportation and Police to implement traffic management on roads to be traversed mobilization of heavy equipment such as transformers imported from Jakarta.

- Institutional Approach

- Cooperating with Sub District apparatus and local village in terms of pathway mobilization of equipment and materials construction.
 - To coordinate with Department of Transportation and Police in handling of pathway mobilization of equipment and materials construction.

e. Locations of Environmental Management

Location management conducted in:

- Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Time of Management Implementation

Impact management of mobilization of equipment and construction materials carried out during construction period lasts.

g. Implementing Institutions of Environmental Management

Institution which carry out management activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

h. Supervisory Institutions Implementation of Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Department of Transportation of West Bandung and Cianjur Regencies
- Police
- Sub District and village apparatus in study area.

i. Reporting Institutions for Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

3) Access Road Construction

a. Source of Impact

Existence of land maturation for access roads carrying excavation and stockpiling of appropriate elevation planned.

b. Type of impact

- Air quality: reduction in air quality and increased dust due to land maturation for access roads carrying.
- Noise: an increase in noise from equipment used for road conductivity.
- Stability of slopes: occurrence of ground motion due to access road work plan cut and fill.

c. Benchmark of Impact

- Air Quality, Government Regulation of Republic Indonesia Number 41 Year 1999 on Air Pollution Control.
- Noise, Environment Minister Decree No. KEP-48/MENLH / XII/1996, on Noise Level Standard.
- Stability of slopes, slope stability level prior to land maturation for roads carrying implemented.

d. Environmental Management Efforts

- Technology Approach
 - Using heavy equipment that emit exhaust emissions that meet requirements.
 - Conduct watering on road that has been done land maturation especially in dry season.
 - Set up a schedule for work including work that lead to high noise made at 08:00 to 17:00.
 - To maintain stability of slopes in cleanup of land in an effort not perform particularly clearcut stands that have a strong rooting.
 - Disclosure must be done systematically in areas that have a slope <30%, with not much to do stripping.
 - Peeling sloping land in area carried out with due regard to slope safety factor of not more than 60 ° or higher ratio of slopes of the terrace 5: 1.

- Crack the sloping ground on area to be filled by an impermeable soil (clay) to prevent entry of rain water going into the ground which can trigger avalanches.
 - Stabilization physically done by manufacture of terrace or steps. Angle is used as a natural avalanche angle scale on manufacture of terra-serring. Natural avalanche angle can be determined from laboratory testing in Soil Mechanics.
- Institutional Approach
 - Coordination with Forest Service, local apparatus, community leaders, and communities in study area.
- e. Locations of Environmental Management

Location management conducted in:

 - Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
 - Cihea Village, Haurwangi Sub District, Cianjur Regency.
- f. Time of Management Implementation

Management of impacts performed during access road construction activities undertaken.
- g. Implementing Institutions of Environmental Management

Institution which carry out management activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.
- h. Supervisory Institutions Implementation of Environmental Management
 - Regional Environment Management Agency of West Java Province.
 - Environment Agency of West Bandung Regency.
 - Environment Office of Cianjur Regency.
 - Forest Service of West Bandung and Cianjur Regencies
 - Sub District and village apparatus in study area.
- i. Reporting Institutions for Environmental Management
 - Regional Environment Management Agency of West Java Province.
 - Environment Agency of West Bandung Regency.
 - Environment Office of Cianjur Regency.

4) Civil Construction

a. Source of Impact

Source impacts from construction activities including civil construction weir, intake, headrace tunnel, penstock, powerhouse and tailrace.

b. Type of impact

- Increased noise, the explosions (blasting) for tunnel
- Increasing rate of erosion and sedimentation in downstream location activities
- Decrease in water quality, especially for turbidity at downstream location activities
- Flora, vegetation clearance for powerhouse and switchyard
- Fauna, loss of fauna habitat
- Aquatic Biota, aquatic biota diversity index decreased
- Public unrest, increased turbidity at downstream location activities

c. Benchmark of Impact

- Increased noise, Environment Minister Decree No. KEP-48/MENLH / XII/1996, on Noise Level Standard.
- Erosion and sedimentation, erosion and sedimentation prior to construction activities undertaken
- Decrease in water quality, West Java Governor Decree No. 39 of 2000.
- Stability of slopes, slope stability prior to construction activities undertaken.
- Flora, vegetation composition and type and number of individuals before activities.
- Fauna, habitat conditions and type and number of individuals before activities.
- Aquatic Biota, plankton and benthos diversity index before planning construction activities takes place.
- Public unrest, number and frequency of local public complaints against activities in progress.

d. Environmental Management Efforts

- Technology Approach
 - Blasting with smooth-blasting method, and use of cover-screen to reduce noise and bursts of particles of soil/rock blasting results.

- Setting up a temporary pond from run-off before it flows into Citarum River to avoid sedimentation of river.
 - To maintain stability of slopes in cleanup of land in an effort not perform particularly clearcut stands that have a strong rooting.
 - Disclosure must be done systematically in areas that have a slope <30%, with not much to do stripping.
 - Peeling sloping land in area carried out with due regard to slope safety factor of not more than 60 ° or higher ratio of slopes of the terrace 5: 1.
 - Biological slope stabilization uses plants for retrofitting a cliff, so biological stabilization is often referred to as bio-engineering. Plants are often used for slope stabilization is a type of bamboo. Planting is done after taking/mining on hillside cut/peeled finish. Along with that, do also planting seeds of green plants such as albisia or other local plants which have same function as shade trees.
- Social Approach
 - Perform approach and inform public about management activities undertaken.
 - Institutional Approach
 - Coordination with local officials, community leaders, and communities in study area.
- e. Locations of Environmental Management
- Location management conducted in:
- Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
 - Cihea Village, Haurwangi Sub District, Cianjur Regency.
- f. Time of Management Implementation
- Management of impacts performed during construction activities take place.
- g. Implementing Institutions of Environmental Management
- Institution which carry out management activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.
- h. Supervisory Institutions Implementation of Environmental Management
- Regional Environment Management Agency of West Java Province.
 - Environment Agency of West Bandung Regency.
 - Environment Office of Cianjur Regency.

- Sub District and village apparatus in study area.
- i. Reporting Institutions for Environmental Management
 - Regional Environment Management Agency of West Java Province.
 - Environment Agency of West Bandung Regency.
 - Environment Office of Cianjur Regency.

5) Landfill former quarry land

a. Source of Impact

Source impacts from landfill activities of former quarry.

b. Type of impact

- Planning, land and soil, changes in land use for disposal area.
- Flora, reduced some types of flora

c. Benchmark of Impact

- Planning, land and soil, utilization of space in accordance with Spatial Planning West Bandung and Cianjur regencies.
- Flora, vegetation composition and number and types of individuals prior to activity.

d. Environmental Management Efforts

- Technology Approach
 - Perform compaction at landfill (disposal area) and gradually planted with vegetation.
 - Use of disposal areas with minimal area.
 - Perform reforestation around disposal area that is still open, by planting crops that can dampen noise, absorb dust and other pollutants.
 - Any change in land use in vicinity of Rajamandala HEPP should refer to applicable regulations.
- Social Approach
 - Perform approach and inform public about management activities undertaken.

- Institutional Approach

- Coordination with local officials, community leaders, and communities in study area.

- e. Locations of Environmental Management

- Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Cihea Village, Haurwangi Sub District, Cianjur Regency.

- f. Time of Management Implementation

Impact management activities conducted during former landfill excavation carried out.

- g. Implementing Institutions of Environmental Management

Institution which carry out management activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

- h. Supervisory Institutions Implementation of Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

- i. Reporting Institutions for Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

6) Release of Labor

- a. Source of Impact

Source impacts from release of labor activity.

- b. Type of impact

Completion of construction activities are characterized by release of employment is forecasted to have an impact on declining revenue during this part of community who were involved in project.

- c. Benchmark of Impact

Decrease in income: average income of population, especially during activities directly involved in construction activities.

d. Environmental Management Efforts

- Technology Approach
 - Channelling some of local workforce in operations of HEPP.
- Social Approach
 - Perform approach and inform public about completion of construction activities.
- Institutional Approach
 - Coordination with local officials, community leaders, and communities in study area.

e. Locations of Environmental Management

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Time of Management Implementation

Impact management activities carried out during release of labor performed.

g. Implementing Institutions of Environmental Management

Institution which carry out management activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

h. Supervisory Institutions Implementation of Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

i. Reporting Institutions for Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

4.1.3. Operational Stage

1) Operation of Plant

a. Source of Impact

Source impacts from operating activities Rajamandala HEPP.

b. Type of impact

- Decrease in water discharge, decrease in water discharge at downstream weir of Rajamandala HEPP until Powerhouse Rajamandala.
- Decrease in water quality, high content of BOD due to domestic waste
- Facilities and public infrastructure, increasing roads that can be used by people around.
- Employment opportunities and trying, lack of job opportunities and strive towards a population of approximately.
- Perception of society, emergence of a negative public perception.

c. Benchmark of Impact

- Decrease in water discharge: maximum water discharge Citarum River to downstream power house Saguling HEPP until Rajamandala HEPP.
- Decrease in water quality: West Java Governor Decree No. 39 of 2000.
- Employment opportunities and try: number of residents who have not worked on study area.
- Public facilities and infrastructure: number of public facilities and infrastructure prior to operational Rajamandala HEPP.
- Public perception: level of public complaints before Rajamandala HEPP operation took place.

d. Environmental Management Efforts

- Technology Approach
 - Promote the compensation discharge to water Citarum River downstream Saguling HEPP power house until Rajamandala HEPP power house, which will be based on Government Regulation No. 38 Year 2011 on the River.
 - Supporting activities of community-managed small businesses.
 - Prioritise recruitment of local residents for Rajamandala HEPP operations as needed, by way of selection against job applicants with requirements of compulsory identity cards fitted with locals as well as

attach biodata and experience appropriate to the expertise of skilled labor.

- Make public facilities ie toilets (shower, sink and toilet).

- Social Approach

- Perform approach and inform public about management activities undertaken

- Institutional Approach

- Working closely with government agencies (local Labor Agency), Sub District and village on procurement activities (recruitment) labor in order to obtain required manpower in accordance.

e. Locations of Environmental Management

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Time of Management Implementation

Time for environmental management held two time a year during ongoing of HEPP operational service.

g. Implementing Institutions of Environmental Management

Institution which carry out management activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

h. Supervisory Institutions Implementation of Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

i. Reporting Institutions for Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

2) Maintenance of Plant Facilities and infrastructures

a. Source of Impact

Source impacts from maintenance activities generating facilities and infrastructure.

b. Type of impact

Maintenance activities of facilities and infrastructure forecasted impact on employment creation.

c. Benchmark of Impact

- Number of people who have not worked in the study area.
- Average income of population before event.

d. Environmental Management Efforts

- Technology Approach
 - Prioritise recruitment of local residents for Rajamandala HEPP operations as needed, by way of selection against job applicants with requirements of compulsory identity cards fitted with locals as well as attach biodata and experience appropriate to the expertise of skilled labor.
 - Employ local workforce with standard wage/salary is adjusted to level of expertise and education that are owned and adapted to local minimum wage (UMR).
 - Develop and can establish a mutually beneficial relationship, so that presence of Rajamandala HEPP provide benefits to local residents.
- Social Approach
 - Perform approach and inform public about management activities undertaken.
- Institutional Approach
 - Coordination with local officials, community leaders, and communities in study area.

e. Locations of Environmental Management

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Time of Management Implementation

Time for environmental management held two time a year during ongoing of HEPP operational service.

g. Implementing Institutions of Environmental Management

Institution which carry out management activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

h. Supervisory Institutions Implementation of Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

i. Reporting Institutions for Environmental Management

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

Table 4.1. Summary of Rajamandala HEPP Environmental Management

No	Source of Impact	Type of impact	Benchmark of Impact	Environmental Management Program	Location of Management	Time of Management Implementation	Institutions of Environmental Management			
I	PRE CONSTRUCTION STAGE							Implementer	Supervisor	Reporting
1	Field Survey	- Perception of community	- Number and frequency of public complaints against activity plan	<div><div>■ Social Approach</div><div><ul style="list-style-type: none">- Conduct socialization on procedures and rules that apply regarding land acquisition for development- Deliberation and approaches regarding compensation involving all parties concerned.</div><div>■ Institutional Approach</div><div><ul style="list-style-type: none">- Establish a public complaints place minimum level of Sub Districts to accommodate complaints from affected communities.- To pay compensation according to agreement and regulations whose implementation in cooperation with local government.- To coordinate with Sub District apparatus and local villagers.</div></div>	<div><ul style="list-style-type: none">- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.</div>	Impact management is done onces during field survey activities carried out	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<div><ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.</div>	<div><ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.</div>	
2	Procurement of land	- Levels of income - Public unrest	<div><ul style="list-style-type: none">- Level of income: income levels prior to activities carried out.- Public unrest: number and frequency of public complaints against activity plan.</div>	<div><div>■ Social Approach</div><div><ul style="list-style-type: none">- Conduct socialization on procedures and rules that apply regarding land acquisition for implementation of development for public interest.- Deliberation and approaches regarding compensation involving all parties concerned.</div><div>■ Institutional Approach</div><div><ul style="list-style-type: none">- Establish a public complaints place minimum level of Sub Districts to accommodate complaints from affected communities.- To pay compensation according to agreement and regulations whose implementation in cooperation with local government</div></div>	<div><ul style="list-style-type: none">- Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.- Cihea Village, Haurwangi Sub District, Cianjur Regency.</div>	Impact management is done onces during land acquisition activities undertaken	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<div><ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.</div>	<div><ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.</div>	

No	Source of Impact	Type of impact	Benchmark of Impact	Environmental Management Program	Location of Management	Time of Management Implementation	Institutions of Environmental Management		
				<ul style="list-style-type: none">- To coordinate with Sub District apparatus and local villagers.			Implementer	Supervisor	Reporting
II	CONSTRUCTION STAGE								
1.	Procurement and mobilization of labor	<ul style="list-style-type: none">- Opening up an job opportunity and trying- Public unrest- Morbidity- Environmental sanitation	<ul style="list-style-type: none">- Employment opportunities and try: number of local labor absorbed and variety of business types that appear.- Public unrest: number of complaints from public before activity takes place.- Morbidity: number of patients with infectious diseases before activity takes place.- Environment sanitation: amount of waste before activity takes place.	<ul style="list-style-type: none">■ Technology Approach<ul style="list-style-type: none">- To prioritize workforce needs derived from local people.- Provide a waste facilities (trash cans, TPS, wheelie bin) and perform routines transporting waste from every corner location to be collected in polling.- Requires candidate to look clean bill of health workers from health care establishments are referenced.- Closes well of TPS/Polling to avoid overflow and swarms of flies.■ Social Approach<ul style="list-style-type: none">- Appeal for migrant workers to understand and respect customs of local communities.- Pursue procurement needs of daily living migrant workers from local community.- Conducting socialization to workers in order to dispose of waste done at a place that has been provided.■ Institutional Approach<ul style="list-style-type: none">- Cooperating with local offices and local authorities in terms of manpower recruitment.- To coordinate with Department of Hygiene in handling of waste on-site activities- Cooperating with local Department of Health.	<ul style="list-style-type: none">- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.- Bantaracingin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.	Managing impact of procurement and mobilization of labor performed during construction period lasts	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.- Sub District and village apparatus in study area.	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.
2.	Mobilization of equipment and construction materials	<ul style="list-style-type: none">- Decrease in air quality- Noise- Damage to roads and	<ul style="list-style-type: none">- Decrease in air quality, Government Regulation of the Republic Indonesia Number 41 Year 1999 on Control of	<ul style="list-style-type: none">■ Technology Approach<ul style="list-style-type: none">- Set type of heavy equipment and vehicles so as not to be forced to e location of activities, but material transported by small vehicles.	<ul style="list-style-type: none">- Rajamandala Kulon Village, Cipatat Sub District, West Bandung	Management impact of mobilization of equipment and construction	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java

No	Source of Impact	Type of Impact	Benchmark of Impact	Environmental Management Program	Location of Management	Time of Management Implementation	Institutions of Environmental Management		
							Implementer	Supervisor	Reporting
		bridges - Public unrest	Air Pollution. - Increased noise, Environment Minister Decree No. KEP-48/MENLH/ XII/1 1996, on Noise Level Standard. - Damage to roads, amount of damage to road before mobilization activities take place. - Public unrest, frequency of complaints before activity takes place.	<ul style="list-style-type: none"> - Using tub cover when transporting construction materials. - Conduct watering dusty road and through material transport vehicles, especially during dry season. - Projects vehicle speed restrictions, especially on driveway/street village that is a maximum of 40 km/hour or according to condition of village roads. - Improve road as soon as possible if there are damaged/collapsed. ■ Social Approach <ul style="list-style-type: none"> - To coordinate with Department of Transportation and Police to implement traffic management on roads to be traversed mobilization of heavy equipment such as transformers imported from Jakarta. ■ Institutional Approach <ul style="list-style-type: none"> - Cooperating with Sub District apparatus and local village in terms of pathway mobilization of equipment and materials construction. - To coordinate with Department of Transportation and Police in handling of pathway mobilization of equipment and materials construction. 	<ul style="list-style-type: none"> - Cihea Village, Haurwangi Sub District, Cianjur Regency. 	materials carried out during construction period lasts.		<ul style="list-style-type: none"> Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency. - Sub District and village apparatus in study area. 	<ul style="list-style-type: none"> Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency.
3.	Access Road Construction	- Air quality - Noise - Stability of slopes	<ul style="list-style-type: none"> - Air Quality, Government Regulation of Republic Indonesia Number 41 Year 1999 on Air Pollution Control. - Noise, Environment Minister Decree No. KEP-48/MENLH / XII/1996, on Noise Level Standard. - Stability of slopes, slope stability level prior 	<ul style="list-style-type: none"> ■ Technology Approach <ul style="list-style-type: none"> - Using heavy equipment that emit exhaust emissions that meet requirements. - Conduct watering on road that has been done land maturation especially in dry season. - Set up a schedule for work including work that lead to high noise made at 08:00 to 17:00. - To maintain stability of slopes in cleanup of land in an effort not perform particularly clearcut stands that have a 	<ul style="list-style-type: none"> - Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency. - Cihea Village, Haurwangi Sub District, Cianjur Regency. 	Management of impacts performed during road access construction activities undertaken.	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<ul style="list-style-type: none"> - Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment 	<ul style="list-style-type: none"> - Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment

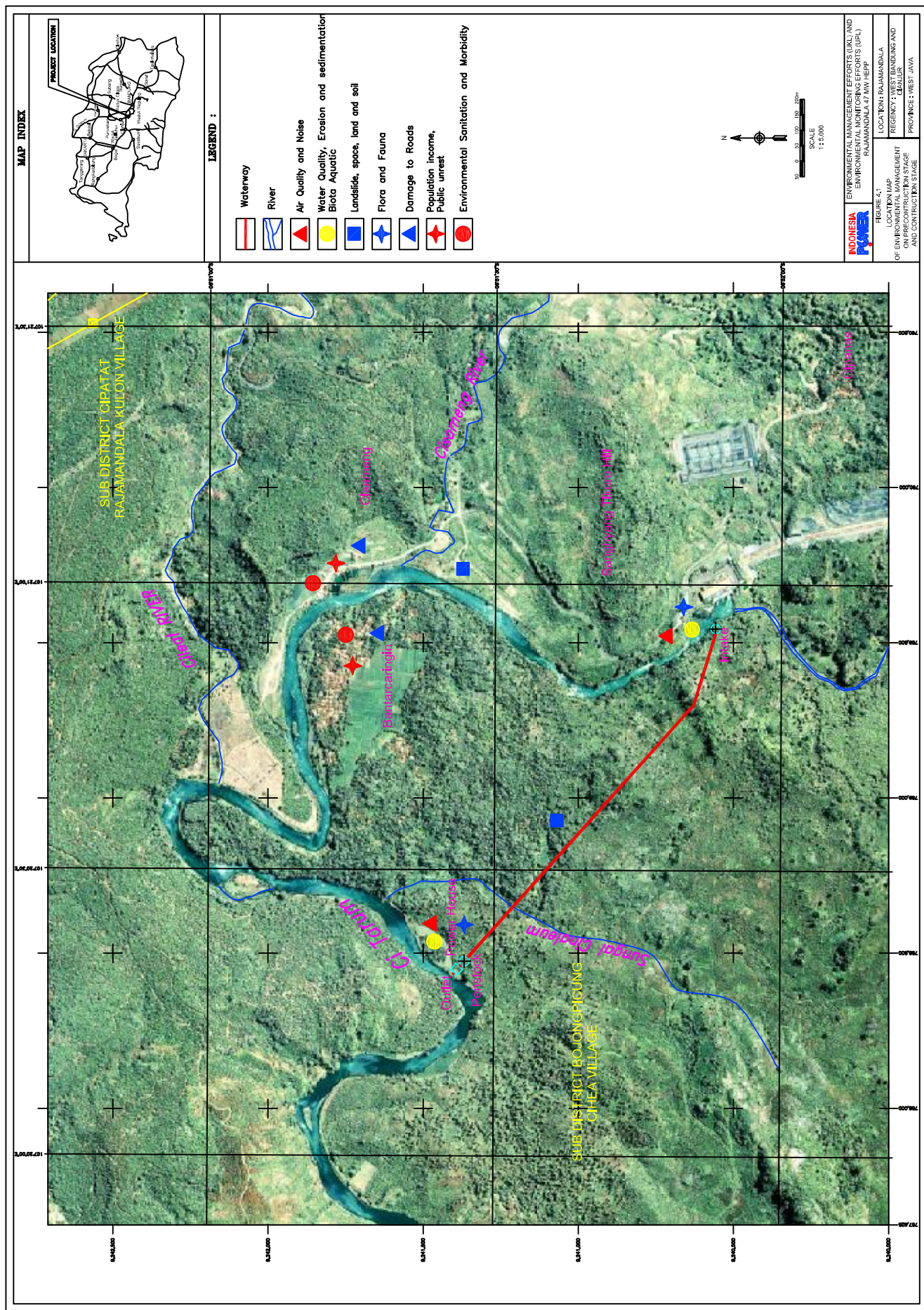
No	Source of Impact	Type of impact	Benchmark of Impact	Environmental Management Program	Location of Management	Time of Management Implementation	Institutions of Environmental Management		
							Implementer	Supervisor	Reporting
			to land maturation for roads carrying implemented.	<ul style="list-style-type: none">- strong rooting.- Disclosure must be done systematically in areas that have a slope <30%, with not much to do stripping.- Peeling sloping land in area carried out with due regard to slope safety factor of not more than 60 ° or higher ratio of slopes of the terrace 5: 1.- Crack the sloping ground on area to be filled by an impermeable soil (clay) to prevent entry of rain water going into the ground which can trigger avalanches.- Stabilization physically done by manufacture of terra-sering or steps. Angle is used as a natural avalanche angle scale on manufacture of terra-sering. Natural avalanche angle can be determined from laboratory testing in Soil Mechanics.■ Institutional Approach<ul style="list-style-type: none">- Coordination with Forest Service, local apparatus, community leaders, and communities in study area.				Office of Cianjur Regency. <ul style="list-style-type: none">- Forest Service of West Bandung and Cianjur Regencies- Sub District and village apparatus in study area.	Office of Cianjur Regency.
4.	Civil Construction	<ul style="list-style-type: none">- Noise- Erosion and sedimentation- Decrease in water quality- Stability of slopes- Flora & Fauna- Aquatic Biota- Public unrest	<ul style="list-style-type: none">- Increased noise, Environment Minister Decree No. KEP-48/MENLH / XII/1996, on Noise Level Standard.- Erosion and sedimentation, erosion and sedimentation prior to construction activities undertaken- Decrease in water quality, West Java Governor Decree No. 39 of 2000.	<ul style="list-style-type: none">■ Technology Approach<ul style="list-style-type: none">- Blasting with smooth-blasting method, and use of cover-screen to reduce noise and bursts of particles of soil/rock blasting results.- Setting up a temporary pond from runoff before it flows into Citarum River to avoid sedimentation of river.- To maintain stability of slopes in cleanup of land in an effort not perform particularly clearcut stands that have a strong rooting.- Disclosure must be done systematically in areas that have a slope <30%, with not much to do stripping.- Peeling sloping land in area carried out	<ul style="list-style-type: none">- Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.- Cihea Village, Haurwangi Sub District, Cianjur Regency.	Management of impacts performed during construction activities take place.	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.

