ANNEX 6

Products

ANNEX 6-1

Report No.001

Report on Activity 1 -1 to 1-5 for BBWS Ciliwung Cisadane

Report on Activity 1-1 to 1-5 for BBWS Ciliwung Cisadane

Contents

5. Activity 1-5

5.1. Make a Short and Middle-term CD plans to accomplish the capacity development recognized in “1-4”

1. Activity 1-1

Activity 1-1 *"Analyze and break down the expected RBO's functions and roles into daily work activities"* is divided into 2 (two) portions for effective analyze and break down, 1) Analyze the expected RBO's functions and roles, 2) Break down daily work activities of expected functions and roles.

1.1. Analyse the expected RBO's functions and roles

1.1.1. Methodology of Analysis on expected RBO's function

In the past meeting with BBWS Ciliwung Cisadane, JICA project team received several plans, reports for analysis to identify expected functions on Integrated Water Resources Management (hereafter referred to IWRM). Therefore, proposal on priority items as expected functions and roles should be analyzed by collected plans and repots

Analysis has been conducted in 3 (three) steps as in below box;

Step 1: Comparing between current functions by Needs Survey and various items
Step 2: Integrating result of above "Step1" to find candidate expected functions and roles as proposal
Step 3: Discussion to decide expected functions and roles

1.1.2. (Step 1) Comparing between current functions and various items

- **Current functions**

Current functions of BBWS and BWS is mentioned on Ministerial Regulation No.20/PRT/M/2016 (No.34/PRT/M2015, No. 21/PRT/M/2010). The functions are common one among all BBWS and BWS in Indonesia.

On the other hands, result of Output 1 will be reflected to activities of Output 2. Activity of Output 2 is for all BBWS and BWS. It is effective and understandable, if we use common functions between output 1 and output 2 as indicators on CD activities.

Therefore, we decided functions and roles on No.20/PRT/M/2016 as current functions and roles for this analysis.

[Reference] Relation and reflection between outputs 1 to output 2

(1) Outputs of activities 1-1 and 1-2 will be reflected to activity 2-5 on evaluation of capacity of RBOs and improvement of benchmarking mechanism

(2) Outputs of activities from 1-3 to 1-9 as "Field Practice" will be considered into activity 2-3 on making and carrying out short- and mid-term plans of CD activities

Current Functions and Roles for analysis of output 1*

a. Preparation of Strategic Plan (POLA) and Master Plan (RENCANA) of water resources management in the river basin
b. Preparation of water resources management programs and action plans for water resources management in river basin
c. Monitoring and evaluation of the implementation / application of a water resources management (POLA) and water resources management plan(RENCANA)
d. Preparation of feasibility studies and technical planning / design / development of water resources
e. Procurement of goods and services as well as the determining the winner (contractors) of Procurement Services Unit (ULP)
f. Implementation of quality management systems and health and safety management systems (SMK3)
g. Water resources management which includes the conservation and utilization of water resources and control of water damage in the basin
h. Management of urban main drainage
i. Management of hydrological system
j. Management of Water resources information system (SISDA)
k. Implementation of operation and maintenance of water resources in the river basin
l. Implementation of technical guidance for water resources management under the authority of provinces and regencies/city
m. Drafting / compilation and preparation of technical recommendations in licensing the use of water resources and permits utilization of water resources in the river area
n. Facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)
o. Empowerment of communities in the management of water resources
p. Implementation of financial accounting report and accounting of state property as the Accounting Unit Area

q. Implementation of the collection, receipt and use of the cost of water resource management services (BJPSDA) in accordance with the provisions of the legislation
r. Implementation of administrative affairs and households of BBWS as well as public communication
s. Preparation of performance agreements and performance reports of BBWS
t. Organize / carry out monitoring and supervision over the use of water resources and investigation of criminal offenses on water resources division

**from No.20/PRT/M/2016 (Translation into English by JICA RBO Project Team)*

- Information for the Analysis

The project team received POLA, Assessment Report and Accountability Report from BBWS Ciliwung Cisadane for analysis.

In addition, the project was suggested that capacity development activity of BBWSs and BWSs should be considered performance of PJT I and II by Director General of Water Resources of PUPR.

Therefore, the project uses three (3) information, POLA, Assessment Report and Accountability Report, for the analysis. Function and Role of PJT I and II is considered as a reference for the analysis.

Various Items

(1) POLA on Ciliwung Cisadane River Basin
(2) Self-Assessment Report of Performance Benchmarking of BBWS Ciliwung Cisadane (2015)
(3) Accountability Report, Fiscal Year 2015 of BBWS Ciliwung Cisadane

Reference

- Functions and Roles of PJT I and II

- **Comparing between Current Functions / Roles and Various Items**

Table-1 shows 3 (three) items and 1 (one) reference , information sources and results of our analysis to find candidate current functions as expected functions / roles. We have picked up much information from each item as important / prioritized / necessary / recommended works to put on adequate current functions / role. Then, to find expected functions / roles, we put value on each current function accordance with each criterion, such as number of works, score gap between current and goal, etc.

Result of each analysis is referred to Attachment 1 to 4.

Table-1 Items for analysis to identify expected functions and roles of BWS Sulawesi I

No.	Items	Information Sources	Analyzed Result	Reference
(1)	POLA	Physical and Non-Physical Efforts	Important functions with detail works	Attachment-1
(2)	Self-Assessment Report 2015	Key Performances and score	Prioritized functions	Attachment-2
(3)	Accountability Report 2015	Main Activities	Necessary works and Performances	Attachment-3
	Self Assessment Report and Company Profile of PJT I and II	Function and duty of PJT I and II	-	Attachment-4

1.1.3. (Step 2) Integrating result of above "Step1" to find candidate expected functions and roles (Duties) as proposal

Table-2 shows integrating analyzed result of "Comparing between current functions / roles and various items" from each analysis (from A 1 to 4), and describes total score and candidate current functions as expected functions / roles.

Table-2 Integrating analyzed result and total score

No.	Current Functions	BBWS Cil Cis					PJT
		POLA	Assessment Report	LAKIP	Analysis Result		SA Report, Company Prifile
a	Preparation of POLA / RENCANA	Middle	Middle	Middle	Middle	6	
b	Preparation of WRM Program / Plan	High	High	High	High	9	Low
c	Monitoring of POLA / RENCANA inplementation	Middle	High	High	High	8	Low
d	Preparation of FS and technical planning / design	High	High	High	High	9	Low
e	Procurment of goods and services	Middle	High	Middle	Middle	7	Middle
f	Implementation of SMK3 (quality, health, safety)	Middle	Middle	Middle	Middle	6	Low
g	WRM, Conservation, Utilization, Damage Control	High	Middle	High	High	8	High
h	Urban main drainage	Middle	-	Low	Low	3	
i	Hydrology System	Middle	Middle	Middle	Middle	6	High
j	WR Information System (SISDA)	Middle	Middle	High	Middle	7	Middle
k	O/M of WR	Middle	Middle	High	Middle	7	High
l	Technical Guidance to Local Authority	Middle	Middle	Middle	Middle	6	High
m	Technical Recommendation for Permission	High	Low	Low	Middle	5	
n	WRM Coordination Team (TKPSDA)	High	Middle	Middle	Middle	7	
o	Public Empowerment	Middle	Middle	Middle	Middle	6	Middle
p	Financial and Property Accounting Report	Middle	Middle	Middle	Middle	6	Middle
q	BJPSDA	Middle	-	Middle	Low	4	Middle
r	Administrative and general affairs	Middle	-	Middle	Low	4	
s	Performance agreement / report	Middle	-	Low	Low	3	Low
t	Monitoring WR use and Investigation of criminals	Middle	-	Middle	Low	4	Low

- "Analysis Result" is prioritized by "Total Score"

  0 – 4: Low, 5-7: Middle, 8 -: High

- "Total Score" is calculated as sum of "Weight Scoring" from 3 items, POLA, Assessment Report and LAKIP (Accountability Report)

- Priority at 3 items, POLA, Assessment Report and LAKIP, is classified by;

  POLA: number of activity from Physical and Non-physical Efforts Matrix of POLA

Assessment Report: gap between current assessment score and target score

LAKIP: number of activity from the report

According to total score on table-2, candidate functions as expected functions / roles are recognized temporarily into 5 (five) functions as below box;

Temporary expected functions / roles

b. Preparation of water resources management programs and action plans for water resources management in river basin

c. Monitoring and evaluation of the implementation / application of a water resources management (POLA) and water resources management plan(RENCANA)

d. Preparation of feasibility studies and technical planning / design / development of water resources

g. Water resources management which includes the conservation and utilization of water resources and control of water damage in the basin

1.1.4. (Step 3) Discussion to decide expected functions and roles

From PIU

- Function and Duty of PJT I and II should not applied into the analysis, because responsibility of B(B)WS and PJTs is different. Therefore, Function and Duty of PJT I and II must be a reference for the analysis, it is not included into “weight Scoring” for the analysis

From BBWS Ciliwung Cisadane

- BBWS Cil Cis also suggested Function and Role of PJT I and II is the reference for the analysis
- BBWS Cil Cis agree that “b”, “d” and “g” as expected function and role, however BBWS suggested to drop “c” from expected function and role. Because monitoring of POLA and RENCANA is currently functioned well, BBWS Cil Cis would like to focus other function and role to improve
- BBWS Cil Cis suggested to include “k” and “n” as expected function and role. There are a lot of issues, concerns and programs on Operation & Maintenance of Water Resources with coordination through TKPSDA

  k: Implementation of operation and maintenance of water resources in the river basin

  n: Facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)

1.1.5. Confirmed expected functions in BWS Sulawesi I

After the discussion with PIU member and BBWS Ciliwung Cisadane, expected function and role for BBWS Ciliwung Cisadane was confirmed at PIU Meeting that was held on 20th September 2017 as below.

Confirmed expected functions / roles

b. Preparation of water resources management programs and action plans for water resources management in river basin
d. Preparation of feasibility studies and technical planning / design / development of water resources
g. Water resources management which includes the conservation and utilization of water resources and control of water damage in the basin
k. Implementation of operation and maintenance of water resources in the river basin
n. Facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)

1.2. Break down daily work activities of expected functions and roles

1.2.1. Methodology of breakdown of daily and important activities on expected RBO's function

In the analysis of above 1.1, important / prioritized / necessary / recommended functions and works already picked up from each item, such as POLA, Self-Assessment Report, Accountability Report, and put on adequate current functions (refer to Attachment 1 to 4). Therefore, candidate daily / important works for expected functions / roles can be sorted out from Attachment 1 to 4. After that, we choose suitable daily / important works and break down into details on daily activities and important duties.

Step 1: Sort out detail duties from bellows for analyzed expected functions
1) POLA, 2) Self-Assessment Report, 3) Accountability Report
Step 2: Break down of daily activity for detail duties

1.2.2. (Step 1) Sort out detail duties from 1) POLA, 2) Self-Assessment Report, and 3) Accountability Report, for analyzed expected functions

Detail Duties from POLA, Self-Assessment Report and Accountability Report are sorted out and classified as candidate daily / important works for expected functions / roles. Table-3.1 to 3.5 shows candidate daily / important works for each expected functions / role.

Table-3.1 Candidate daily / important works for expected functions / roles of "b."

b. Preparation of water resources management programs and action plans for water resources management in river basin		
	POLA	
		Plan the NCICD stage A sea embankment
		Preparing Annual Water Allocation Plan of WS Ciliwung Cisadane to be agreed TKPSDA WS Ciliwung Cisadane
		Arrange plans and implement the protection of river beds and riverbank in major rivers at WS Ciliwung - Cisadane each year
		Sampling for Water Quality Monitoring System, its frequency is 3 times in one year
		Balai support/supervise Ciawi Dam Construction Project Team, such as Land Acquisition and construction works
		Balai support/supervise River Normalization Project Team to implement smoothly
		Review / Stipulation of River Area Border around Situ to secure functions of Situ
	Assessment Report	
	Accountability Report	
		Detail Engineering Design on raw water infrastructure IPA (Water Treatment Plant) at Pesanggrahan and Citayam
		SID raw water infrastructure IPA Mekarsari and Legong
		The LARAP (Survey/Investigation/Design) study on the construction of the Ciawi dam
		EIA study on the construction of the Ciawi dam
		Detail of dam design Ciawi and Sukamahi Dam
		SID check dam in Ciliwung Upstream basin
		Details of situ-situ rehabilitation design in Bogor

Table-3.2 Candidate daily / important works for expected functions / roles of “d.”

d. Preparation of feasibility studies and technical planning / design / development of water resources		
	POLA	
		Collect data and information for planning on necessary capacity as Long Storage at BKB/BKT/Cengkareng drain for reduce internal flood. And implementing activity for awareness raising of residents (Sosialization) on keep water clean at BKB/BKT/Cengkareng drain to satisfy regulation on water quality for Raw Water
		Water quality monitoring, 3 times/year
		Conducting feasibility study and design details of Limo Reservoir, Pesanggrahan River in Cinere Depok
		Review of water allocation for irrigation that intake from Katulampa weir, because irrigation area is reduced
		Implementation of study on potential water supply for raw water to JABODETABEK, to re-allocate the water from irrigation water that intake from Katulampa weir. Because irrigation area is reduced
		Collect data and information for implementation of FS and detail design of reservoirs at Pondok Benda, Angke River in Pamulang
		Collect data and information for implementation of FS and detail design of Genteng Reservoir at Cisadane River
		Implement FS on Narogong Reservoir
		Collect data and information for making a master plan for Integrated Flood Control in Ciliwung Cisadane River Basing, considering on; flood discharge scale 1:100, 1:50, 1:25 and internal flood for drainage capacity: 1:5
		Emergency Operation Plan of Situ Gintung
		Development and installation of early warning systems across all rivers
		Plan and Build sea dikes in Cilincing, Pluit, Pasar Ikan, estuary Kamal and Marunda
		Plan the NCICD stage A sea embankment
		Carry out Feasibility Study and design details of Connecting Channel between Ciliwung River to BKT
		Planning and implement of rehabilitation of sustainable levee against flood
		Plan the NCICD stage A sea embankment
	Assessment Report	
	Accountability Report	
		Detail Engineering Design on raw water infrastructure IP (Water Treatment Plant) at Pesanggrahan and Citayam
		SID raw water infrastructure IPA Mekarsari and Legong
		The LARAP (Survey/Investigation/Design) study on the construction of the Ciawi dam
		EIA study on the construction of the Ciawi dam
		Detail of dam design Ciawi and Sukamahi Dam
		SID check dam in Ciliwung Upstream basin
		Details of situ-situ rehabilitation design in Bogor

Table-3.3 Candidate daily / important works for expected functions / roles of “g.”

g. Water resources management which includes the conservation and utilization of water resources and control of water damage in the basin		
	POLA	
		River Improvement of Ciliwung and Cisadane River Basin
		Activity for awareness raising of residents and public on Ciliwung River Area Border
		Strengthening efforts to implement the critical areas (vegetative and civil engineering).
		Carry out construction of the East Flood Canal (23.5 km) to finish in 2011
		Implement River Channel Improvement at Pesanggrahan, Angke, Sunter (PAS) Rivers
		Implement River Channel Improvement of Ciliwung River from TB.Simatupang up to Manggarai
		Collect data and information for design and implement "short cut" at kalibata and Kebun Baru of Ciliwung River
		Continue to implement work for additional water gate are Karet (at Manggarai, it already finished)
		Check conditions of old water gates at Ciliwung river for revitalization
		Implement Dredging for 13 River and 5 Reservoir in Jakarta, as JEDI Program (Jakarta Emergency Dredging Initiative)
		Implement River Channel Normalization in urban areas (Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi and Kali Dadap, Grogol, Krukut, West Canal (Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat and Cakung, Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) with Q25
		Preparation of a strategy on environment conservation in Ciliwung River Basin with BPDAS and TKPSDA WS Ciliwung Cisadane
		Start the preparation of National Movement of Partnership on Water Security (GNKPA) programs and activities
		Collect data and Information on inundated area by past floods for review Flood Hazard & Risk Maps and to open for public
		Collect data and Information on topography and landslides by past phenomenon for review Sediment Disaster Hazard & Risk Maps and to open for public
		Plan and Build sea dikes in Cilincing, Pluit, Pasar Ikan, estuary Kamal and Marunda
		Carry out construction of the East Flood Canal (23.5 km) to finish
		Implement River Channel Improvement at Pesanggrahan, Angke, Sunter (PAS) Rivers
		Implementing for Ciliwung River Management on Environment Conservation
		Implement River Channel Improvement of Ciliwung River from TB. Simatupang up to Manggarai
		Continue to implement work for additional water gate ar Karet (at Manggarai, it already finished)
		Implement Dredging for 13 River and 5 Reservoir in Jakarta, as JEDI Program (Jakarta Emergency Dredging Initiative)
		Carry out Feasibility Study and design details of Connecting Channel between Ciliwung River to BKT
		Planning and implement of rehabilitation of sustainable levee against flood
		The study on drainage system of Kemayoran and Kota Bekasi in 2016
	Assessment Report	
	Accountability Report	
		Technical Guidance on River Planning and Conservation
		Geotechnical study and underwater investigation of Jakarta costal area
		Detail Design (DD) restoration and upgrading of the Cekeas River
		Detai Design Flood Control of Sungai Bekasi Hilir
		EIA Study on River Channel Improvement at Cisadane River
		Development of Infiltration Wells in Ciliwung River Basin at Kab. Bogor

Table-3.4 Candidate daily / important works for expected functions / roles of “k.”

k. Implementation of operation and maintenance of water resources in the river basin		
	POLA	
		Implementing 60% of reservoirs / situ by BBWS (for reservoirs / sites still managed by the center)
		Implement rehabilitation/OP at 27 water springs
		Implementation of OP for water resources infrastructure (100% Service Level)
		Carry out the OP for Rivers and Drainage channels throughout the year
		Conducting socialization through TKPSDA WS Ciliwung Cisadane for public awareness about the risk of land subsidence by intake ground water in a sustainable manner
	Assessment Report	
	Accountability Report	
		Technical inspections on raw water, situ and dam
		OP Manual on Raw Water Management of Cisarua
		OP Training on Situ and dam
		Thorough inspection Gintung dam.
		Supervision of Situ Maintenance
		Routine maintenance of Situ in the Ciliwung Cisadane river area
		OP of Telemetry
		Routine OP of River Channel in the Ciliwung Cisadan river area
		Facilitation for technical skills of OP officials

Table-3.5 Candidate daily / important works for expected functions / roles of “j.”

n. Facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)		
	POLA	
		Implementation of the detail design for raw water supply/utilizing, volume of water for western and eastern canal from the katulampa weir for irrigation
		Activate the Secretariat of TKPSDA Ciliwung Cisadane in a sustainable manner
		Plan and allocate water through agreements in TKPSDA as well as carrying out river flushing
		Review and implement the water allocation in Cisadane river for making agreement
		Implement water allocation of Cisadane River according to the agreement in a sustainable manner
		Carry out cooperation and coordination with stakeholders for flood management
		Building commitment among stakeholders on tasks and budget of TKPSDA WS Cil-Cis for water resources management in a sustainable manner
	Assessment Report	
	Accountability Report	
		Facilitating NATIONAL MOVEMENT OF PARTNERSHIP (GNKPA) 2. on WATER SAFETY
		Preparing technical recommendations on water use (SIPPA)

1.2.3. (Step 2) Discussion for confirmation of daily and important activities

The project team had discussion with BWS Sulawesi I to confirm of daily / important activities (works). We got new ideas and revisions of candidate daily / important activities for each expected functions / roles as below;

b. Preparation of water resources management programs and action plans for water resources management in river basin

- ✓ BBWS Ciliwung Cisadane already formulated POLA. RENCANA was also already drafted and submitted to PUPR HQs.
- ✓ There are several important program/plan/design that should be formulated or finalized, such as NCICD, Dam Constructions, Rehabilitation of Situ-Situ, Annual Water Allocation and so on. These information is included into the Table 3-1 as Daily and Importance Activity
- ✓ Regarding Water Allocation plan, BBWS Ciliwung Cisadane already had the plan of Ciliwung and Bekasi River. But the plan of Cisadane River has not been formulated yet

d. Preparation of feasibility studies and technical planning / design / development of water resources

- ✓ BBWS Ciliwung Cisadane has many studies and plans that have to finalize, such as Dam and Reservoir construction/rehabilitation, Flood Control Plan and so on. These information is included into the Table 3-2.
- ✓ Regarding Water Allocation plan, BBWS Ciliwung Cisadane already had the plan of Ciliwung and Bekasi River. But the plan of Cisadane River has not been formulated yet

g. Water resources management which includes the conservation and utilization of water resources and control of water damage in the basin

- ✓ There are many activities that should implement, such as River Channel Normalization, Water Security and Environment Conservation with Stakeholders through TKPSDA and so on. Almost all the activity is mentioned in Table 3-3
- ✓ Regarding utilization of water resources, BBWS Ciliwung Cisadane emphasizes that formulation of water allocation plan in Cisadane is also important

k. Implementation of operation and maintenance of water resources in the river basin

- ✓ Regarding operation & maintenance of water resources in Ciliwung Cisadane river basin, one of the significant issue is Dam/Situ operation & maintenance
- ✓ On the other hand, land subsidence is also one of the important issues. As BBWS, we should promote public awareness on risk of land subsidence
- ✓ These above topics are included into the Table 3-4

n. Facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)

- ✓ BBWS as secretariat office of TKPSDA, we strengthen their activity more. Therefore, agreement on tasks and budgeting of TKPSDA among members and related organizations is indispensable
- ✓ As an urgent issue, BBWS with TKPSDA should make agreement on water allocation in Cisadane. Therefore, BBWS should create a water balance (water availability and demand) in Cisadane, especially irrigation from Bendung Pasar Baru

1.2.4. Confirmed daily and important activities

b. Preparation of water resources management programs and action plans for water resources management in river basin

- Planning and Supporting for making design of infrastructures, Sea dike for NCICD, Ciawi and Sukamahi Dam, River Normalization project including River Area Boarder Management
- Preparation of Annual Water Allocation Plans in Cisadane River
- Detail Design of Rehabilitation for Situ (Small Dams)
- Survey/Investigation/Design of Check Dams for Ciliwung Upstream Conservation
- Water Quality Sampling and Analysis (3 times in one year)
- Support for design for raw water infrastructures from engineering view point

d. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources

- Flood Control Plan (Flood Scale: 1:100, 1:50, 1:25), internal Flood Plan (1:5) in Ciliwung Cisadane River Basin
- River Environment Improvement Activity, awareness raising for residents for keeping water clean for raw water

- Revision of Water Allocation Plan, especially implementation of study on potential water supply for raw water to JABODETABEK, to re-allocate the water from irrigation water that intake from Katulampa weir. Because irrigation area is reduced
- Feasibility Study and Design of Small Reservoirs (Dams), Limo Reservoir at Pesanggrahan River in Cinere Depok, Reservoirs at Pondok Benda Angke River in Pamulang, Genteng Reservoir at Cisadane River, Narogong Reservoir
- Emergency Operation Plan of Situ Gintung
- Planning and Design of Sea Dikes
- Planning and Implementing levee (revetment) rehabilitation
- Detail Design of Rehabilitation for Situ (Small Dams)
- Survey/Investigation/Design of Check Dams for Ciliwung Upstream Conservation
- Water Quality Sampling and Analysis (3 times in one year)
- Support for design for raw water infrastructures from engineering view point

g. <u>Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin</u>

- River Normalization and Channel Improvement in Ciliwung and Cisadane, and also Pesanggrahan, Angke, Sunter (PAS) Rivers. Additionally, short-cut at Kalibata and Kebun Baru of Ciliwung River
- Urban River Improvement at Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi, Kali Dadap, Grogol, Krukut, West Canal (Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat and Cakung, Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) with Flood Scale 1:25
- Check the current condition of existing/old gate at Ciliwung River, Manggarai and Karet
- Preparation of Environment Conservation Strategy in Ciliwung River Basin and implementation of Environment Conservation Management, including National Movement of Partnership on Water Security (GNKPA) programs and activities
- Hazard Maps on Flood and Sediment Disaster
- Dredging at 13 rivers and 5 reservoirs in Jakarta
- Feasibility Study, Design and Construction of connecting channel between Ciliwung River and BKT
- Rehabilitation of Levee for Flood Control
- The Study of Drainage System in Kemayoran and Bekasi City

- Technical Guidance on River Planning and Conservation
- Detail Design for Flood Control at Cekeas, Bekasi and Cisadane River. Retention Facility and River Channel Improvement
- Geotechnical study and underwater investigation of Jakarta costal area
- Development of Infiltration Wells in Ciliwung River Basin at Kab. Bogor

k. <u>Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin</u>

- Implementation of Operation and Maintenance of Reservoirs (Situ), 60% of all Reservoirs in Ciliwung Cisadane River (other 40% reservoirs by local)
- Implementation of rehabilitation and O&M at 27 ponds
- Implementation of adequate O&M that service quality level should reach 100%
- Implementation of River and Drainage channel through the year
- Socialization and awareness raising of resident with TKPSDA on subsidence risk for underground water intake control
- Supervision, Inspection and Operation & Maintenance of Small Reservoirs (Situ) in Ciliwung Cisadane River Basin, especially inspection of Situ Gintung
- Routine Operation & Maintenance of River Channel
- Operation & Maintenance of Telemetry System

n. <u>Facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)</u>

- Implementation of Water Allocation Plan for Raw Water and detail design of facility especially check volume from Katulampa Weir for Irrigation
- Plan and Allocate for River Flushing with agreement with stakeholders
- Review and Water Allocation Plan in Cisadane River for stakeholders agreement
- Making Cooperation with stakeholders for Flood Management through TKPSDA
- Facilitation of National Movement of Partnership (GNKPA) for water security
- Preparation for technical recommendation on Water User Right (SIPPA)

2. <u>Activity 1-2</u>

Sort out the activities to be strengthened by comparing the actual activities with the ideal functions and roles mentioned above in Activity 1-1

Through discussion between BBWS Ciliwung Cisadane, PIU and JICA project team, activities to be strengthened had been sorted out as below

b. <u>Preparation of water resources management programs and action plans for water resources management in river basin</u>

- Planning and Supporting for making design of infrastructures, Sea dike for NCICD, River Normalization project including River Area Boarder Management
- Preparation of Annual Water Allocation Plans in Cisadane River
- *Survey/Investigation/Design of Check Dams for Ciliwung Upstream Conservation*
- Water Quality Sampling and Analysis (3 times in one year)

d. <u>Compilation of program and plan, feasibility study and planning of technical/design/development of water resources</u>

- Flood Control Plan (Flood Scale: 1:100, 1:50, 1:25), internal Flood Plan (1:5) in Ciliwung Cisadane River Basin
- River Environment Improvement Activity, awareness raising for residents for keeping water clean for raw water
- Revision of Water Allocation Plan, especially implementation of study on potential water supply for raw water to JABODETABEK, to re-allocate the water from irrigation water that intake from Katulampa weir. Because irrigation area is reduced
- Feasibility Study and Design of Small Reservoirs (Dams), Limo Reservoir at Pesanggrahan River in Cinere Depok, Reservoirs at Pondok Benda Angke River in Pamulang, Genteng Reservoir at Cisadane River, Narogong Reservoir
- Emergency Operation Plan of Situ Gintung
- Planning and Design of Sea Dikes
- Planning and Implementing levee (revetment) rehabilitation
- Detail Design of Rehabilitation for Situ (Small Dams)
- Survey/Investigation/Design of Check Dams for Ciliwung Upstream Conservation
- Water Quality Sampling and Analysis (3 times in one year)
- Support for design for raw water infrastructures from engineering view point

g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin

- River Normalization and Channel Improvement in Ciliwung and Cisadane, and also Pesanggrahan, Angke, Sunter (PAS) Rivers. Additionally, short-cut at Kalibata and Kebun Baru of Ciliwung River
- Urban River Improvement at Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi, Kali Dadap, Grogol, Krukut, West Canal (Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat and Cakung, Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) with Flood Scale 1:25
- Check the current condition of existing/old gate at Ciliwung River, Manggarai and Karet
- Preparation of Environment Conservation Strategy in Ciliwung River Basin and implementation of Environment Conservation Management, including National Movement of Partnership on Water Security (GNKPA) programs and activities
- Hazard Maps on Flood and Sediment Disaster
- Dredging at 13 rivers and 5 reservoirs in Jakarta
- Feasibility Study, Design and Construction of connecting channel between Ciliwung River and BKT
- Rehabilitation of Levee for Flood Control
- The Study of Drainage System in Kemayoran and Bekasi City

k. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin

- Implementation of Operation and Maintenance of Reservoirs (Situ), 60% of all Reservoirs in Ciliwung Cisadane River (other 40% reservoirs by local)
- Implementation of rehabilitation and O&M at 27 ponds
- Implementation of adequate O&M that service quality level should reach 100%
- Implementation of River and Drainage channel through the year
- Socialization and awareness raising of resident with TKPSDA on subsidence risk for underground water intake control
- Supervision, Inspection and Operation & Maintenance of Small Reservoirs (Situ) in Ciliwung Cisadane River Basin, especially inspection of Situ Gintung
- Routine Operation & Maintenance of River Channel
- Operation & Maintenance of Telemetry System

n. Facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)

- Implementation of Water Allocation Plan for Raw Water and detail design of facility especially check volume from Katulampa Weir for Irrigation
- Plan and Allocate for River Flushing with agreement with stakeholders
- Review and Water Allocation Plan in Cisadane River for stakeholder's agreement
- Making Cooperation with stakeholders for Flood Management through TKPSDA
- Facilitation of National Movement of Partnership (GNKPA) for water security
- Preparation for technical recommendation on Water User Right (SIPPA)

3. Activity 1-3

3.1. Identify priority issues, which are necessary to be tackled with stakeholders as common and important targets,

Candidate issues which are necessary to be tackled with stakeholders are selected from result of Activity 1-2 "activities to be strengthened" as below. The issues will be selected by discussion with PUPR, BBWS Ciliwung Cisadane.

b. Preparation of water resources management programs and action plans for water resources management in river basin

- Planning and Supporting for making design of infrastructures, Sea dike for NCICD, River Normalization project including River Area Boarder Management
- Preparation of Annual Water Allocation Plans in Cisadane River
- *Survey/Investigation/Design of Check Dams for Ciliwung Upstream Conservation*
- Water Quality Sampling and Analysis (3 times in one year)

d. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources

- Flood Control Plan (Flood Scale: 1:100, 1:50, 1:25), internal Flood Plan (1:5) in Ciliwung Cisadane River Basin
- River Environment Improvement Activity, awareness raising for residents for keeping water clean for raw water
- Revision of Water Allocation Plan, especially implementation of study on potential water supply for raw water to JABODETABEK, to re-allocate the water from

irrigation water that intake from Katulampa weir. Because irrigation area is reduced

- Feasibility Study and Design of Small Reservoirs (Dams), Limo Reservoir at Pesanggrahan River in Cinere Depok, Reservoirs at Pondok Benda Angke River in Pamulang, Genteng Reservoir at Cisadane River, Narogong Reservoir
- Emergency Operation Plan of Situ Gintung
- Planning and Design of Sea Dikes
- Planning and Implementing levee (revetment) rehabilitation
- Detail Design of Rehabilitation for Situ (Small Dams)
- Survey/Investigation/Design of Check Dams for Ciliwung Upstream Conservation
- Water Quality Sampling and Analysis (3 times in one year)
- Support for design for raw water infrastructures from engineering view point

h. <u>Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin</u>

- River Normalization and Channel Improvement in Ciliwung and Cisadane, and also Pesanggrahan, Angke, Sunter (PAS) Rivers. Additionally, short-cut at Kalibata and Kebun Baru of Ciliwung River
- Urban River Improvement at Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi, Kali Dadap, Grogol, Krukut, West Canal (Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat and Cakung, Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) with Flood Scale 1:25
- Check the current condition of existing/old gate at Ciliwung River, Manggarai and Karet
- Preparation of Environment Conservation Strategy in Ciliwung River Basin and implementation of Environment Conservation Management, including National Movement of Partnership on Water Security (GNKPA) programs and activities
- Hazard Maps on Flood and Sediment Disaster
- Dredging at 13 rivers and 5 reservoirs in Jakarta
- Feasibility Study, Design and Construction of connecting channel between Ciliwung River and BKT
- Rehabilitation of Levee for Flood Control
- The Study of Drainage System in Kemayoran and Bekasi City

k. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin

- Implementation of Operation and Maintenance of Reservoirs (Situ), 60% of all Reservoirs in Ciliwung Cisadane River (other 40% reservoirs by local)
- Implementation of rehabilitation and O&M at 27 ponds
- Implementation of adequate O&M that service quality level should reach 100%
- Implementation of River and Drainage channel through the year
- Socialization and awareness raising of resident with TKPSDA on subsidence risk for underground water intake control
- Supervision, Inspection and Operation & Maintenance of Small Reservoirs (Situ) in Ciliwung Cisadane River Basin, especially inspection of Situ Gintung
- Routine Operation & Maintenance of River Channel
- Operation & Maintenance of Telemetry System

n. Facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)

- Implementation of Water Allocation Plan for Raw Water and detail design of facility especially check volume from Katulampa Weir for Irrigation
- Plan and Allocate for River Flushing with agreement with stakeholders
- Review and Water Allocation Plan in Cisadane River for stakeholder's agreement
- Making Cooperation with stakeholders for Flood Management through TKPSDA
- Facilitation of National Movement of Partnership (GNKPA) for water security
- Preparation for technical recommendation on Water User Right (SIPPA)

As a result of discussions among BBWS Ciliwung Cisadane, PIU and JICA Project Team, all activity items that were selected as activity to be strengthened are selected as priority issues that should be tackled with stakeholders. Because, BBWS Ciliwung Cisadane manages several rivers where flow in JABODETABEK. It includes DKI, West Java and Banten Provinces and there many kinds of stakeholders and water users. Therefore, all activity from Activity 1-2 is related with stakeholders and important.