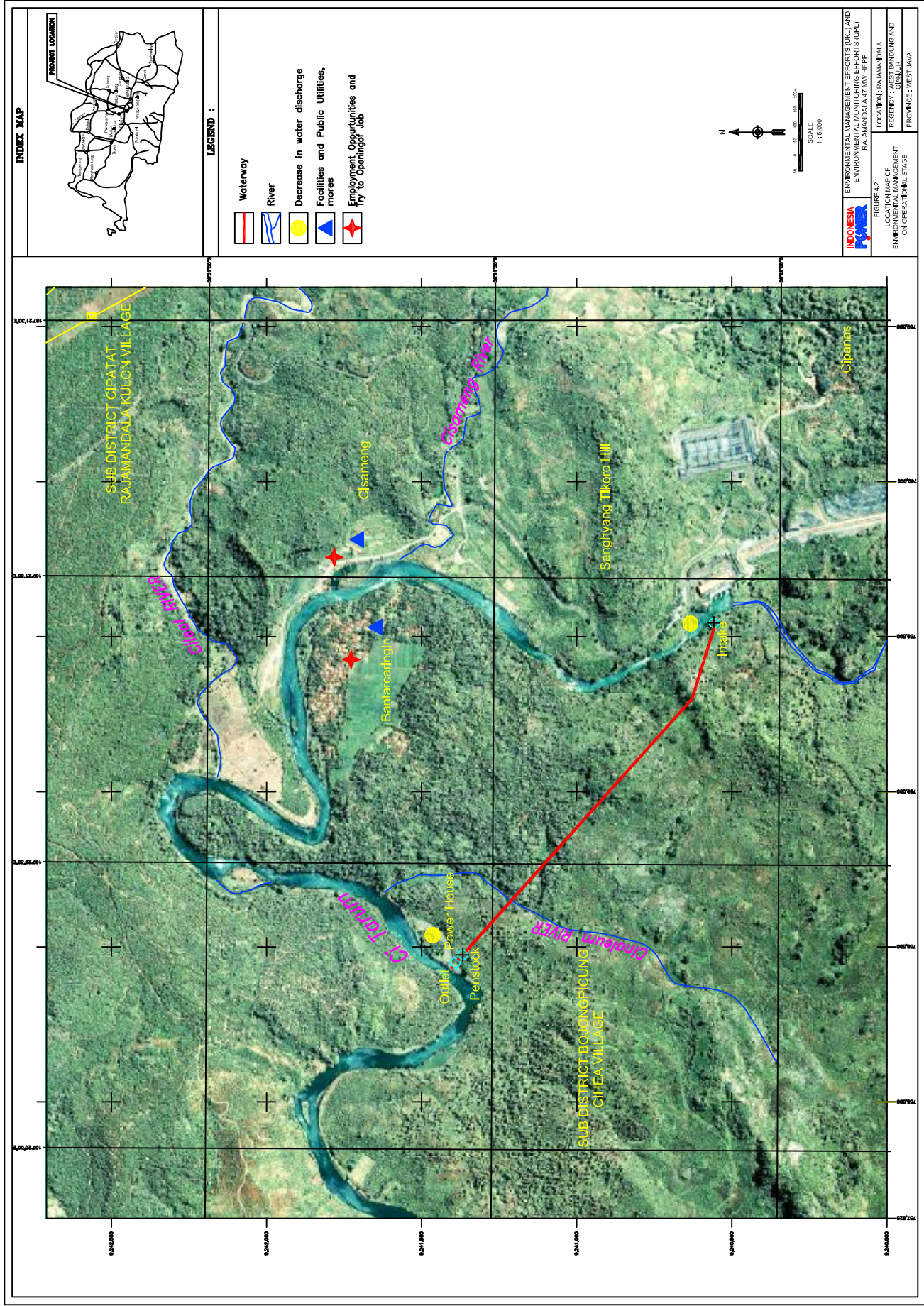
No	Source of Impact	Type of Impact	Benchmark of Impact	Environmental Management Program	Location of Management	Time of Management Implementation	Institutions of Environmental Management		
							Implementer	Supervisor	Reporting
			<ul style="list-style-type: none"> - Stability of slopes, slope stability prior to construction activities undertaken. - Flora, vegetation composition and type and number of individuals before activities. - Fauna, habitat conditions and type and number of individuals before activities. - Aquatic Biota, plankton and benthos diversity index before planning construction activities takes place. - Public unrest, number and frequency of local public complaints against activities in progress. 	<p>with due regard to slope safety factor of not more than 60 ° or higher ratio of slopes of the terrace 5: 1.</p> <ul style="list-style-type: none"> - Biological slope stabilization uses plants for retrofitting a cliff, so biological stabilization is often referred to as bio-engineering. Plants are often used for slope stabilization is a type of bamboo. Planting is done after taking/mining on hillside cut/peeled finish. Along with that, do also planting seeds of green plants such as albisia or other local plants which have same function as shade trees. ■ Social Approach <ul style="list-style-type: none"> - Perform approach and inform public about management activities undertaken. ■ Institutional Approach <ul style="list-style-type: none"> - Coordination with local officials, community leaders, and communities in study area. 				<ul style="list-style-type: none"> - Sub District and village apparatus in study area. 	
5.	Landfill former quarry land	<ul style="list-style-type: none"> - Planning, land and soil - Flora 	<ul style="list-style-type: none"> - Planning, land and soil, utilization of space in accordance with Spatial Planning West Bandung and Cianjur regencies. - Flora, vegetation composition and number and types of individuals prior to activity. 	<ul style="list-style-type: none"> ■ Technology Approach <ul style="list-style-type: none"> - Perform compaction at landfill (disposal area) and gradually planted with vegetation. - Use of disposal areas with minimal area. - Perform reforestation around disposal area that is still open, by planting crops that can dampen noise, absorb dust and other pollutants. - Any change in land use in vicinity of Rajamandala HEPP should refer to applicable regulations. ■ Social Approach <ul style="list-style-type: none"> - Perform approach and inform public about management activities 	<ul style="list-style-type: none"> - Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency. - Cihea Village, Haurwangi Sub District, Cianjur Regency. 	<p>Impact management activities conducted during former landfill excavation carried out.</p>	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<ul style="list-style-type: none"> - Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency. 	<ul style="list-style-type: none"> - Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency.

No	Source of Impact	Type of Impact	Benchmark of Impact	Environmental Management Program	Location of Management	Time of Management Implementation	Institutions of Environmental Management		
							Implementer	Supervisor	Reporting
6.	Release of Labor	- Decrease in income	Decrease in income: the average income of population, especially during activities directly involved in construction activities.	<ul style="list-style-type: none"> Institutional Approach <ul style="list-style-type: none"> - Coordination with local officials, community leaders, and communities in study area. Technology Approach <ul style="list-style-type: none"> - Channelling some of local workforce in operations of HEPP. Social Approach <ul style="list-style-type: none"> - Perform approach and inform public about completion of construction activities. Institutional Approach <ul style="list-style-type: none"> - Coordination with local officials, community leaders, and communities in study area. 	<ul style="list-style-type: none"> Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency. Bantarcaingin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency. 	Impact management activities carried out during release of labor performed.	<ul style="list-style-type: none"> Consortium of PT. Indonesia Power and Kansai. Co., Ltd 	<ul style="list-style-type: none"> Sub District and village apparatus in study area. Regional Environment Management Agency of West Java Province. Environment Agency of West Bandung Regency. Environment Office of Cianjur Regency. Sub District and village apparatus in study area. 	<ul style="list-style-type: none"> Regional Environment Management Agency of West Java Province. Environment Agency of West Bandung Regency. Environment Office of Cianjur Regency.
III OPERATIONAL STAGE									
1.	Operation of Plant	<ul style="list-style-type: none"> - Decrease in water discharge - Decrease in water quality - Facilities and public infrastructure - Employment opportunities and trying - Perception of society 	<ul style="list-style-type: none"> - Decrease in water discharge: maximum water discharge Citarum River to downstream power house Saguling HEPP until Rajamandala HEPP. - Decrease in water quality: West Java Governor Decree No. 39 of 2000. - Employment 	<ul style="list-style-type: none"> Technology Approach <ul style="list-style-type: none"> - Promote the compensation discharge to water Citarum River downstream Saguling HEPP power house until Rajamandala HEPP power house, which will be based on Government Regulation No. 38 Year 2011 on the River. - Supporting activities of community-managed small businesses. - Prioritise recruitment of local residents for Rajamandala HEPP operations as needed, by way of selection against job 	<ul style="list-style-type: none"> Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency. Bantarcaingin Kampong, Cihea Village, Haurwangi Sub District, Cianjur 	Time for environmental management held two time a year during ongoing of HEPP operational service.	<ul style="list-style-type: none"> Consortium of PT. Indonesia Power and Kansai. Co., Ltd 	<ul style="list-style-type: none"> Regional Environment Management Agency of West Java Province. Environment Agency of West Bandung Regency. Environment Office of 	<ul style="list-style-type: none"> Regional Environment Management Agency of West Java Province. Environment Agency of West Bandung Regency. Environment Office of

No	Source of Impact	Type of impact	Benchmark of Impact	Environmental Management Program	Location of Management	Time of Management Implementation	Institutions of Environmental Management		
							Implementer	Supervisor	Reporting
			<p>opportunities and seek: number of residents who have not worked on study area.</p> <ul style="list-style-type: none"> - Public facilities and infrastructure: number of public facilities and infrastructure prior to operational Rajamandala HEPP. - Public perception: level of public complaints before Rajamandala HEPP operation took place. 	<p>applicants with requirements of compulsory identity cards fitted with locals as well as attach biodata and experience appropriate to the expertise of skilled labor.</p> <ul style="list-style-type: none"> - Make public facilities ie toilets (shower, sink and toilet). ■ Social Approach <ul style="list-style-type: none"> - Perform approach and inform public about management activities undertaken ■ Institutional Approach <ul style="list-style-type: none"> - Working closely with government agencies (local Labor Agency), Sub District and village on procurement activities (recruitment) labor in order to obtain required manpower in accordance. 	Regency.			<p>Cianjur Regency.</p> <ul style="list-style-type: none"> - Sub District and village apparatus in study area. 	Cianjur Regency.
2.	Maintenance of Plant Facilities and infrastructures	<ul style="list-style-type: none"> - Income Level 	<ul style="list-style-type: none"> - Number of people who have not worked in the study area. - Average income of population before event. 	<ul style="list-style-type: none"> ■ Technology Approach <ul style="list-style-type: none"> - Prioritise recruitment of local residents for Rajamandala HEPP operations as needed, by way of selection against job applicants with requirements of compulsory identity cards fitted with locals as well as attach biodata and experience appropriate to the expertise of skilled labor. - Employ local workforce with standard wage/salary is adjusted to level of expertise and education that are owned and adapted to local minimum wage (UMR). - Develop and can establish a mutually beneficial relationship, so that presence of Rajamandala HEPP provide benefits to local residents. ■ Social Approach <ul style="list-style-type: none"> - Perform approach and inform public about management activities undertaken. 	<ul style="list-style-type: none"> - Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency. - Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency. 	<p>Time for environmental management held two time a year during ongoing of HEPP operational service.</p>	<p>Consortium of PT. Indonesia Power and Kansai. Co., Ltd</p>	<ul style="list-style-type: none"> - Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency. - Sub District and village apparatus in study area. 	<ul style="list-style-type: none"> - Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency.

No	Source of Impact	Type of impact	Benchmark of Impact	Environmental Management Program	Location of Management	Time of Management Implementation	Institutions of Environmental Management		
							Implementer	Supervisor	Reporting
				<div><div>▪ Institutional Approach</div><div>- Coordination with local officials, community leaders, and communities in study area.</div></div>					





4.2. Environmental Monitoring Program

4.2.1. Pre Construction Stage

1) Field Survey

a. Source of Impact

Source impacts from field survey activities.

b. Type of impact

Type of impact is monitored to public unrest redress land and decreased water supplies.

c. Monitoring Method

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Subdistrict Government, Regency Government and others.

d. Time of Monitoring

Period of onces environmental monitoring performed before field survey activities carried out.

e. Location of Monitoring

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Implementing Institutions of Environmental Monitoring

Institution which carry out monitoring activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

g. Supervisory Institutions Implementation of Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

h. Reporting Institutions for Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

2) Land Aquisition

a. Source of Impact

Source impacts from land acquisition activities.

b. Type of impact

Types of impacts to be monitored are public unrest against amount of indemnification/compensation received.

c. Monitoring Method

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.

d. Time of Monitoring

Period environmental monitoring performed once prior to land acquisition activities undertaken.

e. Location of Monitoring

- Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Implementing Institutions of Environmental Monitoring

Institution which carry out monitoring activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

g. Supervisory Institutions Implementation of Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

h. Reporting Institutions for Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

4.2.2. Construction Stage

1) Procurement and mobilization of labor

a. Source of Impact

Source impacts from procurement activities and mobilization of labor.

b. Type of impact

- Employment opportunities and try to opening of job opportunities and business opportunity for people around.
- Public unrest on concerns of labor used is brought labor by contractors.
- Morbidity of migrant workers who carry infectious diseases.
- Environmental sanitation number of waste generation from project workers.

c. Monitoring Method

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.

d. Time of Monitoring

Period of onces environmental monitoring performed during construction period.

e. Location of Monitoring

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Implementing Institutions of Environmental Monitoring

Institution which carry out monitoring activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

g. Supervisory Institutions Implementation of Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

h. Reporting Institutions for Environmental Monitoring

- Regional Environment Management Agency of West Java Province.

- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

2) Mobilization of equipment and construction materials

a. Source of Impact

Source impacts from equipment and mobilization construction materials of activities.

b. Type of impact

- Decrease in air quality, increased concentrations of dust in air, especially in access mobilization of construction materials.
- Increased noise, increased noise in mobilization path of construction materials.
- Damage to roads, road damage caused by mobilization of equipment and construction materials.
- Public unrest arises due to fears of increasing concentrations of dust and road damage.

c. Monitoring Method

- Decrease in air quality

Data was collected by way of direct air sampling in field using a chemical reaction (absorbent) and dust by using a Hi-Vol sampler for laboratory tests, dust was measured by gravimetric methods and test results compared with Quality Standards Regulation PP RI No. 41, of 1999, concerning Control of Air Pollution.

- Increased noise

Noise levels were measured field using a sound level meter which is expressed in units of dBA and compare it with Noise Level Standard based KepMenLh No: KEP-48/MENLH/11/1996, on Noise Level Standard.

- Damage to roads

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.

- Public Unrest

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas

secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.

d. Time of Monitoring

Period of environmental monitoring carried out during construction phase with frequency of 6 (six) months.

e. Location of Monitoring

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Implementing Institutions of Environmental Monitoring

Institution which carry out monitoring activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

g. Supervisory Institutions Implementation of Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

h. Reporting Institutions for Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

3) Access Road Construction

a. Source of Impact

Source impacts from road construction activities conductivity.

b. Type of impact

- Air quality: reduction in air quality and increased dust due to land maturation for access roads carrying.
- Noise: an increase in noise from equipment used for road conductivity.
- Stability of slopes: occurrence of ground motion due to access road work plan cut and fill.

c. Monitoring Method

- Decrease in air quality

Data was collected by way of direct air sampling in field using a chemical reaction (absorbent) and dust by using a Hi-Vol sampler for laboratory tests, dust was measured by gravimetric methods and test results compared with Quality Standards Regulation PP RI No. 41, of 1999, concerning Control of Air Pollution.

- Increased noise

Noise levels were measured field using a sound level meter which is expressed in units of dBA and compare it with Noise Level Standard based KepMenLh No: KEP-48/MENLH/11/1996, on Noise Level Standard.

- Stability of slopes

Methods of monitoring is done by collecting secondary data obtained from feasibility study report, Directorate of GTL, Bakosurtanal and field observations.

d. Time of Monitoring

Period of environmental monitoring carried out during construction phase with frequency of 6 (six) months.

e. Location of Monitoring

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Implementing Institutions of Environmental Monitoring

Institution which carry out monitoring activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

g. Supervisory Institutions Implementation of Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

h. Reporting Institutions for Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

4) Civil Construction

a. Source of Impact

Source impacts from civil construction activities.

b. Type of impact

- Noise, an increase in noise due to blasting.
- Erosion and sedimentation, disruption of water flow downstream of Rajamandala HEPP.
- Decrease in water quality, increase turbidity of river water due to entrainment of material into the body of water erosion.
- Stability of slopes, slope stability and disruption of presence or absence of landslide events or at locations where soil movement.
- Flora, reduced some types of flora and habitat loss due to wear of land for a power house.
- Fauna, habitat loss caused by reduced land will lead to loss of several types of animal species.
- Aquatic Biota, decrease aquatic biota species diversity in Citarum River caused erosion and sedimentation.
- Public unrest, because air pollution, water and social jealousy because it can not be involved in project.

c. Monitoring Method

- Increased noise

Noise levels were measured field using a sound level meter which is expressed in units of dBA and compare it with Noise Level Standard based KepMenLh No: KEP-48/MENLH/11/1996, on Noise Level Standard.

- Erosion and sedimentation

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by direct interview of respondent. Whereas secondary data collected of water discharge from UBP Saguling.

- Decrease in water quality

Monitoring method of water quality by water sampling conducted for each location ± 2 liters, parameters pH, DHL and DO were measured directly on ground, minerals, nutrients and organic matter in analysis at laboratory.

- Stability of slopes

Methods of monitoring is done by collecting secondary data obtained from feasibility study report, Directorate of GTL, Bakosurtanal and field observations.

- Flora

Monitoring methods carried out by means of collecting primary data and secondary data. Primary data collected by vegetation inventories, while secondary data collected from relevant agencies.

- Fauna

Monitoring methods carried out by means of collecting primary data and secondary data. Primary data collected by method of cruising (non of bird) and IPA (for birds), while secondary data collected from relevant.

- Aquatic Biota

Monitoring methods done by filtering water with a plankton net no.25 and identification methods are microscopic and Sadgwick-Rafter, Sampling benthos with Eckman Dredge and benthos samples were identified by means of a stereo microscope, while to fish by means of interviews and direct observation.

- Public Unrest

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.

d. Time of Monitoring

Period of environmental monitoring carried out during construction phase with frequency of 6 (six) months.

e. Location of Monitoring

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Implementing Institutions of Environmental Monitoring

Institution which carry out monitoring activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

g. Supervisory Institutions Implementation of Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

h. Reporting Institutions for Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

5) Landfill former quarry land

a. Source of Impact

Source impacts from landfill activities of former quarry.

b. Type of impact

- Planning, land and soil, changes in land use for disposal area.
- Flora, reduced some types of flora

c. Monitoring Method

- Planning, land and soil

Environmental monitoring methods carried out by observation and direct interviews with questionnaire guide and conduct study on spatial planning of Cianjur and West Bandung regencies.

- Flora

Monitoring methods carried out by means of collecting primary data and secondary data. Primary data collected by vegetation inventories, while secondary data collected from relevant agencies.

d. Time of Monitoring

Period of environmental monitoring carried out during construction phase with frequency of 6 (six) months.

e. Location of Monitoring

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Implementing Institutions of Environmental Monitoring

Institution which carry out monitoring activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

g. Supervisory Institutions Implementation of Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

h. Reporting Institutions for Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

6) Release of Labor

a. Source of Impact

Source impacts from the release of labor activity.

b. Type of impact

Completion of construction activities are characterized by release of labors is forecasted to have an impact on declining revenue of community during this part who got involved in project.

c. Monitoring Method

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.

d. Time of Monitoring

Period of environmental monitoring carried out during construction phase with frequency of 6 (six) months.

e. Location of Monitoring

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Implementing Institutions of Environmental Monitoring

Institution which carry out monitoring activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

g. Supervisory Institutions Implementation of Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

h. Reporting Institutions for Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

4.2.3. Operational Stage

1) Operation of Plant

a. Source of Impact

Source impacts from operating activities Rajamandala HEPP.

b. Type of impact

- Decrease in water discharge, decrease in water discharge at downstream weir of Rajamandala HEPP until Powerhouse Rajamandala.
- Decrease in water quality, high content of BOD due to domestic waste
- Facilities and public infrastructure, increasing roads that can be used by people around.
- Employment opportunities and trying, lack of job opportunities and strive towards a population of approximately.
- Perception of society, emergence of a negative public perception.

c. Monitoring Method

- Decrease in discharge

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by direct interview of respondent. Whereas secondary data collected of water discharge from UBP Saguling.

- Decrease in water quality

Monitoring method of water quality by water sampling conducted for each location \pm 2 liters, parameters pH, DHL and DO were measured directly on ground, minerals, nutrients and organic matter in analysis at laboratory.

- Facilities and infrastructure

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.

- Employment opportunities and try

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.

- Perception of community

Monitoring methods carried out by direct interviews with local community using a questionnaire.

d. Time of Monitoring

Environmental monitoring conducted during operational of plant by frequency period with 6 (six) months.

e. Location of Monitoring

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Implementing Institutions of Environmental Monitoring

Institution which carry out monitoring activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

g. Supervisory Institutions Implementation of Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

h. Reporting Institutions for Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

2) Maintenance of Facilities and infrastructures

a. Source of Impact

Source impacts from maintenance activities facilities and infrastructure.

b. Type of impact

Maintenance activities of facilities and infrastructure forecasted impact on employment creation.

c. Monitoring Method

Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.

d. Time of Monitoring

Environmental monitoring conducted during operational of plant by frequency period with 6 (six) months.

e. Location of Monitoring

- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.
- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.

f. Implementing Institutions of Environmental Monitoring

Institution which carry out monitoring activities is a consortium of PT. Indonesia Power and Kansai. Co., Ltd as project initiator.

g. Supervisory Institutions Implementation of Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.
- Sub District and village apparatus in study area.

h. Reporting Institutions for Environmental Monitoring

- Regional Environment Management Agency of West Java Province.
- Environment Agency of West Bandung Regency.
- Environment Office of Cianjur Regency.

Table 4.2. Summary of Rajamandala HEPP Environmental Monitoring

No	Source of Impact	Types of impacts to be monitored	Environmental Monitoring Effort			Institutions of Environmental Monitoring		
			Location	Time of Monitoring	Method	Implementer	Supervisor	Reporting
I	PRE CONSTRUCTION STAGE							
1.	Field Survey	Public unrest	<ul style="list-style-type: none">- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.	Environmental monitoring period of onces performed before field survey activities carried out	Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.- Sub District and village apparatus in study area.	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.
2	Procurement of land	<ul style="list-style-type: none">- Levels of income- Public unrest	<ul style="list-style-type: none">- Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.- Cihea Village, Haurwangi Sub District, Cianjur Regency.	Environmental monitoring period of onces performed before Procurement of land activities carried out	Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.- Sub District and village apparatus in study area.	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.
II	CONSTRUCTION STAGE							
1.	Procurement and mobilization of labor	<ul style="list-style-type: none">- Opening up an job opportunity and trying- Public unrest- Morbidity	<ul style="list-style-type: none">- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West	Period of onces environmental monitoring performed during construction period.	Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government,	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java

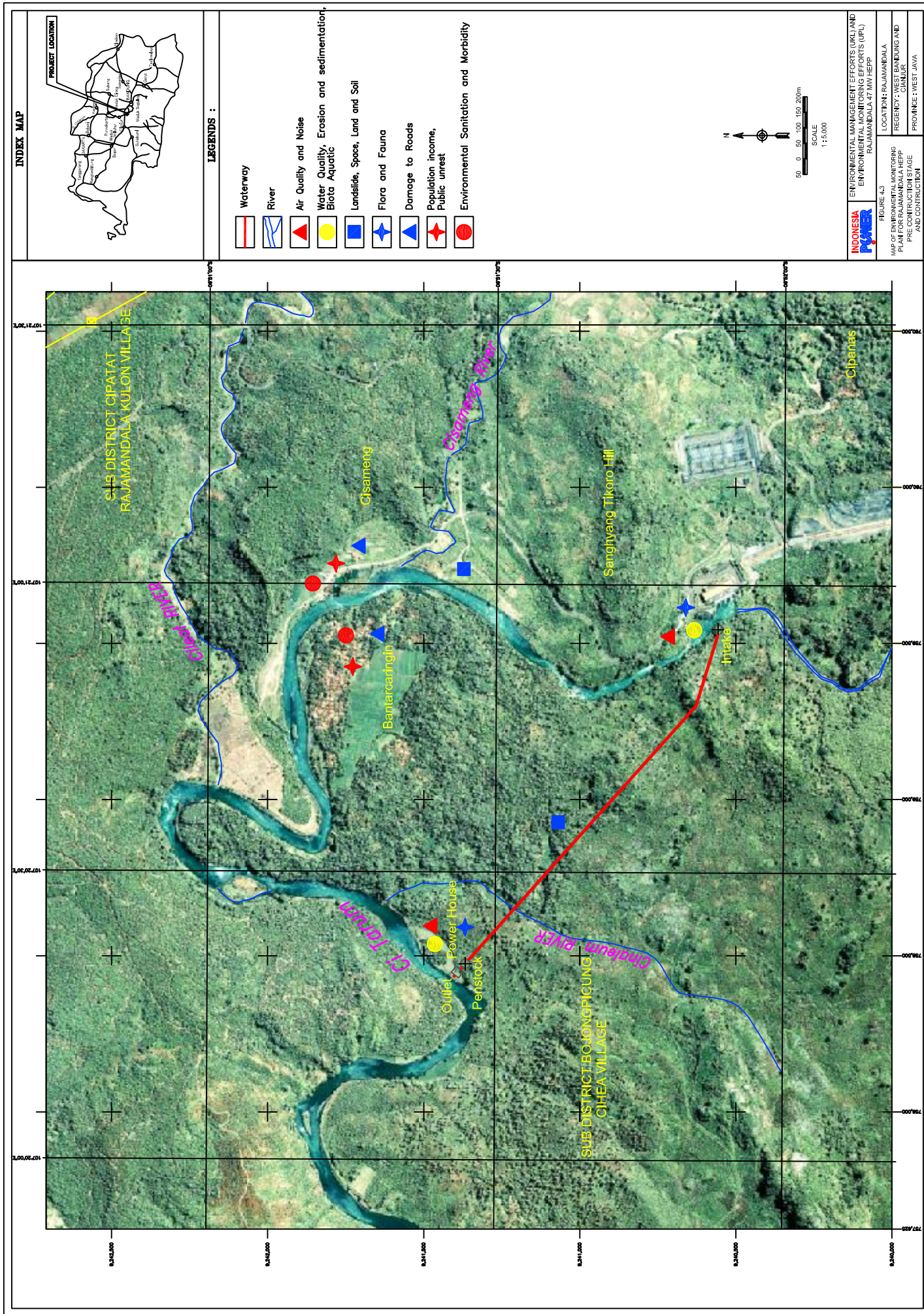
No	Source of Impact	Types of impacts to be monitored	Environmental Monitoring Effort			Institutions of Environmental Monitoring		
			Location	Time of Monitoring	Method	Implementer	Supervisor	Reporting
		- Environmental sanitation	Bandung Regency. - Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.		Regency Government and others.		Regency. - Environment Office of Cianjur Regency. - Sub District and village apparatus in study area.	Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency.
2.	Mobilization of equipment and construction materials	- Decrease in air quality - Noise - Damage to roads and bridges - Public unrest	- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency. - Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.	Period of environmental monitoring carried out during construction phase with frequency of 6 (six) months.	- Decrease in air quality Data was collected by way of direct air sampling in field using a chemical reaction (absorbent) and dust by using a Hi-Vol sampler for laboratory tests, dust was measured by gravimetric methods and test results compared with Quality Standards Regulation PP RI No. 41, of 1999, concerning Control of Air Pollution. - Increased noise Noise levels were measured field using a sound level meter which is expressed in units of dBA and compare it with Noise Level Standard based KepMenLh No: KEP-48/MENLH/11/1996, on Noise Level Standard. - Damage to roads Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others. - Public Unrest Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government,	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	- Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency. - Sub District and village apparatus in study area.	- Regional Environment Management Agency of West Java Province. - Environment Agency of West Java Province. - Environment Office of West Bandung Regency. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency. - Sub District and village apparatus in study area.

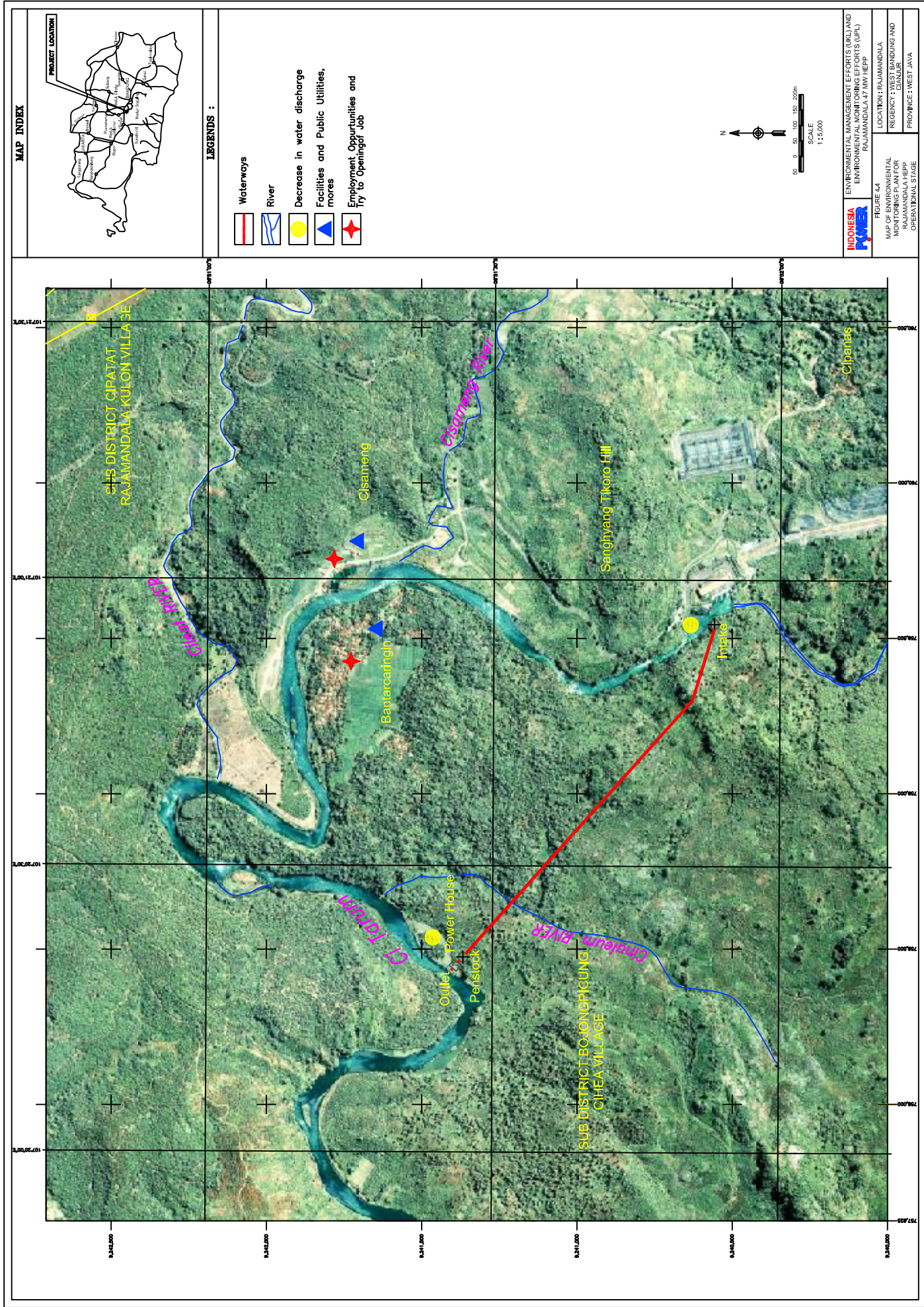
No	Source of Impact	Types of impacts to be monitored	Environmental Monitoring Effort			Institutions of Environmental Monitoring		
			Location	Time of Monitoring	Method	Implementer	Supervisor	Reporting
3.	Access Road Construction	<ul style="list-style-type: none">- Decrease in air quality- Noise- Stability of slopes	<ul style="list-style-type: none">- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.	Period of environmental monitoring carried out during construction phase with frequency of 6 (six) months.	<ul style="list-style-type: none">- Decrease in air quality- Data was collected by way of direct air sampling in field using a chemical reaction (absorbent) and dust by using a Hi-Vol sampler for laboratory tests, dust was measured by gravimetric methods and test results compared with Quality Standards Regulation PP RI No. 41, of 1999, concerning Control of Air Pollution.- Increased noise- Noise levels were measured field using a sound level meter which is expressed in units of dBA and compare it with Noise Level Standard based KepMenLh No: KEP-48/MENLH/11/1996, on Noise Level Standard.- Stability of slopes- Methods of monitoring is done by collecting secondary data obtained from feasibility study report, Directorate of GTL, Bacosurtanal and field observations.	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.- Sub District and village apparatus in study area.	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.- Sub District and village apparatus in study area.
4.	Civil Construction	<ul style="list-style-type: none">- Noise- Erosion and sedimentation- Decrease in water quality- Stability of slopes- Flora & Fauna- Aquatic Biota- Public unrest	<ul style="list-style-type: none">- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency.- Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.	Period of environmental monitoring carried out during construction phase with frequency of 6 (six) months.	<ul style="list-style-type: none">- Increased noise- Noise levels were measured field using a sound level meter which is expressed in units of dBA and compare it with Noise Level Standard based KepMenLh No: KEP-48/MENLH/11/1996, on Noise Level Standard.- Erosion and sedimentation- Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by direct interview of respondent. Whereas secondary data collected of water discharge from UBP Saguling.- Decrease in water quality- Monitoring method of water quality by water sampling conducted for each location ± 2 liters, parameters pH, DHL and DO were measured directly on ground, minerals,	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.- Sub District and village apparatus in study area.	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung Regency.- Environment Office of Cianjur Regency.- Sub District and village apparatus in study area.

No	Source of Impact	Types of impacts to be monitored	Environmental Monitoring Effort		Institutions of Environmental Monitoring			
			Location	Time of Monitoring	Method	Implementer	Supervisor	Reporting
					<p>nutrients and organic matter in analysis at laboratory.</p> <ul style="list-style-type: none">- Stability of slopes <p>Methods of monitoring is done by collecting secondary data obtained from feasibility study report, Directorate of GTL, Baksurtanal and field observations.</p> <ul style="list-style-type: none">- Flora <p>Monitoring methods carried out by means of collecting primary data and secondary data. Primary data collected by vegetation inventories, while secondary data collected from relevant agencies.</p> <ul style="list-style-type: none">- Fauna <p>Monitoring methods carried out by means of collecting primary data and secondary data. Primary data collected by method of cruising (non of bird) and IPA (for birds), while secondary data collected from relevant.</p> <ul style="list-style-type: none">- Aquatic Biota <p>Monitoring methods done by filtering water with a plankton net no.25 and identification methods are microscopic and Sadgwick-Rafter. Sampling benthos with Eckman Dredge and benthos samples were identified by means of a stereo microscope, while to fish by means of interviews and direct observation.</p> <ul style="list-style-type: none">- Public Unrest <p>Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.</p>			
5	Landfill former quarry land	<ul style="list-style-type: none">- Planning, land and soil- Flora	<ul style="list-style-type: none">- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub	Period of environmental monitoring carried out during construction phase with frequency of 6 (six) months.	<ul style="list-style-type: none">- Planning, land and soil <p>Environmental monitoring methods carried out by observation and direct interviews with questionnaire guide and conduct study on spatial planning of Cianjur and West</p>	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java Province.- Environment Agency of West Bandung	<ul style="list-style-type: none">- Regional Environment Management Agency of West Java

No	Source of Impact	Environmental Monitoring Effort				Institutions of Environmental Monitoring		
		Types of impacts to be monitored	Location	Time of Monitoring	Method	Implementer	Supervisor	Reporting
			District, West Bandung Regency. - Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.		- Flora Monitoring methods carried out by means of collecting primary data and secondary data. Primary data collected by vegetation inventories, while secondary data collected from relevant agencies.		Regency. - Environment Office of Cianjur Regency. - Sub District and village apparatus in study area.	Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency.
6	Release of Labor	- Decrease in income	- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency. - Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.	Period of environmental monitoring carried out during construction phase with frequency of 6 (six) months.	Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	- Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency. - Sub District and village apparatus in study area.	- Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency.
III OPERATIONAL STAGE								
1.	Operation of Plant	- Decrease in water discharge - Decrease in water quality - Facilities and public infrastructure - Employment opportunities and trying - Perception of society	- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency. - Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.	Environmental monitoring conducted during operational of plant by frequency period with 6 (six) months.	- Decrease in discharge Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by direct interview of respondent. Whereas secondary data collected of water discharge from UBP Saguling. - Decrease in water quality Monitoring method of water quality by water sampling conducted for each location \pm 2 liters, parameters pH, DHL and DO were measured directly on ground, minerals, nutrients and organic matter in analysis at laboratory. - Facilities and infrastructure	Consortium of PT. Indonesia Power and Kansai. Co., Ltd	- Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency. - Sub District and village apparatus in study area.	- Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency.

No	Source of Impact	Types of impacts to be monitored	Environmental Monitoring Effort		Institutions of Environmental Monitoring			
			Location	Time of Monitoring	Method	Implementer	Supervisor	Reporting
					Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others. - Employment opportunities and try Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others. - Perception of community Monitoring methods carried out by direct interviews with local community using a questionnaire.			
2.	Maintenance of Facilities and infrastructures	- Creation of employment	- Cisameng Kampong, Rajamandala Kulon Village, Cipatat Sub District, West Bandung Regency. - Bantarcaringin Kampong, Cihea Village, Haurwangi Sub District, Cianjur Regency.	Environmental monitoring conducted during operational of plant by frequency period with 6 (six) months.	Methods of monitoring carried out by means of collecting primary data and secondary data. Primary data were collected by interview respondents. Whereas secondary data collected from relevant agencies such as Village and Sub District Government, Regency Government and others.	Consortium of P.T. Indonesia Power and Kansai. Co., Ltd	- Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency. - Sub District and village apparatus in study area.	- Regional Environment Management Agency of West Java Province. - Environment Agency of West Bandung Regency. - Environment Office of Cianjur Regency.





CHAPTER 5

STAMP AND SIGNATURE

Chapter 5

STAMP AND SIGNATURE

1. Name : Supangkat Iwan Santoso
2. Position : Chairman of Management Committee Consortium PT.
Indonesia Power – Kansai Electric Power Co. Inc
Director of Development & Commerce,
PT Indonesia Power
3. Address : PLN Building
Jl. Jenderal Gatot Subroto Kav. 18 Jakarta 12950

Jakarta, December 2011
On Behalf of Consortium
PT. Indonesia Power –
Kansai Electric Power Co. Inc
DIRECTOR OF DEVELOPMENT AND
COMMERCIAL
PT. INDONESIA POWER
INDONESIA
POWER
SUPANGKAT IWAN SANTOSO

APPENDICES

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APPENDIX 4	NEWS EVENTS, THE ATTENDANCE LIST, AND SUGGESTIONS / FEEDBACK SOCIALIZATION ACTIVITIES RAJAMANDALA 47 MW HEPP
APPENDIX 5	COMPETENCY STANDARDS OF HEPP
APPENDIX 6	RESULT OF MEASURING THE QUALITY OF WELL WATER AND RIVER WATER
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APPENDIX 1

MINUTES AND MEETING OF DISCUSSION RAJAMANDALA 47 MW HEPP



PEMERINTAH PROVINSI JAWA BARAT
BADAN PENGELOLAAN LINGKUNGAN HIDUP DAERAH
BPLHD

Jl. Naripan No. 25 Telp. 022 - 4204871 Fax. 022-4231570 Kotak Pos 1117 Bandung 40111
www.bplhdjabar.go.id | Email. bplhd@bplhdjabar.go.id

Nomor : 660.1/4.631.11/2011
Sifat : Biasa
Lampiran : -
Perihal : **Risalah Rapat Pembahasan Dokumen UKL**
- UPL Rencana Kegiatan Pembangunan
PLTA Rajamandala 47 MW di Kabupaten
Bandung Barat dan Cianjur

Bandung, 14 Nopember 2011
Kepada
Yth. Pimpinan PT. Indonesia Power
Jl. Jend. Gatot Subroto Kav. 18
Di JAKARTA,

Menindaklanjuti Rapat Pembahasan Dokumen UKL – UPL Rencana Kegiatan Pembangunan PLTA Rajamandala 47 MW yang berlokasi di Kabupaten Bandung Barat dan Cianjur pada tanggal 10 Nopember 2011 yang diselenggarakan di Ruang Rapat Lt. 6 Kantor BPLHD Provinsi Jawa Barat Jalan Naripan No. 25 Bandung yang dihadiri oleh :

- Wakil dari Dinas PSDA Provinsi Jawa Barat.
- Kepala Kantor Lingkungan Hidup Kabupaten Bandung Barat.
- Kepala Kantor Lingkungan Hidup Kabupaten Cianjur.
- Wakil dari Dinas Bina Marga dan Pengairan Kabupaten Bandung Barat.
- Wakil dari Dinas Bina Marga dan Pengairan Kabupaten Cianjur.
- Drs. Taufiq Afiff, MSc. (Wakil dari PSLH – ITB).
- Wisandana, SH. MSi. (Tim Teknis).
- Ir. Suharsono (Tim Teknis).
- Wakil Bidang Tata Kelola Lingkungan BPLHD Prov. Jabar.
- Camat Cipatat Kabupaten Bandung Barat.
- Camat Haurwangi Kabupaten Cianjur.
- Kepala Desa Cihea Kecamatan Haurwangi Kab. Cianjur.
- Pemrakarsa Kegiatan : PT. Indonesia Power.
- Tim Penyusun Dokumen UKL – UPL : PT. Kwarisa Hexagon.

Beberapa saran, tanggapan dan masukan dari peserta rapat baik tertulis maupun lisan sebagai bahan perbaikan dokumen, diantaranya adalah sebagai berikut :

1. Deskripsi rencana agar lebih diperjelas sehingga benar-benar dapat memberikan informasi dan gambaran yang nyata dari rencana kegiatan yang dilaksanakan tersebut.
2. Penentuan kapasitas rencana kegiatan sebesar 47 MW didasarkan atas apa? Apakah memang kemampuan maksimal dari PLTA sebesar itu atau untuk menghindari kapasitas 50 MW yang merupakan kegiatan wajib AMDAL.
3. Agar melakukan koordinasi dengan instansi terkait di kabupaten untuk penyesuaian rencana kegiatan ini dengan RTRW di wilayah setempat.
4. Untuk memudahkan pemahaman terhadap rencana kegiatan, sebaiknya dibuatkan bagan alir untuk tahapan setiap jenis kegiatan yang akan dilaksanakan.
5. Agar diurutkan tahapan rencana kegiatan secara jelas dan rinci dari tahap pra konstruksi - operasi. Kemudian identifikasi setiap kegiatan yang akan mempengaruhi lingkungan dan berikan penjelasan apakah kegiatan tersebut dampaknya bisa dikendalikan oleh SOP yang ada atau tidak. Jika tidak maka dampak tersebut yang nantinya harus dilakukan pengelolaan.