4. Activity 1-4

4.1. Identify concrete work activities to tackle the priority issues recognized in "1-3"

Before making concrete work activity, we selected adequate activities for Capacity Development for BBWS Ciliwung Cisadane. Some of the priority activities that were selected in Activity 1-4 should be conducted other agencies, consultants and contractors. Some of the activities has been conducted in concrete plan that coordinated with stakeholders.

b. Preparation of water resources management programs and action plans for water resources management in river basin

- Preparation of Annual Water Allocation Plans in Cisadane River
- *Survey/Investigation/Design of Check Dams for Ciliwung Upstream Conservation*
- Water Quality Sampling and Analysis (3 times in one year)

d. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources

- Revision of Water Allocation Plan, especially implementation of study on potential water supply for raw water to JABODETABEK, to re-allocate the water from irrigation water that intake from Katulampa weir. Because irrigation area is reduced
- Emergency Operation Plan of Situ Gintung
- Planning and Implementing levee (revetment) rehabilitation
- Detail Design of Rehabilitation for Situ (Small Dams)
- Survey/Investigation/Design of Check Dams for Ciliwung Upstream Conservation
- Water Quality Sampling and Analysis (3 times in one year)

h. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin

- River Normalization and Channel Improvement in Ciliwung and Cisadane, and also Pesanggrahan, Angke, Sunter (PAS) Rivers. Additionally, short-cut at Kalibata and Kebun Baru of Ciliwung River
- Urban River Improvement at Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi, Kali Dadap, Grogol, Krukut, West Canal (Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat and Cakung, Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) with Flood Scale 1:25
- Preparation of Environment Conservation Strategy in Ciliwung River Basin and implementation of Environment Conservation Management, including National Movement of Partnership on Water Security (GNKPA) programs and activities

k. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin

- Implementation of Operation and Maintenance of Reservoirs (Situ), 60% of all Reservoirs in Ciliwung Cisadane River (other 40% reservoirs by local)
- Implementation of rehabilitation and O&M at 27 ponds
- Supervision, Inspection and Operation & Maintenance of Small Reservoirs (Situ) in Ciliwung Cisadane River Basin, especially inspection of Situ Gintung

n. Facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)

- Implementation of Water Allocation Plan for Raw Water and detail design of facility especially check volume from Katulampa Weir for Irrigation
- Plan and Allocate for River Flushing with agreement with stakeholders
- Review and Water Allocation Plan in Cisadane River for stakeholder's agreement
- Making Cooperation with stakeholders for Flood Management through TKPSDA
- Facilitation of National Movement of Partnership (GNKPA) for water security
- Preparation for technical recommendation on Water User Right (SIPPA)

4.2. Identify area of the capacity development necessary for those work activities

Areas and concrete activity of capacity development for these priority issues is identified into several activities as below. Some of topics is related with other priority issues.

➢ Irrigation water demand calculation at Cisadane Downstream

An activity of **"Preparation of Annual Water Allocation Plans in Cisadane River"** in *b. preparation of water resources management programs and action plans for water resources management in river basin* is firstly identified as concrete activity for Water Allocation and Water Balance Calculation in Cisadane River. However, there are similar identified activities as follows;

- "Revision of Water Allocation Plan, especially implementation of study on potential water supply for raw water to JABODETABEK, to re-allocate the water from irrigation water that intake from Katulampa weir" [*d. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources*]

- "Implementation of Water Allocation Plan for Raw Water and detail design of facility especially check volume from Katulampa Weir for Irrigation"
- "Review and Water Allocation Plan in Cisadane River for stakeholder's agreement" [*n. Facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)*]

These three topics are related into water allocation and re-calculation of irrigation water demands. As the result of discussion to make concrete work plan for the activity, JICA project should focus on the re-calculation of the irrigation water demand at Cisadane Downstream area where agriculture field is rapidly decreasing by industrial development and Soekarno Hatta International Airport Re-development. JICA Project will do;

1) Discussion on detail schedule of activity and collecting areal data
2) Check the Areal Data with Satellite and other data to find decreasing locations
3) Simple Survey at Site to identify current agriculture field area
4) Calculation of Irrigation Area on GIS
5) Re-calculation of Irrigation Water Demand for Cisadane Utara Irrigation Area

➢ Environment Conservation at Upper Ciliwung

An activity on "**Survey/Investigation/Design of Check Dams for Ciliwung Upstream Conservation**" in [b. Preparation of water resources management programs and action plans for water resources management in river basin] is firstly identified as a concrete activity for Environment Conservation at Upper Ciliwung". However , there are similar identified activities as follows;

- Survey/Investigation/Design of Check Dams for Ciliwung Upstream Conservation [d. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources]
- Preparation of Environment Conservation Strategy in Ciliwung River Basin and implementation of Environment Conservation Management, including National Movement of Partnership on Water Security (GNKPA) programs and activities [h. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin]

These two topics are related into environment conservation for upstream of Ciliwung River. According to BBWS Ciliwung Cisadane, the BBWS has a project plan on development of "Situ Telaga Saat" at upper Ciliwung. as a result of discussion, the project at upper Ciliwung includes "Environment Conservation" as one of the purposes. Therefore, JICA project supports for the project at upper Ciliwung on environment conservation as Project Activity.

1) Site Survey to confirm current conditions of Situ Telaga Saat

2) Choosing adequate SAKURA for Situ Telaga Saat and survey availability of SAKURA
3) Introducing example of Environment Conservation Project in Japan
4) Discussion on concepting and planning of the Project for making TOR of the Project

➢ Operation & Maintenance of Dam (Situ) for safety

An activity on "**Supervision, Inspection and Operation & Maintenance of Small Reservoirs (Situ) in Ciliwung Cisadane River Basin, especially inspection of Situ Gintung**" in [k. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin] is firstly identified as concrete activity for Operation and Maintenance of Dam (Situ) for safety. However , there are similar identified activities as follows;

- Emergency Operation Plan of Situ Gintung [d. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources]
- Detail Design of Rehabilitation for Situ (Small Dams) [d. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources]
- Implementation of Operation and Maintenance of Reservoirs (Situ), 60% of all Reservoirs in Ciliwung Cisadane River (other 40% reservoirs by local) [k. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin]
- Implementation of rehabilitation and O&M at 27 ponds [k. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin]

These four topics are related into Operation & Maintenance for Dam Safety. According to BBWS Ciliwung Cisadane, Situ Gintung (dam) has a leakage from bottom of downstream side of spillway. BBWS will conduct an investigation/inspection survey. As the result of discussion to make concrete work plan for the activity, JICA project will support for the investigation/inspection survey at Situ Gintung for Dam safety, on

1) Condition check on leakage at Situ Gintung
2) Method of the inspection and analysis of leakage
3) Analysis of the survey result to find factor
4) Countermeasures and maintenance plan for the leakage problem

➢ River Development (Normalization) in Ciliwung, Cisadane and other Rivers

An activity on "**Planning and Implementing levee (revetment) rehabilitation**" in [d. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources] is firstly identified as concrete activity for

River Normalization in Ciliwung, Cisadane and other Rivers. However , there are similar identified activities as follows;

- River Normalization and Channel Improvement in Ciliwung and Cisadane, and also Pesanggrahan, Angke, Sunter (PAS) Rivers. Additionally, short-cut at Kalibata and Kebun Baru of Ciliwung River [h. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin]
- Urban River Improvement at Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi, Kali Dadap, Grogol, Krukut, West Canal (Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat and Cakung, Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) with Flood Scale 1:25 [h. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin]

These two topics are related into River Normalization in Ciliwung, Cisadane and other Rivers. According to BBWS Ciliwung Cisadane, River Development Works, especially for flood control, was modified as river naturalization works which is based on request from DKI Jakarta. But the most difficult thing for the river works in Jakarta is that we cannot relocate houses in river area. Those houses in river area are officially illegal one. However, a judgement from Local Court said that Government should compensate for relocation even illegal house owner. BBWS will appeal against the decision from lower to higher court. Separately of the situation, BBWS would like to conduct River Normalization for Flood Control. JICA project might support for this matter with,

1) Introduction of Nature-Oriented River Works in Japan
2) Introduction of Urban River Flood Control Measures in Japan
3) On -site confirmation for feasibility on Naturalization of River and Flood Control in Urban River

5. Activity 1-5

5.1. Make a Short and Middle-term CD plans to accomplish the capacity development recognized in “1-4”

For accomplishment of CD recognized in Activity 1-4, it is a best way that project can implement a many activity to fulfill of CD for priority issues. However, the project should concentrate only several activities due to current resources of JICA experts and availability of member in BBWS Ciliwung Cisadane. Therefore, we, JICA project team and BBWS Ciliwung Cisadane agreed that we concentrate one activity for **“Irrigation water demand**

calculation at Cisadane Downstream".

Figure-1 shows CD plan until end of the project as a middle-term plan. Detail schedule and procedure for CD activity as a short-term plan is included into Figure-1 for implementation of CD activity as On the Job Training (OJT). Short- and middle- term CD plan are created through discussion between BBWS Ciliwung Cisadane and JICA project team.

However, during conducting OJT on "Irrigation water demand calculation at Cisadane Downstream", priority of the activity topics had been changed, because of requests from stakeholders, policy changes and others. Therefore, Project Manager (PIU), BBWS Ciliwung Cisadane and JICA Project Team discussed to add OJT Topic as project activities after Training in Japan on 2018. Because new prioritized topics were included into topic of training in Japan on 2018, such as dam operation & maintenance at Miwa dam, Misogawa dam and Kuzuryu Dam and River Environmental Improvement at HIMEJI River and Highways Management Office of MLIT. JICA Project had conducted several activities with BBWS Ciliwung Cisadane for "**Environment Conservation at Upper Ciliwung**" and "**Operation & Maintenance of Dam (Situ) for safety**", for examples following up of training in Japan on Dam Maintenance and introduction of environment Conservation Project in Japan.

PIU, BBWS Ciliwung Cisadane and JICA Project decided officially adding two topics as OJT topics, " **Environment Conservation at Upper Ciliwung"** and **"Operation & Maintenance of Dam (Situ) for safety"**, dropping one topic from OJT topic, **"Irrigation water demand calculation at Cisadane Downstream"**, at a meeting on 23rd October 2018. Figure-1 shows revised CD plan including new OJT topics.

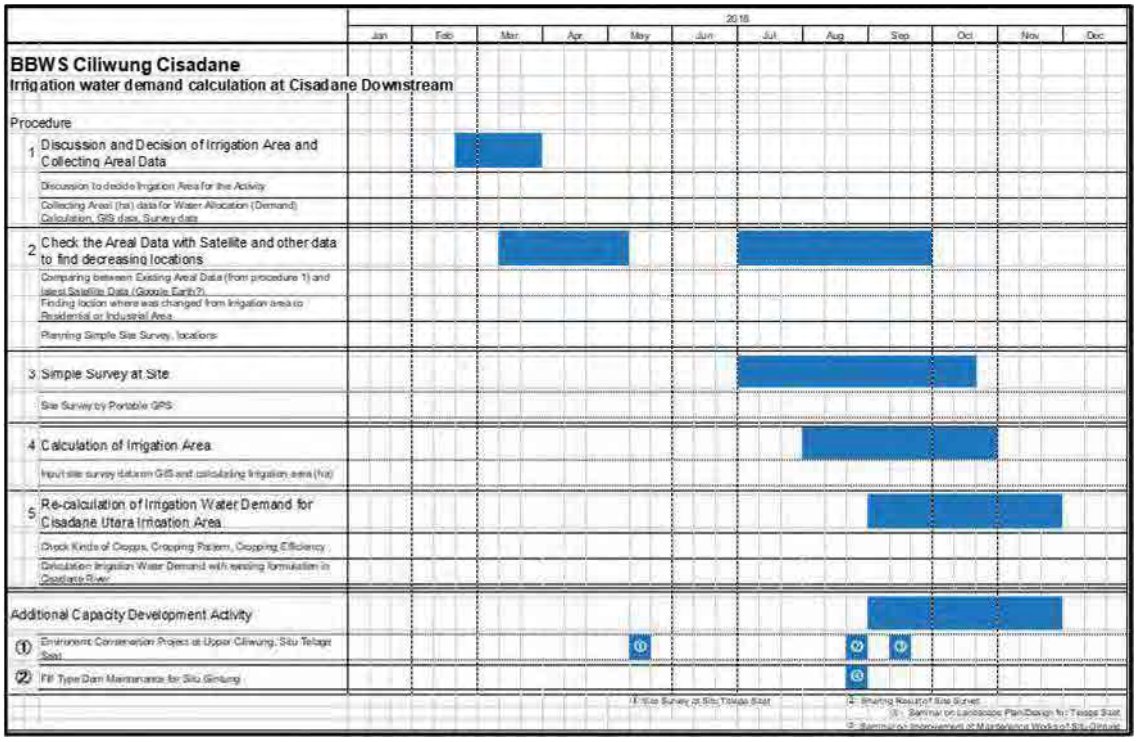


Figure-1 Detail Schedule and Procedure for CD Activity

END

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
a.	penyusunan pola dan rencana pengelolaan sumber daya air pada wilayah sungai	Review Peraturan Perundangan-undangan di Bidang Sumber Daya Air dan Peraturan Lainnya yang Terkait			Middle
		Review Kebijakan Pengelolaan Sumber Daya Air atau Kebijakan Pembangunan Provinsi atau Kabupaten/Kota			
		Inventarisasi data (Data umum, Data Sumber Daya Air dan Data Kebutuhan Air)			
		Identifikasi kondisi lingkungan dan permasalahan			
		Identifikasi Terhadap Potensi yang Bisa Dikembangkan			
		Menetapkan kebijakan tentang transfer air antar wilayah	Pemberdayaan dan Peningkatan Peran Masyarakat dan Dunia Usaha	Pengaturan Pengelolaan Sumber Daya Air	
	preparation of Strategic Plan (POLA) and Master Plan (RENCANA) of water resources management in the river basin	Review of legislation and regulations in the field of Water Resources and Other regulations Relating			
		Review Water Resources Management Policy or the Provincial Development Policy or the Regency / City			
		Inventory Data (General Data, Water Resources Data and Water Needs Data)			
		Identification of environmental conditions and problems			
		Identification Of Potential Can Be Developed			
		Establish a policy on water transfers between regions	Empowerment and Increased Role of Civil Society and Business	Water Resource Management Control	
b.	penyusunan program pengelolaan sumber daya air dan rencana kegiatan pengelolaan sumber daya air pada wilayah sungai	Menyusun perencanaan bangunan pengamanan muara dan erosi pantai, dan melaksanakan pembangunan pengamanan muara dan erosi pantai (100%)	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	High
		Merencanakan dan mengalokasi air penggelontoran melalui kesepakatan dalam TKP sumber daya air, serta melaksanakan penggelontoran sungai			
		Merencanakan (2011-2013 = 100%) dan melaksanakan (2014-2015 = 10%) perlindungan alur dan tebing sungai di sungai-sungai utama pada WS Ciliwung – Cisadane			
		Merencanakan sistem monitoring kualitas air real time		Pengelolaan Kualitas Air Dan Pengendalian Pencemaran	
		Menyusun perencanaan pembangunan IPAL industri terpadu pada kawasan industri, beserta penyiapan organisasi pengelolanya			
		Merencanakan dan membangun saluran pembuangan air limbah perkotaan terpisah dari saluran drainasi, secara bertahap (5% area kota), terutama pada kawasan pengembangan perumahan atau perkotaan baru			
		Merencanakan Kaskade Sungai Ciliwung di Depok	Pendayagunaan Sumber Daya Air	Penyediaan Sumber Daya Air	
		Menyusun Master Plan Sistem Pengendalian Banjir secara menyeluruh di WS Ciliwung - Cisadane selesai tahun 2015,,debit banjir rencana Sungai utama 1:100, 1:50 sungai dalam kota 1:25, saluran Drainasi 1:5	Pengendalian Daya Rusak Air	Pencegahan Bencana	
		Menyusun Peraturan Daerah tentang pembangunan kawasan pemukiman baru yang mengikuti kaidah konservasi	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	
		Menyusun Peraturan Daerah dan menerapkan pengendalian alih fungsi lahan secara berkelanjutan di Jabodetabek			
		Menyusun Peraturan Daerah pemberian Insentif bagi Pengembang yang menambah RTH			
		Menyusun Peraturan Daerah tentang pembangunan kawasan pemukiman baru yang mengikuti kaidah konservasi	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	
		Menyusun Peraturan Daerah tentang perlindungan dan fungsi situ serta mensosialisasikannya			
		Menyusun peraturan gubernur tentang penetapan batas dan pemanfaatan daerah sempadan sungai dan situ/waduk sebagai turunan dari Peraturan Daerah, dan melaksanakan, memantau serta menerapkan sanksi terhadap pelanggaran pelaksanaan Pergub tentang penetapan batas dan pemanfaatan daerah sempadan sungai dan situ/waduk secara berkelanjutan	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	
		Menyusun Peraturan Daerah tentang perlindungan dan fungsi situ serta mensosialisasikannya		Pengawetan Air	

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
	preparation of water resources management programs and action plans for water resources management in river basin	Plan (2011-2013 = 100%) and execute (2014-2015 = 10%) and the flow of the river bank protection in the major rivers in the WS Ciliwung - Cisadane	Water Resources Conservation	Protection and Conservation of Water Resources	
		planning Construction protection for estuaries and coastal erosion, and carry out the construction of estuaries and coastal erosion protection (100%)			
		Plan and water allocation flushing through an agreement in the Coordinating Team Management of Water Resources (TKPSDA), as well as carrying out flushing stream			
		Planning a water quality monitoring system in real time		Water Quality Management and Pollution Control	
		Planning the construction of an integrated industrial wastewater in industrial areas, as well as the preparation of the management organization			
		Planning and building urban sewerage apart from drainage, gradually (5% city areas), especially in urban areas or new housing development			
		Cascade Planning the of Ciliwung River in Depok	Utilization of Water Resources	Provision of Water Resources	
		Compile Master Plan of Integrated Flood Control System in WS Ciliwung - Cisadane finished 2015, a major river flood discharge plan 1: 100, 1:50 1:25 of the river in the city, drainage 1: 5	Water Damage Control	Disaster Prevention	
		Drafting regional regulations concerning the construction of new residential areas that follow the rules of conservation	Water Resources Conservation	Water Resources Protection and Conservation	
		Drafting regional regulations and implementing control over the land in a sustainable manner in Jabodetabek			
		Drafting regional regulations granting incentives for developers who add green open space (RTH)			
		Drafting regional regulations concerning the construction of new residential areas that follow the rules of conservation			
		Develop Regional Regulation on the protection and function there and socialize			
		Prepare regulations governor of delimitation and utilization of river border area and there / reservoir as a derivative of the Regional Regulation, and implement, monitor and impose sanctions for violations of the delimitation Pergub implementation and utilization of river border area and there / reservoirs in a sustainable manner			
		Develop Regional Regulation on the protection and function there and socialize		Water preservation	
c.	pemantauan dan evaluasi penyelenggaraan /penerapan pola pengelolaan sumber daya air dan rencana pengelolaan sumber daya air	Menyusun perencanaan bangunan pengamanan muara dan erosi pantai, dan melaksanakan pembangunan pengamanan muara dan erosi pantai (100%)	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	Middle
		Merencanakan dan mengalokasi air penggelontoran melalui kesepakatan dalam TKP sumber daya air, serta melaksanakan penggelontoran sungai			
		Melakukan kajian pengembangan penerapan teknologi desalinasi dan ultra filtrasi, serta mendorong peran industri/swasta untuk menerapkannya	Pendayagunaan Sumber Daya Air	Pengembangan Sumber Daya Air	
	monitoring and evaluation of the implementation / application of a water resources management (POLA) and water resources management plan(RENCANA)	planning Construction protection for estuaries and coastal erosion, and carry out the construction of estuaries and coastal erosion protection (100%)	Water Resources Conservation	Protection and Conservation of Water Resources	
		Plan and water allocation flushing through an agreement in the Coordinating Team Management of Water Resources (TKPSDA), as well as carrying out flushing stream			
		Reviewing the development of the application of desalination technology and ultrafiltration, and encouraging the role of industry / private sector to implement	Utilization of Water Resources	Water Resources Development	
		Merencanakan instalasi Penjernihan kapasitas 9 m3/det di Curug dan perencanaan trase jalur pipa dari Curug ke Jakarta serta pelaksanaan produksi air minum 4 m3/det dikirim ke Jakarta.	Pendayagunaan Sumber Daya Air	Penyediaan Sumber Daya Air	
		Perencanaan dan pelaksanaan Rehabilitasi Tarum Barat dari kapasitas semula 16 m3/det menjadi 31 m3/det			
		Merencanakan Long Storage BKB dan BKT dan Cengkareng drain (DKI Jakarta).Sosialisasi ke masyarakat untuk tidak memguang sampah dan limbah ke sungai			
		Menyusun Perencanaan pasokan dan perbaikan kualitas air dari long storage BKB+BKT dan Cengkareng Drain			

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
d.	penyusunan studi kelayakan dan perencanaan teknis/desain/pengembangan sumber daya air	Merencanakan Karian Serpong Conveyance System (KSCS) tahap I	Pendayagunaan Sumber Daya Air	Penyediaan Sumber Daya Air	High
		Merencanakan alokasi pasokan air dari long storage BKB+BKT+Cascade Depok			
		Menyusun Perencanaan pasokan dari long storage Cascade Depok dan review alokasi air irigasi bendung katulampa dan bendung empang yang areanya berkurang			
		Melaksanakan studi kelayakan dan detail desain Waduk Pondok Benda, Sungai Angke di Pamulang			
		Melaksanakan studi kelayakan dan detail desain Waduk Limo, Sungai Pesanggrahan di Cinere Depok			
		Melaksanakan studi kelayakan dan detail desain Waduk Genteng di Sungai Cisadane, Rancamaya Bogor			
		Melaksanakan studi kelayakan dan detail desain Waduk Narogong di Sungai Citeureup/Cileungsi-Cibinong			
		Merencanakan dan melaksanakan pemisahaan fungsi saluran air baku dan air irigasi di Saluran Induk Tarum Barat (Cantek 100% dalam 2 thn, Pelaksanaan 30% dalam 3 thn)		Penggunaan Sumber Daya Air	
		Merencanakan (2011-2013 = 100%) dan Melaksanakan (2014-2015 = 50%) Irigasi sederhana ke irigasi teknis DI. Sibanteng pada Sungai Citempuandi Desa Sibanteng, Kecamatan Leuwisadeng, Kabupaten Bogor.		Pengembangan Sumber Daya Air	
		Merencanakan (2011-2013 = 100%) pemanfaatan tenaga air, melaksanakan (2014-2015 = 40%)			
		Melakukan studi dan detail desain irigasi Cimanceuri dan bendung Cimanceuri			
		Melakukan studi dan detail desain irigasi Cikarang hilir			
		Melakukan studi dan pelaksanaan pengusahaan air minum 4 m3/det berdasarkan kerjasama Pemda DKI Jakarta, Pemda Jabar, PJT II dan investor/swasta	Pendayagunaan Sumber Daya Air	Pengusahaan Sumber Daya Air	
		Menyusun Master Plan Sistem Pengendalian Banjir secara menyeluruh di WS Ciliwung - Cisadane selesai tahun 2015,,debit banjir rencana Sungai utama 1:100, 1:50 sungai dalam kota 1:25, saluran Drainasi 1:5	Pengendalian Daya Rusak Air	Pencegahan Bencana	
		Merencanakan dan menetapkan jalur evakuasi dan tempat pengungsian			
		Merencanakan pengembangan dan pemasangan sistem peringatan dini di semua sungai	Pengendalian Daya Rusak Air	Pencegahan Bencana	
		Merencanakan dan Membangun tanggul laut di Cilincing, Pluit, Pasar Ikan, Kamal muara dan Marunda			
		Merencanakan dan Meningkatkan tanggul laut di pantai Tangerang dan Bekasi			
		Melaksanakan FS dan Perencanaan JCDS/Jakarta Coastal Defence Strategy			
		Melaksanakan Studi Kelayakan dan detil desain Connecting Channel Ciliwung ke BKT			
		Merencanakan dan melaksanakan rehabilitasi tanggul banjir secara berkelanjutan			
		Menyusun perencanaan bangunan pengamanan muara dan erosi pantai, dan melaksanakan pembangunan pengamanan muara dan erosi pantai (100%)	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	
		Menyusun perencanaan pembangunan IPAL industri terpadu pada kawasan industri, beserta penyiapan organisasi pengelolanya	Konservasi Sumber Daya Air	Water Quality Management and Pollution Control	
		Planning installation 9 m3/s capacity clearance at Curug and pipeline path planning from Curug to Jakarta and implementation of drinking water production 4 m3/s delivered to Jakarta.	Utilization of Water Resources	Provision of Water Resources	
		Planning and carrying out the rehabilitation of West Tarum of original capacity 16 m3 / s to 31 m3 / sec			
		Long Storage BKB Planning the and BKT and Cengkareng drain (Jakarta) .Sosialisasi to the public not to throw litter and waste into the river			
		Compile Supply Planning and water quality improvement of long storage BKB + BKT and Cengkareng Drain			
		Planning the Karian Serpong Conveyance System (KSCS) Phase I			
		Planning the water supply allocation of long storage BKB + BKT + Cascade Depok			
		Compile the supply planning of long storage Cascade Depok and review the allocation of irrigation water weir and weir dam Katulampa that area is reduced			
		Carry out a feasibility study and detailed design of the reservoir Pondok Benda, Angke River in Pamulang	Utilization of Water Resources	Provision of Water Resources	
		Carry out a feasibility study and detailed design of Limo Reservoir, Pesanggrahan River in Cinere Depok			
		Carry out a feasibility study and detailed design of Genteng Reservoir in Cisadane River, Rancamaya Bogor			
		Carry out a feasibility study and detailed design Narogong Reservoir in Citeureup River / Cileungsi-Cibinong			
		Plan and implement separation of functions raw water channels and irrigation water in the West Tarum Main Channel (Cantek 100% in 2 yrs, implementation of 30% in 3 yrs)			