6. Seperti apa kondisi

6. Seperti apa kondisi lapangan untuk memastikan dampak-dampak yang akan ditimbulkan dari rencana kegiatan yang akan dilakukan tersebut. Rencana kegiatan dan kondisi lapangan yang jelas memudahkan menentukan dampak yang akan terjadi dari kegiatan yang akan dilaksanakan.
7. Pemindahan debit air sebesar 75% untuk rencana kegiatan ini tentunya akan menimbulkan permasalahan, baik terhadap masyarakat dan lingkungan? Untuk itu agar diperjelas kembali. Bagaimana dampak terhadap pertanian yang ada disana? Dimana merupakan sawah dengan kualitas baik.
8. Fluktuasi debit air yang ada apakah akan mempengaruhi suplai air yang digunakan baik bagi pertanian maupun masyarakat?
9. Keterkaitan dengan kegiatan lain yang ada, dimana akan ada rencana kegiatan PLTA Cisokan, yang tentunya akan ada dampak kumulatif agar dijelaskan.
10. Hal II-3, disebutkan tipe weir untuk rencana kegiatan ini adalah tipe floating weir. Mohon agar diperjelas kembali.
11. Hal. II-5, akan dilakukan pengerukan dengan kedalaman 2 m dengan volume material kerukan diperkirakan sebesar 200.000 m³, akan dibuang kemana agar dijelaskan.
12. Hal. II-9, Tabel 2.6 agar ditampilkan lokasi administrasinya terletak di desa dan kecamatan mana.
13. Hal. II-12, untuk pembangunan jalan akses apakah ada yang masuk wilayah Kabupaten Bandung Barat, apabila ada berapa panjangnya agar disebutkan.
14. Hal. II-16, lokasi pengambilan sampel agar ditampilkan di peta sehingga lebih jelas dan informatif.
15. Gambaran kondisi geologi dari lokasi rencana kegiatan agar ditampilkan.
16. Hal. III-10, terjadi peningkatan BOD dikarenakan penurunan debit, bagaimana upaya pengelolaan dan pemantauan yang akan dilakukan agar diperjelas.
17. Peledakan yang akan dilakukan agar menjadi perhatian dalam pelaksanaannya sehingga tidak menimbulkan kekhawatiran dimasyarakat sekitar lokasi kegiatan.
18. Hal. III-14, adanya peningkatan laju erosi sebesar 7,31 ton/thn menjadi 29,26 t/thn bagaimana upaya pengelolaan dan pemantauan yang akan dilakukan agar diperjelas.
19. Hal. III-21, Tabel 3.1 mengenai penjelasan besaran dampak agar disesuaikan kembali.
20. Mengingat dampak dari kegiatan ini yang pokok adalah masalah sosial, agar lebih diperjelas dan diperdalam kajiannya terhadap aspek sosial tersebut yang diakibatkan dari rencana kegiatan ini.
21. Terkait pembebasan tanah sebaiknya tidak terpaku kepada NJOP, apabila dimungkinkan didasarkan pada keputusan hasil musyawarah diantara para pihak yang terkait.
22. Bab. IV, agar ditambahkan untuk instansi penerima pelaporan. Institusi pengelola lingkungan hidup di Kabupaten Bandung Barat agar disesuaikan kembali menjadi KLH bukan Dinas LH.
23. Dampak pada kegiatan UKL-UPL biasanya sudah jelas bagaimana upaya pengelolaan yang akan dilakukan. Akan tetapi pada rencana kegiatan ini ada sebagian dampak yang harus diprakirakan/diprediksikan besaran dampaknya serta upaya pengelolaan dan pemantauan yang harus dilakukan, seperti ; kekhawatiran kurangnya supply air yang akan digunakan masyarakat maupun kegiatan lain yang selama ini telah berjalan. Untuk itu terkait prakiraan dampak tersebut diatas harus lebih diperjelas dan diperinci kembali sehingga jelas akan seperti apa yang akan dilakukan oleh Pemrakarsa kegiatan.
24. Hasil dari kegiatan PLTA (listrik yang dihasilkan) agar dijelaskan apakah untuk memenuhi kebutuhan listrik di kabupaten terkait atau untuk interkoneksi jaringan Jawa-Bali agar dijelaskan. Hal ini apabila dimungkinkan dapat dimanfaatkan untuk masyarakat disekitar lokasi kegiatan yang belum ada listriknya sebelum digunakan untuk pihak lain.
25. Dalam pelaksanaan pekerjaan (tahap konstruksi) agar memberikan prioritas kepada pembagian masyarakat disekitar lokasi rencana kegiatan dengan melakukan koordinasi dengan aparat setempat (desa maupun kecamatan).

26. Agar melakukan

26. Agar melakukan sosialisasi kepada masyarakat disekitar rencana kegiatan secara jelas sehingga masyarakat memahami rencana kegiatan yang akan dilaksanakan, khususnya mengenai dampak yang ditimbulkan dari kegiatan (baik negatif maupun positif) serta upaya pengelolaan dampak yang akan dilakukan kedepannya.
27. Peta-peta dan gambar yang ada agar diperjelas sehingga lebih informatif.
28. Memperbaiki redaksional penulisan antara lain inkonsistensi data dan informasi antar bab, satuan, serta kesalahan penulisan.
29. Matrik UKL-UPL agar disesuaikan kembali berdasarkan hasil koreksi yang telah dilakukan.
30. Jadwal rencana pelaksanaan kegiatan agar disampaikan, hal ini untuk memberikan kepastian kepada masyarakat disekitar lokasi kegiatan.
31. Agar dibuat surat pernyataan akan melaksanakan pengelolaan dan pemantauan lingkungan dari Pemrakarsa kegiatan yang ditandatangani diatas materai.

Hasil perbaikan atas Dokumen Upaya Pengelolaan Lingkungan Hidup (UKL) dan Upaya Pemantauan Lingkungan Hidup (UPL) sesuai dengan saran dan masukan peserta rapat yang hadir sebagaimana tersebut di atas, selambat-lambatnya 14 (empatbelas) hari kerja untuk segera disampaikan kembali kepada BPLHD Provinsi Jawa Barat untuk proses evaluasi lebihlanjut melalui Rapat Tim Teknis.

KEPALA BPLHD PROVINSI JAWA BARAT,



Dr.-Ir. SETIAWAN W, Dipl.SE.M.Eng.
Pembina Utama Muda
NIP. 196308261990011001

Tembusan disampaikan kepada Yth. :

1. Bapak Gubernur Jawa Barat (sebagai laporan).
2. Kepala BAPPEDA Provinsi Jawa Barat.
3. Kepala Dinas Energi dan Sumber Daya Mineral Provinsi Jawa Barat.
4. Kepala Dinas Pengelolaan Sumber Daya Air Provinsi Jawa Barat.
5. Kepala Kantor Lingkungan Hidup Kab. Bandung Barat.
6. Kepala Kantor Lingkungan Hidup Kab. Cianjur.
7. Tim Teknis.

APPENDIX 2

ADVICE AND COMMENTS OF DISCUSSION RAJAMANDALA 47 MW HEPP

ADVICES AND COMMENTS
RAJAMANDALA 47 MW HEPP UKL-UPL STUDY IN WEST BANDUNG REGENCY AND CIANJUR REGENCY WEST JAVA PROVINCE

NO	ADVICES AND INPUTS	ANSWER/COMMENTS	CORRECTION PAGES
1	Description of plans to be more clarified so it really can provide information and overview of action plan is implemented.	Description of planned development activities of Rajamandala 47 MW HEPP started pre-construction phase to operations are contained in document.	II – 9 to II – 17
2	Determination of activities planned capacity of 47 MW based on? Is it a maximum capacity of HEPP for it or to avoid a capacity of 50 MW which is a mandatory EIA activities.	Capacity of 47 MW is the maximum capacity of Rajamandala HEPP that uses a turbine to water discharge that flowed at 168 m ³ /sec with high elevation differences in water intake and water in outlet by 34 meters.	II – 3
3	In order to coordinate with related institutions in Regency for adjustment of this activity with Spatial Plan (RTRW) in local area.	Location plan for Rajamandala 47 MW HEPP are in accordance with draft Spatial Plan (RTRW) Cianjur Regency.	II – 32 and Appendix
4	To facilitate understanding of planned activities, might want to create a flow chart for the stages of each type of activity to be carried out.	Stages of plan activities based on flow chart of starting pre-construction, construction and operation	III – 16 to III – 17
5	To be sequenced stages of plan activities clearly and detailed of phase pre-construction until operation. Then identify any activities that would affect environment and provide an explanation if impact of these activities can be controlled by standard operating procedures (SOP) that exists or not. If not then impact that will have to do management.	Standard Operational Procedure (SOP) for tunnel work (headrace tunnel) was added in document	II – 13 to II – 16
6	What kind of field conditions to ensure impacts that will result from plan activities to be conducted. Plan activities and field conditions obviously make it easier to determine impact that will occur from activities to be implemented.	Plan development activities Rajamandala 47 MW HEPP started pre-construction phase, construction and operation have been listed in document. As for the initial field conditions as environmental baseline that has been included in document namely on the chemical-physical components, biological, socio-economic-cultural and public health.	Chapter II
7	Transfer of water discharge by 75% to plan these activities will certainly cause problems, both on society and environment? For that to be clarified again. How does impact on agriculture is there? Where is rice fields with good quality.	Location of existing rice fields in Bantarcaringin Kampong are rain-fed rice fields.	-
8	Fluctuation of water discharge that is whether it will affect supplies of water both used for agriculture and society?	Water used from exhaust of Tailrace of Saguling HEPP not used for agriculture in Bantarcaringin Kampong or Cisameng Kampong	
9	Associated with other activities that exist, where there will be activities planned Cisokan HEPP, which certainly would be no cumulative impacts to be described.	Operation of Rajamandala HEPP will utilize tailrace exhaust Saguling HEPP so highly dependent on operations Saguling HEPP, while Cisokan HEPP using the flow of water from Cisokan River	II – 19

NO	ADVICES AND INPUTS	ANSWER/COMMENTS	CORRECTION PAGES
10	Pages II-3, described type of weir to plan this activity is of type floating weir. Please be clarified again.	Type of floating weir is type of fixed weir, where remaining excess water will overflow weir above body	II – 3
11	Pages II-5, will be dredging to a depth of 2 m with volume of dredge material is estimated at 200,000 m ³ , will be disposed of where to be explained.	Dredge material will be discharged to a disposal area located in vicinity plan of Rajamandala HEPP powerhouse with a planned area of about 50,000 m ² .	II – 17
12	Pages. II-9, Table 2.6 to display location of administrative located where are Sub district and village.	Administrative location of land use plans for Rajamandala HEPP have been added	Table 2.6 page II – 9
13	Pages. II-12, for construction of access roads if there are in area West Bandung Regency, how long to be mentioned.	To plan access roads will be using West Bandung Regency with a length of about ± 100 meters from existing roads of Saguling HEPP	II – 12
14	Pages II-16, sampling locations to be displayed in map making it more clearly and informative.	Map of sampling locations will be added in document	II – 45
15	Overview geological conditions of site plan of activities to be displayed.	Geological conditions at the construction site plans Rajamandala 47 MW HEPP been added in document	II – 26 to II – 30
16	Pages III-10, there is BOD increased due to reduction in discharge, how management and monitoring efforts that will be done in order to be clarified.	Management conducted a compensation discharge in downstream of weir plan of Rajamandala HEPP to be able to maintain river ecosystem	IV – 15
17	Blasting will be done in order to be a concern in its implementation so as not to cause concern in community in location of activities.	Blasting during construction of headrace tunnel will use a DWM (Drilling Blasting Methods), so that impact of from noise and vibration can be suppressed	II – 30
18	Pages III-14, an increase in erosion rate of 7.31 tons/year to 29.26 tons/year how management and monitoring efforts will be done in order to be clarified.	Management and monitoring of the erosion rate has been included in chapter IV	IV – 10 and IV – 34
19	Pages III-21, Table 3.1 on explanation of impact scale to be adjusted again.	Summary of impact of development plan Rajamandala 47 MW HEPP have been adjusted	III – 21
20	Considering impact of these activities is main social problems, to be more clarified and deepened study of social aspects resulting of this activity plan.	Impact on social aspects have been included in impact and management and environmental monitoring.	Chapter 3 and Chapter 4
21	Related to land acquisition should not be stuck to the NJOP, where possible based on a decision result of deliberation among the parties concerned.	Land acquisition will be made by consensus between land owners / cultivators with initiators and has been listed in documents	II – 9

NO	ADVICES AND INPUTS	ANSWER/COMMENTS	CORRECTION PAGES
22	Chapter. IV, to be added to recipients agency reporting. Environmental management institutions in West Bandung Regency in order to be re-adjusted to Office of Environmental is not Department of Environmental.	Institutions recipients and management environmental reporting has been adjusted	Chapter IV
23	Impact on activities of UKL-UPL is usually obvious how management efforts will be done. But in this action plan there are some impacts that must be estimated/predicted impact scale and management and monitoring efforts should be done, such as concerns about lack of water supply to be used by people as well as other activities that had been running. Forecasts related to the impact of above should be further clarified and elaborated so it would obviously like what will be done by the proponent activity.	Impact of less water supply due to transfer flow from weir Rajamandala HEPP to powerhouse Rajamandala HEPP, planned to be used discharge compensation at the time of Rajamandala HEPP operations.	UKL, IV – 15
24	Results of HEPP activities (generated electricity) that explained whether to meet electricity needs in Regency involved or for Java-Bali interconnection network to be described. This can be utilized wherever possible to community around location of activities that do not have electricity before being used for other party.	Electricity generated in addition to supplying West Java will also support interconnection system Java - Bali, and has been listed in the document.	II – 19
25	In the implementation work (construction phase) to give priority to distribution of communities around location of activity plan in coordination with local authorities (village or subdistrict).	Manpower requirements during construction will be optimized from the residents around and have been listed in documents	II – 10 and IV- 4 - IV-5
26	In order to socialization to communities around activity plan so that people clearly understand plan of activities to be implemented, especially regarding impact of activities (both negative and positive) as well as impact of management efforts will be done in future.	Socialization to the community has been conducted in Office UBP Saguling on 23 November 2011. Minutes of socialization and attendance list has been attached	Appendix
27	The maps and pictures are to be clarified so it is more informative.	The maps has been corrected	-
28	Fix editorial writing among others, inconsistencies of data and information between chapters, units, and writing errors.	Document has been corrected	-
29	UKL-UPL matrix in order to be re-adjusted based on results of correction that has been done	UKL-UPL Matriks has been adjusted	UKL : IV – 18 to IV – 25 UPL : IV – 41 to IV – 46
30	Implementation plan schedule of activities to be delivered, this is to give certainty to communities around location of activities.	Schedule of activity plan have been added	II – 18
31	To be made a statement, will carry out environmental management and monitoring activities from initiators and signature, stamp duty.	Statement letter management and environmental monitoring have been added in documents	-

APPENDIX 3

PERMITS LETTER OF SPATIAL PLAN CIANJUR REGENCY



PEMERINTAH KABUPATEN CIANJUR
B A P P E D A
BADAN PERENCANAAN PEMBANGUNAN DAERAH
JL. RAYA BANDUNG NO. 65 TELP/FAX (0263) 280645 KARANGTENGAH CIANJUR 43281

Nomor : 050/540/Bapp/2011
Lampiran : -
Perihal : Rencana Pembangunan PLTA Rajamandala
dan Jalur Transmisi SUTT.

Cianjur, 30 Nopember 2011


Kepada
Yth. Direktur Pengembangan dan
Niaga PT. INDONESIAN POWER
di

TEMPAT

Berkenaan dengan rencana pembangunan PLTA Rajamandala 47 MW, dan Jalur SUTT 150 kV oleh PT. Indonesian Power, bekerjasama dengan Kansai Electric Power Co. Inc, maka untuk itu perlu kami sampaikan hal-hal sebagai berikut :

1. Bahwa rencana pembangunan PLTA Rajamandala 47 MW, yang terletak di Desa Cihea Kecamatan Haurwangi Kabupaten Cianjur, dan Desa Rajamandala kulon Kecamatan Cipatat Kab. Bandung Barat.
2. Bahwa rencana pembangunan tapak menara tranmisi SUTT 150 kV yang terletak di Desa Cihea, Desa Haurwangi dan Desa Kertasari Kecamatan Haurwangi Kabupaten Cianjur.
3. Baik rencana pembangunan PLTA Rajamandala maupun untuk jalur tranmisi SUTT termaksud telah terakomodasi di dalam draft Rencana Tata Ruang Wilayah (RTRW) Kabupaten Cianjur.
4. Berkenaan dengan hal tersebut diatas, perlu kami informasikan bahwa kegiatan tersebut agar dilengkapi dengan dokumen UKL/UPL

Demikian kami sampaikan. Atas kerjasamanya kami ucapkan terima kasih


KEPALA

dr. H. RATU TRI YULIA H, MKM
NIP. 19561116198703002

Tembusan:

1. Yth. Bapak Bupati Cianjur (sebagai laporan);
2. Yth. Bapak Sekretaris Daerah Kab. Cianjur (sebagai laporan);
3. Yth. Camat Haurwangi Kabupaten Cianjur;



RANCANGAN

PERATURAN DAERAH KABUPATEN CIANJUR
NOMOR.....TAHUN 2011

TENTANG

RENCANA TATA RUANG WILAYAH KABUPATEN CIANJUR
TAHUN 2011 – 2031

DENGAN RAHMAT TUHAN YANG MAHA ESA

BUPATI CIANJUR,

- Menimbang : a. bahwa keberadaan ruang yang terbatas dan pemahaman masyarakat yang berkembang terhadap pentingnya penataan ruang, memerlukan penyelenggaraan penataan ruang yang transparan, efektif dan partisipatif, agar terwujud ruang yang aman, nyaman, produktif dan berkelanjutan;
- b. bahwa untuk mengakomodasi dinamika perkembangan pembangunan yang tumbuh pesat di Kabupaten Cianjur dan untuk menjamin keterpaduan dan keserasian antara Rencana Tata Ruang Wilayah Kabupaten Cianjur dengan Rencana Tata Ruang Wilayah Provinsi Jawa Barat dan Nasional, maka diperlukan sinkronisasi terhadap Rencana Tata Ruang Wilayah Kabupaten Cianjur;
- c. bahwa dengan terbitnya Undang-Undang Nomor 26 Tahun 2007 tentang Penataan Ruang maka Peraturan Daerah Kabupaten Cianjur Nomor 1 Tahun 1997 tentang Rencana Tata Ruang Wilayah Kabupaten Cianjur sudah tidak sesuai lagi dengan kebutuhan pengaturan penataan ruang dan kebijakan penataan ruang, sehingga perlu diganti dengan peraturan daerah yang baru;
- d. bahwa berdasarkan pertimbangan sebagaimana dimaksud pada huruf a, huruf b, dan huruf c perlu menetapkan peraturan daerah tentang Rencana Tata Ruang Wilayah Kabupaten Cianjur Tahun 2011 – 2031.

- Mengingat : 1. Pasal 18 ayat (6) Undang-undang Dasar Negara Republik Indonesia Tahun 1945;
2. Undang-Undang Nomor 14 Tahun 1950 tentang Pembentukan Daerah-Daerah Kabupaten dalam Lingkungan Provinsi Jawa Barat (Berita Negara Tahun 1950) sebagaimana telah diubah dengan

- Undang-undang Nomor 4 Tahun 1968 tentang Pembentukan Kabupaten Purwakarta dan Kabupaten Subang dengan mengubah Undang-undang Nomor 14 Tahun 1950 tentang Pembentukan Daerah-Daerah Kabupaten Dalam Lingkungan Propinsi Jawa Barat (Lembaran Negara Republik Indonesia Tahun 1968 Nomor 31, Tambahan Lembaran Negara Republik Indonesia Nomor 2851);
3. Undang-Undang Nomor 32 Tahun 2004 tentang Pemerintahan Daerah (Lembaran Negara Republik Indonesia Tahun 2004 Nomor 125, Tambahan Lembaran Negara Nomor 4437) sebagaimana telah dua kali diubah, terakhir dengan Undang-Undang Nomor 12 Tahun 2008 tentang Perubahan Kedua atas Undang-Undang Nomor 32 Tahun 2004 tentang Pemerintahan Daerah (Lembaran Negara Republik Indonesia Tahun 2008 Nomor 59, Tambahan Lembaran Negara Republik Indonesia Nomor 4844);
 4. Undang-Undang Nomor 26 Tahun 2007 tentang Penataan Ruang (Lembaran Negara Republik Indonesia Tahun 2007 Nomor 68, Tambahan Lembaran Negara Nomor 4735);
 5. Peraturan Pemerintah Nomor 26 Tahun 2008 tentang Rencana Tata Ruang Wilayah Nasional (Lembaran Negara Republik Indonesia Tahun 2008 Nomor 48, Tambahan Lembaran Negara Republik Indonesia Nomor 4833);
 6. Peraturan Pemerintah Nomor 15 Tahun 2010 tentang Penyelenggaraan Penataan Ruang (Lembaran Negara Republik Indonesia Tahun 2010 Nomor 21, Tambahan Lembaran Negara Republik Indonesia Nomor 5103);
 7. Peraturan Pemerintah Nomor 68 Tahun 2010 tentang Bentuk dan Tata Cara Peran Masyarakat dalam Penataan Ruang (Lembaran Negara Republik Indonesia Tahun 2010 Nomor 118, Tambahan Lembaran Negara Republik Indonesia Nomor 5160);
 8. Peraturan Presiden Nomor 54 Tahun 2008 tentang Penataan Ruang Kawasan Jakarta, Bogor, Depok, Tangerang, Bekasi, Puncak dan Cianjur;
 9. Peraturan Daerah Nomor 22 tahun 2010 tentang Rencana Tata Ruang Wilayah Provinsi Jawa Barat (Lembaran Daerah Provinsi Jawa Barat Tahun 2010 Nomor 22 Seri E).

Dengan Persetujuan Bersama

DEWAN PERWAKILAN RAKYAT DAERAH KABUPATEN CIANJUR

dan

BUPATI CIANJUR

MEMUTUSKAN :

Menetapkan : **PERATURAN DAERAH TENTANG RENCANA TATA RUANG WILAYAH KABUPATEN CIANJUR TAHUN 2011 – 2031.**

BAB I KETENTUAN UMUM

Pasal 1

Dalam peraturan daerah ini yang dimaksud dengan :

1. Kabupaten adalah Kabupaten Cianjur.
2. Bupati adalah Bupati Cianjur.
3. Pemerintah Daerah adalah Pemerintah Kabupaten Cianjur.
4. Ruang adalah wadah yang meliputi ruang daratan, ruang laut dan ruang udara termasuk ruang di dalam bumi sebagai satu kesatuan wilayah; tempat manusia dan makhluk hidup lain, melakukan kegiatan dan memelihara kelangsungan hidupnya.
5. Tata ruang adalah wujud struktur ruang dan pola ruang.
6. Struktur ruang adalah susunan pusat-pusat permukiman dan sistem jaringan prasarana dan sarana yang berfungsi sebagai pendukung kegiatan sosial ekonomi masyarakat yang secara hierarkis memiliki hubungan fungsional.
7. Pola ruang adalah distribusi peruntukan ruang dalam suatu wilayah yang meliputi peruntukan ruang untuk fungsi lindung dan peruntukan ruang untuk fungsi budi daya.
8. Penataan ruang adalah proses perencanaan tata ruang, pemanfaatan ruang, dan pengendalian pemanfaatan ruang.
9. Penyelenggaraan penataan ruang adalah kegiatan yang meliputi pengaturan, pembinaan, pelaksanaan dan pengawasan penataan ruang.
10. Perencanaan tata ruang adalah suatu proses untuk menentukan struktur ruang dan pola ruang yang meliputi penyusunan dan penetapan rencana tata ruang.
11. Pemanfaatan ruang adalah upaya untuk mewujudkan struktur ruang dan pola ruang sesuai dengan rencana tata ruang melalui penyusunan dan program beserta pembiayaannya.
12. Pengendalian pemanfaatan ruang adalah upaya untuk mewujudkan tertib tata ruang.
13. Rencana tata ruang adalah hasil perencanaan tata ruang.
14. Rencana Tata Ruang Wilayah Kabupaten Cianjur yang selanjutnya disebut RTRW adalah hasil perencanaan tata ruang wilayah Kabupaten Cianjur.
15. Daya dukung adalah kemampuan lingkungan alam beserta segenap unsur dan sumber dayanya untuk menunjang perikehidupan manusia serta makhluk hidup lainnya secara berkelanjutan.
16. Daya tampung adalah kemampuan lingkungan hidup untuk menyerap penduduk, zat, energi, dan/atau komponen lain yang masuk atau dimasukkan kedalamnya.
17. Pusat Kegiatan Wilayah promosi yang selanjutnya disebut PKWpromosi adalah pusat kegiatan yang berpotensi dapat berfungsi untuk melayani kegiatan skala provinsi atau beberapa

kabupaten/kota yang dipromosikan untuk dapat ditetapkan sebagai Pusat Kegiatan Wilayah.

18. Pusat Kegiatan Lokal yang selanjutnya disebut PKL adalah kawasan perkotaan yang berfungsi untuk melayani kegiatan skala kabupaten atau beberapa kecamatan.
19. Pusat Kegiatan Lokal promosi yang selanjutnya disebut PKLpromosi adalah kawasan perkotaan yang berpotensi untuk melayani kegiatan skala kabupaten atau beberapa kecamatan yang dipromosikan untuk dapat ditetapkan sebagai Pusat Kegiatan Lokal.
20. Pusat Pelayanan Kawasan yang selanjutnya disebut PPK adalah kawasan perkotaan yang berfungsi untuk melayani kegiatan skala kecamatan atau beberapa desa.
21. Pusat Pelayanan Lingkungan yang selanjutnya disebut PPL adalah pusat permukiman yang berfungsi untuk melayani kegiatan skala antar desa.
22. Prasarana wilayah adalah kelengkapan dasar fisik yang memungkinkan wilayah dapat berfungsi sebagaimana mestinya.
23. Jalan adalah prasarana transportasi darat yang meliputi segala bagian jalan, termasuk bangunan pelengkap dan perlengkapannya yang diperuntukkan bagi lalu lintas, yang berada pada permukaan tanah, di atas permukaan tanah, di bawah permukaan tanah dan/atau air, serta di atas permukaan air, kecuali jalan kereta api, jalan lori, dan jalan kabel.
24. Sistem Jaringan Jalan adalah satu kesatuan ruas jalan yang saling menghubungkan dan mengikat pusat-pusat pertumbuhan dengan wilayah yang berada dalam pengaruh pelayanannya dalam satu hubungan hierarkis.
25. Pelabuhan Khusus adalah pelabuhan yang dikelola untuk kepentingan sendiri guna menunjang kegiatan tertentu.
26. Bandar Udara adalah lapangan terbang yang dipergunakan untuk mendarat dan lepas landas pesawat udara, naik turun penumpang, dan/atau bongkar muat kargo dan/atau pos, serta dilengkapi dengan fasilitas keselamatan penerbangan dan sebagai tempat perpindahan antar moda transportasi.
27. Wilayah Sungai yang selanjutnya disebut WS adalah kesatuan wilayah pengelolaan sumber daya air dalam satu atau lebih daerah aliran sungai dan/atau pulau-pulau kecil yang luasnya kurang dari atau sama dengan 2.000 km².
28. Daerah Aliran Sungai yang selanjutnya disebut DAS adalah suatu wilayah daratan yang merupakan satu kesatuan dengan sungai dan anak-anak sungainya, yang berfungsi menampung, menyimpan, dan mengalirkan air yang berasal dari curah hujan ke danau atau ke laut secara alami, yang batas di darat merupakan pemisah topografis dan batas di laut sampai dengan daerah perairan yang masih terpengaruh aktivitas daratan.
29. Cekungan Air Tanah yang selanjutnya disebut CAT adalah suatu wilayah yang dibatasi oleh batas hidrogeologis, tempat semua

- kejadian hidrogeologis seperti proses pengimbuhan, pengaliran, dan pelepasan air tanah berlangsung.
30. Daerah Irigasi adalah kesatuan lahan yang mendapat air dari satu jaringan irigasi.
 31. Jaringan Irigasi adalah saluran, bangunan, dan bangunan pelengkap yang merupakan satu kesatuan yang diperlukan untuk penyediaan, pembagian, pemberian, penggunaan, dan pembuangan air irigasi.
 32. Waduk adalah tempat atau wadah penampungan air di sungai agar dapat digunakan untuk irigasi atau keperluan lain.
 33. Situ/Telaga adalah suatu wadah genangan air di atas permukaan tanah yang terbentuk secara alami maupun buatan yang airnya berasal dari tanah atau air permukaan sebagai bagian dari siklus hidrologis yang potensial dan merupakan salah satu bentuk kawasan lindung.
 34. Sistem Penyediaan Air Minum yang selanjutnya disebut SPAM merupakan satu kesatuan sistem fisik (teknik) dan non fisik dari prasarana dan sarana air minum.
 35. Tempat Pemrosesan Akhir sampah yang selanjutnya disebut TPA adalah tempat untuk memproses dan mengembalikan sampah ke media lingkungan secara aman bagi manusia dan lingkungan.
 36. Instalasi Pengolahan Lumpur Tinja yang selanjutnya disebut IPLT adalah sistem yang mengolah lumpur yang berasal dari pengurasan tangki septik.
 37. Ruang Terbuka Hijau yang selanjutnya disebut RTH adalah area memanjang/jalur dan/atau mengelompok, yang penggunaannya lebih bersifat terbuka, tempat tumbuh tanaman, baik yang tumbuh secara alamiah maupun yang sengaja ditanam.
 38. Wilayah adalah ruang yang merupakan kesatuan geografis beserta segenap unsur terkait yang batas dan sistemnya ditentukan berdasarkan aspek administratif dan/atau aspek fungsional.
 39. Kawasan adalah wilayah dengan fungsi utama lindung dan budi daya.
 40. Kawasan lindung adalah wilayah yang ditetapkan dengan fungsi utama melindungi kelestarian lingkungan hidup yang mencakup sumber daya alam dan sumber daya buatan.
 41. Kawasan resapan air adalah daerah yang mempunyai kemampuan tinggi untuk meresapkan air hujan sehingga merupakan tempat pengisian air bumi yang berguna sebagai sumber air.
 42. Kawasan sekitar mata air adalah kawasan di sekeliling, di sepanjang kiri kanan, di atas dan di bawah mata air yang dibatasi oleh garis sempadan.
 43. Kawasan rawan bencana adalah kawasan yang potensial mengalami bencana alam.
 44. Kawasan Suaka Alam adalah kawasan dengan ciri khas tertentu, baik di daratan maupun di perairan yang mempunyai fungsi pokok sebagai kawasan pengawetan keanekaragaman tumbuhan

- dan satwa serta ekosistemnya yang juga berfungsi sebagai wilayah sistem penyangga kehidupan.
45. Kawasan Pelestarian Alam adalah kawasan dengan ciri khas tertentu, baik di daratan maupun di perairan yang mempunyai fungsi pokok perlindungan sistem penyangga kehidupan, pengawetan keanekaragaman jenis tumbuhan dan satwa, serta pemanfaatan secara lestari sumber daya alam hayati dan ekosistemnya.
 46. Cagar Alam adalah kawasan suaka alam yang karena keadaan alamnya mempunyai kekhasan/keunikan jenis tumbuhan dan/atau keanekaragaman tumbuhan beserta gejala alam dan ekosistemnya yang memerlukan upaya perlindungan dan pelestarian agar keberadaan dan perkembangannya dapat berlangsung secara alami.
 47. Taman Nasional adalah kawasan pelestarian alam yang mempunyai ekosistem asli, dikelola dengan sistem zonasi yang dimanfaatkan untuk tujuan penelitian, ilmu pengetahuan, pendidikan, menunjang budidaya, pariwisata, dan rekreasi.
 48. Taman Wisata Alam adalah kawasan pelestarian alam yang dimanfaatkan terutama untuk kepentingan pariwisata alam dan rekreasi.
 49. Cagar Budaya adalah kawasan perlindungan dengan fungsi untuk melestarikan benda yang mempunyai nilai penting bagi sejarah, ilmu pengetahuan dan kebudayaan.
 50. Kawasan budi daya adalah wilayah yang ditetapkan dengan fungsi utama untuk dibudi dayakan atas dasar kondisi dan potensi sumber daya alam, sumber daya manusia dan sumber daya buatan.
 51. Kawasan peruntukan pariwisata adalah kawasan yang diperuntukkan bagi kegiatan pariwisata dan segala sesuatu yang berhubungan dengan wisata termasuk pengusahaan objek dan daya tarik wisata serta usaha-usaha yang terkait di bidang tersebut.
 52. Kawasan peruntukan industri adalah kawasan yang secara teknis dapat digunakan untuk kegiatan industri serta tidak mengganggu kelestarian fungsi lingkungan hidup.
 53. Kawasan peruntukan permukiman adalah bagian dari lingkungan hidup di luar kawasan lindung yang berfungsi sebagai tempat tinggal/lingkungan hunian dan tempat kegiatan yang mendukung perikehidupan dan penghidupan.
 54. Kawasan peruntukan permukiman perkotaan adalah kawasan yang digunakan untuk kegiatan utama non pertanian dan pada umumnya ditunjang oleh sarana dan prasarana transportasi yang memadai, fasilitas peribadatan, pendidikan, perdagangan dan jasa perkantoran dan pemerintahan. Kawasan permukiman perkotaan terdiri atas bangunan rumah tempat tinggal, baik berskala besar, sedang, kecil, bangunan rumah campuran tempat tinggal/usaha dan tempat usaha.

55. Kawasan peruntukan permukiman perdesaan adalah suatu kawasan untuk permukiman yang ada pada lokasi sekitarnya masih didominasi oleh lahan pertanian, tegalan, perkebunan, dan pemanfaatan lainnya.
56. Kawasan pertahanan dan keamanan adalah kawasan yang ditetapkan dengan fungsi utama untuk kepentingan kegiatan pertahanan dan keamanan negara.
57. Kawasan Strategis Nasional yang selanjutnya disebut KSN adalah wilayah yang penataan ruangnya diprioritaskan karena mempunyai pengaruh sangat penting secara nasional terhadap kedaulatan negara, pertahanan keamanan negara, ekonomi, sosial budaya, dan/atau lingkungan, termasuk wilayah yang ditetapkan sebagai warisan dunia.
58. Kawasan Strategis Provinsi yang selanjutnya disebut KSP adalah wilayah yang penataan ruangnya diprioritaskan karena mempunyai pengaruh sangat penting dalam lingkup provinsi terhadap aspek pertahanan dan keamanan negara, ekonomi, sosial budaya, lingkungan, dan/atau pendayagunaan sumber daya alam dan teknologi tinggi.
59. Kawasan Strategis Kabupaten yang selanjutnya disebut KSK adalah wilayah yang penataan ruangnya diprioritaskan karena mempunyai pengaruh sangat penting dalam lingkup kabupaten terhadap ekonomi, sosial, budaya dan/atau lingkungan.
60. Kawasan agropolitan adalah kawasan yang terdiri atas satu atau lebih pusat kegiatan pada wilayah perdesaan sebagai sistem produksi pertanian dan pengelolaan sumber daya alam tertentu yang ditunjukkan oleh adanya keterkaitan fungsional dan hirarki keruangan satuan sistem permukiman dan sistem agrobisnis.
61. Peraturan zonasi adalah ketentuan yang mengatur tentang persyaratan pemanfaatan ruang dan ketentuan pengendaliannya dan disusun untuk setiap blok/zona peruntukan yang ditetapkan zonanya dalam rencana rinci tata ruang.
62. Izin pemanfaatan ruang adalah izin yang dipersyaratkan dalam kegiatan pemanfaatan ruang sesuai dengan ketentuan peraturan perundang-undangan.
63. Insentif adalah perangkat atau upaya untuk memberikan rangsangan terhadap pelaksanaan kegiatan yang sejalan dengan rencana tata ruang.
64. Disinsentif adalah perangkat untuk mencegah, membatasi pertumbuhan, atau mengurangi pelaksanaan kegiatan yang tidak sejalan dengan rencana tata ruang.
65. Peran masyarakat adalah berbagai kegiatan masyarakat yang timbul atas kehendak dan keinginan sendiri di tengah masyarakat, untuk bernilai dan bergerak dalam menyelenggarakan penataan ruang.
66. Orang adalah orang perseorangan dan/atau korporasi.
67. Badan Koordinasi Penataan Ruang Daerah yang selanjutnya disebut BKPRD adalah badan bersifat *ad hoc* yang dibentuk untuk

mendukung pelaksanaan Undang-Undang Nomor 26 Tahun 2007 tentang Penataan Ruang di Kabupaten Cianjur mempunyai fungsi membantu tugas Bupati dalam koordinasi penataan ruang di Kabupaten.

Bagian Kedua Peran dan Fungsi

Pasal 2

RTRW Kabupaten Cianjur disusun sebagai alat operasionalisasi pelaksanaan pembangunan di wilayah Kabupaten Cianjur.

Pasal 3

RTRW Kabupaten Cianjur menjadi pedoman untuk:

- a. penyusunan rencana pembangunan jangka panjang daerah;
- b. penyusunan rencana pembangunan jangka menengah daerah;
- c. pemanfaatan ruang dan pengendalian pemanfaatan ruang di wilayah kabupaten;
- d. perwujudan keterpaduan, keterkaitan, dan keseimbangan antarsektor;
- e. penetapan lokasi dan fungsi ruang untuk investasi;
- f. penataan ruang kawasan strategis kabupaten; dan
- g. penyusunan rencana rinci tata ruang di wilayah kabupaten.

Bagian Ketiga Ruang Lingkup

Paragraf 1 Muatan

Pasal 4

RTRW Kabupaten Cianjur memuat:

- a. tujuan, kebijakan, dan strategi penataan ruang wilayah kabupaten;
- b. rencana struktur ruang wilayah kabupaten;
- c. rencana pola ruang wilayah kabupaten;
- d. penetapan kawasan strategis kabupaten;
- e. arahan pemanfaatan ruang wilayah kabupaten; dan
- f. ketentuan pengendalian pemanfaatan ruang wilayah kabupaten.

Paragraf 2 Wilayah Perencanaan

Pasal 5

Rencana sistem prasarana lainnya di wilayah kabupaten sebagaimana dimaksud dalam Pasal 11 ayat (3) huruf b terdiri atas:

- a. rencana sistem jaringan energi/kelistrikan;
- b. rencana sistem jaringan telekomunikasi;
- c. rencana sistem jaringan sumber daya air; dan
- d. rencana sistem jaringan prasarana wilayah lainnya;

Paragraf 1

Rencana Sistem Jaringan Energi/Kelistrikan

Pasal 21

(1) Rencana sistem jaringan energi/kelistrikan sebagaimana dimaksud dalam Pasal 20 huruf a terdiri atas:

- a. jaringan pipa minyak dan gas bumi;
- b. jaringan tenaga listrik; dan
- c. jaringan transmisi tenaga listrik.

(2) Jaringan pipa minyak dan gas bumi sebagaimana dimaksud dalam ayat (1) huruf a meliputi :

- a. rencana pengembangan jaringan pipa distribusi Bahan Bakar Minyak (BBM) pada jalur Padalarang – Cianjur – Sukabumi meliputi:

1. Kecamatan Haurwangi;
2. Kecamatan Ciranjang;
3. Kecamatan Bojongpicung;
4. Kecamatan Cibeber;
5. Kecamatan Cilaku;
6. Kecamatan Warungkondang; dan
7. Kecamatan Gekbrong.

(3) Jaringan tenaga listrik sebagaimana dimaksud dalam ayat (1) huruf b meliputi :

- a. pembangkit tenaga listrik meliputi:

1. Pembangkit Listrik Tenaga Air (PLTA) Cirata dengan kapasitas 8 (delapan) turbin terpasang sebesar 1.008 (seribu delapan) mW;
2. PLTA Cijedil dengan kapasitas 2 (dua) turbin terpasang sebesar 440 (empat ratus empat puluh) kW;
3. rencana pembangunan PLTA Cisokan Hulu (*Upper Cisokan Pumped Storage - UCPS*) dengan kapasitas 4 (empat) turbin terpasang sebesar 1.040 (seribu empat puluh) mW;
4. rencana pembangunan PLTA Rajamandala dengan kapasitas terpasang sebesar 47 (empat puluh tujuh) mW;
5. rencana pengembangan potensi panas bumi yang berada di Cipanas-Pacet dan Tanggeung-Cibungur;
6. rencana pengembangan energi alternatif meliputi :
 - a) pembangunan Pembangkit Listrik Tenaga Mikro Hidro (PLTMH) meliputi:

- 1) PLTMH Kebon Muncang, Kecamatan Cikadu dengan kapasitas terpasang sebesar 35 (tiga puluh lima) kiloWatt;
 - 2) PLTMH Batubereum, Kecamatan Pagelaran dengan kapasitas terpasang sebesar 50 (lima puluh) kiloWatt;
 - 3) PLTMH Girimukti, Kecamatan Sindangbarang dengan kapasitas terpasang sebesar 50 (lima puluh) kiloWatt;
 - 4) PLTMH Wangunsari, Kecamatan Naringgul; dan
 - 5) PLTMH di Kecamatan Cidaun meliputi:
 - (1) PLTMH Puncakbaru dengan kapasitas terpasang sebesar 29 (dua puluh sembilan) kiloWatt;
 - (2) PLTMH Cibuluh dengan kapasitas terpasang sebesar 60 (enam puluh) kiloWatt;
 - (3) PLTMH Mekarjaya dengan kapasitas terpasang sebesar 40 (empat puluh) kiloWatt; dan
 - (4) PLTMH Cipelah dengan kapasitas terpasang sebesar 17,6 (tujuh belas koma enam) kiloWatt.
- b) pengembangan PLTMH meliputi:
1. Kecamatan Sukaresmi;
 2. Kecamatan Bojongpicung;
 3. Kecamatan Ciranjang;
 4. Kecamatan Cibeber;
 5. Kecamatan Sukanagara;
 6. Kecamatan Cikadu;
 7. Kecamatan Kadupandak;
 8. Kecamatan Cibinong;
 9. Kecamatan Pagelaran;
 10. Kecamatan Takokak
 11. Kecamatan Leles
 12. Kecamatan Sindangbarang;
 13. Kecamatan Naringgul; dan
 14. Kecamatan Cidaun.
- c) pengembangan Pembangkit Listrik Tenaga Surya (PLTS) meliputi:
1. Kecamatan Karangtengah;
 2. Kecamatan Bojongpicung;
 3. Kecamatan Campakamulya
 4. Kecamatan Takokak;
 5. Kecamatan Pagelaran;
 6. Kecamatan Cibinong;
 7. Kecamatan Cijati;
 8. Kecamatan Kadupandak;
 9. Kecamatan Leles; dan
 10. Kecamatan Cidaun.

- b. peningkatan kapasitas Gardu Induk Cianjur di Kecamatan Cugenang dengan kapasitas trafo 2 x 60 (enam puluh) meterVoltAmpere; dan
 - c. rencana pembangunan Gardu Induk di Kecamatan Tanggeung dengan kapasitas trafo 30 (tiga puluh) meterVoltAmpere.
- (4) Jaringan transmisi tenaga listrik sebagaimana dimaksud dalam ayat (1) huruf c meliputi :
- a. jaringan transmisi Saluran Udara Tegangan Ekstra Tinggi (SUTET) pada jalur Sukaresmi-Mande-Sukaluyu-Ciranjang-Haurwangi dengan kapasitas tegangan 500 (lima ratus) kiloVolt;
 - b. jaringan transmisi SUTET pada jalur Campakamulya-Sukanegara-Takokak dengan kapasitas tegangan 500 (lima ratus) kiloVolt;
 - c. rencana pembangunan SUTET pada jalur Bojongpicung-Haurwangi dengan kapasitas tegangan 500 (lima ratus) kiloVolt;
 - d. rencana pembangunan jaringan transmisi Saluran Udara Tegangan Tinggi (SUTT) pada jalur Cugenang-Tanggeung dengan kapasitas tegangan 70 (tujuh puluh) kiloVolt dengan potensi uprating sampai dengan 150 (seratus lima puluh) kiloVolt; dan
 - e. rencana pembangunan jaringan transmisi SUTT di Kecamatan Haurwangi dengan kapasitas tegangan 150 (seratus lima puluh) kiloVolt.

Paragraf 2

Rencana Sistem Jaringan Telekomunikasi

Pasal 22

- (1) Rencana pengembangan sistem jaringan telekomunikasi sebagaimana dimaksud dalam Pasal 20 huruf b meliputi:
 - a. jaringan kabel; dan
 - b. jaringan nirkabel.
- (2) Rencana pengembangan jaringan kabel sebagaimana dimaksud pada ayat (1) huruf a berupa peningkatan kapasitas sambungan telepon kabel.
- (3) Rencana pengembangan jaringan nirkabel sebagaimana dimaksud pada ayat (1) huruf b berupa pemanfaatan menara telekomunikasi Base Transceiver Station (BTS) secara bersama pada kawasan perkotaan dan penempatan BTS secara selektif pada kawasan perdesaan.
- (4) Pemanfaatan BTS secara bersama pada kawasan perkotaan berupa penetapan lokasi dan jumlah BTS akan diatur lebih lanjut dengan peraturan Bupati.