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
	preparation of feasibility studies and technical planning / design / development of water resources	Planning the (2011-2013 = 100%) and Execute (2014-2015 = 50%) is simple Irrigation to technical irrigation (Irrigation Area). Sibanteng on Citempuandi River Village Sibanteng, Leuwisadeng subdistrict, Bogor regency.		Water Resources Development	
		Planning the (2011-2013 = 100%) the utilization of hydropower, implement (2014-2015 = 40%)			
		Conducted a study and detailed design of Cimanceuri irrigation and dam			
		Conducted a study and detailed design of irrigation downstream Cikarang			
		Conducting the study and implementation of drinking water exploitation 4 m3 / s based the cooperation Jakarta Government, Government of West Java, PJT II and investor / private	Utilization of Water Resources	Exploitation of Water Resources	
		Compile Master Plan of Integrated Flood Control System in WS Ciliwung - Cisadane finished 2015, a major river flood discharge plan 1: 100, 1:50 1:25 of the river in the city, drainage 1: 5	Water Damage Control	Disaster Prevention	
		Plan and establish an evacuation route and evacuation shelter			
		Plan the development and installation of early warning systems in all rivers			
		Plan and Build a sea dike in Cilincing, Pluit, Pasar Ikan, Kamal Muara and Marunda			
		Plan and Improve the sea dike on the coast Tangerang and Bekasi			
		Carry out the Feasibility Study and Planning JCDS / Jakarta Coastal Defense Strategy			
		Carry out the feasibility study and detailed design of Connecting Channel Ciliwung to BKT	Water Damage Control	Disaster Prevention	
		Plan and implement rehabilitation of flood embankment in a sustainable			
		Planning safety building estuaries and coastal erosion, and carry out the construction of estuaries and coastal erosion protection (100%)	Water Resources Conservation	Water Resources Protection and Conservation	
		Planning the construction of an integrated industrial wastewater in industrial areas, as well as the preparation of the management organization	Water Resources Conservation	Water Quality Management and Pollution Control	
e.	pelaksanaan pengadaan barang dan jasa serta penetapan pemenang selaku Unit Layanan Pengadaan (ULP)	Membangun komitmen diantara instansi terkait bidang sumber daya air dalam pengalokasian anggaran pengelolaan sumber daya air melalui TKPSDA WS Cil-Cis secara berkelanjutan	Pemberdayaan dan Peningkatan Peran Masyarakat dan Dunia Usaha	Pendanaan	Middle
		Menginventarisasi kebutuhan dan melaksanakan pengadaan peralatan untuk menunjang SISDA terpadu			
		Mengoperasikan dan memelihara peralatan yang menunjang SISDA secara berkelanjutan			
		Menyediakan dana SISDA terpadu untuk operasional, pemeliharaan dan pengadaan peralatan serta pengembangan SDM dan koordinasi secara berkelanjutan			
		Melakukan kajian dan penetapan pungutan jasa pengelolaan sumber daya air			
	the procurement of goods and services as well as the determining the winner of Procurement Services Unit (ULP)	Build commitment among the relevant agencies in the field of water resources management budget allocation of water resources through WS TKPSDA Cil-Cis sustainably	Empowerment and Improved Role of Civil Society and Business	funding	
		Making inventory on necessary equipment and implement of procurement for SISDA			
		Continue to operate and maintain equipment for SISDA			
		Preparation for SISDA funds for operational, maintenance and procurement of equipment and human resource development			
		Conducting studies and the establishment of collection services for water resources management			
	penyelenggaraan sistem manajemen mutu dan system manajemen keselamatan dan kesehatan kerja (SMK3)	Melakukan kajian, pembahasan dan penetapan BLU Pengelolaan sumber daya air	Pemberdayaan dan Peningkatan Peran Masyarakat dan Dunia Usaha	Pendanaan	
		Memantau dan mengawasi operasional BLU Pengelolaan sumber daya air secara berkelanjutan			
		PDAM melaksanakan menejemen distribusi air minum dengan menjaga kualitas dan keberlanjutannya sebesar 9 m3/detik			
		Melakukan studi dan pelaksanaan pengusahaan air minum 5 m3/detik berdasarkan kerjasama Pemda DKI Jakarta, Pemda Jabar, PJT II dan investor/swasta			
		Mendorong kelompok industri mengolah air kotor dan air laut menjadi air bersih/tawar secara berkelanjutan			
		Melaksanakan pemberdayaan masyarakat dlm pengelolaan sampah (di saluran, sungai) secara berkelanjutan			
		Membentuk kelompok gerakan peduli air , peduli sampah. Melaksanakan pembinaan, bimbingan dan peningkatan peran serta perempuan dalam pengelolaan sumber daya air secara berkelanjutan			

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
f.	implementation of quality management systems and health and safety management systems (SMK3)	Conducting the study, discussion and establishment of the Internal Audit Unit Water Resources Management (BLU)	Empowerment and Improved Role of Civil Society and Business	funding	Middle
		Monitor and supervise to BLU operations for sustainable water resources management			
		PDAM conducts drinking water distribution management (9m3/s), including maintaining the quality			
		Conducting study and implementation of drinking water business (5m3/s) with cooperation of DKI Jakarta Government, Local Government of West Java, PJT II and investor / private			
		Encourage industrial groups to process sewage and seawater into clean water			
		Implement community empowerment in waste management (in channel, river) in a sustainable manner			
		Establish a group for promotion of water environemental conservation, such as garbages and waste water, and guidance and improvement of women's participation for sustainable management of water resources			
	pengelolaan sumber daya air yang meliputi konservasi sumber daya air, pendayagunaan sumber daya air, dan pengendalian daya rusak air pada wilayah sungai	Mengendalikan longsoran dan erosi tebing di sungai-sungai utama.	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	
		Mengawasi dan menertibkan hunian dan usaha lainnya di bantaran sungai	Pengendalian Daya Rusak Air	Pencegahan Bencana	
		Melakukan inventarisasi dan pemetaan daerah rawan longsor di tingkat Kab/Kota			
		Melaksanakan upaya perkuatan daerah kritis (vegetatif dan sipil teknis).			
		Melaksanakan penyelesaian pembangunan Banjir Kanal Timur (23.5 km)			
		Melaksanakan normalisasi Sungai Pesanggrahan, Angke, Sunter (PAS)			
		Melaksanakan normalisasi Sungai Ciliwung dari TB. Simatupang sampai dengan Manggarai		Pencegahan Bencana	
		Melaksanakan pelaksanaan sodetan Sungai Ciliwung di lokasi Kalibata dan Kebun Baru		Pencegahan Bencana	
		Melaksanakan penambahan 1 Pintu Air Manggarai dan penambahan 1 Pintu Air Karet			
		Melaksanakan Revitalisasi Pintu Air Ciliwung Lama			
		Melaksanakan Pengerukan 13 Sungai dan 5 Waduk di Jakarta,Program JEDI (Jakarta Emergency Dredging Initiative)	Pengendalian Daya Rusak Air	Pencegahan Bencana	
		Melaksanakan normalisasi sungai diperkotaan (sungai Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi dan Kali Dadap, Grogol, Krukut, Banjir Kanal Barat (Kali Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat dan Cakung, Kali Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) dengan Q25 dan pelaksanaannya.			
		Merehabiltasi hutan bakau sepanjang pantai secara berkelanjutan (25%)	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	
		Mensosialisasikan kepada masyarakat tentang Rencana Teknis Rehabilitasi Hutan dan Lahan (RTkRHL) = 2011-2013, melaksakan kegiatan RTkRHL pada lahan sangat kritis 40% dan lahan kritis 25% area (2014-2015)	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	
		Mensosialisasikan upaya konservasi dan perlindungan lahan agak kritis pada DAS di wilayah WS Ciliwung - Cisadane, dan melaksanakan RTkRHL 20% area			
		Melaksanakan Gerhan dan GNKPA di dalam dan di luar kawasan hutan pada DAS hulu dan tengah WS Ciliwung - Cisadane (25%)			
		Melaksanakan sosialisasi ke masyarakat untuk tidak membuang sampah ke sungai dan membuat TPS untuk di olah	Pengendalian Daya Rusak Air	Pencegahan Bencana	
		Melaksanakan review peta rawan genangan dan sosialisasi ke masyarakat			
		Mengurangi luas perambahan daerah retensi dan bantaran sungai (30%)			
		Melakukan inventarisasi dan pemetaan daerah rawan longsor di tingkat Kab/Kota			
		Merencanakan dan Membangun tanggul laut di Cilincing, Pluit, Pasar Ikan, Kamal muara dan Marunda			
		Melaksanakan penyelesaian pembangunan Banjir Kanal Timur (23.5 km)			
		Melaksanakan normalisasi Sungai Pesanggrahan, Angke, Sunter (PAS)			
		Melaksanakan untuk penataan Sungai Ciliwung:			
		Melaksanakan normalisasi Sungai Ciliwung dari TB. Simatupang sampai dengan Manggarai			
		Melaksanakan penambahan 1 Pintu Air Manggarai dan penambahan 1 Pintu Air Karet			
		Melaksanakan Pengerukan 13 Sungai dan 5 Waduk di Jakarta,Program JEDI (Jakarta Emergency Dredging Initiative)			
		Melaksanakan Studi Kelayakan dan detil desain Connecting Channel Ciliwung ke BKT			
		Melaksanakan Perencanaan dan Pelaksanaan 30 polder-polder antara lain Sunter timur 2, Marunda, dan lain-lain.			

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
		Merencanakan dan melaksanakan rehabilitasi tanggul banjir secara berkelanjutan			
		Melaksanakan perencanaan sistem drainase dan kapasitasnya di JABODETABEK (2011-2013), melaksanakan penataan sistem dan menormalisasi drainase mikro di JABODETABEK (2014-2015) dan berkelanjutan	Pengendalian Daya Rusak Air	Pencegahan Bencana	
g	water resources management which includes the conservation and utilization of water resources and control of water damage in the basin	Control avalanches/landslide and erosion cliffs in major rivers	Water Resources Conservation	Water Resources Protection and Conservation	High
		Supervise and regulate the occupancy and other businesses along the river	Water Damage Control	Disaster Prevention	
		Conduct an inventory and mapping of areas prone to landslides at the level of district / city			
		Strengthening efforts to implement the critical areas (vegetative and civil engineering).			
		Carry out the completion of construction of the East Flood Canal (23.5 km)			
		Carry out normalization Pesanggrahan River, Angke, Sunter (PAS)			
		Carry out normalization of Ciliwung river from TB. Simatupang to Manggarai			
		Carry out the implementation of the shortcut Ciliwung location Kalibata and Kebun Baru			
		Implement additional 1 Manggarai water gate and the addition of 1 Karet water gate			
		Revitalization implement Ciliwung Lama water gate			
		Implement Dredging for 13 River and 5 Reservoir in Jakarta, JEDI Program (Jakarta Emergency Dredging Initiative)			
		Carrying out the normalization of rivers in urban areas (river Cimanceuri, Cirarab, Cisadane, Cengkareng Drain, time Sabi and Kali Dadap, Grogol, Krukut, West Flood Canal (Kali Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat and Cakung, Kali Blencong, Bekasi , Cikeas, Cullinan, Cikarang, CBL, Cilemah Abang) with Q25 and implementation.			
		Rehabilitate mangrove forests along the coast in a sustainable manner (25%)	Water Resources Conservation	Water Resources Protection and Conservation	
		Disseminate to the public on the Technical Plan for Forest and Land Rehabilitation (RTkRHL) = 2011 to 2013, fulfilling activities on land RTkRHL very critical 40% and 25% of critical land area (2014-2015)	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	
		Mensosialisasikan upaya konservasi dan perlindungan lahan agak kritis pada DAS di wilayah WS Ciliwung - Cisadane, dan melaksanakan RTkRHL 20% area			
		Implement the National Movement for Forest and Land Rehabilitation (Gerhan) and the National Movement for Saving Water Partnership (GNKPA) inside and outside the forest area in the watershed upstream and middle WS Ciliwung - Cisadane (25%)			
		The dissemination to the public not to throw garbage into the river and made TPS for processed	Pengendalian Daya Rusak Air	Pencegahan Bencana	
		To review map inundated and dissemination to the public			
		Reduce the area of encroachment retention areas and flood plains (30%)			
		Conduct an inventory and mapping of areas prone to landslides at the level of district / city			
		Plan and Build a sea dike in Cilincing, Pluit, Pasar Ikan, Kamal muara and Marunda			
		Carry out the completion of construction of the East Flood Canal (BKT 23.5 km)			
		Carry out normalization Pesanggrahan River, Angke, Sunter (PAS)			
		Implement for structuring Ciliwung:			
		carry out normalization of Ciliwung River from TB. Simatupang to Manggarai			
		Implement additional 1 Manggarai water gate and the addition of 1 Karet water gate			
		Implement River Dredging 13 River and 5 Reservoir in Jakarta, JEDI Program (Jakarta Emergency Dredging Initiative)			
		Carry out Feasibility Study and details design of Connecting Channel between Ciliwung River and BKT			
		Implement Planning and construction of 30 reclaimed land at Sunter east 2, Marunda, and others.			
		Planning and implement rehabilitation of levee for flood control in a sustainable manner			
		Carrying out drainage system and capacity planning in the Greater Jakarta (2011-2013), implementing system structuring and normalizing micro drainage JABODETABEK (2014-2015) and sustainable			
		Merencanakan dan membangun saluran pembuangan air limbah perkotaan terpisah dari saluran drainasi, secara bertahap (5% area kota), terutama pada kawasan pengembangan perumahan atau perkotaan baru			

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
h.	pengelolaan drainase utama perkotaan	Melaksanakan perencanaan sistem drainase dan kapasitasnya di JABODETABEK (2011-2013), melaksanakan penataan sistem dan menormalisasi drainase mikro di JABODETABEK (2014-2015) dan berkelanjutan			Middle
		Melaksanakan sosialisasi ke masyarakat untuk tidak membuang sampah ke sungai dan membuat TPS untuk di olah			
		Melaksanakan perencanaan normalisasi saluran drainase di perkotaan JABODETABEK dan pelaksanaannya untuk mengurangi genangan utamanya di jalan jalan Jakarta			
	The management of urban main drainage	Planning and building urban sewerage apart from drainage, gradually (5% city areas), especially in urban areas or new housing development			
		In JABODETABEKI 2011-2013: Implement drainage system planning 2014-2015: Implement system arrangement and normalize micro drainage			
		Implement socialization to the community not to throw garbage into the river and make TPS for the process			
		Implement drainage planning in urban JABODETABEK and Implementation of drainage system to reduce inundation on roads in Jakarta			
i.	pengelolaan sistem hidrologi	Inventarisasi data (Data umum, Data Sumber Daya Air dan Data Kebutuhan Air)			Middle
		Menyediakan database sumber daya air yang lengkap dan akurat secara berkelanjutan			
		Mengumpulkan, mengolah dan menyajikan data sumber daya air secara terpadu dan berkelanjutan			
		Inventory Data (General Data, Water Resources Data and Water Needs Data)			

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
	Management of hydrological system	Provide a complete and accurate database of water resources			
		To collect, process and present data for integrated and sustainable water resources management			
j.	pengelolaan system informasi sumber daya air	Mengumpulkan, mengolah dan menyajikan data sumber daya air secara terpadu dan berkelanjutan	Sistem Informasi Sumber Daya Air		Middle
		Melaksanakan pengadaan pegawai dan meningkatkan kapasitasnya sesuai kebutuhan			
		Menginventarisasi kebutuhan dan melaksanakan pengadaan peralatan untuk menunjang SISDA terpadu			
		Mengkoordinasikan data sumber daya air yang berasal dari instansi-instansi terkait dan menerbitkan buku data tahunan serta menyediakan data berbasis web yang mudah diakses secara berkelanjutan	Sistem Informasi Sumber Daya Air		
		Menyediakan pedoman tentang pengelolaan SISDA yang sistematis dan komprehensif			
		Menyediakan database sumber daya air yang lengkap dan akurat secara berkelanjutan			
		Mengkoordinasikan data sumber daya air yang berasal dari instansi-instansi terkait dan menerbitkan buku data tahunan serta menyediakan data berbasis web yang mudah diakses secara berkelanjuta			
		Mengintegrasikan data SISDA yang mudah diakses secara berkelanjutan			
		Menyediakan dana SISDA terpadu untuk operasional, perbaikan peralatan dan peningkatan SDM			
	Water Resources management information System	Collect, process and present data in an integrated water resources and sustainable	Water Resources Information System		
		Implement procurement employees and increase capacity as needed			
		Inventory needs and implement the procurement of equipment to support the Water Resources Information System (SISDA) integrated			
		Coordinate water resource data derived from related institutions and publishes annual data book as well as providing web-based data accessible in a sustainable manner			
		Provide guidance on the management of Water Resources Information System (SISDA) a systematic and comprehensive			
		Provide a complete and accurate database of water resources in a sustainable manner			
		Coordinate water resources data with relevant agencies and publish an annual data book and provide web-based data that is easy access in a sustainable manner			
		Integrate SISDA data that is easy access in a sustainable manner			
		Providing funds Water Resources Information System (SISDA) for the integrated operations, repair of equipment and human resource development			
k.	pelaksanaan operasi dan pemeliharaan sumber daya air pada wilayah sungai	Melaksanakan 60% OP waduk/situ oleh Dinas PU DKI (waduk/situ yang telah di kelola daerah)	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	Middle
		Melaksanakan 60% OP waduk/situ oleh BBWS (bagi waduk/situ yang masih di kelola oleh pusat)			
		Melaksanakan rehabilitasi dan OP 27 mata air		Pengawetan Air	
		Melaksanaan OP prasarana sumber daya air (Tingkat Pelayanan 100%)	Pendayagunaan Sumber Daya Air	Penggunaan Sumber Daya Air	
		Melaksanakan OP Sungai dan saluran Drainasi sepanjang tahun	Pengendalian Daya Rusak Air	Pencegahan Bencana	
		Melaksanakan inventarisasi seluruh sumur pengambilan air tanah dalam, dan membangun sumur pantau pada lokasi yang rawan	Pemberdayaan dan Peningkatan Peran Masyarakat dan Dunia Usaha	Pengaturan Pengelolaan Sumber Daya Air	
		Melaksanakan sosialisasi dan penyadaran publik tentang bahaya pengambilan air tanah dalam yang melampaui batas aman, secara berkelanjutan			
		Merencanakan dan melaksanakan pemisahaan fungsi saluran air baku dan air irigasi di Saluran Induk Tarum Barat (Cantek 100% dalam 2 thn, Pelaksanaan 30% dalam 3 thn)			
	Implementation of operation and maintenance of water resources in the river basin	Implement 60% O&M of reservoir / situ by Jakarta Public Works Agency (for reservoir / situ who have been managed by local government)	Water Resources Conservation	Water Resources Protection and Conservation	Middle
		Implement 60% O&M of reservoir / situ by BBWS Ciliwung-Cisadane (for reservoir / situ who have been managed by central government)			
		Conduct rehabilitation and O & M 27 spring		Water Preservation	
		Implementation of the O & M of water resources infrastructure (50% Service Level)	Utilization of Water Resources	Use of Water Resources	
		Implement O & P Rivers and Drainage channels throughout the year	Water Damage Control	Disaster Prevention	
		Carry out an inventory of all wells in the ground water extraction, and establishing monitoring wells at locations prone	Empowerment and Increased Role of Civil Society and	Water Resource Management Control	
		The dissemination and public awareness about the dangers of groundwater within which exceeded safe limits, in a sustainable manner			

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
		Plan and implementation of the separation of the function of raw water and irrigation water in West Tarum Main Channel (Planning 100% in 2 years, Implementation 30% in 3 years			
I.	pelaksanaan bimbingan teknis pengelolaan sumber daya air yang menjadi kewenangan provinsi dan kabupaten/kota	Menyusun Peraturan Daerah tentang daerah parkir air/dataran banjir bebas dari pemukiman dan usaha lain	Pengendalian Daya Rusak Air	Pencegahan Bencana	Middle
		Menginvenatrisasi kelompok masyarakat yang mempunyai budaya dalam menjaga kelestarian kawasan hutan, lingkungan, dan sumber daya air, serta memberikan bimbingan, arahan dan pemberdayaan untuk menjaga kelestariannya secara berkelanjutan			
		Membentuk kelompok gerakan peduli air , peduli sampah. Melaksanakan pembinaan, bimbingan dan peningkatan peran serta perempuan dalam pengelolaan sumber daya air secara berkelanjutan			
		Melaksanakan bimbingan kepada masyarakat tani di kawasan non hutan yang berlereng untuk menanam tanaman jangka panjang, mulai dari pratanam sampai pasca tanam, disertai penanaman secara tumpang sari secara berkelanjutan, target 60%, kumulatif 100%			
		Menyusun, membahas dan menyepakati pembagian peran dan wewenang antar institusi terkait bidang sumber daya air dalam bentuk pedoman, atau MOU kerjasama pengelolaan antar instansi			
	implementation of technical guidance for water resources management under the authority of provinces and regencies / city	Drafting regional regulations on the parking area of water / flood plains free from settlements and other business	Power Control of Water Damage	Disaster prevention	
		To inventory community groups that have a culture in conservation of forest, environment and water resources. And provide guidance, direction and empowerment for maintenance of their activities in a sustainable manner			
		Establish a group for promotion of water environemental conservation, such as garbages and waste water, and guidance and improvement of women's participation for sustainable management of water resources			
		Carry out guidance to communities in non-forested areas to plant long-term crops, ranging from pratanam to post-planting, accompanied by continuous intercropping. 60% is present target, 100% is future target			
		Compile, discuss and agree on understanding roles and competence among institutions in the field of water resources, such as a MOU of interagency management cooperation			
		Meninventarisasi lokasi penambangan, memberikan arahan lokasi yang sesuai, mengkaji ulang terhadap ijin yang sudah dikeluarkan serta pengaturan ijin dengan memperhatikan kelestarian lingkungan secara berkelanjutan disertai penegakan hukum.	Konservasi Sumber Daya Air	Perlindungan Dan Pelestarian Sumber Daya Air	
		Melaksanakan studi pemanfaatan sisa air irigasi bendung Katulampa dan bendung Empang (2011-2013) dan mengalokasikan air ke saluran PDAM untuk kepentingan air baku Depok dan Bogor (2014)	Pendayagunaan Sumber Daya Air	Penyediaan Sumber Daya Air	
		Mereview dan melaksanakan alokasi air sungai Cisadane sesuai kesepakatan		Penggunaan Sumber Daya Air	
		Melaksanakan kajian SOP waduk/ tampungan/situ di WS Ciiwung-Cisadane (2011-2013) memformulasikan dan mengujicoba (2014-2015)			
		Menginventarisasi potensi dan mengkaji permasalahan pengambilan air tanah dalam oleh pengusaha air isi ulang (2011-2012) serta menata ulang pengambilan air tanah		Pengusahaan Sumber Daya Air	

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
m.	penyusunan dan penyiapan rekomendasi teknis dalam pemberian izin penggunaan sumber daya air dan izin pengusahaan sumber daya air pada wilayah sungai	Menerbitkan Peraturan Daerah pengurangan pengambilan air tanah dalam dan penerapan rumah panggung	Pengendalian Daya Rusak Air	Pencegahan Bencana	High
		Menyediakan kebutuhan air rumah tangga menggunakan mobil tangki untuk Jakarta Utara, Tangerang dan Bekasi			
		Menghentikan pengambilan air tanah dalam yang menyebabkan penurunan tanah, khususnya di lokasi Jakarta Utara, dengan menggantikan pemakaian Air Tanah dengan Air Permukaan			
		Melakukan kajian dan penetapan pungutan jasa pengelolaan sumber daya air	Pemberdayaan dan Peningkatan Peran Masyarakat dan Dunia Usaha	Pendanaan	
		Melaksanakan inventarisasi seluruh sumur pengambilan air tanah dalam, dan membangun sumur pantau pada lokasi yang rawan	Pemberdayaan dan Peningkatan Peran Masyarakat dan Dunia Usaha	Pengaturan Pengelolaan Sumber Daya Air	
		Melaksanakan sosialisasi dan penyadaran publik tentang bahaya pengambilan air tanah dalam yang melampaui batas aman, secara berkelanjutan			
		Menyusun dan menerbitkan dokumen pendelegasian perijinan penggunaan dan pengusahaan air permukaan			
		Menyusun dan menerbitkan dokumen pendelegasian perijinan penggunaan dan pengusahaan air permukaan			
	drafting / compilation and preparation of technical recommendations in licensing the use of water resources and permits utilization of water resources in the river area	inventory of mining sites, provide direction corresponding location, reviewing the permits that have been issued and the license arrangement with attention to the environment in a sustainable manner with law enforcement	Conservation of Water Resources	Protection and Conservation of Water Resources	
		Carry out a study of the remaining Katulampa irrigation water weir and weir dam (2011-2013) and allocate water to channel raw water taps for the benefit of Depok and Bogor (2014)	Utilization of Water Resources	Provision of Water Resources	
		Reviewing and implementing Cisadane river water allocation according to agreement		Use of Water Resources	
		Conducting a study on the reservoir SOP / bin / situ in Ciiwung WS-Cisadane (2011-2013) formulated and tested (2014-2015)			
		The inventory and study the problems of ground water in the water refill businessman (2011-2012) as well as rearranging groundwater		Exploitation of Water Resources	
		Regions issued the reduction of ground water in and implementation stage houses	Power Control of Water Damage	Disaster prevention	
		Providing for domestic water use tankers for North Jakarta, Tangerang and Bekasi			
		Stopping the extraction of ground in that cause land subsidence, particularly in the North Jakarta, to replace the use of Groundwater with Surface Water			
		Conducting studies and the establishment of collection services for water resources management	Empowerment and Increased Role of Civil Society and Business	Funding	
		Carry out an inventory of all wells in the ground water extraction, and establishing monitoring wells at locations prone		Controlling of Water Resources Management	
		The dissemination and public awareness about the dangers of groundwater within which exceeded safe limits, in a sustainable manner			
		Draw up and publish a document delegating the licensing and operation of surface water use			
		Compile and publish a document delegating the licensing and operation of surface water use			
n.	fasilitasi kegiatan Tim Koordinasi Pengelolaan Sumber daya air pada wilayah sungai	Membentuk dan Mengaktifkan Komisi Irigasi Provinsi, Kabupaten/Kota	Pemberdayaan dan Peningkatan Peran Masyarakat dan Dunia Usaha	Forum Koordinasi Pengelolaan Sumber Daya Air	High
		Mengaktifkan/mengoptimalkan Dewan sumber daya air Provinsi di WS Ciliwung Cisadane secara berkelanjutan			
		Membentuk dan Mengaktifkan Dewan sumber daya air Kabupaten/Kota sesuai kebutuhan			
		Mengaktifkan Sekretariat WS Ciliwung Cisadane secara berkelanjutan			
		Membentuk forum komunikasi DAS dan mengaktifkan forum			
		Melaksanakan koordinasi antar instansi terkait DI Ciujung, DI Cidurian			
		Merencanakan dan mengalokasi air penggelontoran melalui kesepakatan dalam TKPsumber daya air, serta melaksanakan penggelontoran sungai			
		Mendorong terbitnya penetapan kelas sungai oleh Gubernur			
		Menegakkan peraturan tentang kelas sungai			
		Mereview dan melaksanakan alokasi air sungai Cisadane sesuai kesepakatan			
		Melaksanakan alokasi air sungai Cisadane sesuai kesepakatan secara berkelanjutan			
		Melaksanakan kerja sama dan koordinasi dalam penanggulangan banjir			
		Membangun komitmen diantara instansi terkait bidang sumber daya air dalam pengalokasian anggaran pengelolaan sumber daya air melalui TKPSDA WS Cil-Cis secara berkelanjutan		Pendanaan	
		Forming and Enabling Irrigation Commission Province, Regency / City			
		Activate / optimize water resources Provincial Council in WS Ciliwung Cisadane in sustainably way			

Compare between current functions and POLA

Current Functions		POLA			Evaluation
	Ministerial Regulation No.20/PRT/M/2016	Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
	facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)	Forming and water resources Enabling Council District / City as needed	Empowerment and Increased Role of Civil Society and Business	Coordination Forum for Water Resources Management	
		Enabling WS Ciliwung Cisadane Secretariat in a sustainable manner			
		Forming a communication forum DAS and activate forum			
		Implement coordination among relevant agencies Regional Irrigation (DI) Ciujung, Regional Irrigation (DI) Cidurian			
		Planing and implementing a water allocation and flushing water through TKPSDA's agreements			
		Encouraging the determination of river classes by the Governor and publication			
		Enforcing regulations about river classes			
		Reviewing the existing Cisadane river water allocation and implementing			
		Implementing the Cisadane river water allocation as agreed in a sustainable manner			
		Carry out cooperation and coordination in the response to flooding			
		Build commitment among the relevant agencies in the field of water resources management budget allocation of water resources through TKPSDA WS Cil-Cis in a sustainable manner		Funding	
o.	pemberdayaan masyarakat dalam pengelolaan sumber daya air	Melaksanakan sosialisasi dan pemberdayaan masyarakat terhadap penggunaan sanitasi individu, perdesaan dan komunal (terutama daerah berpenduduk padat dan sekitar sumber air)			Middle
		Melaksanakan pemberdayaan masyarakat terhadap penggunaan sanitasi lingkungan			
		Membentuk kelompok gerakan peduli air , peduli sampah. Melaksanakan pembinaan, bimbingan dan peningkatan peran serta perempuan dalam pengelolaan sumber daya air secara berkelanjutan			
	empowerment of communities in the management of water resources	Conducting socialization and community empowerment towards individual, rural and communal sanitation (especially civilization areas and surrounding water sources)			
		Implement community empowerment towards the sanitation for environement			
		Establish a group for promotion of water environemental conservation, such as garbages and waste water, and guidance and improvement of women's participation for sustainable management of water resources			
	pelaksanaan penyusunan laporan akuntansi keuangan dan akuntansi barang milik negara selaku Unit Akuntansi Wilayah	Menyusun dan menetapkan pedoman menejemen aset dalam pengelolaan sumber daya air	Pemberdayaan dan Peningkatan Peran Masyarakat dan Dunia Usaha	Lembaga Pengelolaan Sumber Daya Air	
		Melaksanakan monitoring dan pengawasan dalam penerapan pedoman menejemen aset pengelolaan sumber daya air secara berkelanjutan			
		Menyusun dan menetapkan pedoman menejemen aset dalam pengelolaan sumber daya air			
		Membangun komitmen diantara instansi terkait bidang sumber daya air dalam pengalokasian anggaran pengelolaan sumber daya air melalui TKPSDA WS Cil-Cis secara berkelanjutan		Pendanaan	
		Melakukan kajian dan penetapan pungutan jasa pengelolaan sumber daya air			

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
p.	implementation of financial accounting report and accounting of state property as the Accounting Unit Area	Prepare and establish guidelines for asset management in the management of water resources	Empowerment and Increased Role of Civil Society and Business	Institution of Water Resources Management	Middle
		Carry out monitoring and supervision with making guidelines for implementation of integrated and sustainable water resources management			
		Prepare and establish guidelines for asset management in the management of water resources			
		Build commitment among the relevant agencies in the field of water resources management budget allocation of water resources through TKPSDA WS Cil-Cis in a sustainable manner		Pendanaan	
		Conducting studies and the establishment of collection services for water resources management			
q.	pelaksanaan pemungutan, penerimaan dan penggunaan biaya jasa pengelolaan sumber daya air (BJPSDA) sesuai dengan ketentuan peraturan perundang-undangan the implementation of the collection, receipt and use of the cost of water resource management services (BJPSDA) in accordance with the provisions of the	Melakukan kajian dan penetapan pungutan jasa pengelolaan sumber daya air			Middle
		Menerapkan pungutan jasa pengelolaan sumber daya air secara berkelanjutan			
		Conducting study for determination of water resources management services fee			
		Implementing water resources management services fee system in a sustainable manner			
r.	pelaksanaan urusan tata usaha dan rumah tangga balai serta komunikasi publik implementation of administrative affairs and households of BBWS as well as public communication	Membangun komitmen diantara instansi terkait bidang sumber daya air dalam pengalokasian anggaran pengelolaan sumber daya air melalui TKPsumber daya air WS 6 Ci secara berkelanjutan			Middle
		Mengaktifkan forum komunikasi DAS secara berkelanjutan dalam rangka menjaga kelestarian fungsi konservasi			
		Membangun waduk, situ dan kolam retensi sesuai kebutuhan			
		Building commitment among related institutions in the field of water resources management on allocation of water resource management budget through TKPSDA of 6 Ci Rivers in a sustainable basis			
		Conducting watershed communication forums continuously in order to improve functions of BBWS			
		Build reservoirs, situ and retention ponds as needed			
s.	penyusunan perjanjian kinerja dan laporan kinerja Balai preparation of performance agreements and performance reports of BBWS	Meningkatkan kapasitas masing-masing unit kerja sumber daya air dengan menggunakan pengukuran kinerja (Performance Benchmarking = 14 indikator) secara berkelanjutan			Middle
		Increase capacity of each unit in BBWS by using performance measurement (Performance Benchmarking = 14 indicators) in a sustainable manner			
	mengatur / melaksanakan pemantauan dan pengawasan atas penggunaan sumber daya air dan penyidikan tindak pidana di divisi sumber daya air	Melaksanakan gerakan Sungai bersih secara terpadu (Prokasih), secara rutin			
		Melakukan pemantauan, evaluasi melaksanakan penegakan hukum terhadap pelanggar yang melakukan pencemaran			
		Meningkatkan kualitas air sungai sesuai atau lebih baik dari standar baku mutu			
		Melaksanakan monitoring kualitas air, terutama terhadap limbah industri secara rutin. serta menegakkan peraturan.			
		Meningkatkan SDM petugas monitoring, pengawas dan penegak hukum (PPNS) melalui fasilitasi training tentang pengelolaan lingkungan (khususnya kualitas air)			
		Melaksanakan sosialisasi peraturan tentang syarat kualitas air limbah, dan kewajiban penggunaan IPAL industri, serta mendorong pembangunan IPAL dan penegakan hukum bagi pelanggar			

Compare between current functions and POLA

Current Functions		POLA			Evaluation
Ministerial Regulation No.20/PRT/M/2016		Physical and Non-Physical Efforts Matrix	Source		
			Aspect	Sub-Aspect	
t.					Middle
	organize / carry out monitoring and supervision over the use of water resources and investigation of criminal offenses on water resources division	Implement a "clean river movement (Prokasih)" in an integrated and sustainable manner			
		Conducting monitoring an enforcement of law against violators who makes water pollution sources			
		Improve river water quality in accordance with standards and try to be better			
		Implement periodical water quality monitoring, especially on industrial waste. And enforce regulations.			
		Improve human resources for monitoring, supervisors and law enforcement (PPNS) through training facilitation on environmental management (especially water quality)			
		Implement socialization for regulations on waste water quality requirements, and obligations of industrial IPAL use, and encourage the development of WWTP and law enforcement for offenders			

*Criteria of Evaluation

High: Number of Physical and Non-Physical Efforts is 10 or more
Middle: Number of Physical and Non-Physical Efforts is 10 or less
Low: No Physical and Non-Physical Efforts

Compare between current functions and Assessment Report

Current Functions		Assessment Report					
Ministerial Regulation No.20/PRT/M/2016		Indicator	Criteria for Performance Benchmarking for scoring	Score			Evaluation
				Current	Target	Gap	
a	penyusunan pola dan rencana pengelolaan sumber daya air pada wilayah sungai preparation of Strategic Plan (POLA) and Master Plan (RENCANA) of water resources management in the river basin	2. Tata Kelola Sumber Daya Air	Tanggung-jawab RBO (BBWS/BWS/BPSDA/PJT) telah jelas terinci serta dikuatkan oleh kebijakan dan landasan hukum tentang masalah air, walaupun dalam tahap sedang dikembangkan. **(Nilai Indikator =3,0)**	3.0	4.0	1.0	Middle
b	penyusunan program pengelolaan sumber daya air dan rencana kegiatan pengelolaan sumber daya air pada wilayah sungai preparation of water resources management programs and action plans for water resources management in river basin	10.Perencanaan tata kelola di dalam RBO (BBWS/BWS/BPSDA/PJT)	Perencanaan strategis telah diterapkan antara lain dengan menggunakan metode yang dapat mengidentifikasi dan menanggapi perubahan di dalam satuan wilayah sungai. Ada beberapa rencana yang dikembangkan oleh badan pengelola sumberdaya air untuk mencapai visi dan misinya; **(Nilai indikator = 2.5)**	2.5	4.0	1.5	High
c	pemantauan dan evaluasi penyelenggaraan /penerapan pola pengelolaan sumber daya air dan rencana pengelolaan sumber daya air monitoring and evaluation of the implementation / application of a water resources management (POLA) and water resources management plan(RENCANA)	7.Pengembangan SDM 8. Pengembangan Teknik 9. Pengembangan RBO (BBWS/BWS/BPSDA/ PJT)	RBO (BBWS/BWS/BPSDA/PJT) mempunyai rencana penggantian dan pendayagunaan aset untuk jangka pendek dan jangka panjang. Rencana ini dipergunakan menganggarkan biaya yang diperlukan. Walau sudah terencana, namun sesekali masih ditemui perbaikan yang bersifat incidental; **(Nilai Indikator =2,5)**	2.5	4.0	1.5	High
d	penyusunan studi kelayakan dan perencanaan teknis/desain/pengembangan sumber daya air preparation of feasibility studies and technical planning / design / development of water resources	7.Pengembangan SDM 8. Pengembangan Teknik 9. Pengembangan RBO (BBWS/BWS/BPSDA/ PJT)	RBO (BBWS/BWS/BPSDA/PJT) mempunyai rencana penggantian dan pendayagunaan aset untuk jangka pendek dan jangka panjang. Rencana ini dipergunakan menganggarkan biaya yang diperlukan. Walau sudah terencana, namun sesekali masih ditemui perbaikan yang bersifat incidental; **(Nilai Indikator =2,5)**	2.5	4.0	1.5	High
e	pelaksanaan pengadaan barang dan jasa serta penetapan pemenang selaku Unit Layanan Pengadaan (ULP) the procurement of goods and services as well as the determining the winner of Procurement Services Unit (ULP)	5. Kondisi Lingkungan	BBWS/BWS/BPSDA/PJT dan Instansi terkait telah melaksanakan sebagian kegiatan peningkatan kondisi lingkungan disertai dengan pelaksanaan kegiatan OP dan ME (penyelamatan DAS dan revitalisasi sumber air) ;**(Nilai Indikator = 2,5)**	2.5	4.0	1.5	High
f	penyelenggaraan sistem manajemen mutu dan system manajemen keselamatan dan kesehatan kerja (SMK3) implementation of quality management systems and health and safety management systems (SMK3)	7.Pengembangan SDM 8.Pengembangan Teknik 9. Pengembangan RBO	QMS telah berjalan dan pengendalian mutu data adalah suatu proses yang memiliki standar tetap sehingga pemilik kepentingan dapat meminta data atau informasi dalam keadaan siap pakai; **(Nilai Indikator = 3,0)**	3.0	4.0	1.0	Middle
g	pengelolaan sumber daya air yang meliputi konservasi sumber daya air, pendayagunaan sumber daya air, dan pengendalian daya rusak air pada wilayah sungai water resources management which includes the conservation and utilization of water resources and control of water damage in the basin	*D.TATA KELOLA INTERNAL ORGANISASI*	BBWS/BWS/BPSDA/PJT dan Instansi terkait telah melaksanakan seluruh kegiatan peningkatan kondisi lingkungan, pelaksanaan kegiatan OP dan ME (penyelamatan DAS dan revitalisasi sumber air) yang disertai dengan upaya penyidikan internal oleh PPNS terhadap pelanggaran hukum pada seluruh kegiatan; **(Nilai Indikator = 3,5)**	3.5	4.0	0.5	Middle
h	pengelolaan drainase utama perkotaan The management of urban main drainage	9. Pengembangan RBO (BBWS/BWS/BPSDA /PJT)	*Perlu ditambahkan Indikator dalam Lima Bidang Kinerja Kritis*	-	4.0	-	-
i	pengelolaan sistem hidrologi Management of hydrological system	11.Pendayagunaan SDA, Alokasi Air, Kekeringan dan Perijinan	Tanggung jawab untuk pendayagunaan SDA, alokasi air, manajemen kekeringan dan /atau perijinan tetap terbagi di antara instansi yang berbeda, namun dalam suatu kerangka kerjasama yang juga mencakup dimensi ruang dan waktu. Secara umum masih ada permasalahan operasional yang diakibatkan oleh alokasi yang tidak sesuai; **(Nilai Indikator =3,0)**	3.0	4.0	1.0	Middle
j	pengelolaan system informasi sumber daya air Water Resources management information System	7.Pengembangan Sumber Daya Manusia 8.Pengembangan Teknik	RBO (BBWS/BWS/BPSDA/PJT) sudah menerapkan perbaikan kinerja terus menerus dan mendorong tumbuhnya transparansi. Staf telah terlatih baik dan bersama-sama pimpinan memiliki komitmen bersama untuk mengembangkan badan pengelola; **(Nilai Indikator = 3,5)**	3.5	4.0	0.5	Middle
k	pelaksanaan operasi dan pemeliharaan sumber daya air pada wilayah sungai Implementation of operation and maintenance of water resources in the river basin	3.Keterlibatan Pemakai Air 4.Umpan balik pemakai air	Staf telah dianggap sebagai aset penting bagi BBWS/BWS/BPSDA/PJT dan pengembangan sumberdaya manusia dilakukan untuk memenuhi sasaran jangka panjang dari BBWS/BWS/BPSDA/PJT. **(Nilai Indikator =3.5)**	3.5	4.0	0.5	Middle
l	pelaksanaan bimbingan teknis pengelolaan sumber daya air yang menjadi kewenangan provinsi dan kabupaten/kota	3.Keterlibatan Pemakai Air	Tanggung jawab untuk pendayagunaan SDA, alokasi air, manajemen kekeringan dan /atau perijinan tetap terbagi di antara instansi yang berbeda, namun dalam suatu kerangka kerjasama yang juga mencakup	3.0	4.0	1.0	Middle

Compare between current functions and Assessment Report

Current Functions		Assessment Report					
Ministerial Regulation No.20/PRT/M/2016		Indicator	Criteria for Performance Benchmarking for scoring	Score			Evaluation
				Current	Target	Gap	
l	implementation of technical guidance for water resources management under the authority of provinces and regencies / city	Air 4.Umpan balik pemakai air	suatu kerangka kerjasama yang juga mencakup dimensi ruang dan waktu. Secara umum masih ada permasalahan operasional yang diakibatkan oleh alokasi yang tidak sesuai; **(Nilai Indikator =3,0)**	3.0	4.0	1.0	Middle
m	penyusunan dan penyiapan rekomendasi teknis dalam pemberian izin penggunaan sumber daya air dan izin pengusahaan sumber daya air pada wilayah sungai drafting / compilation and preparation of technical recommendations in licensing the use of water resources and permits utilization of water resources in the river area	3.Keterlibatan Pemakai Air 4.Umpan balik pemakai air	Peraturan perundangan memberikan kepastian kepada RBO(BBWS/BWS/BPSDA/PJT) untuk melaksanakan kewenangan berdasarkan kebutuhan dari semua pemilik kepentingan. RBO(BBWS?BWS?BPSDA/PJT)senantiasa memperbaiki keputusan-keputusan yang berasal dari jenjang dibawahnya. RBO(BBWS/BWS/BPSDA/PJT) telah berfungsi dan mempunyai kewenangan sebagai koordinator dalam pengelolaan sumberdaya air terpadu di wilayah sungai tersebut **(Nilai Indikator = 4,0)**	4.0	4.0	0.0	Low
n	fasilitasi kegiatan Tim Koordinasi Pengelolaan Sumber daya air pada wilayah sungai facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)	3.Keterlibatan Pemakai Ai 4.Umpan balik pemakai air	Ada pertemuan yang terjadual dengan para pemakai air yang secara terbuka memberi peluang kepada mereka untuk menyatakan pandangan dan keprihatinan mereka. **(Nilai Indikator =3,0)**	3.0	4.0	1.0	Middle
o	pemberdayaan masyarakat dalam pengelolaan sumber daya air empowerment of communities in the management of water resources	11.Pendayagunaan SDA, Alokasi Air, Perijinan dan Kekeringan	• BBWS/BWS/BPSDA/PJT telah mendokumentasikan dan meng-update Pedoman/SOP dengan baik. • Komunikasi, koordinasi dan kerjasama telah dilaksanakan secara baik • staf sudah menerima pelatihan yang sesuai untuk menggunakan prosedur yang ada • Sudah ada program pemberdayaan masyarakat dalam hal pengendalian daya rusak air namun belum dilaksanakan;**(Nilai Indikator =3,5)**	3.5	4.0	0.5	Middle
p	pelaksanaan penyusunan laporan akuntansi keuangan dan akuntansi barang milik negara selaku Unit Akuntansi Wilayah implementation of financial accounting report and accounting of state property as the Accounting Unit Area	14.Efisiensi Keuangan 15.Pemulihan biaya (khusus PJT)	• Biaya operasional dan pemeliharaan berasal dari BJPSDA yang dibayar para pengguna air. • Laporan keuangan di audit sesuai standard akuntansi dan dapat diperiksa para pemilik kepentingan. • Biaya pengembangan diprogramkan dari BJPSDA **(Nilai Indikator = 3.0)**	3.0	4.0	1.0	Middle
q	pelaksanaan pemungutan, penerimaan dan penggunaan biaya jasa pengelolaan sumber daya air (BJPSDA) sesuai dengan ketentuan peraturan perundang-undangan the implementation of the collection, receipt and use of the cost of water resource management services (BJPSDA) in accordance with the provisions of the legislation	10.Perencanaan tata kelola didalam RBO 14.Efisiensi Keuangan 15.Pemulihan biaya (khusus PJT)	Tanggung jawab untuk pendayagunaan SDA, alokasi air, manajemen kekeringan dan /atau perijinan tetap terbagi di antara instansi yang berbeda, namun dalam suatu kerangka kerjasama yang juga mencakup dimensi ruang dan waktu. Secara umum masih ada permasalahan operasional yang diakibatkan oleh alokasi yang tidak sesuai; **(Nilai Indikator =3,0)**	3.0	4.0	1.0	Middle
r	pelaksanaan urusan tata usaha dan rumah tangga balai serta komunikasi publik implementation of administrative affairs and households of BBWS as well as public communication	10.Perencanaan tata kelola di dalam RBO (BBWS/BWS/BPSDA/PJT)	*Perlu ditambahkan kriteria penilaian terkait fungsi " r "*	-	4.0	-	-

Compare between current functions and Assessment Report

Current Functions		Assessment Report					
Ministerial Regulation No.20/PRT/M/2016		Indicator	Criteria for Performance Benchmarking for scoring	Score			Evaluation
				Current	Target	Gap	
s	penyusunan perjanjian kinerja dan laporan kinerja Balai preparation of performance agreements and performance reports of BBWS	7.Pengembangan Sumber Daya Manusia. 9.Pengembangan RBO (BBWS/BWS/BPSDA/PJT)	*Perlu ditambahkan kriteria penilaian terkait fungsi " s "*	-	4.0	-	-
t	pelaksanaan pemungutan, penerimaan dan penggunaan biaya jasa pengelolaan sumber daya air (BJPSDA) sesuai dengan ketentuan peraturan perundang-undangan organize / carry out monitoring and supervision over the use of water resources and investigation of criminal offenses on water resources division	10.Perencanaan tata kelola di dalam RBO (BBWS/BWS/BPSDA/PJT) 11.Pendayagunaan SDA, Alokasi Air, Perijinan dan Kekeringan	*Perlu ditambahkan kriteria penilaian terkait fungsi " t "*	-	4.0	-	-

*Criteria of Evaluation

High: Gap of score is over 1.5
Middle: Gap of score is from 0.5 to 1.0
Low: Gap of score is 0.0

Compare between current functions and LAKIP (Accountability Report) 2014

Current Functions (Ministerial Regulation No.20/PRT/M/2016)		Field (Benchmarking Indicators)	LAKIP (Accountability Report) 2014 Activity	Evaluation
a	penyusunan pola dan rencana pengelolaan sumber daya air pada wilayah sungai preparation of Strategic Plan (POLA) and Master Plan (RENCANA) of water resources management in the river basin	2. Tata Kelola Sumber Daya Air	POLA dan RENCANA telah disusun Menyusun Master Plan Overall Flood Control System di Wilayah Sungai Ciliwung - Cisadane, debit design flood discharge main river 1:100, 1:50 river in town, 1:25 Drainage networks, 1:5 retention basin, untuk SDA BBWS CilCis menyusun TKPSDA untuk 6 Ci Menyusun manajemen infrastructure untuk: a.BKT (East Flood Canal) b.BKB (West Flood Canal) c.Situ	Middle
b	penyusunan program pengelolaan sumber daya air dan rencana kegiatan pengelolaan sumber daya air pada wilayah sungai preparation of water resources management programs and action plans for water resources management in river basin	10.Perencanaan tata kelola di dalam RBO (BBWS/BWS/BPSDA/PJT)	DED prasarana air baku IPA Pesanggrahan dan Citayam SID prasarana air baku IPA Mekarsari dan Legong Studi LARAP pembanguan bendungan Ciawi Studi AMDAL pembanguan bendungan Ciawi Detail disain bendungan Ciawi dan Bendunhan Sukamahi SID check dam di DAS Ciliwung Hulu Detail desain rehabilitasi situ-situ di Bogor	High
c	pemantauan dan evaluasi penyelenggaraan /penerapan pola pengelolaan sumber daya air dan rencana pengelolaan sumber daya air monitoring and evaluation of the implementation / application of a water resources management (POLA) and water resources management plan(RENCANA)	7.Pengembangan SDM 8. Pengembangan Teknik 9. Pengembangan RBO (BBWS/BWS/BPSDA/PJT)	Supervisi Pembangunan Jalan Bendung Ciawi dan Sukamahi Supervisi Revitalisasi Situ Cimanggis & Situ Cilala Monitoring & Evaluasi PKSDA Supervisi Revitalisasi Situ Cikaret dan Situ Kebantenan Supervisi Revitalisasi Situ Gedong Supervisi Situ Kelapa Dua, Situ Pondok dan Situ Cangkring	High
d	penyusunan studi kelayakan dan perencanaan teknis/desain/pengembangan sumber daya air preparation of feasibility studies and technical planning / design / development of water resources	7.Pengembangan SDM 8. Pengembangan Teknik 9. Pengembangan RBO (BBWS/BWS/BPSDA/PJT)	DED prasarana air baku IPA Pesanggrahan dan Citayam SID prasarana air baku IPA Mekarsari dan Legong Studi LARAP pembanguan bendungan Ciawi Studi AMDAL pembanguan bendungan Ciawi Detail disain bendungan Ciawi dan Bendunhan Sukamahi SID check dam di DAS Ciliwung Hulu Detail desain rehabilitasi situ-situ di Bogor	High
e	pelaksanaan pengadaan barang dan jasa serta penetapan pemenang selaku Unit Layanan Pengadaan (ULP) the procurement of goods and services as well as the determining the winner of Procurement Services Unit (ULP)	5. Kondisi Lingkungan	Proses appraisal tanah: Pembebasan lahan pembengunan sodetan Kali Ciliwung ke Kanal Banjir Timur Supervisi pengamanan pantai Jakarta Utara Pembangunan pengamanan [anti Jakarta Kuta	Middle
f	penyelenggaraan sistem manajemen mutu dan system manajemen keselamatan dan kesehatan kerja (SMK3) implementation of quality management systems and health and safety management systems (SMK3)	7.Pengembangan SDM 8.Pengembangan Teknik 9. Pengembangan RBO	Meningkatkan pemahaman tentang pengendalian mutu Setup Menyiapkan standar O-M untuk manajemen mutu Kommitmen manajemen mutu Fasilitasi Kegiatan Jaminan Mutu Bidang SD	Middle
g	pengelolaan sumber daya air yang meliputi konservasi sumber daya air, pendayagunaan sumber daya air, dan pengendalian daya rusak air pada wilayah sungai water resources management which includes the conservation and utilization of water resources and control of water damage in the basin	-	Bimbingan Teknis Perencanaan Sungai dan Koservasi Studi dan penyelidikan geoteknik bawah laut Pantai Jakarta DD restorasi dan peningkatan Sungai Cekeas DD Pengendalian banjir Sungai Bekasi Hilir Studi AMDAL Normali Sunagi Cisadane Pembangunan Sumur Resapan Das Ciliwung di Kab. Bogor	High

Compare between current functions and LAKIP (Accountability Report) 2014

Current Functions (Ministerial Regulation No.20/PRT/M/2016)		Field (Benchmarking Indicators)	LAKIP (Accountability Report) 2014 Activity	Evaluation
h	pengelolaan drainase utama perkotaan The management of urban main drainage	Pengembangan RBO (BBWS/BWS/BPSDA/PJT)	*Tidak ditemukan catatan kegiatan pada LAKIP yang terkait dengan fungsi " h "*	Low
i	pengelolaan sistem hidrologi Management of hydrological system	11.Pendayagunaan SDA, Alokasi Air, Kekeringan dan Perijinan	Sudah ada Sistem Manajemen Hydrologi yang dapat dimanfaatkan untuk mendukung kegiatan BBWS CC 1) Meningkatkan pemahaman tentang pengendalian mutu 2) Setup Menyiapkan standar O-M untuk manajemen mutu 3) Kommitmen manajemen mutu	Middle
j	pelaksanaan operasi dan pemeliharaan sumber daya air pada wilayah sungai Water Resources management information System	7.Pengembangan Sumber Daya Manusia 8.Pengembangan Teknik	Sistem informasi disiapkan untuk: 1. Sosialisasi Pola Pengelolaan SDA Wilayah Sungai Ciliwung Cisadane 2. Fasilitasi Penetapan Rencana Pengelolaan SDA Wilayah Sungai CC 3. Sosialisasi Pola Pengelolaan SDA Wilayah Sungai Kepulauan Seribu 4. Fasilitasi Penetapan Rencana Pengelolaan SDA Wilayah Sungai Kepulauan Seribu 5. Operasional Penyelenggaraan Data dan Informasi Bidang SDA	High
k	pelaksanaan operasi dan pemeliharaan sumber daya air pada wilayah sungai Implementation of operation and maintenance of water resources in the river basin	3.Keterlibatan Pemakai Air 4.Umpan balik pemakai air	Technical Audit air baku, situ dan dam OP Manual Managemen air baku Cisarua Training OP ttg Situ and dam inspeksi menyeluruh Gintung dam. Supervisi pemeliharaan situ Pemeliharan rutin situ-situ di wilayah sungai Ciliwung Cisadane OP of Telemetry OP Rutine sungai dan saluran di wilayah sungai Ciliwung Cisadane Facilitasi untuk kemampuan teknis petugas OP	High
l	pelaksanaan bimbingan teknis pengelolaan sumber daya air yang menjadi kewenangan provinsi dan kabupaten/kota implementation of technical guidance for water resources management under the authority of provinces and regencies / city	3.Keterlibatan Pemakai Air 4.Umpan balik pemakai air	Manajemen Konstruksi Pembangunan Sudetan Kali Ciliwung ke Kanal Banjir Timur Program Percepatan dan Perluasan Pembangunan Infrastruktur Sumber Daya Air - Irigasi Kecil (P4ISDA-IK) Menyusun TKPSDA untuk 6 Ci Supervisi Konstruksi Pemeliharaan Situ-situ	Middle
m	penyusunan dan penyiapan rekomendasi teknis dalam pemberian izin penggunaan sumber daya air dan izin pengusahaan sumber daya air pada wilayah sungai drafting / compilation and preparation of technical recommendations in licensing the use of water resources and permits utilization of water resources in the river area	3.Keterlibatan Pemakai Air 4.Umpan balik pemakai air	Penyiapan rekomendasi teknis mengenai penggunaan air dengan surat rekomendasi dan SIPPA	Low
n	fasilitasi kegiatan Tim Koordinasi Pengelolaan Sumber daya air pada wilayah sunga facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)	3.Keterlibatan Pemakai Ai 4.Umpan balik pemakai air	Fasilitasi GERAKAN NASIONAL KEMITRAAN 2.PENYELAMATAN AIR (GNKPA) Fasilitasi TKPSDA Penyiapan rekomendasi teknis mengenai penggunaan air dengan surat rekomendasi dan SIPPA	Middle
o	pemberdayaan masyarakat dalam pengelolaan sumber daya air empowerment of communities in the management of water resources	11.Pendayagunaan SDA, Alokasi Air, Perijinan dan Kekeringan	Fasilitasi GERAKAN NASIONAL KEMITRAAN 2.PENYELAMATAN AIR (GNKPA) Fasilitasi TKPSDA Penyiapan rekomendasi teknis mengenai penggunaan air dengan surat rekomendasi dan SIPPA	Middle
p	pelaksanaan penyusunan laporan akuntansi keuangan dan akuntansi barang milik negara selaku Unit Akuntansi Wilayah implementation of financial accounting report and accounting of state property as the Accounting Unit Area	14.Efisiensi Keuangan 15.Pemulihan biaya (khusus PJT)	Budget untuk O & M hanya terima dari alokasi pemerintah Financial planning telah siap sejalan dengan renstra (strategic planning) and RKP every year Menyediakan bujet yang lebih besar dari sebelumnya.	Middle

Compare between current functions and LAKIP (Accountability Report) 2014

Current Functions (Ministerial Regulation No.20/PRT/M/2016)		Field (Benchmarking Indicators)	LAKIP (Accountability Report) 2014 Activity	Evaluation
q	pelaksanaan pemungutan, penerimaan dan penggunaan biaya jasa pengelolaan sumber daya air (BJPSDA) sesuai dengan ketentuan peraturan perundang-undangan the implementation of the collection, receipt and use of the cost of water resource management services (BJPSDA) in accordance with the provisions of the legislation	10.Perencanaan tata kelola didalam RBO 14.Efisiensi Keuangan 15.Pemulihan biaya (khusus PJT)	Penyiapan rekomendasi teknis mengenai penggunaan air dengan surat rekomendasi dan SIPPA Menyediakan bujet yang lebih besar dari sebelumnya. Menggiatkan TKPSDA 6 Ci Melengkapi dan mengembangkan data, data updated untuk memberikan akses kepada stakeholder melalui web BBWS CC	Middle
r	pelaksanaan urusan tata usaha dan rumah tangga balai serta komunikasi publik implementation of administrative affairs and households of BBWS as well as public communication	10.Perencanaan tata kelola di dalam RBO (BBWS/BWS/BPSDA/PJT)	Propose personnel recruitment to solf the lag of staff in reach the organization objectives. Training Program for Staff BBWS Ciliwung Cisadane Reposisioning of staff base on competency and education are in place	Middle
s	penyusunan perjanjian kinerja dan laporan kinerja Balai preparation of performance agreements and performance reports of BBWS	7.Pengembangan Sumber Daya Manusia. 9.Pengembangan RBO (BBWS/BWS/BPSDA/PJT)	*Tidak ditemukan catatan kegiatan pada LAKIP yang terkait dengan fungsi "s "*	Low
t	pelaksanaan pemungutan, penerimaan dan penggunaan biaya jasa pengelolaan sumber daya air (BJPSDA) sesuai dengan ketentuan peraturan perundang-undangan organize / carry out monitoring and supervision over the use of water resources and investigation of criminal offenses on water resources division	10.Perencanaan tata kelola di dalam RBO (BBWS/BWS/BPSDA/PJT) 11.Pendayagunaan SDA, Alokasi Air, Perijinan dan Kekeringan	Supervisi Pembangunan Jalan Bendung Ciawi dan Sukamahi Supervisi Revitalisasi Situ Cimanggis & Situ Cilala Monitoring & Evaluasi PKSDA Supervisi Revitalisasi Situ Cikaret dan Situ	Middle

*Criteria of Evaluation

High: Number of "Activity" is 5 or more
Middle: Number of "Activity" is 3 or 4
Low: Number of "Activity" is from 0 to 2

Compare between current functions and PJT I and II

Current functions		PJT I		PJT II		Evaluation
Ministerial Regulation No.20/PRT/M/2016		Duty, function and role	Responsible Section	Duty, function and role	Responsible Section	
a	penyusunan pola dan rencana pengelolaan sumber daya air pada wilayah sungai preparation of Strategic Plan (POLA) and Master Plan (RENCANA) of water resources management in the river basin					
b	penyusunan program pengelolaan sumber daya air dan rencana kegiatan pengelolaan sumber daya air pada wilayah sungai preparation of water resources management programs and action plans for water resources management in river basin			Planning of implementation on O/M, conservation of Water Resources Management	Water Management Division I, II, III, IV	Low
c	pemantauan dan evaluasi penyelenggaraan /penerapan pola pengelolaan sumber daya air dan rencana pengelolaan sumber daya air monitoring and evaluation of the implementation / application of a water resources management (POLA) and water resources management plan(RENCANA)					Low
d	penyusunan studi kelayakan dan perencanaan teknis/desain/pengembangan sumber daya air preparation of feasibility studies and technical planning / design / development of water resources					Low
e	pelaksanaan pengadaan barang dan jasa serta penetapan pemenang selaku Unit Layanan Pengadaan (ULP)	Dessemination of monitoring and evaluation results of water quantity and quality to users, community and owner interest		Carry out the management and supervision of the administration of assets, household and general procurement of goods and services.	Bureau of Asset Management and Public Administration	Middle
				Procurement of electrical equipment, heavy equipment, and other goods and services	General Service Unit	
				Carry out the procurement of goods / services conducted through auction / selection to assign a provider of goods / services	Procurement Service Unit	
				Carry out the management and supervision of the administration of assets, household and general procurement of goods and services.	Bureau of Asset Management and Public Administration	
	the procurement of goods and services as well as the determining the winner of Procurement Services Unit (ULP)			Implementation of public relations	Company Secretary	
				representing the Board of Directors to communicate with stakeholders	Company Secretary	
				Manage and improve the function of marketing and partnerships, and improve service to customers, including in dealing with customer complaints in the field of hydropower	Bureau of Concession and Customer Service	
				Coodination with local government and community for administrative matter for water resources management	Water Management Division I, II, III, IV	
f	penyelenggaraan sistem manajemen mutu dan system manajemen keselamatan dan kesehatan kerja (SMK3) implementation of quality management systems and health and safety management systems (SMK3)			Quality management, like ISO	Performance Contrl Unit	Low
g	pengelolaan sumber daya air yang meliputi konservasi sumber daya air, pendayagunaan sumber daya air, dan pengendalian daya rusak air pada wilayah sungai	safety of infrasturactures and secure of water resources		Planning of implementation on O/M, conservation of Water Resources Management	Water Management Division I, II, III, IV	High
		Implementation of Water Resources Conservation and water power control		Implemtation of conservation of water resources	Water Management Division I, II, III, IV	
		Implementation of flushing in the context of the maintenance of rivers		Provide technical guidances on water resources management; -operation -maintenance of infrastructures -water-related disaster management -conservation of water resources -utilization of water resources -information, data management on hydrology -water quality -Hydropower for decision support	Bureau of data management and water allocation Bureau of Concession and Customer Service	
		Monitoring and evaluating water and quantity quality		Implementation of; -O/M of infrastructures -water utilization -water-related disaster management -data management of water resources management	Water Management Division I, II, III, IV	