Paragraf 3
Rencana Sistem Jaringan Sumber Daya Air

Pasal 23

- (1) Rencana pengembangan sistem jaringan sumber daya air sebagaimana dimaksud dalam Pasal 21 huruf c meliputi :
 - a. WS;
 - b. CAT;
 - c. jaringan irigasi;
 - d. jaringan air baku; dan
 - e. sistem pengendali banjir.
- (2) Wilayah Sungai (WS) sebagaimana dimaksud pada ayat (1) huruf a meliputi :
 - a. WS nasional;
 - b. WS lintas kabupaten; dan
 - c. WS kabupaten.
- (3) WS nasional sebagaimana dimaksud pada ayat (2) huruf a berupa WS Citarum yang meliputi Daerah Aliran Sungai (DAS) Citarum;
- (4) WS lintas kabupaten sebagaimana dimaksud pada ayat (2) huruf b berupa WS Cisadea-Cibareno meliputi:
 - a. DAS Cibungur;
 - b. DAS Citihuk;
 - c. DAS Cimaragang;
 - d. DAS Citoe;
 - e. DAS Ciwidig;
 - f. DAS Cipandak;
 - g. DAS Cisepat;
 - h. DAS Ciburial;
 - i. DAS Cikamurang;
 - j. DAS Cibiuk;
 - k. DAS Ciujung;
 - l. DAS Ciwaduk;
 - m. DAS Cicadas;
 - n. DAS Cisadea;
 - o. DAS Cipamungguan;
 - p. DAS Ciselang;
 - q. DAS Cidahu;
 - r. DAS Cidahu Leutik;
 - s. DAS Cikakap;
 - t. DAS Cijambe;
 - u. DAS Cisokan;
 - v. DAS Cibodas;
 - w. DAS Cimapag; dan
 - x. DAS Cibuni.
- (5) WS kabupaten sebagaimana dimaksud pada ayat (2) huruf c termasuk waduk dan situ meliputi:

- a. Waduk Cirata berada di Kecamatan Mande, Kecamatan Cikalongkulon, Kecamatan Ciranjang dan Kecamatan Haurwangi;
 - b. Waduk Cibuni berada di Kecamatan Kadupandak;
 - c. Waduk Cimaskara berada di Kecamatan Cibinong;
 - d. rencana Waduk Cisokan berada di Kecamatan Cibeber dan Kecamatan Campaka;
 - e. Situ Leuwisoro, Situ Galuga, Situ Eceng, Situ Citambur, Situ Tamiang Rawa Beber, Rawa Kalong, Rawa Getok, Rawa Gede I, dan Rawa Benteur berada di Kecamatan Pagelaran;
 - f. Situ Sukamanah, Situ Patat, Rawa Gede II, dan Rawa Hideung berada di Kecamatan Tanggeung; dan
 - g. Situ Hideung dan Situ Tangkil berada di Kecamatan Cibinong.
- (6) CAT sebagaimana dimaksud pada ayat (1) huruf b meliputi:
- a. CAT Cibuni yang merupakan CAT lintas kabupaten; dan
 - b. CAT Cianjur yang merupakan CAT dalam kabupaten.
- (7) Jaringan irigasi sebagaimana dimaksud pada ayat (1) huruf c meliputi:
- a. jaringan irigasi teknis dan irigasi non-teknis meliputi seluruh kecamatan.
 - b. jaringan irigasi sebagaimana dimaksud pada huruf a tercantum dalam Lampiran III, merupakan bagian tidak terpisahkan dari peraturan daerah ini.
- (8) Jaringan air baku sebagaimana dimaksud pada ayat (1) huruf d berupa rencana pengembangan penyediaan jaringan air baku untuk kepentingan kawasan industri di Kecamatan Sukaluyu.
- (9) Sistem pengendalian banjir sebagaimana dimaksud pada ayat (1) huruf e berupa pengembangan infrastruktur pengendali banjir yang meliputi:
- a. Sungai Cisokan di Kecamatan Ciranjang dan Kecamatan Sukaluyu;
 - b. Sungai Citarum di Kecamatan Haurwangi;
 - c. Sungai Cilaku di Kecamatan Cilaku;
 - d. Sungai Cikondang di Kecamatan Cibeber;
 - e. Sungai Cibuni di Kecamatan Kadupandak, Kecamatan Cijati dan Kecamatan Agrabinta;
 - f. Sungai Cidamar di Kecamatan Cidaun; dan
 - g. Sungai Cisadea dan Sungai Ciselang di Kecamatan Sindangbarang.

Paragraf 4

Rencana Sistem Jaringan Prasarana Lainnya

Pasal 24

- (1) Rencana sistem jaringan prasarana lainnya sebagaimana dimaksud dalam Pasal 20 huruf d meliputi:
- a. sistem jaringan air minum;

- a. penyusunan RDTR Ibu Kota Kecamatan;
 - b. penataan fasilitas perdagangan dan jasa skala perkotaan; dan
 - c. penataan infrastruktur kecamatan.
- (4) Pengembangan PPL sebagaimana dimaksud pada ayat (1) huruf c meliputi:
- a. penataan fasilitas pusat permukiman skala antar desa; dan
 - b. penataan infrastruktur kecamatan.

Paragraf 2
Perwujudan Sistem Prasarana

Pasal 47

- (1) Perwujudan sistem prasarana sebagaimana dimaksud dalam Pasal 45 huruf b terdiri atas:
- a. perwujudan sistem prasarana utama; dan
 - b. perwujudan sistem prasarana lainnya.
- (2) Perwujudan sistem prasarana utama sebagaimana dimaksud pada ayat (1) huruf a terdiri atas:
- a. rencana sistem jaringan transportasi darat meliputi:
 - 1. pembangunan jalan bebas hambatan Bandung-Cianjur-Sukabumi-Ciawi;
 - 2. pembangunan jalan lingkar perkotaan Cianjur;
 - 3. pengembangan jalan arteri primer meliputi jaringan jalan horizontal Cianjur selatan dan pembangunan jalan lingkar perkotaan Cianjur;
 - 4. pengembangan jalan kolektor primer yang menghubungkan wilayah Cianjur utara, tengah dan selatan;
 - 5. pengembangan jalan kolektor primer yang menghubungkan dengan kabupaten perbatasan;
 - 6. pengembangan jalan lokal primer yang menghubungkan antar ibu kota kecamatan;
 - 7. pengembangan jalan lokal primer yang menghubungkan antar ibu kota kecamatan dengan desa;
 - 8. pengembangan jalan lokal primer yang menghubungkan antar pusat kegiatan;
 - 9. pengembangan jaringan jalan strategis kabupaten;
 - 10. pembangunan dan pengembangan terminal pada pusat kegiatan;
 - 11. pembangunan terminal barang untuk menunjang kegiatan agribisnis; dan
 - 12. pengembangan jaringan transportasi penyeberangan danau pada Waduk Cirata.
 - b. rencana sistem jaringan perkeretaapian berupa revitalisasi fungsi jaringan jalan kereta api pada jalur Bandung-Cianjur-Sukabumi;

- c. rencana sistem jaringan transportasi laut berupa pengembangan pelabuhan khusus pariwisata di Kecamatan Cidaun dan pembangunan pelabuhan khusus tambang di Kecamatan Agrabinta; dan
 - d. rencana sistem jaringan transportasi udara berupa pengembangan bandar udara perintis di Kecamatan Cidaun.
- (3) Perwujudan sistem prasarana lainnya sebagaimana dimaksud pada ayat (1) huruf b terdiri atas:
- a. rencana sistem jaringan energi/kelistrikan meliputi:
 1. pembangunan PLTA Cisokan Hulu (*Upper Cisokan Pumped Storage*);
 2. pembangunan PLTA Rajamandala;
 3. pembangunan Gardu Induk (GI) Tanggeung;
 4. pembangunan SUTET Bojongpicung-Haurwangi;
 5. pembangunan SUTT pada jalur Cugenang – Tanggeung;
 6. pembangunan SUTT di Kecamatan Haurwangi;
 7. pengembangan potensi pembangkit listrik tenaga panas bumi di Kecamatan Pagelaran dan Kecamatan Pacet-Cipanas; dan
 8. pengembangan PLTMH di Kecamatan Cikadu, Pagelaran, Naringgul, Sindangbarang dan Cidaun;
 - b. rencana sistem jaringan telekomunikasi meliputi:
 1. peningkatan kapasitas satuan sambungan telepon (SST) kabel; dan
 2. pemanfaatan menara telekomunikasi bersama.
 - c. rencana sistem jaringan sumber daya air meliputi:
 1. pengembangan waduk dan situ;
 2. pengembangan, pemeliharaan dan peningkatan operasionalisasi jaringan irigasi;
 3. penyediaan sumber dan jaringan pelayanan air baku;
 4. pembangunan dan pengembangan infrastruktur pengendali banjir.
 - d. rencana sistem jaringan prasarana lainnya meliputi:
 1. penetapan jalur dan ruang evakuasi bencana pada kawasan rawan bencana;
 2. penyediaan sumber dan jaringan pelayanan air minum;
 3. pengembangan dan peningkatan pelayanan penyediaan air minum perkotaan dan perdesaan;
 4. pengendalian pemanfaatan air tanah dangkal dan artesis;
 5. pembangunan TPA di Kecamatan Cikalongkulon dan Kecamatan Cikadu;
 6. optimalisasi kinerja pelayanan pengangkutan dan pengolahan sampah perkotaan;
 7. pengembangan sistem septik tank individu atau komunal untuk perumahan dan permukiman;
 8. pengembangan sistem septik tank komunal pada kawasan permukiman berkepadatan sedang-tinggi;

9. pengembangan sistem septik tank kolektif pada kawasan perkantoran, pendidikan, pemerintahan dan komersil;
10. pengembangan instalasi pengolahan limbah pada kawasan peruntukan budi daya peternakan dan industri;
11. pengembangan IPLT di Babakan Karet, Kecamatan Cianjur
12. pengembangan, operasi dan pemeliharaan prasarana drainase kawasan permukiman; dan
13. peningkatan peran serta masyarakat dalam pengelolaan lingkungan.

Paragraf 3
Perwujudan Struktur Ruang Wilayah Kabupaten
Tahap Pertama

Pasal 48

Indikasi program utama perwujudan struktur ruang wilayah kabupaten tahap pertama diprioritaskan pada:

- (1) Pengembangan dan peningkatan fungsi pusat kegiatan sebagai pusat pelayanan sistem perkotaan dan sistem perdesaan meliputi;
 - a. penyusunan RDTR dan peraturan zonasi (*zoning regulation*) pada PKL dan PPK;
 - b. penataan infrastruktur kecamatan;
 - c. penataan fasilitas perdagangan dan jasa skala perkotaan pada pusat pelayanan sistem perkotaan; dan
 - d. penataan fasilitas pusat permukiman skala antar desa pusat pelayanan sistem perdesaan.
- (2) Pengembangan dan peningkatan fungsi sistem prasarana terdiri atas:
 - a. sistem prasarana utama; dan
 - b. sistem prasarana lainnya.
- (3) Pengembangan dan peningkatan fungsi sistem prasarana utama sebagaimana dimaksud pada ayat (2) huruf a terdiri atas:
 - a. sistem jaringan transportasi darat meliputi:
 1. pembangunan jalan bebas hambatan pada ruas Bandung-Cianjur-Sukabumi-Ciawi;
 2. pembangunan jalan lingkar perkotaan Cianjur pada ruas lingkar timur, lingkar selatan dan lingkar barat;
 3. pengembangan dan peningkatan jalan arteri primer;
 4. pengembangan dan peningkatan jalan kolektor primer;
 5. pengembangan dan peningkatan jalan kolektor sekunder;
 6. pengembangan dan peningkatan jalan lokal;
 7. pengembangan dan peningkatan jaringan jalan strategis kabupaten;
 8. pengembangan dan peningkatan Terminal Pasirhayam;
 9. pembangunan terminal Tipe C pada pusat kegiatan;
 10. pengembangan dan peningkatan STA Cigombong;

11. pembangunan terminal barang berupa STA di Kecamatan Sukanagara dan Kecamatan Cidaun;
 12. pembangunan dermaga penyeberangan danau di Waduk Cirata
 13. pengembangan jalur lintas penyeberangan danau pada Waduk Cirata.
 - b. sistem jaringan perkeretaapian berupa pengembangan dan peningkatan stasiun kereta api serta revitalisasi fungsi jaringan jalan kereta api pada jalur Bandung-Padalarang-Cianjur-Sukabumi; dan
 - c. sistem jaringan transportasi laut berupa pembangunan pelabuhan khusus pariwisata di Kecamatan Cidaun dan pelabuhan khusus pertambangan di Kecamatan Agrabinta.
- (4) Pengembangan dan peningkatan fungsi sistem prasarana lainnya sebagaimana dimaksud pada ayat (2) huruf b terdiri atas:
- a. sistem jaringan energi/kelistrikan meliputi:
 1. pembangunan PLTA Cisokan Hulu (*Upper Cisokan Pumped Storage*);
 2. pembangunan PLTA Rajamandala;
 3. pembangunan Gardu Induk (GI) Tanggeung;
 4. pembangunan SUTET Bojongpicung-Haurwangi;
 5. pembangunan SUTT pada jalur Cugenang – Tanggeung;
 6. pembangunan SUTT di Kecamatan Haurwangi;
 7. pengembangan potensi dan pembangunan PLTMH di Kecamatan Cikadu, Pagelaran, Naringgul, Sindangbarang dan Cidaun; dan
 8. pengembangan potensi PLTS.
 - b. sistem jaringan telekomunikasi berupa peningkatan kapasitas satuan sambungan telepon (SST) kabel dan pemanfaatan BTS / menara telekomunikasi bersama.
 - c. sistem jaringan sumber daya air meliputi:
 1. pengembangan dan pemeliharaan waduk/situ;
 2. pengembangan, pemeliharaan dan peningkatan operasionalisasi jaringan irigasi;
 3. pengembangan penyediaan sumber dan jaringan pelayanan air baku; dan
 4. pembangunan dan pengembangan infrastruktur pengendali banjir.
 - d. sistem jaringan prasarana lainnya meliputi:
 1. penetapan jalur dan ruang evakuasi bencana pada kawasan rawan bencana;
 2. pengembangan jaringan dan peningkatan pelayanan penyediaan air minum pada kawasan perkotaan dan pusat kegiatan;
 3. pembangunan dan pengembangan SPAM IKK dan SPAM perdesaan;
 4. pembangunan dan pengembangan pelayanan penyediaan air minum pada kawasan perdesaan;

5. pengendalian pemanfaatan air tanah dangkal dan artesis;
6. pembangunan TPA di Kecamatan Cikalongkulon;
7. pengembangan sistem septik tank individu atau komunal untuk perumahan dan permukiman;
8. pengembangan sistem septik tank komunal pada kawasan permukiman berkepadatan sedang-tinggi;
9. pengembangan sistem septik tank kolektif pada kawasan perkantoran, pendidikan, pemerintahan dan komersil;
10. pengembangan instalasi pengolah air limbah pada kawasan peruntukan budi daya peternakan dan industri;
11. pengembangan dan peningkatan IPLT Babakan Karet;
12. pengembangan, pemeliharaan dan peningkatan operasionalisasi jaringan drainase pada kawasan permukiman perkotaan dan pusat kegiatan.

Bagian Ketiga
Indikasi Program Utama
Perwujudan Pola Ruang Wilayah Kabupaten

Paragraf I
Perwujudan Pola Ruang

Pasal 49

- (1) Indikasi program utama perwujudan pola ruang wilayah kabupaten sebagaimana dimaksud dalam Pasal 44 ayat (1) huruf b meliputi:
 - a. perwujudan kawasan lindung; dan
 - b. perwujudan kawasan budi daya.
- (2) Perwujudan kawasan lindung sebagaimana dimaksud pada ayat (1) huruf a meliputi:
 - a. pengaturan pengelolaan kawasan lindung di tanah milik;
 - b. rehabilitasi lahan kritis pada kawasan lindung;
 - c. perlindungan kawasan resapan air;
 - d. penetapan perlindungan sempadan waduk/situ, sungai dan sumber mata air;
 - e. pengembangan RTH perkotaan;
 - f. penataan batas dan zonasi kawasan suaka alam, pelestarian alam dan cagar budaya;
 - g. normalisasi sungai pada kawasan rawan banjir;
 - h. penyusunan kajian mitigasi bencana; dan
 - i. pengembangan sarana peringatan dini pada daerah rawan bencana.
- (3) Perwujudan kawasan budi daya sebagaimana dimaksud pada ayat (1) huruf b meliputi:
 - a. perwujudan kawasan peruntukan hutan produksi dan hutan rakyat meliputi:
 1. pengembangan hutan rakyat;

APPENDIX 4

NEWS EVENTS, THE ATTENDANCE LIST, AND SUGGESTIONS / FEEDBACK SOCIALIZATION ACTIVITIES RAJAMANDALA 47 MW HEPP

BERITA ACARA

KONSULTASI PUBLIK DALAM RANGKA

RENCANA PEMBANGUNAN PLTA RAJAMANDALA 47 MW DI KECAMATAN CIPATAT – KABUPATEN BANDUNG BARAT DAN KECAMATAN HAURWANGI – KABUPATEN CIANJUR PROPINSI JAWA BARAT

Pada hari ini *Rabu*, tanggal 23 bulan *Nopember* tahun *Dua Ribu Sebelas*, kami yang bertandatangan di bawah ini, telah melaksanakan **Konsultasi Publik** dengan masyarakat yang diperkirakan terkena dampak rencana kegiatan di wilayah **Kecamatan Cipatat dan Kecamatan Haurwangi**, dalam rangka Rencana Pembangunan PLTA Rajamandala 47 MW, berdasarkan surat undangan dari Konsorsium PT. Indonesia Power dan Kansai Electric Power Co. Inc, No 001/Nov/IP/2011, tanggal 16 Nopember 2011 mengenai Konsultasi Publik dalam Rangka Rencana Pembangunan PLTA Rajamandala 47 MW dan Transmisi 150 kV.

Adapun hasil konsultasi publik sesuai dengan Notulen dan Daftar Hadir sebagaimana terlampir.

Demikian Berita Acara ini dibuat dengan sebenarnya untuk dipergunakan sebagaimana mestinya.

Wakil peserta dan pelaksana:

Konsorsium PT. Indonesia Power – Kansai
Electric Power Co. Inc



HADI MUNIB



PT. Kwarsa Hexagon










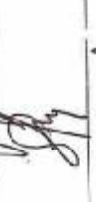

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Camat Haurwangi



DAFTAR HADIR PESERTA KONSULTASI PUBLIK
 DALAM RANGKA RENCANA KEGIATAN PEMBANGUNAN
 PLTA RAJAMANDALA 47 MW DAN TRANSMISI 150 kV,
 KABUPATEN BANDUNG BARAT DAN KABUPATEN CIANJUR,
 PROPINSI JAWA BARAT

Tempat : Aula Kantor UBP Saguling, Jl. Komp. Cioray, Kecamatan Cipatat, Propinsi Jawa Barat.
 Tanggal : 23 Nopember 2011.

No.	Nama	Jabatan	Alamat	Tanda Tangan	No. Telp
1	Sumbana	Wakil Ketua DPRD Kabupaten Bandung Barat	Baita Ciampey		
2	A. Aronedi	TK. Pamanua	- - -		081906570722
3	Asep	Kaur Ciumin	Cigaronpong		081906570722
4	Aldi. Santosa	BPD	Cinies		081906570722
5	M. SEPHTA M. M.	SEKRET	Hurukarear		081906570722
6	Endang Jumiya	Karispanan LH	Cianjur		081227916412
7	Andi. A.	KTU LH	- - -		
8	Stephanus.	Reksa Pus 25.	Ciampey		082116858809
9	Vadi	SEKRETARIS	Hackwangt		


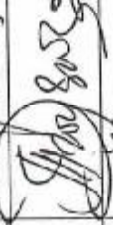







DAFTAR HADIR PESERTA KONSULTASI PUBLIK
DALAM RANGKA RENCANA KEGIATAN PEMBANGUNAN
PLTA RAJAMANDALA 47 MW DAN TRANSMISI 150 kV,
KABUPATEN BANDUNG BARAT DAN KABUPATEN CIANJUR,
PROPINSI JAWA BARAT

Tempat : Aula Kantor UBP Saguling, Jl. Komp. Cioray, Kecamatan Cipatat, Propinsi Jawa Barat.
 Tanggal : 23 Nopember 2011.

No.	Nama	Jabatan	Alamat	Tanda Tangan	No. Telp
1	Ardi, Iriwan Yasmawati Bunawan	/Sppt/SPV	PT KTH		—
2.	Nurfacla	Staf Kearsa	Bandung		09502176
3	Sulacmas	K. Tim. studi UCL/UEL	Bandung		0912128207
4	Dadany	Pw.10	Bantar Caringin		081909495083
5	IRIN	RT 03/25	Cisameng		—
6	ACEP HIDAYAT	Perangkat Desa Cute	CITUA		085793969839
7	Sanuri, L.	L PM	Aaurwangi		08117038655
8	Mawati R.	Warga.	HATA WANEI		081910050818
9	Asep Supri	Kambag	Cipatat		085294407579






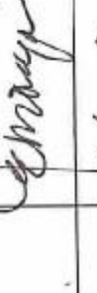
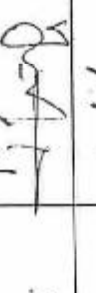


**DAFTAR HADIR PESERTA KONSULTASI PUBLIK
DALAM RANGKA RENCANA KEGIATAN PEMBANGUNAN
PLTA RAJAMANDALA 47 MW DAN TRANSMISI 150 KV,
KABUPATEN BANDUNG BARAT DAN KABUPATEN CIANJUR,
PROVINSI JAWA BARAT**

Tempat : Aula Kantor UBP Saguling, Jl. Komp. Cioray, Kecamatan Cipatat, Propinsi Jawa Barat.
Tanggal : 23 Nopember 2011.