Compare between current functions and PJT I and II

Current functions		PJT I		PJT II		Evaluation
Ministerial Regulation No.20/PRT/M/2016		Duty, function and role	Responsible Section	Duty, function and role	Responsible Section	
g		Utilization of water resources shall be maintained with harmony among social function, environmental function and economy, cooperation with related government and organizations; -Supply of surface water for daily needs -Irrigation water supply for existing irrigation system -flood control -Conservation of water resources -Development of drinking water and sanitation for household use		Implementation of hydropower station and power distribution	Hydropower Division	High
		Meet the basic need for daily and irrigation for small holder agriculture in irrigation system		Operation of laboratory for water resources management, such as water quality.	General Service Unit	
	water resources management which includes the conservation and utilization of water resources and control of water damage in the basin	Monitoring and evaluating water quantity and quality		Hydrological and water quality data management	Bureau of data management and water allocation	
		Dessemination of monitoring and evaluation of water quantity and quality to users and community				
		Dessemination of monitoring and evaluation results of water quantity and quality to users, community and owner interest				
h	pengelolaan drainase utama perkotaan The management of urban main drainage					
i	pengelolaan sistem hidrologi	Monitoring and evaluating water and quantity quality		Provide technical guidances on water resources management; -operation -maintenance of infrastructures -water-related disaster management -conservation of water resources -utilization of water resources -information, data management on hydrology -water quality -Hydropower for decision support	Bureau of data management and water allocation Bureau of Concession and Customer Service	High
	Management of hydrological system	Monitoring and evaluating water quantity and quality		Hydrological and water quality data management	Bureau of data management and water allocation	
j	pengelolaan system informasi sumber daya air	Dessemination of monitoring and evaluation of water quantity and quality to users and community		Provide technical guidances on water resources management; -operation -maintenance of infrastructures -water-related disaster management -conservation of water resources -utilization of water resources -information, data management on hydrology -water quality -Hydropower for decision support	Bureau of data management and water allocation Bureau of Concession and Customer Service	Middle
				Implementation of; -O/M of infrastructures -water utilization -water-related disaster management -data management of water resources management	Water Management Division I, II, III, IV	
	Water Resources management information System			Hydrological and water quality data management	Bureau of data management and water allocation	
				Data Management on water resources management	Water Management Division I, II, III, IV	
	pelaksanaan operasi dan pemeliharaan sumber daya air pada wilayah sungai	safety of infrasturactures and secure of water resources		Planning of implementation on O/M, conservation of Water Resources Management	Water Management Division I, II, III, IV	
		Implementation of flushing in the context of the maintenance of rivers		Provide technical guidances on water resources management; -operation -maintenance of infrastructures -water-related disaster management -conservation of water resources -utilization of water resources -information, data management on hydrology -water quality -Hydropower for decision support	Bureau of data management and water allocation Bureau of Concession and Customer Service	
		Monitoring and evaluating water and quantity quality		Implementation of; -O/M of infrastructures -water utilization -water-related disaster management -data management of water resources management	Water Management Division I, II, III, IV	

Compare between current functions and PJT I and II

Current functions		PJT I		PJT II		Evaluation
Ministerial Regulation No.20/PRT/M/2016		Duty, function and role	Responsible Section	Duty, function and role	Responsible Section	
k		Utilization of water resources shall be maintained with harmony among social function, environmental function and economy, cooperation with related government and organizations; -Supply of surface water for daily needs -Irrigation water supply for existing irrigation system -flood control -Conservation of water resources -Development of drinking water and sanitation for household use		Implementation of O/M and safety security of water resources management and infrastructures	Water Management Division I, II, III, IV	High
		Monitoring and evaluating water quantity and quality		O/M of hydropower infrastructures	Hydropower Division	
	Implementation of operation and maintenance of water resources in the river basin	Dessemination of monitoring and evaluation of water quantity and quality to users and community				
		Implementation of Operation and Maintenance (routine, periodic, minor repair and emergency) infrastructure of water resources				
		safety of infrasturactures and secure of water resources				
		O/M Water Resources Infrastructure which are hannded over from government				
		O/M and secure of government assets				
l	pelaksanaan bimbingan teknis pengelolaan sumber daya air yang menjadi kewenangan provinsi dan kabupaten/kota	Utilization of water resources shall be maintained with harmony among social function, environmental function and economy, cooperation with related government and organizations; -Supply of surface water for daily needs -Irrigation water supply for existing irrigation system -flood control -Conservation of water resources -Development of drinking water and sanitation for household use		Provide technical guidances on water resources management; -operation -maintenance of infrastructures -water-related disaster management -conservation of water resources -utilization of water resources -information, data management on hydrology -water quality -Hydropower for decision support	Bureau of data management and water allocation Bureau of Concession and Customer Service	High
		Provision of technical consideration and advice to water resources managers for their preparation of technical reccommendation and plan of water use		Manage and improve the function of marketing and partnerships, and improve service to customers, including in dealing with customer complaints in the field of hydropower	Bureau of Concession and Customer Service	
	implementation of technical guidance for water resources management under the authority of provinces and regencies / city	Provision of technical consideration and advice to water resources managers for their preparation of technical reccommendation and plan of water use		Coodination with local government and community for administrative matter for water resources management	Water Management Division I, II, III, IV	
		Provision of technical consideration and advice to water resources managers for their preparation of technical reccommendation and plan of water use				
m	penyusunan dan penyiapan rekomendasi teknis dalam pemberian izin penggunaan sumber daya air dan izin pengusahaan sumber daya air pada wilayah sungai					
	drafting / compilation and preparation of technical recommendations in licensing the use of water resources and permits utilization of water resources in the river area					
n	fasilitasi kegiatan Tim Koordinasi Pengelolaan Sumber daya air pada wilayah sungai	Dessemination of monitoring and evaluation results of water quantity and quality to users, community and owner interest		Water service fee is decided mutually, based on agreement among stakeholders based on government regulation		High
		Provision of technical consideration and advice to water resources managers for their preparation of technical reccommendation and plan of water use		representing the Board of Directors to communicate with stakeholders	Company Secretary	
	facilitation of Coordination Team of Water Resources Management at the river basin(TKPSDA)			Manage and improve the function of marketing and partnerships, and improve service to customers, including in dealing with customer complaints in the field of hydropower	Bureau of Concession and Customer Service	
				Coodination with local government and community for administrative matter for water resources management	Water Management Division I, II, III, IV	
				Coordination with relevant agencies for hydropower operation	Hydropower Division	
o	pemberdayaan masyarakat dalam pengelolaan sumber daya air	Counseling to community to inprove community empowerment with other managers of water resources		Coordination with government and community for public empowerment on water distribution	Water Management Division I, II, III, IV	Middle
	empowerment of communities in the management of water resources					
p	pelaksanaan penyusunan laporan akuntansi keuangan dan akuntansi barang milik negara selaku Unit Akuntansi Wilayah	O/M and secure of government assets		Carry out the management and supervision of the administration of assets, household and general procurement of goods and services.	Bureau of Asset Management and Public Administration	Middle
				Procurement of electrical equipment, heavy equipment, and other goods and services	General Service Unit	
	implementation of financial accounting report and accounting of state property as the Accounting Unit Area			Carry out the management and supervision of the administration of assets, household and general procurement of goods and services.	Bureau of Asset Management and Public Administration	
				Management of electrical equipment for workshops, heavy equipment, mechanical equipment and laboratory service and drinking water	General Service Unit	

Compare between current functions and PJT I and II

Current functions		PJT I		PJT II		Evaluation
Ministerial Regulation No.20/PRT/M/2016		Duty, function and role	Responsible Section	Duty, function and role	Responsible Section	
q	pelaksanaan pemungutan, penerimaan dan penggunaan biaya jasa pengelolaan sumber daya air (BJPSDA) sesuai dengan ketentuan peraturan perundang-undangan the implementation of the collection, receipt and use of the cost of water resource management services (BJPSDA) in accordance with the provisions of the legislation	Levy, receive, use the service costs for Water Resources Management to finance all the duties and responsibility		Water service fee is decided mutually, based on agreement among stakeholders based on government regulation		Middle
		Provisions on procedures for the implementation of collection and management services fee receipt for Water Resources directed by a Board of Directors				
		Rate of service fee for Water Resources Management use of surface water for drinking water business, business industry, and hydroelectric power generation business, Technical determined by the Minister on the proposed Board of Directors				
r	pelaksanaan urusan tata usaha dan rumah tangga balai serta komunikasi publik implementation of administrative affairs and households of BBWS as well as public communication					
s	penyusunan perjanjian kinerja dan laporan kinerja Balai			Formation of internal investigation team to carry out internal evaluation, assessment and investigation of efficiency and effectiveness on financial, operational, management, human resources, information technology and other activities	Internal Control Unit	Low
	preparation of performance agreements and performance reports of BBWS			Develop, monitor, evaluate and review the inplementation of policy and guideline for performance management	Performance Contrl Unit	
				Planning in the field of human resources, employment, development, coaching, education and training, welfare, health and safety Employee health services and personnel administration	Bureau of Human Resources	
t	pelaksanaan pemungutan, penerimaan dan penggunaan biaya jasa pengelolaan sumber daya air (BJPSDA) sesuai dengan ketentuan peraturan perundang-undangan organize / carry out monitoring and supervision over the use of water resources and investigation of criminal offenses on water resources division					Low

*Criteria of Evaluation

High: Number of function, duty and role is 2 or more from each PJT I and PJT II
Middle: Number of function, duty and role is 1 or more from each PJT I and PJT II
Low: Others

b. Preparation of water resources management programs and action plans for water resources management in river basin

Activity 1-1 (Procedure 1)		Activity 1-1 (Procedure 2)		Activity 1-2		Activity 1-3
POLA						
Menyusun perencanaan bangunan pengamanan muara dan erosi pantai, dan melaksanakan pembangunan pengamanan muara dan erosi pantai (100%)	planning Construction protection for estuaries and coastal erosion, and carry out the construction of estuaries and coastal erosion protection (100%)	Merencanakan tanggul laut NCICD stage A	Plan the NCICD stage A sea embankment	Merencanakan tanggul laut NCICD stage A	Planing Sea Embankment as NCICD Stage A	Merencanakan tanggul laut NCICD stage A
Merencanakan dan mengalokasi air penggelontoran melalui kesepakatan dalam TKP sumber daya air, serta melaksanakan penggelontoran sungai	Plan and water allocation flushing through an agreement in the Coordinating Team Management of Water Resources (TKPSDA), as well as carrying out flushing stream	Menyusun Rencana Alokasi Air Tahunan WS Ciliwung Cisadane untuk disepakati TKPSDA WS Ciliwung Cisadane	Preparing Annual Water Allocation Plan of WS Ciliwung Cisadane to be agreed TKPSDA WS Ciliwung Cisadane	Menyusun Rencana Alokasi Air Tahunan WS Ciliwung Cisadane untuk disepakati TKPSDA WS Ciliwung Cisadane	Preparing Annual Water Allocation Plan of WS Ciliwung Cisadane to be agreed TKPSDA WS Ciliwung Cisadane	Menyusun Rencana Alokasi Air Tahunan WS Ciliwung Cisadane untuk disepakati TKPSDA WS Ciliwung Cisadane
Merencanakan (2011-2013 = 100%) dan melaksanakan (2014-2015 = 10%) perlindungan alur dan tebing sungai di sungai-sungai utama pada WS Ciliwung – Cisadane	Plan (2011-2013 = 100%) and execute (2014-2015 = 10%) and the flow of the river bank protection in the major rivers in the WS Ciliwung - Cisadane	Menyusun rencana dan melaksanakan perlindungan alur dan tebing sungai di sungai-sungai utama pada WS Ciliwung – Cisadane pada tiap tahun	Arrange plans and implement the project of river beds and riverbank in major rivers at WS Ciliwung - Cisadane each year	Menyusun rencana dan melaksanakan perlindungan alur dan tebing sungai di sungai-sungai utama pada WS Ciliwung – Cisadane pada tiap tahun	Arrange plans and implement the project of river beds and riverbank in major rivers at WS Ciliwung - Cisadane each year	Menyusun rencana dan melaksanakan perlindungan alur dan tebing sungai di sungai-sungai utama pada WS Ciliwung – Cisadane pada tiap tahun
Merencanakan sistem monitoring kualitas air real time	Planning a water quality monitoring system in real time	Sistem Monitoring Pengambilan Sample manual 3 kali dalam satu tahun	Sampling for Water Quality Monitoring System, its frequency is 3 times in one year	Sistem Monitoring Pengambilan Sample manual 3 kali dalam satu tahun	Sampling for Water Quality Monitoring System, its frequency is 3 times in one year	Sistem Monitoring Pengambilan Sample manual 3 kali dalam satu tahun
Menyusun perencanaan pembangunan IPAL industri terpadu pada kawasan industri, beserta penyiapan organisasi pengelolanya	Planning the construction of an integrated industrial wastewater in industrial areas, as well as the preparation of the management organization	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Merencanakan dan membangun saluran pembuangan air limbah perkotaan terpisah dari saluran drainasi, secara bertahap (5% area kota), terutama pada kawasan pengembangan perumahan atau perkotaan baru	Planning and building urban sewerage apart from drainage, gradually (5% city areas), especially in urban areas or new housing development	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Merencanakan Kaskade Sungai Ciliwung di Depok	Cascade Planning the of Ciliwung River in Depok	*Belum dilaksanakan menunggu selesai Bendungan Ciawi*	Balai support/supervise Ciawi Dam Construction Project Team, such as Land Acquisition and construction works			
Menyusun Master Plan Sistem Pengendalian Banjir secara menyeluruh di WS Ciliwung - Cisadane selesai tahun 2015,,debit banjir rencana Sungai utama 1:100, 1:50 sungai dalam kota 1:25, saluran Drainasi 1:5	Compile Master Plan of Integrated Flood Control System in WS Ciliwung - Cisadane finished 2015, a major river flood discharge plan 1: 100, 1:50 1:25 of the river in the city, drainage 1: 5	*Belum dilaksanakan menunggu selesai nya pelaksanaan pembangunan Sarpras Pengendali Banjir*	Balai support/supervise River Normalization Project Team to implement smoothly			
Menyusun Peraturan Daerah tentang pembangunan kawasan pemukiman baru yang mengikuti kaidah konservasi	Drafting regional regulations concerning the construction of new residential areas that follow the rules of conservation	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Menyusun Peraturan Daerah dan menerapkan pengendalian alih fungsi lahan secara berkelanjutan di Jabodetabek	Drafting regional regulations and implementing control over the land in a sustainable manner in Jabodetabek	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Menyusun Peraturan Daerah pemberian Insentif bagi Pengembang yang menambah RTH	Drafting regional regulations granting incentives for developers who add green open space (RTH)	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Menyusun Peraturan Daerah tentang pembangunan kawasan pemukiman baru yang mengikuti kaidah konservasi	Drafting regional regulations concerning the construction of new residential areas that follow the rules of conservation	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Menyusun Peraturan Daerah tentang perlindungan dan fungsi situ serta mensosialisasikannya	Develop Regional Regulation on the protection and function there and socialize	~~kegiatan dilakukan oleh instansi terkait lainnya~~				

Menyusun peraturan gubernur tentang penetapan batas dan pemanfaatan daerah sempadan sungai dan situ/waduk sebagai turunan dari Peraturan Daerah, dan melaksanakan, memantau serta menerapkan sanksi terhadap pelanggaran pelaksanaan Pergub tentang penetapan batas dan pemanfaatan daerah sempadan sungai dan situ/waduk secara berkelanjutan	Prepare regulations governor of delimitation and utilization of river border area and there / reservoir as a derivative of the Regional Regulation, and implement, monitor and impose sanctions for violations of the delimitation Pergub implementation and utilization of river border area and there / reservoirs in a sustainable manner	Upaya dalam pengamanan Situ berupa kegiatan pengadministrasian situ dan Kajian / Penetapan Sempadan Sungai	Review / Stipulation of River Area Border around Situ to secure functions of Situ	Upaya dalam pengamanan Situ berupa kegiatan pengadministrasian situ dan Kajian / Penetapan Sempadan Sungai	Review / Stipulation of River Area Border around Situ to secure functions of Situ	Upaya dalam pengamanan Situ berupa kegiatan pengadministrasian situ dan Kajian / Penetapan Sempadan Sungai
Menyusun Peraturan Daerah tentang perlindungan dan fungsi situ serta mensosialisasikannya	Develop Regional Regulation on the protection and function there and socialize	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Assessment Report						
LAKIP		2015				
DED prasarana air baku IPA Pesanggrahan dan Citayam	DED raw water infrastructure IPA Pesanggrahan and Citayam	DED prasarana air baku IPA Pesanggrahan dan Citayam	Detail Engineering Design on raw water infrastructure IPA (Water Treatment Plant) at Pesanggrahan and Citayam			
SID prasarana air baku IPA Mekarsari dan Legong	SID raw water infrastructure IPA Mekarsari and Legong	SID prasarana air baku IPA Mekarsari dan Legong	SID raw water infrastructure IPA Mekarsari and Legong			
Studi LARAP pembanguan bendungan Ciawi	LARAP study on Ciawi dam construction	Studi LARAP pembanguan bendungan Ciawi	The LARAP (Survey/Investigation/Design) study on the construction of the Ciawi dam			
Studi AMDAL pembanguan bendungan Ciawi	The EIA study on the construction of the Ciawi dam	Studi AMDAL pembanguan bendungan Ciawi	EIA study on the construction of the Ciawi dam			
Detail disain bendungan Ciawi dan Bendunhan Sukamahi	Detailed design of Ciawi and Sukamahi dam	Detail disain bendungan Ciawi dan Bendunhan Sukamahi	Detail of dam design Ciawi and Sukamahi Dam			
SID check dam di DAS Ciliwung Hulu	SID check dam in upstream of Ciliwung	SID check dam di DAS Ciliwung Hulu	SID check dam in Ciliwung Upstream basin			
Detail desain rehabilitasi situ-situ di Bogor	Detail design of situ rehabilitation in Bogor	Detail desain rehabilitasi situ-situ di Bogor	Details of situ-situ rehabilitation design in Bogor			
PJT						

d. Preparation of feasibility studies and technical planning / design / development of water resources

Activity 1-1 (Procedure 1)		Activity 1-1 (Procedure 2)		Activity 1-2		Activity 1-3
POLA						
Merencanakan instalasi Penjernihan kapasitas 9 m3/det di Curug dan perencanaan trase jalur pipa dari Curug ke Jakarta serta pelaksanaan produksi air minum 4 m3/det dikirim ke Jakarta.	Planning installation 9 m3/s capacity clearance at Curug and pipeline path planning from Curug to Jakarta and implementation of drinking water production 4 m3/s delivered to Jakarta.	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Perencanaan dan pelaksanaan Rehabilitasi Tarum Barat dari kapasitas semula 16 m3/det menjadi 31 m3/det	Planning and carrying out the rehabilitation of West Tarum of original capacity 16 m3 / s to 31 m3 / sec	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Merencanakan Long Storage BKB dan BKT dan Cengkareng drain (DKI Jakarta).Sosialisasi ke masyarakat untuk tidak memguang sampah dan limbah ke sungai	Long Storage BKB Planning the and BKT and Cengkareng drain (Jakarta) .Sosialisasi to the public not to throw litter and waste into the river	*Belum Dilaksanakan*	Collect data and information for planning on necessary capacity as Long Storage at BKB/BKT/Cengkareng drain for reduce internal flood. And implementing activity for awareness raising of residents (Sosialization) on keep water clean at BKB/BKT/Cengkareng drain to satisfy regulation on water quality for Raw Water			
Menyusun Perencanaan pasokan dan perbaikan kualitas air dari long storage BKB+BKT dan Cengkareng Drain	Compile Supply Planning and water quality improvement of long storage BKB + BKT and Cengkareng Drain	Pemantauan berupa monitoring kualitas air setiap tahun 3 kali	Water quality monitoring, 3 times/year	Pemantauan berupa monitoring kualitas air setiap tahun 3 kali	Water quality monitoring, 3 times/year	Pemantauan berupa monitoring kualitas air setiap tahun 3 kali
Merencanakan Karian Serpong Conveyance System (KSCS) tahap I	Planning the Karian Serpong Conveyance System (KSCS) Phase I	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Merencanakan alokasi pasokan air dari long storage BKB+BKT+Cascade Depok	Planning the water supply allocation of long storage BKB + BKT + Cascade Depok	Melaksanakan studi kelayakan dan detail desain Waduk Limo, Sungai Pesanggrahan di Cinere Depok	Conducting feasibility study and design details of Limo Reservoir, Pesanggrahan River in Cinere Depok			Melaksanakan studi kelayakan dan detail desain Waduk Limo, Sungai Pesanggrahan di Cinere Depok
Menyusun Perencanaan pasokan dari long storage Cascade Depok dan review alokasi air irigasi bendung katulampa dan bendung empang yang areanya berkurang	Compile the supply planning of long storage Cascade Depok and review the allocation of irrigation water weir and weir dam Katulampa that area is reduced	Review alokasi air irigasi bendung katulampa dan bendung empang yang areanya berkurang	Review of water allocation for irrigation that intake from Katulampa weir, because irrigation area is reduced	Review alokasi air irigasi bendung katulampa dan bendung empang yang areanya berkurang	Review of water allocation for irrigation that intake from Katulampa weir, because irrigation area is reduced	Review alokasi air irigasi bendung katulampa dan bendung empang yang areanya berkurang
		Pelaksanaan studi potensi air baku JABODTABEK dengan hasil bahwa memanfaatkan alokasi air irigasi bendung katulampa dan bendung empang yang areanya berkurang menjadi air baku	Implementation of study on potential water supply for raw water to JABODETABEK, to re-allocate the water from irrigation water that intake from Katulampa weir. Because irrigation area is reduced	Pelaksanaan studi potensi air baku JABODTABEK dengan hasil bahwa memanfaatkan alokasi air irigasi bendung katulampa dan bendung empang yang areanya berkurang menjadi air baku	Implementation of study on potential water supply for raw water to JABODETABEK, to re-allocate the water from irrigation water that intake from Katulampa weir. Because irrigation area is reduced	Pelaksanaan studi potensi air baku JABODTABEK dengan hasil bahwa memanfaatkan alokasi air irigasi bendung katulampa dan bendung empang yang areanya berkurang menjadi air baku
Melaksanakan studi kelayakan dan detail desain Waduk Pondok Benda, Sungai Angke di Pamulang	Carry out a feasibility study and detailed design of the reservoir Pondok Benda, Angke River in Pamulang	*Belum Dilaksanakan*	Collect data and information for implementation of FS and detail design of reservoirs at Pondok Benda, Angke River in Pamulang			
Melaksanakan studi kelayakan dan detail desain Waduk Limo, Sungai Pesanggrahan di Cinere Depok	Carry out a feasibility study and detailed design of Limo Reservoir, Pesanggrahan River in Cinere Depok	Hasil Study Kelayakan tidak Feasible	-			
Melaksanakan studi kelayakan dan detail desain Waduk Genteng di Sungai Cisadane, Rancamaya Bogor	Carry out a feasibility study and detailed design of Genteng Reservoir in Cisadane River, Rancamaya Bogor	*Belum Dilaksanakan*	Collect data and information for implementation of FS and detail design of Genteng Reservoir at Cisadane River			
Melaksanakan studi kelayakan dan detail desain Waduk Narogong di Sungai Citeureup/Cileungsi-Cibinong	Carry out a feasibility study and detailed design Narogong Reservoir in Citeureup River / Cileungsi-Cibinong	Pelaksanaan FS Waduk Narogong	Implement FS on Narogong Reservoir	Pelaksanaan FS Waduk Narogong	Implement FS on Narogong Reservoir	Pelaksanaan FS Waduk Narogong
Merencanakan dan melaksanakan pemisahaan fungsi saluran air baku dan air irigasi di Saluran Induk Tarum Barat (Cantek 100% dalam 2 thn, Pelaksanaan 30% dalam 3 thn)	Plan and implement separation of functions raw water channels and irrigation water in the West Tarum Main Channel (Cantek 100% in 2 yrs, implementation of 30% in 3 yrs)	~~kegiatan dilakukan oleh instansi terkait lainnya~~				

Merencanakan (2011-2013 = 100%) dan Melaksanakan (2014-2015 = 50%) Irigasi sederhana ke irigasi teknis DI. Sibanteng pada Sungai Citempuandi Desa Sibanteng, Kecamatan Leuwisadeng, Kabupaten Bogor.	Planning the (2011-2013 = 100%) and Execute (2014-2015 = 50%) is simple Irrigation to technical irrigation (Irrigation Area). Sibanteng on Citempuandi River Village Sibanteng, Leuwisadeng subdistrict, Bogor regency.	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Merencanakan (2011-2013 = 100%) pemanfaatan tenaga air, melaksanakan (2014-2015 = 40%)	Planning the (2011-2013 = 100%) the utilization of hydropower, implement (2014-2015 = 40%)	*Belum Dilaksanakan*	-			
Melakukan studi dan detail desain irigasi Cimanceuri dan bendung Cimanceuri	Conducted a study and detailed design of Cimanceuri irrigation and dam	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Melakukan studi dan detail desain irigasi Cikarang hilir	Conducted a study and detailed design of irrigation downstream Cikarang	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Melakukan studi dan pelaksanaan pengusahaan air minum 4 m3/det berdasarkan kerjasama Pemda DKI Jakarta, Pemda Jabar, PJT II dan investor/swasta	Conducting the study and implementation of drinking water exploitation 4 m3 / s based the cooperation Jakarta Government, Government of West Java, PJT II and investor / private	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Menyusun Master Plan Sistem Pengendalian Banjir secara menyeluruh di WS Ciliwung - Cisadane selesai tahun 2015,,debit banjir rencana Sungai utama 1:100, 1:50 sungai dalam kota 1:25, saluran Drainasi 1:5	Compile Master Plan of Integrated Flood Control System in WS Ciliwung - Cisadane finished 2015, a major river flood discharge plan 1: 100, 1:50 1:25 of the river in the city, drainage 1: 5	*Belum Dilaksanakan*	Collect data and information for making a master plan for Integrated Flood Control in Ciliwung Cisadane River Basing, considering on; flood discharge scale 1:100, 1:50, 1:25 and internal flood for drainage capacity: 1:5			
Merencanakan dan menetapkan jalur evakuasi dan tempat pengungsian	Plan and establish an evacuation route and evacuation shelter	RTD Bendungan Gintung	Emergency Operation Plan of Situ Gintung	RTD Bendungan Gintung	Emergency Operation Plan of Situ Gintung	RTD Bendungan Gintung
Merencanakan pengembangan dan pemasangan sistem peringatan dini di semua sungai	Plan the development and installation of early warning systems in all rivers	Menyusun pengembangan dan pemasangan sistem peringatan dini di semua sungai	Development and installation of early warning systems across all rivers	Menyusun pengembangan dan pemasangan sistem peringatan dini di semua sungai	Development and installation of early warning systems across all rivers	Menyusun pengembangan dan pemasangan sistem peringatan dini di semua sungai
Merencanakan dan Membangun tanggul laut di Cilincing, Pluit, Pasar Ikan, Kamal muara dan Marunda	Plan and Build a sea dike in Cilincing, Pluit, Pasar Ikan, Kamal Muara and Marunda	Merencanakan dan Membangun tanggul laut di Cilincing, Pluit, Pasar Ikan, Kamal muara dan Marunda	Plan and Build sea dikes in Cilincing, Pluit, Pasar Ikan, estuary Kamal and Marunda	Merencanakan dan Membangun tanggul laut di Cilincing, Pluit, Pasar Ikan, Kamal muara dan Marunda	Plan and Build sea dikes in Cilincing, Pluit, Pasar Ikan, estuary Kamal and Marunda	Merencanakan dan Membangun tanggul laut di Cilincing, Pluit, Pasar Ikan, Kamal muara dan Marunda
Merencanakan dan Meningkatkan tanggul laut di pantai Tangerang dan Bekasi	Plan and Improve the sea dike on the coast Tangerang and Bekasi	Merencanakan tanggul laut NCICD stage A	Plan the NCICD stage A sea embankment	Merencanakan tanggul laut NCICD stage A	Planing Sea Embankment as NCICD Stage A	Merencanakan tanggul laut NCICD stage A
Melaksanakan FS dan Perencanaan JCDS/Jakarta Coastal Defence Strategy	Carry out the Feasibility Study and Planning JCDS / Jakarta Coastal Defense Strategy					
Melaksanakan Studi Kelayakan dan detil desain Connecting Channel Ciliwung ke BKT	Carry out the feasibility study and detailed design of Connecting Channel Ciliwung to BKT	Melaksanakan Studi Kelayakan dan detil desain Connecting Channel Ciliwung ke BKT	Carry out Feasibility Study and design details of Connecting Channel between Ciliwung River to BKT			Melaksanakan Studi Kelayakan dan detil desain Connecting Channel Ciliwung ke BKT
Merencanakan dan melaksanakan rehabilitasi tanggul banjir secara berkelanjutan	Plan and implement rehabilitation of flood embankment in a sustainable	Merencanakan dan melaksanakan rehabilitasi tanggul banjir secara berkelanjutan	Planning and implement of rehabilitation of sustainable levee against flood	Merencanakan dan melaksanakan rehabilitasi tanggul banjir secara berkelanjutan	Planning and implement of rehabilitation of sustainable levee against flood	Merencanakan dan melaksanakan rehabilitasi tanggul banjir secara berkelanjutan
Menyusun perencanaan bangunan pengamanan muara dan erosi pantai, dan melaksanakan pembangunan pengamanan muara dan erosi pantai (100%)	Planning safety building estuaries and coastal erosion, and carry out the construction of estuaries and coastal erosion protection (100%)	Merencanakan tanggul laut NCICD stage A	Plan the NCICD stage A sea embankment	Merencanakan tanggul laut NCICD stage A	Planing Sea Embankment as NCICD Stage A	Merencanakan tanggul laut NCICD stage A
Menyusun perencanaan pembangunan IPAL industri terpadu pada kawasan industri, beserta penyiapan organisasi pengelolanya	Planning the construction of an integrated industrial wastewater in industrial areas, as well as the preparation of the management organization	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Assessment Report						
LAKIP						
DED prasarana air baku IPA Pesanggrahan dan Citayam	DED raw water infrastructure IPA Pesanggrahan and Citayam	DED prasarana air baku IPA Pesanggrahan dan Citayam	Detail Engineering Design on raw water infrastructure IP (Water Treatment Plant) at Pesanggrahan and Citayam			
SID prasarana air baku IPA Mekarsari dan Legong	SID raw water infrastructure IPA Mekarsari and Legong	SID prasarana air baku IPA Mekarsari dan Legong	SID raw water infrastructure IPA Mekarsari and Legong			