No.	Nama	Jabatan	Alamat	Tanda Tangan	No. Telp
1	Nandany	Tamir	Kmp Cigomey		
2	Ded. Kadaruman (Kus)	Winaswasta	Des. Haurwangi		087823 05 0201
3	Supriatno	Kades	Des. Cihua		887890383889
4	Wigunaryana	KARIRATIS	Des. Cihorwarori		081809238888
5	Alyat. S	Edi. Des	Des. Cipatat		081854170514
6	usef	LPM.	Kerta Sari		081890 05 2536
7	Wulandari	Mari	Kec. Loro		-
8	Isur S	Masarakat	Kep. Tasar		
9	JAYAM J	Yohann	Kertan		087721080304









**DAFTAR HADIR PESERTA KONSULTASI PUBLIK
DALAM RANGKA RENCANA KEGIATAN PEMBANGUNAN
PLTA RAJAMANDALA 47 MW DAN TRANSMISI 150 kV,
KABUPATEN BANDUNG BARAT DAN KABUPATEN CIANJUR,
PROPINSI JAWA BARAT**

Tempat : Aula Kantor UBP Saguling, Jl. Komp. Cioray, Kecamatan Cipatat, Propinsi Jawa Barat.
Tanggal : 23 Nopember 2011.

No.	Nama	Jabatan	Alamat	Tanda Tangan	No. Telp
1	Ade wahyudin	Presk. Ngapadad	Bt. Caringin, Cikuc.		08772124370
2	Ade suhendri	Warga	Kp. Samang		
3	Ali Nurdin	Pres. Desa Ciheta	Ciheta		087721072909
4	Dede Mustopa	Kapus I	Ciheta		087880558008
5	Suparna A/S.	ang. BAS.	Xperwargi		08782040545
6	Endang Hidayat	TANA	HAKRUMAGI		085222149222
7	Kep. ZEARA	KJ02/KW09	HAKRUMAGI		
8	Wahyu	.KRT	Haur-wangi		081.912244608
9	WASEP	Kab. Bandung	KBS/KSH		081820444840









DAFTAR HADIR PESERTA KONSULTASI PUBLIK
DALAM RANGKA RENCANA KEGIATAN PEMBANGUNAN
PLTA RAJAMANDALA 47 MW DAN TRANSMISI 150 KV,
KABUPATEN BANDUNG BARAT DAN KABUPATEN CIANJUR,
PROPINSI JAWA BARAT

Tempat : Aula Kantor UBP Saguling, Jl. Komp. Cioray, Kecamatan Cipatat, Propinsi Jawa Barat.
 Tanggal : 23 Nopember 2011.

No.	Nama	Jabatan	Alamat	Tanda Tangan	No. Telp
1	YAYU WAHYUDINI	KADES RAJAMANDALA	RAJA MAXIPALA		081320105706
2	Rosa	SATPOL	Cipatat		081321765274
3	H. Rasyid	KADES/CIANJUR	Kecamatan/Hutan		087820070057
4	M. Achmad R.	Pranala	---		078245301997
5	Mumet	MOSYARAT	---	Mumin	---
6	Pran	---	---		---
7	SARDI	MESRAK	RT. KALOG		08191209495
8	Pranila	---	---		---
9	Dede	---	---		---

DAFTAR HADIR PESERTA KONSULTASI PUBLIK
DALAM RANGKA RENCANA KEGIATAN PEMBANGUNAN
PLTA RAJAMANDALA 47 MW DAN TRANSMISI 150 KV,
KABUPATEN BANDUNG BARAT DAN KABUPATEN CIANJUR,
PROPINSI JAWA BARAT

Tempat : Aula Kantor UBP Saguling, Jl. Komp. Cioray, Kecamatan Cipatat, Propinsi Jawa Barat.
 Tanggal : 23 Nopember 2011.

No.	Nama	Jabatan	Alamat	Tanda Tangan	No. Telp
1	Orini, Agustinus	Ruk Pem	Repeandela		085 294 482 547
2	Anda	Reka BPD	-		010 321 207 183
3	NANANG	Babinsa	-		081383576424
4	ACENG SUGIANTO	Ket RW 05	Kayar Kajar		087720478195
5	H. Suwinda	Kabirina Kencana	Bc sk		081221527269
6	Era Safast	Ket RT 03/09	Bantar Kalong Cihoo		081912126190
7	Dang H.	Ka Sa Bulak	Jurkim		✓
8	Hadi Mumbi	PT Indosat Power	Jabate		08128137732

Ringkasan Tanggapan, Saran Dan Masukan Public Consultation Meeting (PCM)

No	Tanggapan
1	Tenaga Kerja diutamakan penduduk setempat
2	Setuju dengan adanya pembangunan transmisi baru asalkan tidak mengganggu kesehatan dan pembangunan tersebut sesuai dengan peraturan pemerintah dan undang-undang dasar perlistrikan yang sifatnya tidak merugikan pemilik tanah, bangunan, dan lingkungan di wilayah yang dilewati jalur transmisi.
4	Adanya kompensasi yang sesuai untuk pembebasan lahan, pohon, dan lainnya yang terkena proyek..
5	Agar menjaga keamanan, ketertiban, dan kebersihan selama masa konstruksi berlangsung, sehingga tidak ada dampak yang merugikan lingkungan sekitarnya.
6	Menjaga kebersamaan dan menghindari hal-hal yang merugikan masyarakat itu sendiri.
7	Dalam pembuatan jalan disarankan untuk menghindari areal persawahan.
8	Ada kepedulian terhadap lingkungan dan irigasi yang baik.
9	Adanya kerjasama dengan pemerintah setempat terutama untuk kesejahteraan warga yang terkena dampak PLTA rajamandala.
10	Tenaga lokal yang nanti ikut berkerja agar diutamakan keselamatannya.
11	Penduduk yang berada di sekitar PLTA Rajamandala agar nantinya diperhatikan kesejahteraannya.
12	Khusus untuk lokasi RW 25 Kampung Cisameng yang sudah pasti terkena dampak Ring 1, kami mohon semua warga masyarakat kami dialokasikan untuk permukiman baru dan tersedianya sarana dan prasarana yang sama, seperti : MCK, Masjid, Madrasah, dan jalan akses kampung. Libatkan N.G.O/LSM setempat dan masyarakat sekitarnya dari semua kegiatan.
13	Agar dibuatkan skala prioritas untuk tenaga kerja, baik tenaga ahli maupun tenaga lainnya.
14	Diharapkan agar membangun fasilitas umum dan sarana transportasi masyarakat sekitar Desa Cihea
15	Harus ada sosialisasi langsung di lokasi sekitar proyek.
16	Karena Proyek tersebut sebagian besar berada di Desa Cihea, mohon agar nama Cihea di masukkan pada nama proyek tersebut, seperti PLTA RAJAMANDALA-CIHEA 47 MW & Transmisi 150 kV.
17	Agar dipastikan bahan rencana kegiatan pembangunan pembangkit dan jaringan transmisi 150 kV untuk masuk RTRW Kabupaten Cianjur 2011-2031 yang saat ini sedang dalam tahap evaluasi.
18	Karena adanya penebangan-penebangan pohon untuk pembuatan jalan hantar, disarankan untuk menanam kembali pohon-pohon tersebut.
19	Agar dibuatkan fasilitas untuk pengembangan wisata air.
20	Dampak SUTT 150 kV harus bisa diminimalisir sepanjang jalur transmisi.
21	Pihak Indonesia Power harus bisa menjamin keselamatan warga masyarakat kami khususnya daerah yang dilintasi kabel transmisi.
22	Pihak Indonesia Power harus bisa membantu bilamana warga masyarakat mengadakan suatu kegiatan, seperti pembangunan masjid, dll.
23	Jangan sampai airnya bau seperti yang sekarang kami rasakan.
24	Saya minta agar jalan yang digunakan untuk mengangkut alat-alat dan bahan konstruksi agar diperbaiki bilamana ada kerusakan.
25	Jalur transmisi kami sarankan agar tidak melewati sarana pendidikan.

APPENDIX 5

COMPETENCY STANDARDS OF HEPP

LAMPIRAN IX: KEPUTUSAN MENTERI ENERGI DAN SUMBER DAYA MINERAL

NOMOR :

TANGGAL :

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN
BIDANG PEMBANGKITAN TENAGA LISTRIK**

**SUB BIDANG INSPEKSI
PLTA**

**DEPARTEMEN ENERGI DAN SUMBER DAYA MINERAL
2004**

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN
BIDANG PEMBANGKITAN TENAGA LISTRIK
SUB BIDANG KONSTRUKSI PLTA
LEVEL 3**

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN
BIDANG PEMBANGKITAN TENAGA LISTRIK
SUB BIDANG KONSTRUKSI PLTA**

Kode Unit : KAA.KUK.001 (3) A
Judul Unit : Memasang Turbin Air
Uraian Unit : Unit kompetensi ini berkaitan dengan pelaksanaan pemasangan peralatan Turbin Air pembangkit pada Pusat Listrik sesuai dengan batasan dan standar *manual book* serta modifikasi yang telah dilakukan.

SUB KOMPETENSI	KRITERIA UNJUK KERJA
1. Menyiapkan dan Menerapkan prosedur pemasangan Turbin Air	1.1. Dipahaminya Surat perintah kerja, izin kerja, Gambar kerja, format berita acara, prosedur pemasangan, persyaratan lingkungan, format uji dan dokumen yang terkait sudah disiapkan. 1.2. Jadwal dan program kerja pemasangan Turbin Air dibuat sesuai standar yang berlaku di perusahaan. 1.3. Alat ukur yang terkait diperlukan dan K3 sudah disiapkan sesuai keperluan dalam kondisi dapat bekerja dengan baik dan aman. 1.4. Sumber daya yang diperlukan untuk pemasangan Turbin Air diidentifikasi sesuai spesifikasi pekerjaan. 1.5. Perlengkapan kerja (gambar, instruksi kerja dll.) diinterpretasikan sesuai dengan rencana kerja. 1.6. Peralatan Kerja dipilih sesuai dengan spesifikasi pekerjaan. 1.7. Lokasi kerja disiapkan sesuai dengan keperluan pekerjaan dan prosedur perusahaan.
2. Memasang Turbin Air	2.1. Prosedur (Installation procedure) dan kebijakan K3 dijalankan sesuai dengan SOP. 2.2. Turbin Air dipasang sesuai dengan persyaratan tanpa menimbulkan gangguan pada lingkungan. 2.3. Pemasangan Turbin Air sesuai dengan persyaratan. 2.4. Kejadian dan kondisi yang tidak direncanakan harus diatasi sesuai prosedur yang berlaku
3. Memeriksa pemasangan peralatan Turbin Air	3.1. Hasil pemasangan Peralatan Turbin Air diperiksa secara visual dan dicatat sesuai Standar Pemasangan yang ditetapkan.

4. Menguji pemasangan Turbin Air	<p>3.2. Hasil pemeriksaan secara visual diluar standar akan dilakukan perbaikan sesuai dengan Standar yang berlaku.</p> <p>4.1. Hasil pemasangan diuji sesuai dengan standar yang ditetapkan.</p> <p>4.2. Ketidaksesuaian hasil pemasangan segera dilakukan perbaikan.</p> <p>4.3. Pengidentifikasian ketidaksesuaian hasil pemasangan Turbin Air .</p> <p>4.4. Hasil akhir pengujian diyakinkan sesuai dengan standar yang ditetapkan.</p>
5. Membuat laporan	Laporan/statement Pemasangan dibuat dalam bentuk berita acara pemasangan sesuai dengan format standar yang ditetapkan.

Persyaratan/Kondisi Unjuk Kerja

Dalam melaksanakan unit kompetensi ini harus didukung dengan tersedianya:

1. SOP & K3 yang berlaku.
2. *Instruction Manual* (Installation prosedur) dari masing-masing Peralatan
3. Gambar kerja yang berlaku.
4. Peralatan dan instrumen yang terkait dengan pelaksanaan unit kompetensi ini.

Acuan Penilaian

1. Unit kompetensi yang harus diketahui sebelumnya:
 - No. KAA.KMV.001 (2) A Memasang peralatan Sistem
 - No. KAA.KMT.301 (2) A Memasang *Shaft* Turbin Air
 - No. KAA.KMR.001 (2) A Memasang *Runner*
 - No. KAA.KMG.001 (2) A Memasang *Guide Vane*
2. Kompetensi harus diujikan ditempat kerja atau ditempat lain secara simulasi dengan kondisi kerja sesuai dengan keadaan normal.
3. Pengetahuan yang dibutuhkan:
 - a. Turbin Air
 - b. Mekanika Fluida
 - c. Heat Transfer
 - d. Konversi Energi
4. Persyaratan dasar kualifikasi pendidikan formal: Minimal Setara SLTA berpengalaman 3(tiga) tahun
5. Memiliki pengetahuan tentang:
 - a. Dasar Pemasangan Turbin Air Pembangkit
 - b. *On Site Training* sesuai peralatan Turbin Air yang akan dipasang.

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN
BIDANG PEMBANGKITAN TENAGA LISTRIK
SUB BIDANG KONSTRUKSI PLTA**

Kode Unit : KAA.KLG.001 (3) A
Judul Unit : Memasang Generator
Uraian Unit : Unit kompetensi ini berkaitan dengan pelaksanaan pemasangan peralatan Generator pada Pusat Listrik sesuai dengan batasan dan standar *manual book* serta modifikasi yang telah dilakukan.

SUB KOMPETENSI	KRITERIA UNJUK KERJA
1. Menyiapkan dan Menerapkan prosedur pemasangan Generator	1.1. Dipahaminya Surat perintah kerja, izin kerja, Gambar kerja, format berita acara, prosedur pemasangan, persyaratan lingkungan, format uji dan dokumen yang terkait sudah disiapkan. 1.2. Jadwal dan program kerja pemasangan Generator pembangkit. 1.3. Alat ukur yang terkait diperlukan dan K3 sudah disiapkan sesuai keperluan dalam kondisi dapat bekerja dengan baik dan aman. 1.4. Sumber daya yang diperlukan untuk pemasangan Generator pembangkit diidentifikasi sesuai spesifikasi pekerjaan. 1.5. Perlengkapan kerja (gambar, instruksi kerja dll.) diinterpretasikan sesuai dengan rencana kerja. 1.6. Peralatan Kerja dipilih sesuai dengan spesifikasi pekerjaan. 1.7. Lokasi kerja disiapkan sesuai dengan keperluan pekerjaan dan prosedur perusahaan.
2. Memasang Generator	2.1. Prosedur dan kebijakan K3 dijalankan sesuai dengan SOP. 2.2. Generator pembangkit dipasang sesuai dengan persyaratan tanpa menimbulkan gangguan pada lingkungan. 2.3. Pemasangan Generator Pembangkit sesuai dengan persyaratan. 2.4. Kejadian dan kondisi yang tidak direncanakan harus diatasi sesuai prosedur yang berlaku.
3. Memeriksa pemasangan peralatan Generator.	3.1. Hasil pemasangan Peralatan Generator pembangkit diperiksa secara visual dan dicatat sesuai Standar Pemasangan yang ditetapkan. 3.2. Hasil pemeriksaan secara visual diluar standar akan dilakukan perbaikan sesuai dengan Standar yang berlaku.

4. Menguji pemasangan Generator	4.1. Hasil pemasangan diuji sesuai dengan standar yang ditetapkan. 4.2. Ketidaksesuaian hasil pemasangan segera dilakukan perbaikan. 4.3. Pengidentifikasian ketidaksesuaian hasil pemasangan Generator Pembangkit.
5. Membuat laporan	4.4. Hasil akhir pengujian diyakinkan sesuai dengan standar yang ditetapkan. Laporan/statement Pemasangan dibuat dalam bentuk berita acara pemasangan sesuai dengan format standar yang ditetapkan.

Persyaratan/Kondisi Unjuk Kerja

Dalam melaksanakan unit kompetensi ini harus didukung dengan tersedianya:

1. SOP & K3 yang berlaku.
2. *Instruction Manual/Installation* prosedur dari masing-masing Peralatan
3. Gambar kerja yang berlaku.
4. Peralatan dan instrumen yang terkait dengan pelaksanaan unit kompetensi ini.

Acuan Penilaian

1. Unit kompetensi yang harus diketahui sebelumnya:
No. KAA.KLG.102 (2) A Memasang *Stator dan Rotor*
No. KAA.KLG.101 (2) A Memasang Peralatan Eksitasi
No. KAA.KKP.001 (2) A Memasang Peralatan Sistem Proteksi Generator
2. Kompetensi harus diujikan ditempat kerja atau ditempat lain secara simulasi dengan kondisi kerja sesuai dengan keadaan normal.
3. Pengetahuan yang dibutuhkan:
 - a. Generator
 - b. Pesawat angkat
 - c. Tahanan Isolasi
 - d. Gambar Instalasi
4. Persyaratan dasar kualifikasi pendidikan formal: Minimal Setara SLTA berpengalaman 3(tiga) tahun
5. Memiliki pengetahuan tentang:
 - a. Dasar Pemasangan Generator Pembangkit
 - b. *On Site Training* sesuai peralatan Generator Pembangkit yang Akan dipasang.

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN
BIDANG PEMBANGKITAN TENAGA LISTRIK
SUB BIDANG KONSTRUKSI PLTA**

Kode Unit : KAA.KSP.001 (2) A
Judul Unit : Memasang *Penstock*
Uraian Unit : Unit kompetensi ini berkaitan dengan pelaksanaan pemasangan *Penstock* pada Pusat Listrik sesuai dengan batasan dan standar *manual book* serta modifikasi yang telah dilakukan.

SUB KOMPETENSI	KRITERIA UNJUK KERJA
1. Menerapkan prosedur pemasangan <i>Penstock</i>	<p>1.1. Dipahaminya Surat perintah kerja, izin kerja, Gambar kerja, format berita acara, persyaratan lingkungan, format uji dan dokumen yang terkait sudah disiapkan.</p> <p>1.2. Jadwal dan program kerja pemasangan <i>Penstock</i>.</p> <p>1.3. Alat ukur yang terkait diperlukan dan K3 sudah disiapkan sesuai keperluan dalam kondisi dapat bekerja dengan baik dan aman.</p>
2. Menyiapkan pemasangan <i>Penstock</i>	<p>2.1. Sumber daya yang diperlukan untuk pemasangan pipa dan <i>Valve</i> diidentifikasi sesuai spesifikasi pekerjaan.</p> <p>2.2. Perlengkapan kerja (gambar, instruksi kerja dll.) diinterpretasikan sesuai dengan rencana kerja.</p> <p>2.3. Peralatan Kerja dipilih sesuai dengan spesifikasi pekerjaan.</p> <p>2.4. Lokasi kerja disiapkan sesuai dengan keperluan pekerjaan dan prosedur perusahaan.</p>
3. Memasang <i>Penstock</i>	<p>3.1. Prosedur dan kebijakan K3 dijalankan sesuai dengan SOP</p> <p>3.2. <i>Penstock</i> dipasang sesuai dengan persyaratan tanpa menimbulkan gangguan pada lingkungan.</p> <p>3.3. Pemasangan <i>Penstock</i> sesuai dengan persyaratan.</p> <p>3.1. Kejadian dan kondisi yang tidak direncanakan harus diatasi sesuai prosedur yang berlaku</p>
4. Memeriksa pemasangan <i>Penstock</i> .	<p>4.1. Hasil pemasangan <i>Penstock</i> diperiksa secara visual dan dicatat sesuai Standar Pemasangan yang ditetapkan.</p>

5. Menguji pemasangan <i>Penstock</i>	<p>4.2. Hasil pemeriksaan secara visual diluar standar akan dilakukan perbaikan sesuai dengan Standar yang berlaku.</p> <p>5.1. Hasil pemasangan diuji sesuai dengan standar yang ditetapkan.</p> <p>5.2. Ketidaksesuaian hasil pemasangan segera dilakukan perbaikan.</p> <p>5.3. Hasil akhir perbaikan diyakinkan sesuai dengan standar yang ditetapkan</p>
6. Membuat laporan	Laporan/statement Pemasangan dibuat dalam bentuk berita acara pemasangan sesuai dengan format standar yang ditetapkan.

Persyaratan/Kondisi Unjuk Kerja

Dalam melaksanakan unit kompetensi ini harus didukung dengan tersedianya:

1. SOP dan K3 yang berlaku.
2. Instruction Manual/Installation procedure dari masing-masing Peralatan
3. Gambar kerja yang berlaku.
4. Peralatan dan instrumen yang terkait dengan pelaksanaan unit kompetensi ini.

Acuan Penilaian

1. Unit kompetensi yang harus diketahui sebelumnya:
 - a. KAA.KMV.001(1)A Memasang pipa dan valve
2. Kompetensi harus diujikan ditempat kerja atau ditempat lain secara simulasi dengan kondisi kerja sesuai dengan keadaan normal.
3. Pengetahuan yang dibutuhkan:
 - a. Pesawat angkat
 - b. Teknik Pengelasan
 - c. Servo pneumatic
 - d. Pelapisan logam (coating)
4. Persyaratan dasar kualifikasi pendidikan formal: Minimal Setara SLTA berpengalaman 3(tiga) tahun
5. Memiliki pengetahuan tentang:
 - a. Dasar Pemasangan *Penstock*
 - b. *On Site Training* sesuai *Penstock* yang akan dipasang

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN
BIDANG PEMBANGKITAN TENAGA LISTRIK
SUB BIDANG KONSTRUKSI PLTA**

Kode Unit : KAA.KMT.302 (2) A
 Judul Unit : Memasang Bantalan Turbin Air
 Uraian Unit : Unit kompetensi ini berkaitan dengan pelaksanaan pemasangan Bantalan Turbin Air pada Pusat Listrik sesuai dengan batasan dan standar *manual book* serta modifikasi yang telah dilakukan.

SUB KOMPETENSI	KRITERIA UNJUK KERJA
1. Menerapkan prosedur pemasangan Bantalan Turbin Air	1.1. Dipahaminya Surat perintah kerja, izin kerja, Gambar kerja, format berita acara, persyaratan lingkungan, format uji dan dokumen yang terkait sudah disiapkan. 1.2. Jadwal dan program kerja pemasangan Bantalan Turbin Air. 1.3. Alat ukur yang terkait diperlukan dan K3 sudah disiapkan sesuai keperluan dalam kondisi dapat bekerja dengan baik dan aman.
2. Menyiapkan pemasangan Bantalan Turbin Air	2.1. Sumber daya yang diperlukan untuk pemasangan pipa dan <i>Va/ve</i> diidentifikasi sesuai spesifikasi pekerjaan. 2.2. Perlengkapan kerja (gambar, instruksi kerja dll.) diinterpretasikan sesuai dengan rencana kerja. 2.3. Peralatan Kerja dipilih sesuai dengan spesifikasi pekerjaan. 2.4. Lokasi kerja disiapkan sesuai dengan keperluan pekerjaan dan prosedur perusahaan.
3. Memasang Bantalan Turbin Air	3.1. Prosedur dan kebijakan K3 dijalankan sesuai dengan SOP 3.2. Bantalan Turbin Air dipasang sesuai dengan persyaratan tanpa menimbulkan gangguan pada lingkungan. 3.3. Pemasangan Bantalan Turbin Air sesuai dengan persyaratan. 3.4. Kejadian dan kondisi yang tidak direncanakan harus diatasi sesuai prosedur yang berlaku.

4. Memeriksa pemasangan Bantalan Turbin Air,	4.1. Hasil pemasangan Bantalan Turbin Air diperiksa secara visual dan dicatat sesuai Standar Pemasangan yang ditetapkan. 4.2. Hasil pemeriksaan secara visual diluar standar akan dilakukan perbaikan sesuai dengan Standar yang berlaku.
5. Menguji pemasangan Bantalan Turbin Air	5.1. Hasil pemasangan diuji sesuai dengan standar yang ditetapkan. 5.2. Ketidaksesuaian hasil pemasangan segera dilakukan perbaikan. 5.3. Hasil akhir perbaikan diyakinkan sesuai dengan standar yang ditetapkan.
6. Membuat laporan	Laporan/statement Pemasangan dibuat dalam bentuk berita acara pemasangan sesuai dengan format standar yang ditetapkan.

Persyaratan/Kondisi Unjuk Kerja

Dalam melaksanakan unit kompetensi ini harus didukung dengan tersedianya:

1. SOP dan K3 yang berlaku
2. Instruction Manual/Installation procedure dari masing-masing Peralatan
3. Gambar kerja yang berlaku.
4. Peralatan dan instrumen yang terkait dengan pelaksanaan unit kompetensi ini.

Acuan Penilaian

1. Unit kompetensi yang harus diketahui sebelumnya:
 - a. KAA.HMT.301(3) A memelihara Turbin air
 - b. KAA.OUK.001(3) A Mengoperasikan Unit PLTA Besar
2. Kompetensi harus diujikan ditempat kerja atau ditempat lain secara simulasi dengan kondisi kerja sesuai dengan keadaan normal.
3. Pengetahuan yang dibutuhkan:
 - a. Pengetahuan Bahan
 - b. Teknik Pelumasan
 - c. Teknik Pengukuran
4. Persyaratan dasar kualifikasi pendidikan formal: Minimal Setara SLTA berpengalaman 3(tiga) tahun
5. Memiliki pengetahuan tentang:
 - a. Dasar Pemasangan Bantalan Turbin Air
 - b. *On Site Training* sesuai Bantalan Turbin Air yang akan dipasang

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN
BIDANG PEMBANGKITAN TENAGA LISTRIK
SUB BIDANG KONSTRUKSI PLTA**

Kode Unit : KAA.KKP.001 (2) A
 Judul Unit : Memasang Peralatan Proteksi Generator
 Uraian Unit : Unit kompetensi ini berkaitan dengan pelaksanaan pemasangan Peralatan Proteksi Generator pada Pusat Listrik sesuai dengan batasan dan standar *manual book* serta modifikasi yang telah dilakukan.

SUB KOMPETENSI	KRITERIA UNJUK KERJA
1. Menerapkan prosedur pemasangan Peralatan Proteksi Generator	1.1. Dipahaminya Surat perintah kerja, izin kerja, Gambar kerja, format berita acara, persyaratan lingkungan, format uji dan dokumen yang terkait sudah disiapkan. 1.2. Jadwal dan program kerja pemasangan Peralatan Proteksi Generator. 1.3. Alat ukur yang terkait diperlukan dan K3 yang sudah disiapkan sesuai keperluan dalam kondisi dapat bekerja dengan baik dan aman.
2. Menyiapkan pemasangan Peralatan Proteksi Generator	2.1. Sumber daya yang diperlukan untuk pemasangan Proteksi Generator diidentifikasi sesuai spesifikasi pekerjaan. 2.2. Perlengkapan kerja (gambar, instruksi kerja dll.) diinterpretasikan sesuai dengan rencana kerja. 2.3. Peralatan Kerja dipilih sesuai dengan spesifikasi pekerjaan. 2.4. Lokasi kerja disiapkan sesuai dengan keperluan pekerjaan dan prosedur perusahaan.
3. Memasang Peralatan Proteksi Generator	3.1. Prosedur dan kebijakan K3 dijalankan sesuai dengan SOP 3.2. Peralatan Proteksi Generator dipasang sesuai dengan persyaratan tanpa menimbulkan gangguan pada lingkungan. 3.3. Pemasangan Peralatan Proteksi Generator sesuai dengan persyaratan. 3.4. Kejadian dan kondisi yang tidak direncanakan harus diatasi sesuai prosedur yang berlaku.
4. Memeriksa pemasangan Peralatan Proteksi Generator.	4.1. Hasil pemasangan Peralatan Proteksi Generator diperiksa secara visual dan dicatat sesuai Standar Pemasangan yang ditetapkan.

5. Menguji pemasangan Peralatan Proteksi Generator	<p>4.2. Hasil pemeriksaan secara visual diluar standar akan dilakukan perbaikan sesuai dengan Standar yang berlaku.</p> <p>5.1. Hasil pemasangan diuji sesuai dengan standar yang ditetapkan.</p> <p>5.2. Ketidaksesuaian hasil pemasangan segera dilakukan perbaikan.</p> <p>5.3. Hasil akhir perbaikan diyakinkan sesuai dengan standar yang ditetapkan.</p>
6. Membuat laporan	Laporan/statement Pemasangan dibuat dalam bentuk berita acara pemasangan sesuai dengan format standar yang ditetapkan.

Persyaratan/Kondisi Unjuk Kerja

Dalam melaksanakan unit kompetensi ini harus didukung dengan tersedianya:

1. SOP dan K3 yang berlaku
2. Instruction Manual/Installation procedure dari masing-masing Peralatan
3. Gambar kerja yang berlaku.
4. Peralatan dan instrumen yang terkait dengan pelaksanaan unit kompetensi ini.

Acuan Penilaian

1. Unit kompetensi yang harus diketahui sebelumnya:
 - KAA OUK 301 (3)A Mengoperasikan Unit PLTA Besar
 - KAA HLG 001 (3)A Memelihara Generator
 - KAA HKP 001 (3)A Memelihara Proteksi
2. Kompetensi harus diujikan ditempat kerja atau ditempat lain secara simulasi dengan kondisi kerja sesuai dengan keadaan normal.
3. Pengetahuan yang dibutuhkan:
 - a. Generator
 - b. Sistem Proteksi Generator
 - c. Gambar Instalasi
4. Persyaratan dasar kualifikasi pendidikan formal: Minimal Setara SLTA berpengalaman 3(tiga) tahun
5. Memiliki pengetahuan tentang:
 - a. Dasar Pemasangan Peralatan Proteksi Generator
 - b. *On Site Training* sesuai Peralatan Proteksi Generator yang akan dipasang

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN
BIDANG PEMBANGKITAN TENAGA LISTRIK
SUB BIDANG KONSTRUKSI PLTA**

Kode Unit : KAA.KMA.001(1) A
Judul Unit : Memasang Pintu Air
Uraian Unit : Unit kompetensi ini berkaitan dengan pelaksanaan pemasangan Pintu Air pada Pusat Listrik sesuai dengan batasan dan standar *manual book* serta modifikasi yang telah dilakukan.

SUB KOMPETENSI	KRITERIA UNJUK KERJA
1. Merencanakan dan menyiapkan pemasangan Pintu Air	<p>1.1. Dipahaminya Surat perintah kerja/Instruksi Kerja, izin kerja, Gambar kerja, format berita acara, persyaratan lingkungan, format uji dan dokumen yang terkait sudah disiapkan.</p> <p>1.2. Jadwal dan program kerja pemasangan Pintu Air sudah disiapkan.</p> <p>1.3. Alat ukur yang terkait diperlukan dan K3 sudah disiapkan sesuai keperluan dalam kondisi dapat bekerja dengan baik dan aman.</p>
2. Memasang Pintu Air	<p>2.1. Sumber daya yang diperlukan untuk pemasangan Pintu Air diidentifikasi sesuai spesifikasi pekerjaan.</p> <p>2.2. Perlengkapan kerja (gambar, instruksi kerja dll.) diinterpretasikan sesuai dengan rencana kerja.</p> <p>2.3. Peralatan Kerja dipilih sesuai dengan spesifikasi pekerjaan.</p> <p>2.4. Lokasi kerja disiapkan sesuai dengan keperluan pekerjaan dan prosedur perusahaan.</p> <p>2.5. Prosedur dan kebijakan K3 dijalankan sesuai dengan SOP</p> <p>2.6. Pintu Air dipasang sesuai dengan persyaratan tanpa menimbulkan gangguan pada lingkungan.</p> <p>2.7. Pintu Air disambung dan dihubungkan sesuai dengan persyaratan.</p> <p>2.8. Kejadian dan kondisi yang tidak direncanakan harus diatasi sesuai prosedur yang berlaku.</p>

3. Memeriksa pemasangan Pintu Air .	3.1. Hasil pemasangan Pintu Air diperiksa secara visual dan dicatat sesuai Standar Pemasangan yang ditetapkan. 3.2. Hasil pemeriksaan secara visual diluar standar akan dilakukan perbaikan sesuai dengan Standar yang berlaku.
4. Membuat Laporan	Laporan/statement Pemasangan dibuat dalam bentuk berita acara pemasangan sesuai dengan format standar yang ditetapkan.

Persyaratan/Kondisi Unjuk Kerja

Dalam melaksanakan unit kompetensi ini harus didukung dengan tersedianya:

1. SOP dan K3 yang berlaku.
2. *Instruction Manual* dari masing-masing Peralatan
3. Gambar kerja yang berlaku.
4. Peralatan dan instrumen yang terkait dengan pelaksanaan unit kompetensi ini.

Acuan Penilaian

1. Unit kompetensi yang harus diketahui sebelumnya:
 - a. KAA.HMA.001(1)A Memelihara pintu air
2. Kompetensi harus diujikan ditempat kerja atau ditempat lain secara simulasi dengan kondisi kerja sesuai dengan keadaan normal.
3. Pengetahuan yang dibutuhkan:
 - a. *Valve* dan Pemipaan
 - b. Pengelasan & Non Destruction Testing (NDT)
 - c. Gambar Instalasi
4. Persyaratan dasar kualifikasi pendidikan formal: Minimal Setara SLTA berpengalaman 3(tiga) tahun
5. Memiliki pengetahuan tentang:
 - a. Dasar Pemasangan Pintu Air
 - b. *On Site Training* sesuai Pintu Air yang akan dipasang.

**STANDAR KOMPETENSI
TENAGA TEKNIK BIDANG PEMBANGKITAN
SUB BIDANG INSPEKSI
BANGUNAN SIPIL PEMBANGKIT
LEVEL 3**

**STANDAR KOMPETENSI
TENAGA TEKNIK BIDANG PEMBANGKITAN
SUB BIDANG INSPEKSI
BANGUNAN SIPIL PEMBANGKIT**

Kode Unit : KIT.ISP.001 (1) A
 Judul Unit : Menginspeksi Pondasi.
 Uraian Unit : Unit kompetensi ini berkaitan dengan pelaksanaan inspeksi Pondasi yang meliputi Pondasi Dinamis dan Statis pada pusat listrik , sesuai dengan batasan dan standar manual book serta modifikasi yang telah dilakukan.

SUB KOMPETENSI	KRITERIA UNJUK KERJA
1. Merencanakan dan menyiapkan inspeksi Pondasi.	1.1. Dipahaminya surat perintah kerja, ijin kerja, gambar kerja, blanko berita acara, persyaratan lingkungan, blanko uji dan dokumen terkait sudah disiapkan. 1.2. Jadwal dan program kerja inspeksi Pondasi sudah disiapkan. 1.3. Kelengkapan inspeksi dan K3 sudah disiapkan sesuai keperluan dalam kondisi dapat bekerja dengan baik dan aman.
2. Menyiapkan pelaksanaan inspeksi Pondasi.	2.1. Sumber daya yang diperlukan untuk inspeksi diidentifikasi sesuai spesifikasi pekerjaan. 2.2. Perlengkapan kerja (gambar, instruksi kerja dll.) diinterpretasikan sesuai dengan rencana kerja. 2.3. Kelengkapan inspeksi dipilih sesuai dengan spesifikasi pekerjaan 2.4. Lokasi kerja disiapkan sesuai dengan keperluan pekerjaan dan prosedur perusahaan.
3. Melaksanakan inspeksi Pondasi.	3.1. Pelaksanaan inspeksi Pondasi dilakukan dan dicatat sesuai prosedur dan format inspeksi Pusat listrik 3.2. Data hasil inspeksi dikumpulkan untuk proses pengolahan 3.3. Inspeksi ulang dilakukan bila diperlukan.
4. Membuat Laporan Inspeksi.	4.1. Laporan inspeksi dibuat sesuai dengan format yang berlaku. 4.2. Tim Inspeksi melaporkan hasil inspeksi kepada manajemen Pusat Listrik.

Persyaratan/Kondisi Unjuk Kerja :

Dalam melaksanakan unit kompetensi ini harus didukung dengan tersedianya:

1. *SOP* yang berlaku di Perusahaan/Pusat listrik
2. *Maintenance Manual* dari masing-masing Pondasi
3. *Log sheet* atau *report sheet* yang ditetapkan oleh perusahaan
4. Peralatan dan instrumen yang terkait dengan pelaksanaan unit kompetensi ini.

Acuan Penilaian :

1. Unit kompetensi yang harus dimiliki sebelumnya:
 - a. KIT. HSP.001 (3)A – Memelihara Pondasi; level 3.
2. Kompetensi harus diujikan ditempat kerja atau ditempat lain secara simulasi dengan kondisi kerja sesuai dengan keadaan normal.
3. Pengetahuan yang dibutuhkan:
 - a. Rekayasa Pondasi
 - b. Mekanikan Tanah
 - c. Konstruksi Beton
 - d. Metode Pelaksanaan Konstruksi
4. Persyaratan dasar kualifikasi pendidikan formal:
Setara SMK-Sipil/SLTA yang sudah memiliki sertifikat sesuai butir 5a.
5. Memiliki pengetahuan tentang:
 - a. Kursus-kursus kejuruan yang mendukung butir 3.
 - b. Inspeksi Tingkat Dasar
 - c. *On Site Training* sesuai Pondasi yang diinspeksi.

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN BIDANG
PEMBANGKITAN TENAGA LISTRIK
SUB BIDANG PERENCANAAN PEMELIHARAAN PLTA
LEVEL 3**

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN
BIDANG PEMBANGKITAN TENAGA LISTRIK SUB BIDANG
PERENCANAAN PEMELIHARAAN PLTA**

Kode Unit : KAA.RHK.001 (3)A A
Judul Unit : Merencanakan Pemeliharaan Pusat Listrik
Uraian Unit : Unit kompetensi ini berkaitan dengan pelaksanaan Perencanaan Pemeliharaan Pusat Listrik, sesuai dengan batasan dan standar manual book serta modifikasi yang telah dilakukan.

SUB KOMPETENSI	KRITERIA UNJUK KERJA
1. Merencanakan dan menyiapkan Perencanaan Pemeliharaan Pusat Listrik	1.1. Dipahaminya surat perintah kerja, ijin kerja, gambar kerja dan pengetahuan yang dibutuhkan, blanko berita acara, persyaratan lingkungan, blanko uji dan dokumen terkait sudah disiapkan. 1.2. Kelengkapan Pemeliharaan dan K3 sudah disiapkan sesuai keperluan dalam kondisi dapat bekerja dengan baik dan aman.
2. Menyiapkan Pelaksanaan Perencanaan Pemeliharaan Pusat Listrik .	2.1. Gambar teknik, volume pekerjaan, Rencana Anggaran Biaya (RAB), Dokumen Lelang dan Jadwal serta Program Kerja Perencanaan Pemeliharaan Pusat Listrik dianalisis dan dibandingkan dengan standar. 2.2. Hasil analisis disetujui untuk dilaksanakan atau dikoreksi untuk Perencanaan pemeliharaan , yang dicantumkan pada dokumen kerja.
3. Melaksanakan Perencanaan Pemeliharaan Pusat Listrik .	3.1. Pengawasan Perencanaan pemeliharaan Pusat Listrik dilakukan dan dicatat sesuai prosedur dan format Pemeliharaan Pusat Listrik 3.2. Permasalahan yang timbul selama pelaksanaan Perencanaan pemeliharaan Pusat Listrik dianalisis dan dibandingkan dengan dokumen kerja.
4. Memeriksa hasil Perencanaan Pemeliharaan Pusat Listrik	4.1. Permasalahan yang timbul dianalisis dan dibandingkan dengan SOP Pusat Listrik/Maintenance Manual. 4.2. Dibuat rekomendasi, persetujuan atau penolakan atas hasil pelaksanaan pekerjaan.
5. Membuat Laporan Hasil Perencanaan Pemeliharaan Pusat Listrik	Laporan dan rekomendasi hasil pemeliharaan dibuat sesuai dengan format yang berlaku.

Persyaratan/Kondisi Unjuk Kerja

Dalam melaksanakan unit kompetensi ini harus didukung dengan tersedianya:

1. SOP dan K3 yang berlaku di Perusahaan/Pusat listrik
2. *Maintenance Manual*
3. *Log sheet* atau *report sheet* yang ditetapkan oleh perusahaan
4. Peralatan dan instrumen yang terkait dengan pelaksanaan unit kompetensi ini.

Acuan Penilaian

1. Unit kompetensi yang harus dimiliki sebelumnya:
 - a. No. KAA.RHM.001 (2) A - Perencanaan Pemeliharaan Peralatan Mesin
 - b. No. KAA.RHL .001 (2) A - Perencanaan Pemeliharaan Listrik
 - c. No. KAA.RHK .001 (2) A - Perencanaan Pemeliharaan Kontrol
2. Kompetensi harus diujikan ditempat kerja atau ditempat lain secara simulasi dengan kondisi kerja sesuai dengan keadaan normal.
3. Pengetahuan yang dibutuhkan:
 - a. Ekonomi Teknik
 - b. Statistik
 - c. Manajemen Proyek
 - d. Manajemen Konstruksi
4. Persyaratan dasar kualifikasi pendidikan formal: Setara SMK/SMU/D3 berpengalaman 3(tiga) tahun
5. Memiliki pengetahuan tentang:
 - a. Kursus-kursus kejuruan yang mendukung butir 3.
 - b. *On Site Training* sesuai yang perencanaan pemeliharaan.

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN
BIDANG PEMBANGKITAN TENAGA LISTRIK
SUB BIDANG PERENCANAAN PEMELIHARAAN
PLTA LEVEL 2**

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN
BIDANG PEMBANGKITAN TENAGA LISTRIK
SUB BIDANG PERENCANAAN PEMELIHARAAN PLTA**

Kode Unit : KAA.RHM.001 (2) A
Judul Unit : Merencanakan Pemeliharaan Peralatan Mesin
Uraian Unit : Unit kompetensi ini berkaitan dengan pelaksanaan perencanaan pemeliharaan peralatan mesin pada Pusat Listrik sesuai dengan batasan dan standar manual book serta modifikasi yang telah dilakukan.

SUB KOMPETENSI	KRITERIA UNJUK KERJA
1. Menetapkan konsep awal perencanaan pemeliharaan peralatan mesin	1.1. Perencanaan dan penyiapan perencanaan pemeliharaan peralatan mesin sesuai kondisi peralatan dan jam operasi. 1.2. Bahan dan data sudah disiapkan sesuai keperluan dalam kondisi dapat bekerja dengan baik dan aman. 1.3. Perlengkapan kerja diinterpretasikan sesuai dengan rencana kerja. 1.4. Peralatan Kerja dipilih sesuai dengan spesifikasi pekerjaan.
2. Merancang perencanaan pemeliharaan peralatan mesin	2.1. Prosedur dan kebijakan K3 dijalankan sesuai dengan SOP. 2.2. Perancangan pemeliharaan peralatan mesin sesuai dengan persyaratan yang berlaku tanpa menimbulkan gangguan pada lingkungan. 2.3. Kejadian dan kondisi yang tidak direncanakan harus diatasi sesuai prosedur yang berlaku.
3. Melakukan evaluasi perancangan perencanaan pemeliharaan peralatan mesin	3.1. Hasil perencanaan pemeliharaan peralatan mesin dievaluasi berdasarkan kondisi lapangan. 3.2. Hasil ketidaksesuaian perencanaan diluar standar akan dilakukan dikoordinasikan sesuai dengan SOP yang ditetapkan.
4. Membuat Laporan	Laporan perencanaan pemeliharaan peralatan mesin dibuat dalam bentuk tabulasi sesuai dengan format standar yang ditetapkan.

Persyaratan/Kondisi Unjuk Kerja

Dalam melaksanakan unit kompetensi ini harus didukung dengan tersedianya:

1. SOP dan K3 yang berlaku diperusahaan/ Pusat Listrik
2. *Instruction Manual* dari masing-masing Peralatan
3. *Gambar kerja* yang berlaku.
4. Peralatan dan instrumen yang terkait dengan pelaksanaan unit kompetensi ini.

Acuan Penilaian

1. Unit kompetensi yang harus diketahui sebelumnya:
 - a. KAA.HMT.301 (3)A - Memelihara Turbin Air
 - b. KAA.OUK.001 (3)A - Mengoperasikan Unit PLTA Besar
 - c. KAA.HMP.001 (2)A - Memelihara Piping
 - d. KAA.HMV.001 (2)A - Memelihara Valve
 - e. KAA.HMK.001 (2)A - Memelihara Pompa dan Kompresor
2. Kompetensi harus diujikan ditempat kerja atau ditempat lain secara simulasi dengan kondisi kerja sesuai dengan keadaan normal.
3. Pengetahuan yang dibutuhkan:
 - a. Ekonomi Teknik
 - b. Statistik
 - c. Manajemen Proyek
 - d. Manajemen Konstruksi
4. Persyaratan dasar kualifikasi pendidikan formal: Minimal Setara SMK/SMU/D3 berpengalaman 3(tiga) tahun
5. Memiliki pengetahuan tentang:
 - a. Dasar Pemeliharaan PLTA
 - b. *On Site Training* sesuai perencanaan pemeliharaan mesin.
 - c. Pengoperasian Program Komputer terkait

**STANDAR KOMPETENSI
TENAGA TEKNIK KETENAGALISTRIKAN BIDANG
PEMBANGKITAN TENAGALISTRIK
SUB BIDANG INSPEKSI PLTA
LEVEL 3**