Studi LARAP pembanguan bendungan Ciawi	LARAP study on Ciawi dam construction	Studi LARAP pembanguan bendungan Ciawi	The LARAP (Survey/Investigation/Design) study on the construction of the Ciawi dam		
Studi AMDAL pembanguan bendungan Ciawi	The EIA study on the construction of the Ciawi dam	Studi AMDAL pembanguan bendungan Ciawi	EIA study on the construction of the Ciawi dam		
Detail disain bendungan Ciawi dan Bendunhan Sukamahi	Detailed design of Ciawi and Sukamahi dam	Detail disain bendungan Ciawi dan Bendunhan Sukamahi	Detail of dam design Ciawi and Sukamahi Dam		
SID check dam di DAS Ciliwung Hulu	SID check dam in upstream of Ciliwung	SID check dam di DAS Ciliwung Hulu	SID check dam in Ciliwung Upstream basin		
Detail desain rehabilitasi situ-situ di Bogor	Detail design of situ rehabilitation in Bogor	Detail desain rehabilitasi situ-situ di Bogor	Details of situ-situ rehabilitation design in Bogor		
PJT					

g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin

Activity 1-1 (Procedure 1)		Activity 1-1 (Procedure 2)		Activity 1-2		Activity 1-3
POLA				**Flood Management**		**Flood Management**
Mengendalikan longsoran dan erosi tebing di sungai-sungai utama.	Control avalanches/landslide and erosion cliffs in major rivers	pelaksanaan normalisasi sungai-sungai di WS Ciliwung Cisadane	River Improvement of Ciliwung and Cisadane River Basin	pelaksanaan normalisasi sungai-sungai di WS Ciliwung Cisadane	River Improvement of Ciliwung and Cisadane River Basin	pelaksanaan normalisasi sungai-sungai di WS Ciliwung Cisadane
Mengawasi dan menertibkan hunian dan usaha lainnya di bantaran sungai	Supervise and regulate the occupancy and other businesses along the river	Sosialisasi Sempadan Sungai Ciliwung	Activity for awareness raising of residents and public on Ciliwung River Area Border	Sosialisasi Sempadan SUngai Ciliwung	Activity for awareness raising of residents and public on Ciliwung River Area Border	Sosialisasi Sempadan SUngai Ciliwung
Melakukan inventarisasi dan pemetaan daerah rawan longsor di tingkat Kab/Kota	Conduct an inventory and mapping of areas prone to landslides at the level of district / city	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Melaksanakan upaya perkuatan daerah kritis (vegetatif dan sipil teknis).	Strengthening efforts to implement the critical areas (vegetative and civil engineering).	Melaksanakan upaya perkuatan daerah kritis (vegetatif dan sipil teknis).	Strengthening efforts to implement the critical areas (vegetative and civil engineering).	Melaksanakan upaya perkuatan daerah kritis (vegetatif dan sipil teknis).	Strengthening efforts to implement the critical areas (vegetative and civil engineering).	Melaksanakan upaya perkuatan daerah kritis (vegetatif dan sipil teknis).
Melaksanakan penyelesaian pembangunan Banjir Kanal Timur (23.5 km)	Carry out the completion of construction of the East Flood Canal (23.5 km)	Melaksanakan penyelesaian pembangunan Banjir Kanal Timur (23.5 km) tahun 2011	Carry out construction of the East Flood Canal (23.5 km) to finish in 2011			Melaksanakan penyelesaian pembangunan Banjir Kanal Timur (23.5 km) tahun 2011
Melaksanakan normalisasi Sungai Pesanggrahan, Angke, Sunter (PAS)	Carry out normalization Pesanggrahan River, Angke, Sunter (PAS)	Melaksanakan normalisasi Sungai Pesanggrahan, Angke, Sunter (PAS)	Implement River Channel Improvement at Pesanggrahan, Angke, Sunter (PAS) Rivers	Melaksanakan normalisasi Sungai Pesanggrahan, Angke, Sunter (PAS)	Implement River Channel Improvement at Pesanggrahan, Angke, Sunter (PAS) Rivers	Melaksanakan normalisasi Sungai Pesanggrahan, Angke, Sunter (PAS)
Melaksanakan normalisasi Sungai Ciliwung dari TB. Simatupang sampai dengan Manggarai	Carry out normalization of Ciliwung river from TB. Simatupang to Manggarai	Melaksanakan normalisasi Sungai Ciliwung dari TB. Simatupang sampai dengan Manggarai	Implement River Channel Improvement of Ciliwung River from TB. Simatupang up to Manggarai	Melaksanakan normalisasi Sungai Ciliwung dari TB. Simatupang sampai dengan Manggarai	Implement River Channel Improvement of Ciliwung River from TB. Simatupang up to Manggarai	Melaksanakan normalisasi Sungai Ciliwung dari TB. Simatupang sampai dengan Manggarai
Melaksanakan pelaksanaan sodetan Sungai Ciliwung di lokasi Kalibata dan Kebun Baru	Carry out the implementation of the shortcut Ciliwung location Kalibata and Kebun Baru	*Belum Dilaksanakan*	Collect data and information for design and implement "short cut" at kalibata and Kebun Baru of Ciliwung River			
Melaksanakan penambahan 1 Pintu Air Manggarai dan penambahan 1 Pintu Air Karet	Implement additional 1 Manggarai water gate and the addition of 1 Karet water gate	Melaksanakan penambahan 1 Pintu Air Manggarai dan penambahan 1 Pintu Air Karet	*Continue to implement work for additional water gate are Karet (at Manggarai, it already finished)*	Melaksanakan penambahan 1 Pintu Air Manggarai dan penambahan 1 Pintu Air Karet	Continue to implement work for additional water gate are Karet (at Manggarai, it already finished)	Melaksanakan penambahan 1 Pintu Air Manggarai dan penambahan 1 Pintu Air Karet
Melaksanakan Revitalisasi Pintu Air Ciliwung Lama	Revitalization implement Ciliwung Lama water gate	*Belum Dilaksanakan*	Check conditions of old water gates at Ciliwung river for revitalization			
Melaksanakan Pengerukan 13 Sungai dan 5 Waduk di Jakarta,Program JEDI (Jakarta Emergency Dredging Initiative)	Implement Dredging for 13 River and 5 Reservoir in Jakarta, JEDI Program (Jakarta Emergency Dredging Initiative)	pelaksanaan pengerukan sungai dalam program JEDI	Implement Dredging for 13 River and 5 Reservoir in Jakarta, as JEDI Program (Jakarta Emergency Dredging Initiative)	pelaksanaan pengerukan sungai dalam program JEDI	Implement Dredging for 13 River and 5 Reservoir in Jakarta, as JEDI Program (Jakarta Emergency Dredging Initiative)	pelaksanaan pengerukan sungai dalam program JEDI
Melaksanakan normalisasi sungai diperkotaan (sungai Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi dan Kali Dadap, Grogol, Krukut, Banjir Kanal Barat (Kali Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat dan Cakung, Kali Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) dengan Q25 dan pelaksanaannya.	Carrying out the normalization of rivers in urban areas (river Cimanceuri, Cirarab, Cisadane, Cengkareng Drain, time Sabi and Kali Dadap, Grogol, Krukut, West Flood Canal (Kali Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat and Cakung, Kali Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cullinan, Cikarang, CBL, Cilemah Abang) with Q25 and implementation.	Melaksanakan normalisasi sungai diperkotaan (sungai Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi dan Kali Dadap, Grogol, Krukut, Banjir Kanal Barat (Kali Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat dan Cakung, Kali Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) dengan Q25 dan pelaksanaannya.	Implement River Channel Normalization in urban areas (Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi and Kali Dadap, Grogol, Krukut, West Canal (Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat and Cakung, Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) with Q25	Melaksanakan normalisasi sungai diperkotaan (sungai Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi dan Kali Dadap, Grogol, Krukut, Banjir Kanal Barat (Kali Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat dan Cakung, Kali Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) dengan Q25 dan pelaksanaannya.	Implement River Channel Normalization in urban areas (Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi and Kali Dadap, Grogol, Krukut, West Canal (Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat and Cakung, Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) with Q25	Melaksanakan normalisasi sungai diperkotaan (sungai Cimanceuri, Cirarap, Cisadane, Cengkareng Drain, Kali Sabi dan Kali Dadap, Grogol, Krukut, Banjir Kanal Barat (Kali Adem), Mampang, Cideng, Cipinang, Buaran, Jatikramat dan Cakung, Kali Blencong, Bekasi, Cikeas, Cileungsi, Cikarang, CBL, Cilemah Abang) dengan Q25 dan pelaksanaannya.
Merehabiltasi hutan bakau sepanjang pantai secara berkelanjutan (25%)	Rehabilitate mangrove forests along the coast in a sustainable manner (25%)	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Mensosialisasikan kepada masyarakat tentang Rencana Teknis Rehabilitasi Hutan dan Lahan (RTkRHL) = 2011-2013, melaksakan kegiatan RTkRHL pada lahan sangat kritis 40% dan lahan kritis 25% area (2014-2015)	Disseminate to the public on the Technical Plan for Forest and Land Rehabilitation (RTkRHL) = 2011 to 2013, fulfilling activities on land RTkRHL very critical 40% and 25% of critical land area (2014-2015)	~~kegiatan dilakukan oleh instansi terkait lainnya~~				
Mensosialisasikan upaya konservasi dan perlindungan lahan agak kritis pada DAS di wilayah WS Ciliwung - Cisadane, dan melaksanakan RTkRHL 20% area	Mensosialisasikan upaya konservasi dan perlindungan lahan agak kritis pada DAS di wilayah WS Ciliwung - Cisadane, dan melaksanakan RTkRHL 20% area	penyusunan strategi konservasi di das ciliwung dengan BPDAS dan TKPSDA WS Ciliwung Cisadane	Preparation of a strategy on environment conservation in Ciliwung River Basin with BPDAS and TKPSDA WS Ciliwung Cisadane	penyusunan strategi konservasi di das ciliwung dengan BPDAS dan TKPSDA WS Ciliwung Cisadane	Preparation of a strategy on environment conservation in Ciliwung River Basin with BPDAS and TKPSDA WS Ciliwung Cisadane	penyusunan strategi konservasi di das ciliwung dengan BPDAS dan TKPSDA WS Ciliwung Cisadane
Melaksanakan Gerhan dan GNKPA di dalam dan di luar kawasan hutan pada DAS hulu dan tengah WS Ciliwung - Cisadane (25%)	Implement the National Movement for Forest and Land Rehabilitation (Gerhan) and the National Movement for Saving Water Partnership (GNKPA) inside and outside the forest area in the watershed upstream and middle WS Ciliwung - Cisadane (25%)	melakukan penyusunan program dan kegiatan GNKPA	Start the preparation of National Movement of Partnership on Water Security (GNKPA) programs and activities	melakukan penyusunan program dan kegiatan GNKPA	Start the preparation of National Movement of Partnership on Water Security (GNKPA) programs and activities	melakukan penyusunan program dan kegiatan GNKPA

Melaksanakan sosialisasi ke masyarakat untuk tidak membuang sampah ke sungai dan membuat TPS untuk di olah	The dissemination to the public not to throw garbage into the river and made TPS for processed	~~Dilakukan bersama instansi lain~~				
Melaksanakan review peta rawan genangan dan sosialisasi ke masyarakat	To review map inundated and dissemination to the public	*Belum Dilaksanakan*	Collect data and Information on inundated area by past floods for review Flood Hazard & Risk Maps and to open for public			
Mengurangi luas perambahan daerah retensi dan bantaran sungai (30%)	Reduce the area of encroachment retention areas and flood plains (30%)	~~Dilakukan bersama instansi lain~~				
Melakukan inventarisasi dan pemetaan daerah rawan longsor di tingkat Kab/Kota	Conduct an inventory and mapping of areas prone to landslides at the level of district / city	*Belum Dilaksanakan*	Collect data and Information on topography and landslides by past phenomenon for review Sediment Disaster Hazard & Risk Maps and to open for public			
Merencanakan dan Membangun tanggul laut di Cilincing, Pluit, Pasar Ikan, Kamal muara dan Marunda	Plan and Build a sea dike in Cilincing, Pluit, Pasar Ikan, Kamal muara and Marunda	Merencanakan dan Membangun tanggul laut di Cilincing, Pluit, Pasar Ikan, Kamal muara dan Marunda	Plan and Build sea dikes in Cilincing, Pluit, Pasar Ikan, estuary Kamal and Marunda	Merencanakan dan Membangun tanggul laut di Cilincing, Pluit, Pasar Ikan, Kamal muara dan Marunda	Plan and Build sea dikes in Cilincing, Pluit, Pasar Ikan, estuary Kamal and Marunda	Merencanakan dan Membangun tanggul laut di Cilincing, Pluit, Pasar Ikan, Kamal muara dan Marunda
Melaksanakan penyelesaian pembangunan Banjir Kanal Timur (23.5 km)	Carry out the completion of construction of the East Flood Canal (BKT 23.5 km)	Melaksanakan penyelesaian pembangunan Banjir Kanal Timur (23.5 km)	Carry out construction of the East Flood Canal (23.5 km) to finish			Melaksanakan penyelesaian pembangunan Banjir Kanal Timur (23.5 km)
Melaksanakan normalisasi Sungai Pesanggrahan, Angke, Sunter (PAS)	Carry out normalization Pesanggrahan River, Angke, Sunter (PAS)	Melaksanakan normalisasi Sungai Pesanggrahan, Angke, Sunter (PAS)	Implement River Channel Improvement at Pesanggrahan, Angke, Sunter (PAS) Rivers	Melaksanakan normalisasi Sungai Pesanggrahan, Angke, Sunter (PAS)	Implement River Channel Improvement at Pesanggrahan, Angke, Sunter (PAS) Rivers	Melaksanakan normalisasi Sungai Pesanggrahan, Angke, Sunter (PAS)
Melaksanakan untuk penataan Sungai Ciliwung:	Implement for structuring Ciliwung:	Melaksanakan untuk penataan Sungai Ciliwung:	Implementing for Ciliwung River Management on Environment Conservation	Melaksanakan untuk penataan Sungai Ciliwung:	Implementing for Ciliwung River Management on Environment Conservation	Melaksanakan untuk penataan Sungai Ciliwung:
Melaksanakan normalisasi Sungai Ciliwung dari TB. Simatupang sampai dengan Manggarai	carry out normalization of Ciliwung River from TB. Simatupang to Manggarai	Melaksanakan normalisasi Sungai Ciliwung dari TB. Simatupang sampai dengan Manggarai	Implement River Channel Improvement of Ciliwung River from TB. Simatupang up to Manggarai	Melaksanakan normalisasi Sungai Ciliwung dari TB. Simatupang sampai dengan Manggarai	Implement River Channel Improvement of Ciliwung River from TB. Simatupang up to Manggarai	Melaksanakan normalisasi Sungai Ciliwung dari TB. Simatupang sampai dengan Manggarai
Melaksanakan penambahan 1 Pintu Air Manggarai dan penambahan 1 Pintu Air Karet	Implement additional 1 Manggarai water gate and the addition of 1 Karet water gate	Melaksanakan penambahan 1 Pintu Air Manggarai dan penambahan 1 Pintu Air Karet	*Continue to implement work for additional water gate ar Karet (at Manggarai, it already finished)*	Melaksanakan penambahan 1 Pintu Air Manggarai dan penambahan 1 Pintu Air Karet	Continue to implement work for additional water gate ar Karet (at Manggarai, it already finished)	Melaksanakan penambahan 1 Pintu Air Manggarai dan penambahan 1 Pintu Air Karet
Melaksanakan Pengerukan 13 Sungai dan 5 Waduk di Jakarta,Program JEDI (Jakarta Emergency Dredging Initiative)	Implement River Dredging 13 River and 5 Reservoir in Jakarta, JEDI Program (Jakarta Emergency Dredging Initiative)	Melaksanakan Pengerukan 13 Sungai dan 5 Waduk di Jakarta,Program JEDI (Jakarta Emergency Dredging Initiative)	Implement Dredging for 13 River and 5 Reservoir in Jakarta, as JEDI Program (Jakarta Emergency Dredging Initiative)	Melaksanakan Pengerukan 13 Sungai dan 5 Waduk di Jakarta,Program JEDI (Jakarta Emergency Dredging Initiative)	Implement Dredging for 13 River and 5 Reservoir in Jakarta, as JEDI Program (Jakarta Emergency Dredging Initiative)	Melaksanakan Pengerukan 13 Sungai dan 5 Waduk di Jakarta,Program JEDI (Jakarta Emergency Dredging Initiative)
Melaksanakan Studi Kelayakan dan detil desain Connecting Channel Ciliwung ke BKT	Carry out Feasibility Study and details design of Connecting Channel between Ciliwung River and BKT	Melaksanakan Studi Kelayakan dan detil desain Connecting Channel Ciliwung ke BKT	Carry out Feasibility Study and design details of Connecting Channel between Ciliwung River to BKT			Melaksanakan Studi Kelayakan dan detil desain Connecting Channel Ciliwung ke BKT
Melaksanakan Perencanaan dan Pelaksanaan 30 polder-polder antara lain Sunter timur 2, Marunda, dan lain-lain.	Implement Planning and construction of 30 reclaimed land at Sunter east 2, Marunda, and others.	~~Dilakukan oleh instansi lain~~				
Merencanakan dan melaksanakan rehabilitasi tanggul banjir secara berkelanjutan	Planning and implement rehabilitation of levee for flood control in a sustainable manner	Merencanakan dan melaksanakan rehabilitasi tanggul banjir secara berkelanjutan	Planning and implement of rehabilitation of sustainable levee against flood	Merencanakan dan melaksanakan rehabilitasi tanggul banjir secara berkelanjutan	Planning and implement of rehabilitati	Merencanakan dan melaksanakan rehabilitasi tanggul banjir secara berkelanjutan
Melaksanakan perencanaan sistem drainase dan kapasitasnya di JABODETABEK (2011-2013), melaksanakan penataan sistem dan menormalisasi drainase mikro di JABODETABEK (2014-2015) dan berkelanjutan	Carrying out drainage system and capacity planning in the Greater Jakarta (2011-2013), implementing system structuring and normalizing micro drainage JABODETABEK (2014-2015) and sustainable	Studi drainasi Kemayoran dan Kota Bekasi tahun 2016	The study on drainage system of Kemayoran and Kota Bekasi in 2016			Studi drainasi Kemayoran dan Kota Bekasi tahun 2016
LAKIP						
Bimbingan Teknis Perencanaan Sungai dan Koservasi	Technical Guidance on River Planning and Conservation	Bimbingan Teknis Perencanaan Sungai dan Koservasi	Technical Guidance on River Planning and Conservation			
Studi dan penyelidikan geoteknik bawah laut Pantai Jakarta	Geotechnical study and underwater investigation for coastal area of Jakarta	Studi dan penyelidikan geoteknik bawah laut Pantai Jakarta	Geotechnical study and underwater investigation of Jakarta costal area			
DD restorasi dan peningkatan Sungai Cekeas	DD restoration and upgrading of the Cekeas River	DD restorasi dan peningkatan Sungai Cekeas	Detail Design (DD) restoration and upgrading of the Cekeas River			
DD Pengendalian banjir Sungai Bekasi Hilir	DD Flood Control of downstream of Bekasi River	DD Pengendalian banjir Sungai Bekasi Hilir	Detai Design Flood Control of Sungai Bekasi Hilir			
Studi AMDAL Normali Sunagi Cisadane	AMDAL Study of River Improvement at Cisadane	Studi AMDAL Normali Sunagi Cisadane	EIA Study on River Channel Improvement at Cisadane River			
Pembangunan Sumur Resapan Das Ciliwung di Kab. Bogor	Construction of infiltration wells at Kabpaten in Cisadane River Basin	Pembangunan Sumur Resapan Das Ciliwung di Kab. Bogor	Development of Infiltration Wells in Ciliwung River Basin at Kab. Bogor			

k. Implementation of operation and Maintenance of Water Resources

Activity 1-1 (Procedure 1)		Activity 1-1 (Procedure 2)		Activity 1-2		Activity 1-3
POLA						
Melaksanakan 60% OP waduk/situ oleh Dinas PU DKI (waduk/situ yang telah di kelola daerah)	Implement 60% O&M of reservoir / situ by Jakarta Public Works Agency (for reservoir / situ who have been managed by local government)	Melaksanakan 60% OP waduk/situ oleh Dinas PU DKI (waduk/situ yang telah di kelola daerah)	-	Melaksanakan 60% OP waduk/situ oleh Dinas PU DKI (waduk/situ yang telah di kelola daerah)		Melaksanakan 60% OP waduk/situ oleh Dinas PU DKI (waduk/situ yang telah di kelola daerah)
Melaksanakan 60% OP waduk/situ oleh BBWS (bagi waduk/situ yang masih di kelola oleh pusat)	Implement 60% O&M of reservoir / situ by BBWS Ciliwung-Cisadane (for reservoir / situ who have been managed by central government)	Melaksanakan 60% OP waduk/situ oleh BBWS (bagi waduk/situ yang masih di kelola oleh pusat)	Implementing 60% of reservoirs / situ by BBWS (for reservoirs / sites still managed by the center)	Melaksanakan 60% OP waduk/situ oleh BBWS (bagi waduk/situ yang masih di kelola oleh pusat)	Implementing 60% of reservoirs / situ by BBWS (for reservoirs / sites still managed by the center)	Melaksanakan 60% OP waduk/situ oleh BBWS (bagi waduk/situ yang masih di kelola oleh pusat)
Melaksanakan rehabilitasi dan OP 27 mata air	Conduct rehabilitation and O & M 27 spring	Melaksanakan rehabilitasi dan OP 27 mata air	Implement rehabilitation/OP at 27 water springs	Melaksanakan rehabilitasi dan OP 27 mata air	Implement rehabilitation/OP at 27 water springs	Melaksanakan rehabilitasi dan OP 27 mata air
Melaksanaan OP prasarana sumber daya air (Tingkat Pelayanan 100%)	Implementation of the O & M of water resources infrastructure (50% Service Level)	Melaksanaan OP prasarana sumber daya air (Tingkat Pelayanan 100%)	Implementation of OP for water resources infrastructure (100% Service Level)	Melaksanaan OP prasarana sumber daya air (Tingkat Pelayanan 100%)	Implementation of OP for water resources infrastructure (100% Service Level)	Melaksanaan OP prasarana sumber daya air (Tingkat Pelayanan 100%)
Melaksanakan OP Sungai dan saluran Drainasi sepanjang tahun	Implement O & P Rivers and Drainage channels throughout the year	Melaksanakan OP Sungai dan saluran Drainasi sepanjang tahun	Carry out the OP for Rivers and Drainage channels throughout the year	Melaksanakan OP Sungai dan saluran Drainasi sepanjang tahun	Carry out the OP for Rivers and Drainage channels throughout the year	Melaksanakan OP Sungai dan saluran Drainasi sepanjang tahun
Melaksanakan inventarisasi seluruh sumur pengambilan air tanah dalam, dan membangun sumur pantau pada lokasi yang rawan	Carry out an inventory of all wells in the ground water extraction, and establishing monitoring wells at locations prone	*Belum Dilaksanakan*	-			
Melaksanakan sosialisasi dan penyadaran publik tentang bahaya pengambilan air tanah dalam yang melampaui batas aman, secara berkelanjutan	The dissemination and public awareness about the dangers of groundwater within which exceeded safe limits, in a sustainable manner	Melaksanakan sosialisasi di tingkat TKPSDA WS Ciliwung Cisadane dan penyadaran publik tentang bahaya pengambilan air tanah dalam yang melampaui batas aman, secara berkelanjutan	Conducting socialization through TKPSDA WS Ciliwung Cisadane for public awareness about the risk of land subsidence by intake ground water in a sustainable manner	Melaksanakan sosialisasi di tingkat TKPSDA WS Ciliwung Cisadane dan penyadaran publik tentang bahaya pengambilan air tanah dalam yang melampaui batas aman, secara berkelanjutan	Conducting socialization through TKPSDA WS Ciliwung Cisadane for public awareness about the risk of land subsidence by intake ground water in a sustainable manner	Melaksanakan sosialisasi di tingkat TKPSDA WS Ciliwung Cisadane dan penyadaran publik tentang bahaya pengambilan air tanah dalam yang melampaui batas aman, secara berkelanjutan
Merencanakan dan melaksanakan pemisahaan fungsi saluran air baku dan air irigasi di Saluran Induk Tarum Barat (Cantek 100% dalam 2 thn, Pelaksanaan 30% dalam 3 thn)	Plan and implementation of the separation of the function of raw water and irrigation water in West Tarum Main Channel (Planning 100% in 2 years, Implementation 30% in 3 years	~~Dilakukan oleh instansi lain~~				
Assessment Report						
LAKIP						
Technical Audit air baku, situ dan dam	Technical Audit of raw water, situ and dam	Technical Audit air baku, situ dan dam	Technical inspections on raw water, situ and dam			
OP Manual Managemen air baku Cisarua	O/M Manual on Management of Cisarua Raw Water	OP Manual Managemen air baku Cisarua	OP Manual on Raw Water Management of Cisarua			
Training OP ttg Situ and dam	Training on O/M of Situ and dam	Training OP ttg Situ and dam	OP Training on Situ and dam			
inspeksi menyeluruh Gintung dam.	Inspection of Gintung dam.	Inspeksi menyeluruh Gintung dam.	Thorough inspection Gintung dam.			
Supervisi pemeliharaan situ	Supervision of maintenance for situ	Supervisi pemeliharaan situ	Supervision of Situ Maintenance			
Pemeliharan rutin situ-situ di wilayah sungai Ciliwung Cisadane	Routine situ maintenance in the Ciliwung Cisadane river basin	Pemeliharan rutin situ-situ di wilayah sungai Ciliwung Cisadane	Routine maintenance of Situ in the Ciliwung Cisadane river area	Pemeliharan rutin situ-situ di wilayah sungai Ciliwung Cisadane	Routine maintenance of Situ in the Ciliwung Cisadane river area	
OP of Telemetry	O/M of River Boundary	OP of Telemetry	OP of Telemetry			
OP Rutine sungai dan saluran di wilayah sungai Ciliwung Cisadane	Rutine O/M of rivers and canals in Ciliwung Cisadane	OP Rutine sungai dan saluran di wilayah sungai Ciliwung Cisadane	Routine OP of River Channel in the Ciliwung Cisadan river area	OP Rutine sungai dan saluran di wilayah sungai Ciliwung Cisadane	Routine OP of River Channel in the Ciliwung Cisadan river area	
Facilitasi untuk kemampuan teknis petugas OP	Facilitation for officers to build technical capability on O/M	Facilitasi untuk kemampuan teknis petugas OP	Facilitation for technical skills of OP officials			

n. Facilitate of Activity of Coordination Team for WRM

Activity 1-1 (Procedure 1)		Activity 1-1 (Procedure 2)		Activity 1-2		Activity 1-3
POLA						
Membentuk dan Mengaktifkan Komisi Irigasi Provinsi, Kabupaten/Kota	Establish and Enable Provincial, District / Municipal Irrigation Commissions	Pelaksanaan detail desain penyediaan air baku yang memanfaatkan debit air pada saluran kalibaru barat dari bendung empang dan kalibaru timur dari bendung katulampa dengan memperhatikan neraca irigasi	Implementation of the detail design for raw water supply/utilizing, volume of water for western and eastern canal from the katulampa weir for irrigation	Pelaksanaan detail desain penyediaan air baku yang memanfaatkan debit air pada saluran kalibaru barat dari bendung empang dan kalibaru timur dari bendung katulampa dengan memperhatikan neraca irigasi	Implementation of the detail design for raw water supply/utilizing, volume of water for western and eastern canal from the katulampa weir for irrigation	Pelaksanaan detail desain penyediaan air baku yang memanfaatkan debit air pada saluran kalibaru barat dari bendung empang dan kalibaru timur dari bendung katulampa dengan memperhatikan neraca irigasi
Mengaktifkan/mengoptimalkan Dewan sumber daya air Provinsi di WS Ciliwung Cisadane secara berkelanjutan		~~Dilakukan oleh instansi lain~~				
Membentuk dan Mengaktifkan Dewan sumber daya air Kabupaten/Kota sesuai kebutuhan		~~Dilakukan oleh instansi lain~~				
Mengaktifkan Sekretariat WS Ciliwung Cisadane secara berkelanjutan		Mengaktifkan Sekretariat WS Ciliwung Cisadane secara berkelanjutan	Activate the Secretariat of TKPSDA Ciliwung Cisadane in a sustainable manner	Mengaktifkan Sekretariat WS Ciliwung Cisadane secara berkelanjutan	Activate the Secretariat of TKPSDA Ciliwung Cisadane in a sustainable manner	Mengaktifkan Sekretariat WS Ciliwung Cisadane secara berkelanjutan
Membentuk forum komunikasi DAS dan mengaktifkan forum		~~Dilakukan oleh instansi lain~~				
Melaksanakan koordinasi antar instansi terkait DI Ciujung, DI Cidurian		???!!				
Merencanakan dan mengalokasi air penggelontoran melalui kesepakatan dalam TKPsumber daya air, serta melaksanakan penggelontoran sungai		Merencanakan dan mengalokasi air melalui kesepakatan dalam TKPsumber daya air, serta melaksanakan penggelontoran sungai	Plan and allocate water through agreements in TKPSDA as well as carrying out river flushing	Merencanakan dan mengalokasi air melalui kesepakatan dalam TKPsumber daya air, serta melaksanakan penggelontoran sungai	Plan and allocate water through agreements in TKPSDA as well as carrying out river flushing	Merencanakan dan mengalokasi air melalui kesepakatan dalam TKPsumber daya air, serta melaksanakan penggelontoran sungai
Mendorong terbitnya penetapan kelas sungai oleh Gubernur		???!!				
Menegakkan peraturan tentang kelas sungai		???!!				
Mereview dan melaksanakan alokasi air sungai Cisadane sesuai kesepakatan		Mereview dan melaksanakan alokasi air sungai Cisadane sesuai kesepakatan	Review and implement the water allocation in Cisadane river for making agreement	Mereview dan melaksanakan alokasi air sungai Cisadane sesuai kesepakatan	Review and implement the water allocation in Cisadane river for making agreement	Mereview dan melaksanakan alokasi air sungai Cisadane sesuai kesepakatan
Melaksanakan alokasi air sungai Cisadane sesuai kesepakatan secara berkelanjutan		Melaksanakan alokasi air sungai Cisadane sesuai kesepakatan secara berkelanjutan	Implement water allocation of Cisadane River according to the agreement in a sustainable manner	Melaksanakan alokasi air sungai Cisadane sesuai kesepakatan secara berkelanjutan	Implement water allocation of Cisadane River according to the agreement in a sustainable manner	Melaksanakan alokasi air sungai Cisadane sesuai kesepakatan secara berkelanjutan
Melaksanakan kerja sama dan koordinasi dalam penanggulangan banjir		Melaksanakan kerja sama dan koordinasi dalam penanggulangan banjir	Carry out cooperation and coordination with stakeholders for flood management	Melaksanakan kerja sama dan koordinasi dalam penanggulangan banjir	Carry out cooperation and coordination with stakeholders for flood management	Melaksanakan kerja sama dan koordinasi dalam penanggulangan banjir
Membangun komitmen diantara instansi terkait bidang sumber daya air dalam pengalokasian anggaran pengelolaan sumber daya air melalui TKPSDA WS Cil-Cis secara berkelanjutan		Membangun komitmen diantara instansi terkait bidang sumber daya air dalam pengalokasian anggaran pengelolaan sumber daya air melalui TKPSDA WS Cil-Cis secara berkelanjutan	Building commitment among stakeholders on tasks and budget of TKPSDA WS Cil-Cis for water resources management in a sustainable manner	Membangun komitmen diantara instansi terkait bidang sumber daya air dalam pengalokasian anggaran pengelolaan sumber daya air melalui TKPSDA WS Cil-Cis secara berkelanjutan	Building commitment among stakeholders on tasks and budget of TKPSDA WS Cil-Cis for water resources management in a sustainable manner	Membangun komitmen diantara instansi terkait bidang sumber daya air dalam pengalokasian anggaran pengelolaan sumber daya air melalui TKPSDA WS Cil-Cis secara berkelanjutan
Assessment Report						
LAKIP						
Fasilitasi GERAKAN NASIONAL KEMITRAAN 2.PENYELAMATAN AIR (GNKPA)	Facilitating NATIONAL MOVEMENT OF PARTNERSHIP No. 2 on WATER SAFETY (GNKPA)	Fasilitasi GERAKAN NASIONAL KEMITRAAN 2.PENYELAMATAN AIR (GNKPA)	Facilitating NATIONAL MOVEMENT OF PARTNERSHIP (GNKPA) 2. on WATER SAFETY	Fasilitasi GERAKAN NASIONAL KEMITRAAN 2.PENYELAMATAN AIR (GNKPA)	Facilitating NATIONAL MOVEMENT OF PARTNERSHIP (GNKPA) 2. on WATER SAFETY	
Fasilitasi TKPSDA	Facilitation of TKPSDA	Fasilitasi TKPSDA				
Penyiapan rekomendasi teknis mengenai penggunaan air dengan surat rekomendasi dan SIPPA	Preparing technical recommendations on water use and making recommendation letter on SIPPA	Penyiapan rekomendasi teknis mengenai penggunaan air dengan surat rekomendasi dan SIPPA	Preparing technical recommendations on water use (SIPPA)	Penyiapan rekomendasi teknis mengenai penggunaan air dengan surat rekomendasi dan SIPPA	Preparing technical recommendations on water use (SIPPA)	
PJT						
Dessemination of monitoring and evaluation results of water quantity and quality to users, community and owner interest						
Provision of technical consideration and advice to water resources managers for their preparation of technical reccommendation and plan of water use						

Water service fee is decided mutually, based on agreement among stakeholders based on government regulation			
representing the Board of Directors to communicate with stakeholders			
Manage and improve the function of marketing and partnerships, and improve service to customers, including in dealing with customer complaints in the field of hydropower			
Coodination with local government and community for administrative matter for water resources management			
Coordination with relevant agencies for hydropower operation			

ANNEX 6-1

Report No.002

Site Survey Result and Proposal of Landscape Plan for Telaga Saat, Upper Ciliwung at BBWS Ciliwung Cisadane

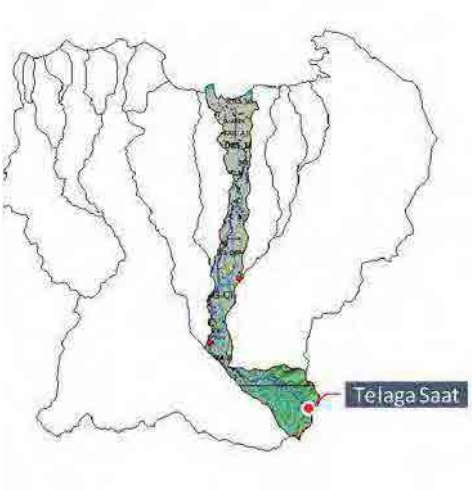
CATATAN PERJALANAN DINAS

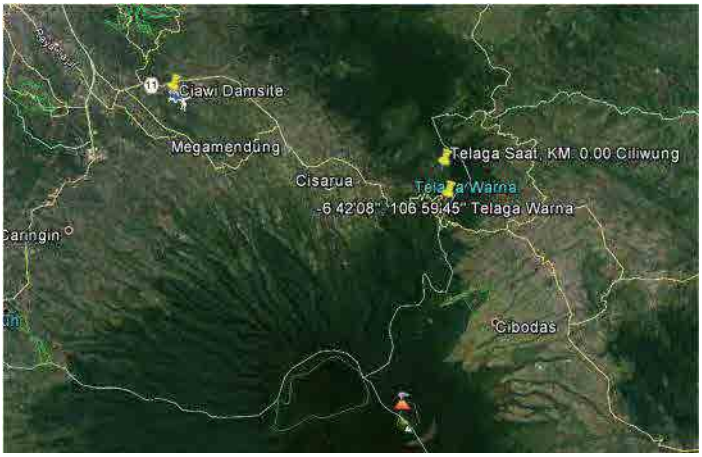
KE TELAGA SAAT, KM. 0.00 CILIWUNG

Kamis, 17 Mei 2018

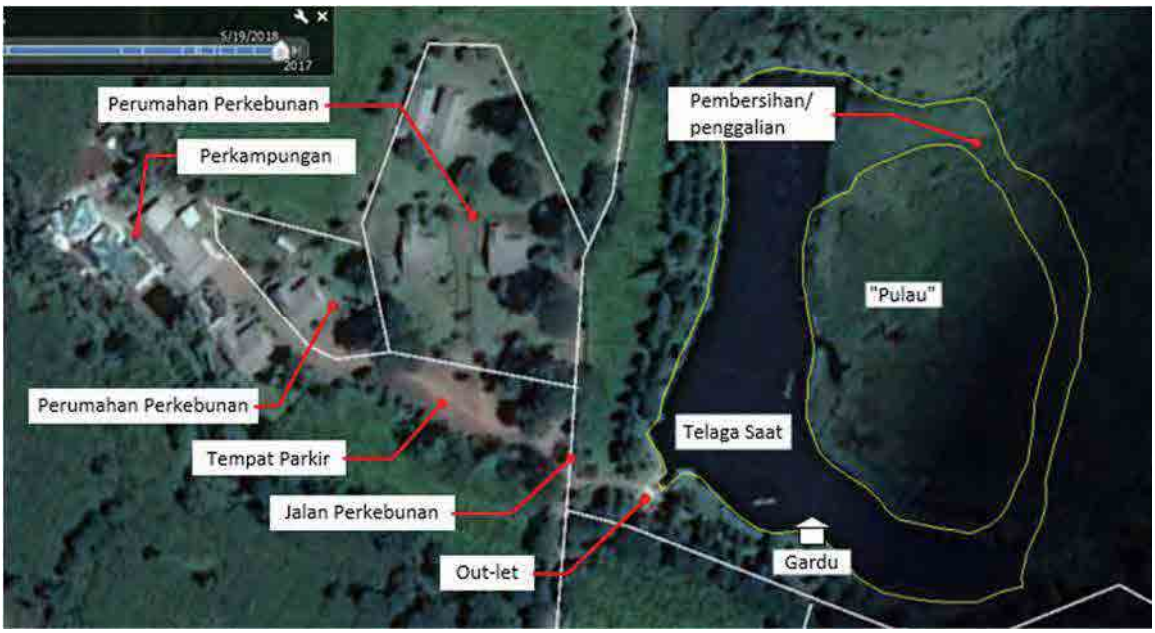
Hirohisa MIURA, Sarwono Sukardi, La Ode Syamsul Aditya, JCA RBO-CD Project
Rian Wahyu Kesumo, Hamdin, Cecep; Satker OP BBWS Ciliwung-Cisadane

1. TELAGA SAAT





Telaga Saat merupakan lokasi awal mula sungai Ciliwung, terletak pada lereng utara-barat Gunung Gede-Pangrango, tepatnya pada koordinat -$6^0$41'21"; $106^0$59'40"; dan pada elevasi 1.433,7 M di atas permukaan laut. Di sebelah selatan Telaga Saat, berjarak 1,8 Km., terdapat juga sebuah telaga alam yang dikenal sebagai Telaga Warna, yang merupakan Taman Wisata Alam yang dikelola oleh Kementerian Lingkungan Hidup dan Kehutanan.
Kawasan ini adalah bagian dari Kelurahan Tugu Utara, Kecamatan Cisarua, Kabupaten Bogor, dikelilingi oleh lereng Gunung yang ditumbuhi pohon teh yang dikelola oleh Perkebunan Teh Ciliwung.



Pada lereng yang lebih curam di elevasi yang lebih tinggi, permukaannya dipenuhi oleh tanaman pohon akasia dan sebagainya.

Kawasan ini juga merupakan bagian dari Kawasan Wisata Gunung Gede-Pangrango yang merupakan Kawasan Lindung, dan juga merupakan habitat bagi binatang langka yang dilindungi, yaitu Elang Jawa *Elang Jawa (Nisaetus bartelsi) adalah salah satu spesies elang berukuran sedang yang endemik di Pulau Jawa. Satwa ini dianggap identik dengan lambang negara Republik Indonesia, yaitu Garuda. Dan sejak 1992, burung ini ditetapkan sebagai maskot satwa langka Indonesia* (Wikipedia). Di sebelah timur telaga, terdapat gubug yang digunakan untuk pengamatan Elang Jawa oleh para pengamat burung.

Di sebelah barat telaga, terdapat dua blok Perumahan karyawan perkebunan dan disebelah selatannya terdapat perkampungan penduduk. Terdapat juga lahan kosong yang biasa dimanfaatkan sebagai Kawasan parkir kendaraan pengunjung, terutama di akhir minggu. Sebagian Perumahan tersebut juga disewakan kepada pengunjung yang memerlukannya (home-stay).

Pada saat peninjauan terlihat adanya burung elang yang melayang berkeliling dekat tebing yang curam di sebelah timur telaga. Juga terlihat banyak penduduk yang sedang asik memancing ikan di telaga. Pada lereng utara terlihat bekas longsoran tebing dan pada lereng timur terlihat bekas longsoran tebing yang lebih besar dan lokasinya relative sangat dekat denga telaga. Pada permukaan air telaga, terlihat sampah organik yang mengapung dan tumbuhan gulma air.

Menurut cerita penduduk setempat, kadang-kadang telaga menjadi "*saat*" atau surut. Diperkirakan bahwa menghilangnya air dari telaga disebabkan oleh dua kemungkinan, yaitu:
a). Akibat tertutup tanah hasil longsoran tebing, atau
b). Akibat tertutupnya permukaan telaga oleh gulma air dan sampah orbanik hasil pembusukan daun dan ranting yang terbawa aliran ke telaga.

Hal ini diperkuat oleh rekaman foto yang terlihat di Google earth, sebagai berikut.

Berdasarkan ha-hal tersebut di atas, keputusan untuk mengelola kawasan Telaga Saat sebagai Kilometer 0.00 Sungai Ciliwung adalah Keputusan yang tepat dan strategis, termasuk untuk menangkal pemberitaan yang kurang benar bahwa selama ini Pengelolaan Ciliwung hanya lebih mengutamakan daerah Jakarta saja.

Elang Jawa (Nisaetus bartelsi)

2. PENGELOLAAN SUMBER DAYA AIR DI SEKITAR TELAGA SAAT

Pengelolaan Sumber Daya Air dikawasan sekitar Telaga Saat selayaknya dilakukan secara komprehensif sehingga dapat menjadi percontohan Pengelolaan SDA, khususnya bagian hulu daerah aliran sungai (DAS), sebagai berikut:

Pada saat peninjauan lapangan terlihat upaya pengelolaan telah dimulai dengan berbagai kegiatan, antara lain:

1) Patok pengukuran topografi keliling telaga
2) Pengerukan/pembersihan telaga dari sampah organic, gulma air, dsb.
3) Pembuatan trase jalan keliling telaga, yang sekaligus berfungsi sebagai "tanggul"" sebelah timur telaga.
4) Pengerukan bagian timur, sehingga terbentuk pulau di tengah telaga
5) Pembuatan alur untuk mengalirkan aliran dari alur (rill) dari kebun teh ke telaga, sebanyak tiga lokasi.

Upaya tersebut di atas perlu ditindak lanjuti dengan berbagai kegiatan yang disarankan sebagai berikut:

2.1. Pelestarian

2.1.1. Pelestarian Sumber Air dan Badan Air

Air telaga Saat berasal dari aliran permukaan (saat hujan) dan dari sumber air di kebun teh yang mengalir melalui alur (rill) di sela-sela tanaman teh, khususnya dari lereng timur. Terlihat se kurang-kurangnya ada tiga buah alur yang terbentuk secara alamiah berasal dari kebun teh masuk ke telaga, dan alur "sejajar" garis kontur yang merupakan alur pengumpul (collector drain) sebelum masuk telaga.

Ancaman terhadap pelestarian sumber air dan badan air dapat berasal dari berbagai hal, antara lain adalah:

1) Erosi alur (rill erosion).
   Untuk mencegah terjadinya erosi alur dan mengurangi dampaknya terhadap Telaga, dapat dilakukan dengan pembuatan kaskade atau rangkaian "drop structure" sederhana dari batu kali; dan Pembuatan bak control di hilir alur.

2) Longsoran tebing.
   Fenomena longsoran tebing khususnya di kawasan ini sulit di prediksi dan dicegah terjadinya. Namun dampaknya terhadap telaga dapat dicegah dan dikurangi dengan memfungsikan badan jalan keliling telaga sebagai tanggul yang menahan tanah longsoran langsung masuk telaga.

3) Sampah dan gulma air.
Masuknya sampah dapat dicegah melalui upaya edukasi-publik, sementara keberadaan gulma air perlu dibersihkan secara berkala sebagai bagian dari kegiatan operasi dan pemeliharaan.
Dapat juga diupayakan untuk memelihara jenis ikan pemangsa gulma air, seperti di uraikan pada butir 2.1.2.

4) Pengupasan permukaan tanah akibat aktivitas pengunjung di tempat parkir kendaraan. Area parkir ini dikelola oleh Perkebunan Teh Ciliwung. Gerusan tanah dari area ini secara langsung tidak masuk ke Telaga Saat, tapi akan terbawa aliran permukaan dan masuk ke alur di hilir telaga dan pada akhirnya ke sungai Ciliwung. Oleh karena itu, perlu dilakukan pendekatan dengan Perkebunan Teh Ciliwung selaku Pengelola dan mendorong dilakukannya upaya penanggulangannya.

2.1.2. Pelestarian habitat Ikan asli Ciliwung

Telaga Saat berpotensi sebagai tempat untuk pelestarian habitat ikan asli Ciliwung. Ruby Vidia Kusumah, aktivis Komunitas Peduli Ciliwung (KPC-Bogor) sekaligus peneliti pada Balai Riset Budidaya Ikan Hias (BRBIH-Depok) menyatakan ada beberapa jenis yang dapat dikembangkan baik untuk olahraga memancing maupun untuk ikan konsumsi diantaranya senggal (*Hemibagrus cf. nemurus*), soro (*Tor soro*), beunteur (*Puntius binotatus*), paray (*Rasbora aprotaenia*), berot (*Macrognathus maculatus*), betok (*Anabas testudineus*), bogo (*Channa striata*), hampal (*Hampala macrolepidota*), hingga ikan lubang (*Anguila bicolor*).

Seorang peternak ikan di Katulampa menceritakan adanya akan asli Ciliwung yang dipelihara di kolamnya yang dapat tumbuh sampai satu meter dan pemakan dedaunan yang tumbuh di tepi kolamnya atau di tepi sungai.

Penebaran benih ikan habitat asli Ciliwung di Telaga Saat selayaknya melibatkan masyarakat setempat, sebagai salah satu upaya memberikan peran serta mereka dalam pengelolaan Telaga Saat.

Ikan Soro yang berhasil dipancing di Cikundul Bogor, dan ikan Hampala

2.2. Perlindungan terhadap daya rusak

2.2.1. Perlindungan terhadap daya rusak air

Potensi kerusakan yang ditimbulkan oleh air terdapat pada alur yang berada di sela-sela pohon teh menuju telaga. Aliran pada alur ini cukup deras karena alur berada pada lereng yang memiliki kemiringan sampai 40 %.
Aliran yang deras ini menyebabkan tergerusnya dasar dan tebing alur (erosi alur, rill erosion).

Untuk mengatasi hal ini, dapat dibuat bangunan Terjun (drop structure) di beberapa tepat sepanjang alur menyerupai kaskade.

2.2.2. Perlindungan terhadap perusakan lingkungan

Keindahan alam dan kesejukan udara disekitar Telaga Saat telah mengundang banyak pengunjung, terutama pada akhir minggu atau saat hari libur. Keberadaan pengunjung ini dapat berpotensi menimbulkan perusakan lingkungan seperti penyampahan dan seperti yang terlihat di area parkir adalah penggerusan permukaan lahan akibat aktivitas kendaraan bermotor.

Oleh karena itu, perlu dipertimbangkan upaya pengelolaan seperti yang dilakukan di kawasan Telaga Warna.

2.3. Pemanfaatan sebagai edukasi publik melalui sarana Informasi

Selama ini air di Telaga Saat tidak dimanfaatkan secara langsung, namun kawasan ini dimanfaatkan oleh masyarakat dan pengunjung sebagai kawasan wisata dan tepat memancing. Sebagai suatu kawasan publik, selayaknya disediakan prasarana publik yang diperlukan seperti tepat berteduh ketika hujan, toilet, dsb.

Kecuali itu, dapat juga dibuatkan papan display untuk memberikan informasi kepada publik tentang kawasan dan upaya pengelolaannya, serta peran serta publik yang diharapkan; sebagai salah satu bentuk edukasi publik.

2.4. Peran serta Masyarakat

Peran serta masyarakat setempat dapat dipertimbangkan dalam bentuk antara lain saran-saran untuk pengelolaan kawasan, menjaga kebersihan dan keamanan prasarana yang ada serta kegiatan pemeliharaan dan sebagainya.

2.5. Beautifikasi dan Pengelolaan Kawasan.

Beautifikasi atau kegiatan memperindah atau mempercantik lingkungan sebenarnya bukanlah tujuan utama kegiatan pengelolaan. Namun beautifikasi dapat meningkatkan apresiasi publik terhadap pengelolaan dan pengelolanya, dan pada saatnya diharapkan dapat meningkatkan kesadaran dan peran serta publik terhadap kegiatan pengelolaan.

Kegiatan beautifikasi yang disarankan adalah penanaman pohon di sekeliling danau dan di pulau yang berada di tengah danau. Dengan elevasi di atas 1.000 meter DPL, iklim dan suhu antara 20 ~ 26^0 C (elevasi Telaga Saat adalah +1.433,7 M DPL, dan saat peninjauan lapangan, suhunya adalah 24^0 C), tanaman yang cocok antara lain adalah pohon sakura.

Pohon Sakura yang tumbuh di Cibodas, Sumba dan Batam

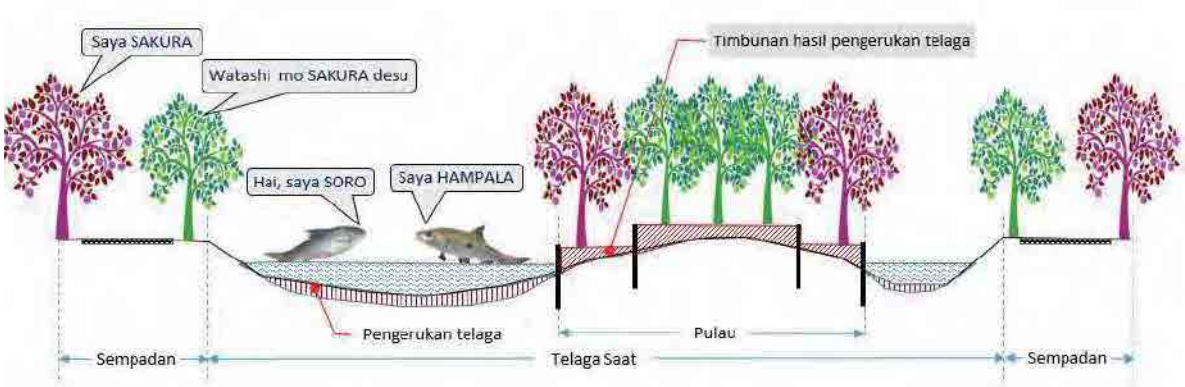
Di Kebun Raya Cibodas telah ditanam ratusan pohon Sakura dengan 7 jenis tanaman Sakura yaitu, *Prunus cerasoides, Prunus yedoensis, Prunus yamasakura, Prunus lannesiana, Prunus sp., Prunus arborea,* dan *Prunus costata*, baik yang berasal dari Jepang maupun dari Himalaya.

Saat ini sudah cukup banyak yang menjual benih maupun bibit pohon Sakura, bahkan dapat dipesan secara on-line, dengan harga yang relatif murah.

Diharapkan pohon Sakura ini ditanam di kiri-kanan jalan setapak sekeliling telaga dan di pulau di tengah telaga setelah dilakukan pembersihan dan penataan.

Penataan ini dilakukan dengan melakukan penebangan semak dan menimbunnya dengan tanah hasil pengerukan dasar telaga seperti terlihat pada gambar sketsa berikut. Untuk mencegah turunnya tanah timbunan, perlu dibuat pagar dari terucuk dan bilik bambu.

Mengingat kawasan Telaga Saat telah menjadi kawasan publik, selayaknya dipertimbangkan unit Pengelola Kawasan Telaga Saat.



3. KESIMPULAN DAN SARAN

Kawasan Telaga Saat dapat dijadikan percontohan pengelolaan sumber daya air secara terpadu termasuk beautifikasi dan edukasi publik. Pelaksanaan pengelolaan dapat dilakukan secara bertahap, yaitu:

1) Tahap pertama

Pembuatan jalan keliling telaga yang bagian timurnya berfungsi juga sebagai tanggul untuk mencegah tanah hasil longsoran lereng langsung masuk ke telaga, dan penanaman pohon sakura di tepi kiri-kanan jalan serta pembuatan prasana umum termasuk tempat berteduh, toilet, dsb.

Pada sisi timur telaga perlu dibuat gorong-gorong di tiga lokasi tempat masuknya alur ke telaga. Sebaiknya gorong-gorong jangan yang terbuat dari beton tumbuk, tetapi dari beton bertulang (pre-casted reinforced concrete, Dusaspun atau Armco. Pembuatan pasangan batu atau beton yang di cor di tempat (cast in-situ) tidak disarankan karena keberadaan air yang banyak akan membuat kualitas beton menjadi sangat rendah.

2) Tahap kedua

Pembersihan telaga dan pulau dari gulma air, bahan organic dan semak belukar serta pengerukan telaga. Tanah hasil pengerukan dapat di timbun di pulau. Sesudah timbunan terkonsolidasi, dapat dilakukan penanaman pohon sakura.

Sangat tidak disarankan untuk pembuatan jembatan ke pulau, untuk mencegah masuknya pengunjung ke pulau. Akses ke pulau dapat dilakukan melalui sampan oleh petugas Pengelola. Untuk keperluan tersebut perlu dibuat dermaga di pulau dan juga tepat berteduh waktu hujan. Penebaran ikan asli Ciliwung dilakukan setelah pengerukan.

3) Tahap ketiga

Pembentukan Unit Pengelola Kawasan Telaga Saat, khususnya untuk melaksanakan kegiatan operasi dan pemeliharaan kawasan secara mandiri serta melaksanakan edukasi publik dan menjadikan kawasan Telaga Saat sebagai kawasan Wisata dengan Konsep edukasi dan bebas sampah (zero garbage resort area).

Jakarta, 21 Mei 2018

Ir. Sarwono Sukardi, Dipl.HE
Profesional Utama Sumber Daya Air
JICA RBO-CD Project.

Menanggulangi Gulma di Waduk Dengan Ikan Graskap

Grass carp / graskap merupakan ikan pemakan rerumputan yang ditemukan di sungai Amur di Siberia dan Cina yang mengalir menuju Lautan Pasifik. Karenanya, seringkali grass carp disebut juga sebagai amur putih (white amur). Sekarang ini, grass carp dibudidayakan secara intensif di Cina, Malaysia, Indonesia, Singapura, Taiwan, Thailand, dan Filipina. Grass carp masuk ke daratan Eropa digunakan sebagai pengontrol hama tanaman dan meningkatkan produksi perikanan melalui polikultur.

Pemanfaatan grass carp sebagai pengontrol hama tanaman (seperti enceng gondok) didasarkan pada kemampuannya untuk mengkonsumsi tanaman (mikro atau makrofita). Grass carp memiliki kemampuan reproduksi yang sangat tinggi. Ikan ini, ketika hidup di Sungai Amur, betina yang secara reproduksi matang (7-15 tahun) dapat menghasilkan telur sebanyak 820.0000 telur. Sedangkan Grass carp yang hidup di perairan Eropa memiliki kemampuan untuk menghasilkan telur berkisar antara 500.000-700.000 / ikan yang berukuran 6-8 kg.

Jumlah vegetasi yang mampu dikonsumsi oleh grass carp bergantung atas ukuran dan jumlah ikan, suhu air, kepadatan hama, dan komposisi spesies, serta lamanya waktu ikan berada di perairan. Ikan berukuran 25-40 cm akan mengkonsumsi lebih banyak makanan (35-50% bb/hari) dibandingkan dengan ikan yang lebih besar (>40 cm) yang hanya mengkonsumsi 20-30% bb/hari. Suhu air terbaik untuk konsumsi pakan grass carp adalah 20-28 C. Konsumsi tanaman mulai stabil pada suhu 10-16 C, dan terjadi secara intensif ketika suhu mencapai 20 C atau lebih tinggi lagi. Pada suhu 20 C, grass carp dapat mengkonsumsi hingga 50% bb, ketika suhu mencapai 22 C konsumsi meningkat hingga 120% bb. Batas maksimal untuk konsumsi bagi grass carp adalah 25 C. Penurunan suhu secara tiba – tiba bisa mengganggu pola makan. Penurunan tiba-tiba suhu air sebesar 4-5 C dari 20 C dapat menyebabkan ikan berhenti makan. Sebaliknya, penurunan secara perlahan menyebabkan peningkatan pilihan pakan dari grass carp.

Petiola enceng gondok

Sama seperti kita, grass carp juga memiliki kesukaan terhadap jenis makanan tertentu. Grass carp berukuran 25-33 mm (TL) memakan alga berfilamen. Sedangkan ada ukuran 35-40 cm (umur sekitar 1-1,5 bulan), ikan ini memakan daun lunak dari makrofita yang tenggelam. Pilihan makanan pada grass carp dewasa menurun bersamaan dengan bertambahnya usia dan ukuran. Grass carp muda memiliki gigi faring yang lemah dan kecil, sehingga pilihan makanannya adalah tanaman yang lunak dan muda.

Ikan usia ini cenderung menghindari tanaman yang memiliki daun yang kasar atau liat seperti (Stratiotes aloides L dan berbagai jenis monokotiledon), daun berukuran besar yang mengapung (Nymphaea dan Nuphar spp), tanaman dengan rasa yang kuat (Polygonum hydropiper L) atau beracun (Ranunculus spp). Hampir sama, ikan dengan berat kurang dari 1 kg memilih akar, sedangkan ikan yang lebih besar juga memakan daun dan petiola enceng gondok . Ikan yang lebih besar dari 1 kg juga memakan tanaman jenis ini HANYA jika tidak ada

makanan lainnya. Jenis makanan yang paling disukai oleh grass carp adalah elodea, water celery, dan pondweed (daun tipis). Sedangkan tanaman yang tidak begitu disukai diantaranya adalah cattail, bulrush, sedge, alga berfilamen, teratai, dan enceng gondok.

Elodea, makanan favorit grass carp

Sebagai biokontrol hama tanaman, kepadatan tebar yang sesuai bagi sebuah perairan bergantung pada berbagai faktor seperti cuaca, ukuran ikan yang ditebar, kecepatan pertumbuhan hama yang diharapkan, faktor biotik dan abiotik lingkungan. Overstocking adalah kondisi dimana seluruh tanaman air (baik target hama maupun tidak) sementara understocking bisa berarti bahwa hanya terjadi penurunan hama tertentu. Kepadatan tebar yang rendah dapat menjaga pertumbuhan hama, tetapi tanaman yan tidak disukai oleh grass carp akan tumbuh cepat dan tidak terkendali. Syarat padat tebar dari ikan herbivora dapat diperkirakan dari total biomassa vegetasi di sebuah perairan.

Kecepatan stocking 3 grass carp (25-30 cm)/ metrik ton tanaman (berat basah) secara signifikan menurunkan biomassa makrofita (Chara sp atau Najas gudalupensis) pada 2 waduk di FLorida. Kondisi ini tidak mencapai overstocking dalam waktu 4-5 tahun semenjak stocking dilakukan. Kecepatan stocking 4-8,4 grass carp (per metrik ton berat basah tanaman) mengurangi biomassa tanaman hingga 0 dalam waktuu 8-17 bulan. Kepadatan tebar grass carp untuk daerah tropis berkisar antara 90 – 120 kg/ha (dengan berat setiap ikan 20-40 gr). Beberapa peneliti merekomendasikan kepadatan tebar 25-30 individu/ha untuk hama tanaman air seperti Hydrilla sp, sambil mengelola populasi kecil dari tanaman air yang kelimpahannya predominan dan tidak disukai oleh grass carp. Biokontrol menjadi efektif jika grass carp ditebar terlebih dahulu di awal peningkatan pertumbuhan tanaman.

Fluktuasi kedalaman perairam juga harus diprediksi dan dipertimbangkan. Karena penurunan kedalaman secara drastis akan menyebabkan overstocking dan kondisi ini menyebabkan ikan sulit untuk dipindahkan dari perairan. Padat tebar haruslah dikalkulasi dari kedalaman terendah.

Tapeworm alias cacing pita, dan grass salah satu vektornya

Apakah grass carp termasuk spesies invasif? Setidaknya, saya menemukan 2 negara bagian (Minnesota dan Texas) yang memasukkan grass carp dalam daftar spesies invasif. Texas dan Oregon hanya mengijinkan penggunaan grass carp triploid (steril) untuk biokontrol. Grass carp normal (diploid) memiliki 48 kromosom, sedangkan triploid memiliki 72. Kromosom ekstra yang ditambahkan menyebabkan grass carp menjadi steril. Dibandingkan dengan Texas, Oregon memiliki peraturan yang lebih ketat. Setiap grass carp harus ditandai dengan Passive Induced Transmitter Tag (PIT). Apa yang membuat mereka khawatir tentang grass carp dan memasukkannya sebagai spesies invasif? Grass carp mampu hidup dengan kondisi oksigen yang rendah (2-3 mg/L), kemampuan reproduksi yang tinggi, dan mampu memakan tanaman hingga 300% berat tubuhnya.

Grass carp dapat memakan semua makrofita dan vegetasi yang menjalar sehingga mengurangi ketersediaan pakan bagi invertebrata dan ikan lainnya. Hal ini menyebabkan perubahan yang signifikan terhadap komposisi makrofita, fitoplankton, dan invertebrata melalui perubahan rantai makanan dan struktur trofik di perairan. Hilangnya makrofita juga menyebabkan hilangnya media untuk ikan fitofil untuk memijah. Introduksi grass carp sebagai biokontrol juga meningkatkan potensi tertularnya ikan lokal dengan beberapa penyakit dan parasit. Grass carp dari Cina dipercaya menjadi sumber utama dan vektor untuk cacing pita Asia.

(sumber: banyuarthamulia.org)

http://www.bibitikan.net/menanggulangi-gulma-di-waduk-dengan-ikan-graskap/#more

Tentang Surya Mina

Surya Mina adalah kelompok budidaya ikan air tawar di Yogyakarta yang menyediakan segala jenis bibit ikan air tawar dan ikan hias. Kami siap melayani pemesanan dan pembelian benih ke seluruh Indonesia dengan kualitas ikan unggulan dan harga terjangkau.

- **Penanggungjawab:** Rahadian Surya
- **Alamat:** Desa Sembungan Rt.04/Rw.21, Wukirasri, Cangkringan
- **Kota:** Sleman, Yogyakarta
- **Kode Pos:** 55583
- **No. Rekening:**
  BRI > 3068-01-000935-50-3
- **Telepon:** 081 2266 33426
- **Web Resmi Surya Mina:**
  - www.suryamina.com
  - www.bibitikan.net

Demikian adalah informasi mengenai kami, Surya Mina Farm Yogyakarta. Jika ada pihak yang mengatasnamakan Surya Mina Farm Yogyakarta selain data di atas, kami tidak bertanggung jawab atas penyalahgunaan maupun transaksi yang mengatasnamakan kelompok Surya Mina Farm. Terimakasih

Memilih Benih Ikan Yang Tepat

Cara Pembayaran

- Benih Ikan Lele
- Benih Ikan Gurame
- Benih Ikan Bawal
- Benih Ikan Nila
- Benih Ikan Patin
- Benih Ikan Mas
- Benih Ikan Graskap
- Ikan Koi

Benih Ikan Graskap

Ikan Graskap memang kurang populer untuk dibudidayakan, namun bukan berarti permintaan ikan graskap itu sedikit. Padahal selain rasanya enak, ikan grass carp ini merupakan pemberantas serangan gulma di air tawar. Selain untuk konsumsi, ikan graskap ini biasanya dimanfaatkan sebagai pengendali gulma, sehingga kita memperoleh manfaat yang lain selain untuk dikonsumsi. Graskap adalah ikan jenis herbivora atau pemakan tanaman. Ikan grass carp bisa

memakan tanaman dengan jumlah hingga tiga kali total berat badannya. Ketika dewasa, panjang tubuh grass carpbisa mencapai 1,2 meter dengan berat 20 kilogram (kg).

Jika anda tertarik dengan budidaya ikan graskap, kami (Surya Mina) menawarkan bibit ikan graskap dengan ukuran B1 (2cm), B2 (3cm), dan B3 (4cm). Adapun spesifikasinya adalah sebagai berikut:

Benih Ikan Graskap Ukuran B1 (2cm)

- Pengiriman per box : 8.000 benih

Minimal Order :

- Ambil ditempat : 1.000 ekor
- Kirim luar jawa : 1 box (8.000 ekor)

Benih Ikan Graskap Ukuran B2 (3cm)

- Pengiriman per box : 6.000 benih

Minimal Order :

- Ambil ditempat : 1.000 ekor
- Kirim luar jawa : 1 box (6.000 ekor)

Benih Ikan Graskap UkuranB3 (4cm)

- Pengiriman per box : 4.000 benih

Minimal Order :

- Ambil ditempat : 1.000 ekor
- Kirim luar jawa : 1 box (4.000 ekor)

http://www.bibitikan.net/benih-ikan-graskap/

Bunga sakura segera mekar di lereng Gunung Lawu

Bunga sakura (*Prunus serrulata*) telah lama dianggap sebagai bunga nasional negara Jepang. Keindahannya saat mekar membuat banyak orang jatuh hati dan rela merogoh kocek dalam-dalam untuk terbang ke negara tersebut dan melihatnya langsung.
Namun, warga Indonesia sebenarnya tak perlu pergi jauh ke Jepang jika penasaran dengan bunga tersebut. Ada beberapa tempat di mana kita bisa melihatnya secara langsung di dalam negeri.
Beberapa di antaranya adalah Kebun Bunga Sakura di Cibodas, Jawa Barat, kemudian di Waingapu, Sumba, Nusa Tenggara Timur, yang biasanya mekar pada periode Oktober-November.
Sakura juga bisa dilihat di Kompleks Industri Batamindo, Batam, Kepulauan Riau, lalu di Kebun Raya Bali, dan Kebun Raya Biologi Wamena, Papua.
Sebentar lagi, giliran warga Jawa Tengah yang tak perlu pergi terlalu jauh untuk bisa melihat keindahan bunga sakura. Mereka bakal dapat menyaksikannya pada kawasan ekowisata di Kabupaten Karanganyar.
Pada Sabtu (27/1/2018), Gubernur Jawa Tengah Ganjar Pranowo meresmikan dimulainya Bukit Taman Wisata Sakura Lawu (Sakral) yang berlokasi di lereng Gunung Lawu, tepatnya di Dusun Dusun Tlogodringo, Desa Gondosuli (Cemoro Kandang), Tawangmangu, Karanganyar.
Sesuai namanya, kelak Sakral akan dipenuhi oleh bunga dari Negeri Matahari Terbit itu.
Pada peresmian tersebut juga hadir Bupati Karanganyar Juliyatmono, Counselor Trade Invest & Industry Kedutaan Besar Jepang di Indonesia, Taro Araki, Deputy Chief of Mission Kedutaan Besar Jepang di Indonesia Kozo Honsei, dan Presiden Direktur PT Toyota Motor Manufacturing Indonesia (TMMI) Warih Andang Tjahjono.
Tawangmangu merupakan kawasan wisata alam pegunungan yang berada di dataran tinggi perbatasan Jawa Tengah dan Jawa Timur. Kecamatan ini berada di lereng Gunung Lawu sehingga memiliki suhu udara yang sejuk, yang diklaim cocok dan sesuai dengan karakter pohon sakura
Sebagai langkah awal, 60 pohon sakura ditanam pada area seluas 1,2 hektare. Selanjutnya, hingga bulan Maret 2018, kawasan ini akan kembali ditanam 40 pohon sakura, hingga genap menjadi 100 pohon.
Rencananya, dalam lima tahun ke depan area Bukit Taman Wisata Sakral akan dikembangkan hingga seluas 5 hektare.

Gubernur Jawa Tengah Ganjar Pranowo (kiri), pada acara penanaman perdana 60 pohon Sakura di Taman Bukit Sakura di kawasan lereng Gunung Lawu, Tawangmangu, Jawa Tengah, Sabtu (27/1/2018). |*Toyota Indonesia*

Hadirnya kawasan wisata baru ini diharapkan dapat memberikan manfaat positif terhadap keanekaragaman ekosistem serta kualitas lingkungan serta perekonomian warga sekitar.
Aktivitas ini juga merupakan tanda persahabatan yang sudah terjalin dengan baik selama 60 tahun antara Indonesia dan Jepang.
Keberadaan Bukit Taman Wisata Sakral di Tawangmangu ini juga diharapkan dapat meningkatkan citra positif sebagai ekowisata asri yang terkenal di Jawa Tengah.

"Kami berharap ke depan masyarakat banyak yang berkunjung di Tanam Sakura untuk menikmati pemandangan bunga sakura yang indah," kata Ganjar, mengutip *Antara*.
Pembangunan taman wisata tersebut juga merupakan bagian dari program tanggung jawab sosial korporat (CSR) bertajuk Toyota Forest dari PT TMMIN, produsen mobil Toyota di Indonesia.
Untuk mempersiapkan pohon sakura yang ditanam tersebut, General Manager PT TMMIN, Adjie Sapta, menjelaskan mereka terlebih dahulu melakukan riset bekerja sama dengan Perum Perhutani, Lembaga Ilmu Pengetahuan Indonesia (LIPI), Universitas Sebelas Maret, serta Kementrian Lingkungan Hidup dan Kehutanan.
Warih Andang Tjahjono menyatakan kontribusi terhadap pelestarian lingkungan hidup merupakan salah satu sasaran utama Toyota Forest, yang telah berlangsung di Indonesia sejak tahun 2003.
Dalan siaran persnya (27/1) disebutkan, Toyota Forest merupakan kegiatan atas penanaman dan pemeliharaan pohon, telah dilaksanakan sejak 2003.
Hingga saat ini, melalui program tersebut Toyota telah menanam lebih dari 1.300.000 pohon di berbagai wilayah Indonesia. Selain pembangunan Bukit Taman Wisata Sakral ini, mereka juga telah merencanakan menanam 300.000 pohon sepanjang 2018.
Mengenai Bukit Taman Wisata Sakral, Warih berharap kehadirannya bisa menambah keasrian daerah dataran tinggi Tawangmangu, sekaligus menjadi tempat wisata yang menarik dan menjadi kebanggaan masyarakat sekitar.
"Kami berharap kawasan Cemoro Kandang Gondosuli ini, nantinya menjadi wisata baru, seperti Grojogan Sewu," ujarnya.
"Ke depannya, Bukit Taman Wisata Toyota diharapkan dapat berperan memberikan manfaat positif terhadap keanekaragaman ekosistem serta kualitas lingkungan dan kualitas hidup warga sekitar."
.

Bunga Sakura di Kebun Raya Cibodas Sedang Bermekaran

Seorang wanita mencium aroma dari bunga sakura yang bermekaran di dekat Washington Monument, Washington, 25 Maret 2017. REUTERS/Yuri Gripas

TEMPO.CO, Jakarta - Bagi yang ingin menikmati bunga sakura, kini bisa mendatangi Kebun Raya Cibodas Lembaga Ilmu Pengetahuan Indonesia (LIPI) di kaki Gunung Gede dan Pangrango, Cianjur, Jawa Barat. Bunga-bunga di kebun yang didirikan pada 1852 ini tengah bermekaran.

"Pohon sakura sudah mulai berbunga," ujar Hendrian, Kepala Balai Konservasi Tumbuhan Kebun Raya Cibodas LIPI.

Kebun Raya Cibodas memiliki Taman Sakura seluas 6.647 meter persegi. Taman ini dibangun pada Maret-Desember 2007 untuk memperkaya taman tematik Kebun Raya Cibodas.

Kebun ini, seperti dimuat di situsnya, memiliki sekitar 435 pohon baik koleksi maupun nonkoleksi. Jenis sakura di kebun ini ada tujuh, yaitu *Prunus cerasoides, Prunus yedoensis, Prunus yamasakura, Prunus lannesiana, Prunus sp, Prunus arborea dan Prunus costata.* Di Taman Sakura terdapat lima jenis, yaitu *Prunus cerasoides, Prunus yedoensis, Prunus yamasakura, Prunus lannesiana,* dan *Prunus sp.*

Seorang pengunjung mangambil gambar bunga sakura yang bermekaran menggunakan ponselnya di taman Ueno, Tokyo, Jepang, 25 Maret 2017. Mekarnya bunga sakura menandakan datangnya musim semi di Jepang. AP/Eugene Hoshiko

Waktu yang diperlukan bunga sakura mulai tumbuh kuncup hingga gugur bunga adalah sekitar tujuh hari. Namun, menurut Hendrian, jika hujan, bunga akan cepat rontok.

Saat ini, belum semua pohon berbunga. "Yang saat ini berbunga hanya satu spesies saja, yaitu *Prunus cerasoides*," ujar Hendrian.

Bunga sakura di Kebun Raya Cibodas bisa berbunga dua kali dalam satu tahun, yaitu Januari-Februari dan Juli-Agustus. Ini berbeda dengan di negara asalnya, Jepang, yang hanya berbunga satu tahun sekali pada Maret-April.

Di Jepang, peristiwa mekarnya bunga sakura merupakan peristiwa yang dinantikan. Masyarakat merayakan musim sakura ini dengan melakukan tradisi Hanami, yang artinya "melihat bunga". Mereka biasanya piknik dengan membawa bekal makanan sambil menikmati bunga sakura yang bermekaran bersama anggota keluarga atau teman.

Nah, jangan lewatkan untuk menikmati bunga cantik berwarna *pink* dengan semburat putih ini tanpa perlu jauh-jauh ke Jepang. "Diperkirakan menjelang atau sekitar awal Februari masa berbunganya akan memuncak," ujar Hendrian.

1. Bunga sakura Hikanzakura

Atau biasa juga disebut *kanhizakura* merupakan jenis bunga sakura yang penyebarannya mulai dari Tiongkok sebelah selatan hingga ke pulau Formosa. Jenis ini tumbuh liar dan lebih banyak ditemukan di daerah Okinawa. Bagi orang yang tinggal di Okinawa, mereka lebih mengenal sakura dengan sebutan *hikansakura*.

Di Okinawa, kuncupnya sakura jenis ini biasanya dimulai antara bulan Januari atau bulan Februari. Sedangkan di pulau Honshu, jenis sakura ditemukan di daerah Kanto hingga ke daerah Kyushu dan biasanya mekar pada bulan Februari atau bulan Maret.

2. Bunga sakura Fuyuzakura

via Flickr.com @ ShigemiJ

Jenis yang tergolong ke dalam jenis "sakura musim dingin", karena bunganya akan mekar pada bulan November hingga akhir bulan Desember.
Daerah Nishimachi di Gunma merupakan tempat yang paling terkenal untuk dapat melihat bunga sakura jenis ini.

3. Bunga sakura Shidarezakura

Jenis ini merupakan bunga resmi daerah Kyoto. Maka dari itu, kamu akan lebih mudah menemukannya di daerah tersebut selama musim semi. Warna pink yang terpancar indah membuat nyaman ketika memandangnya.

4. Bunga sakura Edohigan

via zonabunga.blogspot.com

Jenis ini merupakan jenis sakura yang panjang umur. Terdapat beberapa jenis lain yang mirip dengan jenis ini dan tergolong sakura yang dilindungi yaitu *yamadakashinyozakura* dan *ishiwarizakura*. *Miharutakizakura* merupakan jenis edohigan yang memiliki ciri rantingnya menjuntai-juntai.
Dan *yaebenishidare* memiliki ciri warna yang cerah dan banyak warna.

5. Bunga sakura Yamazakura

via Flickr.com @ Thalassa2

Jenis ini tergolong bunga sakura liar. Biasa disebut juga dengan Ceri Bukit (*Hill Cherry*), banyak ditemukan di pegunungan-pegunungan di Jepang. Jenis ini biasanya memiliki 5 kelopak bunga yang berwarna merah muda yang cerah. Biasa mekar pada bulan Maret hingga bulan April.

6. Bunga sakura Somei Yoshino

Jenis ini merupakan jenis sakura yang paling sering dibudidayakan. Somei Yoshino ini lebih mudah ditemukan keberadaannya. Biasanya mekar pada akhir bulan Maret di wilayah Kyushu dan Shikoku. Dan berikutnya, akan mekar di daerah Tokyo pada akhir bulan April dan di daerah Aomori pada bulan Mei.

Terdapat 5 kelopak bunga dan berwarna merah muda sedikit pucat, Somei Yoshino ini tergolong bunga tunggal. Jika dilihat sepintas, bahkan jenis ini akan terlhat seperti berwarna putih.

7. Bunga sakura Shidarezakura

Biasa disebut juga sebagai *Weeping Cherry*, atau jika dalam bahasa Indonesia bisa bermakna *Ceri Menangis*. Mengapa disebut demikian? Karena bunga sakura jenis ini rantingnya tumbuh ke bawah atau menunduk. Jenis ini mekar lebih dahulu sebelum jenis *Somei Yoshino*.

8. Bunga sakura Ichiyou

Ichiyou bisa bermakna "satu daun". Karena ketika semua kelopak bunganya sudah mekar, maka putiknya akan muncul seperti daun yang keluar dari tengah bunganya. Jenis ini biasanya memiliki 20 hingga 40 kelopak bunga dan sangat dikenal di daerah Asakusa. Bahkan sampai ada semacam festival yang dibuat khusus untuk bunga ini yang diselenggarakan pada bulan April.

9. Bunga sakura Kanzan

Jenis ini merupakan jenis sakura yang berbunga ganda atau biasa disebut dengan istilah Yaezakura. Pada setiap bunganya, ada kurang lebih sekitar 50 kelopak. Walaupun jenis sakura ini waktu mekarnya agak lambat, namun hal tersebut tidak menjadikan keindahannya berkurang.

10. Bunga sakura Kikuzakura

Dari segi bentuk fisiknya, jenis sakura yang ini mirip seperti pom-pom dengan daun-daun lebar yang mengelilinginya. Dalam segi jumlah kelopak, terdapat kurang lebih 80 hingga 130 dalam setiap bunganya. Ciri fisiknya berwarna merah muda cerah. Dapat dengan mudah ditemukan di Tokyo pada awal bulan Mei.

The project on Capacity Development for RBOs
in Integrated Water Resources management in Indonesia (Phase 2)

Examples of Environment Development at Dam Reservoir and River in Japan

14th September 2018, BBWS Ciliwung Cisadane, Jakarta

MIURA Hirohisa
JICA Long Term Expert
(Water Allocation/Facility Operation and Maintenance)

A6-1-No.002-22

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3. Suitable “Sakura” for Situ Telaga Saat

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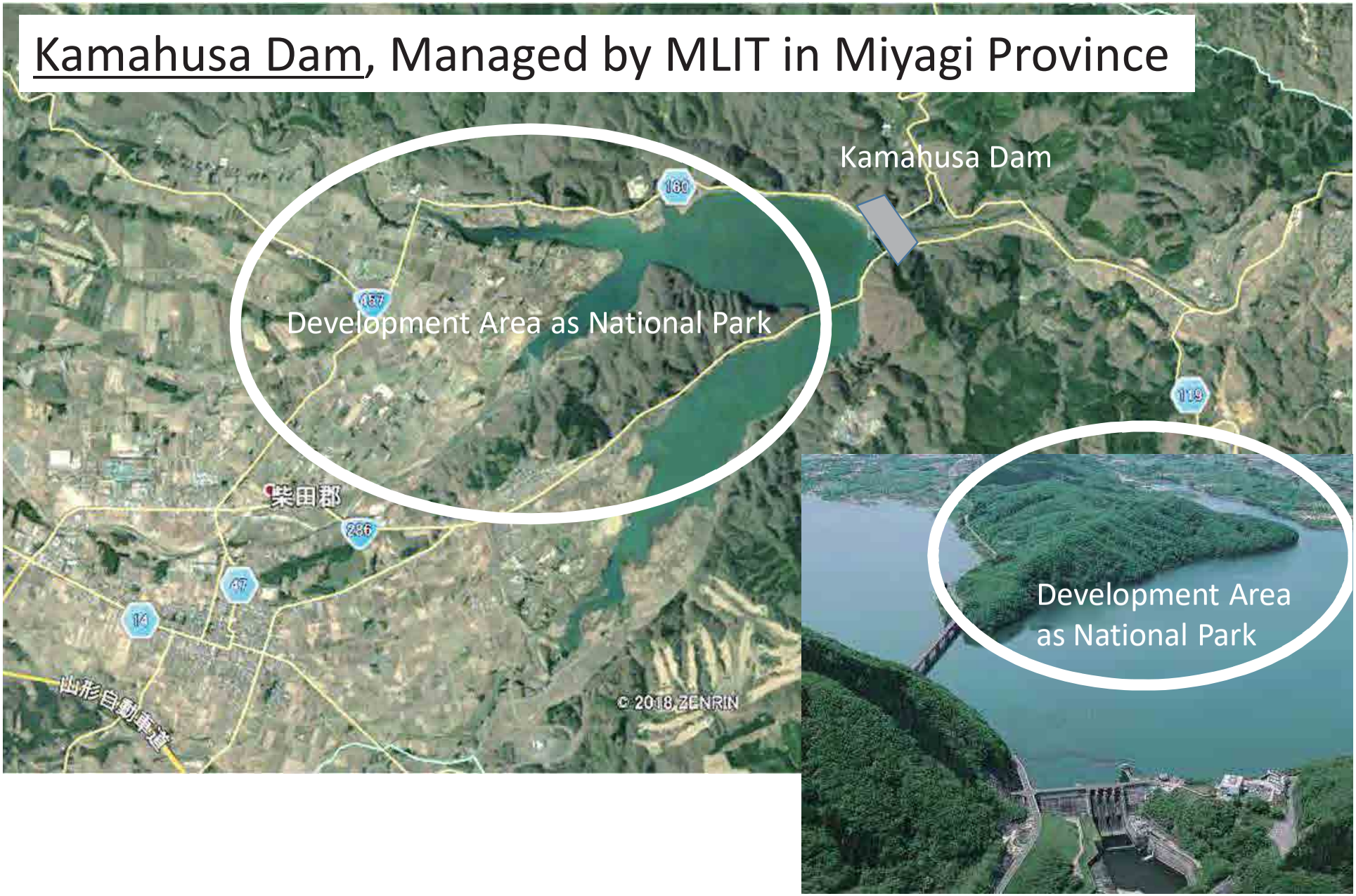
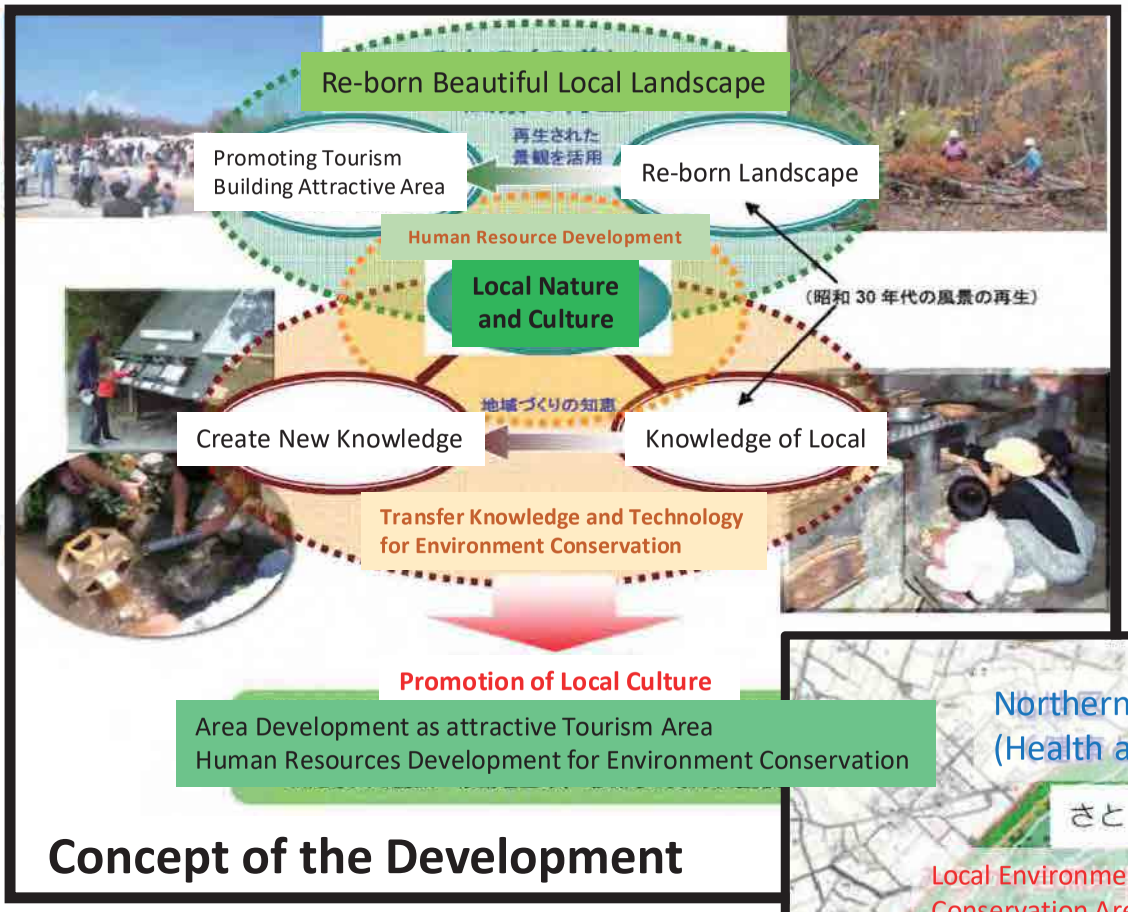
1. Example at Large Dam Reservoir

1. Example at Large Dam Reservoir



1. Example at Large Dam Reservoir

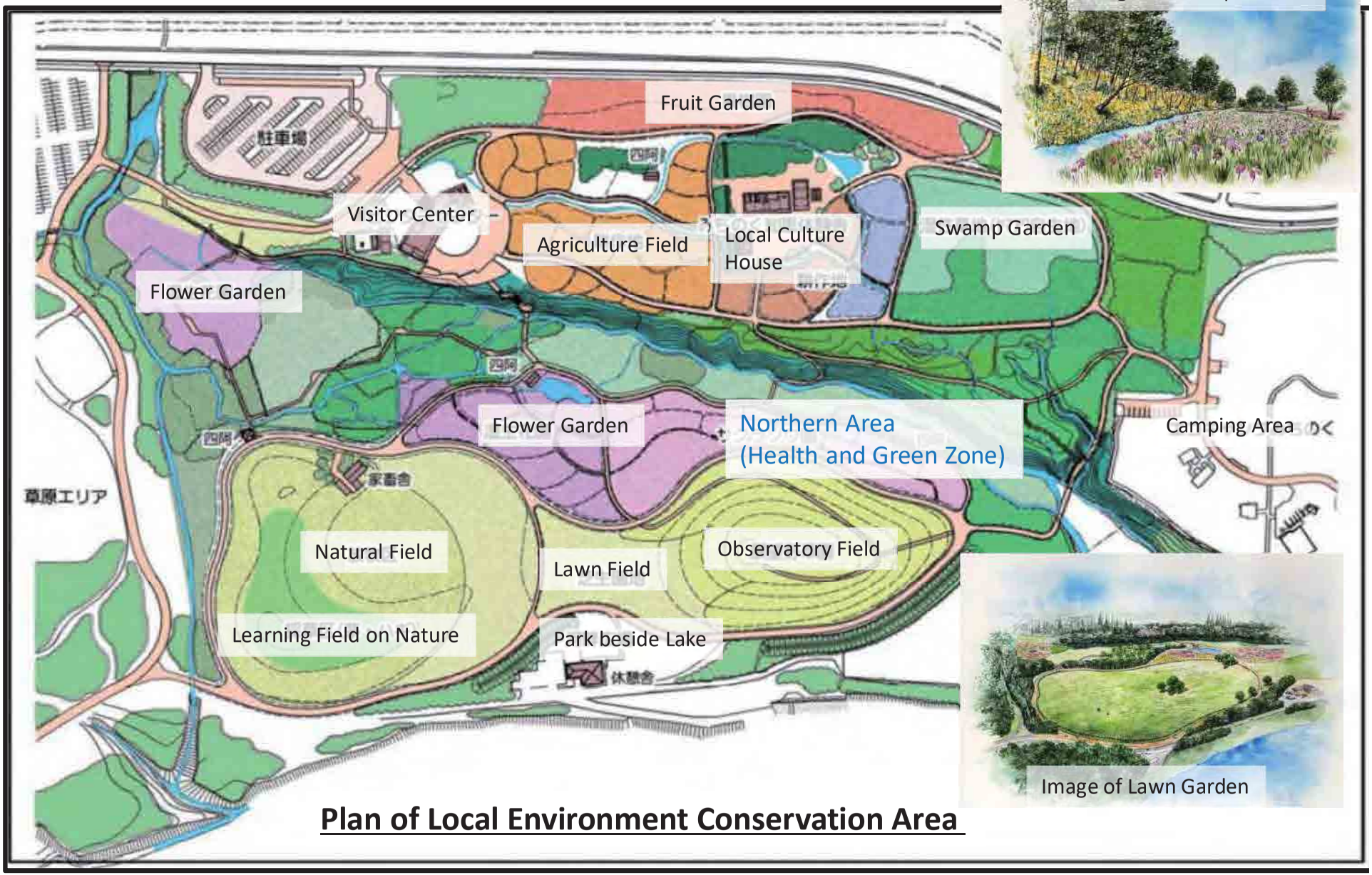


Concept of the Development

Zoning Plan

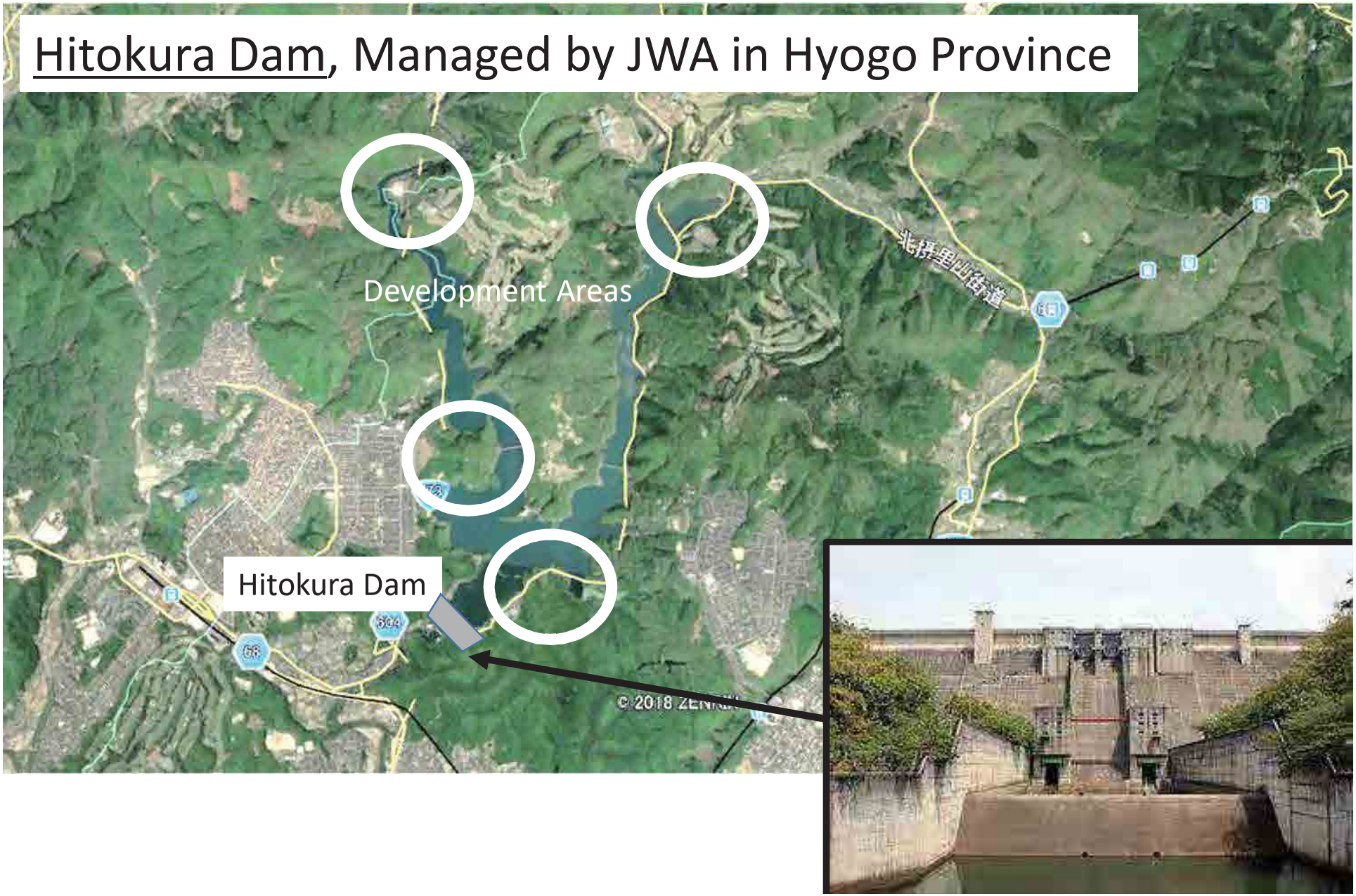
A6-1-No.002-26

1. Example at Large Dam Reservoir



Plan of Local Environment Conservation Area

1. Example at Large Dam Reservoir



1. Example at Large Dam Reservoir

Ryuka Area: Green and Wind Zone

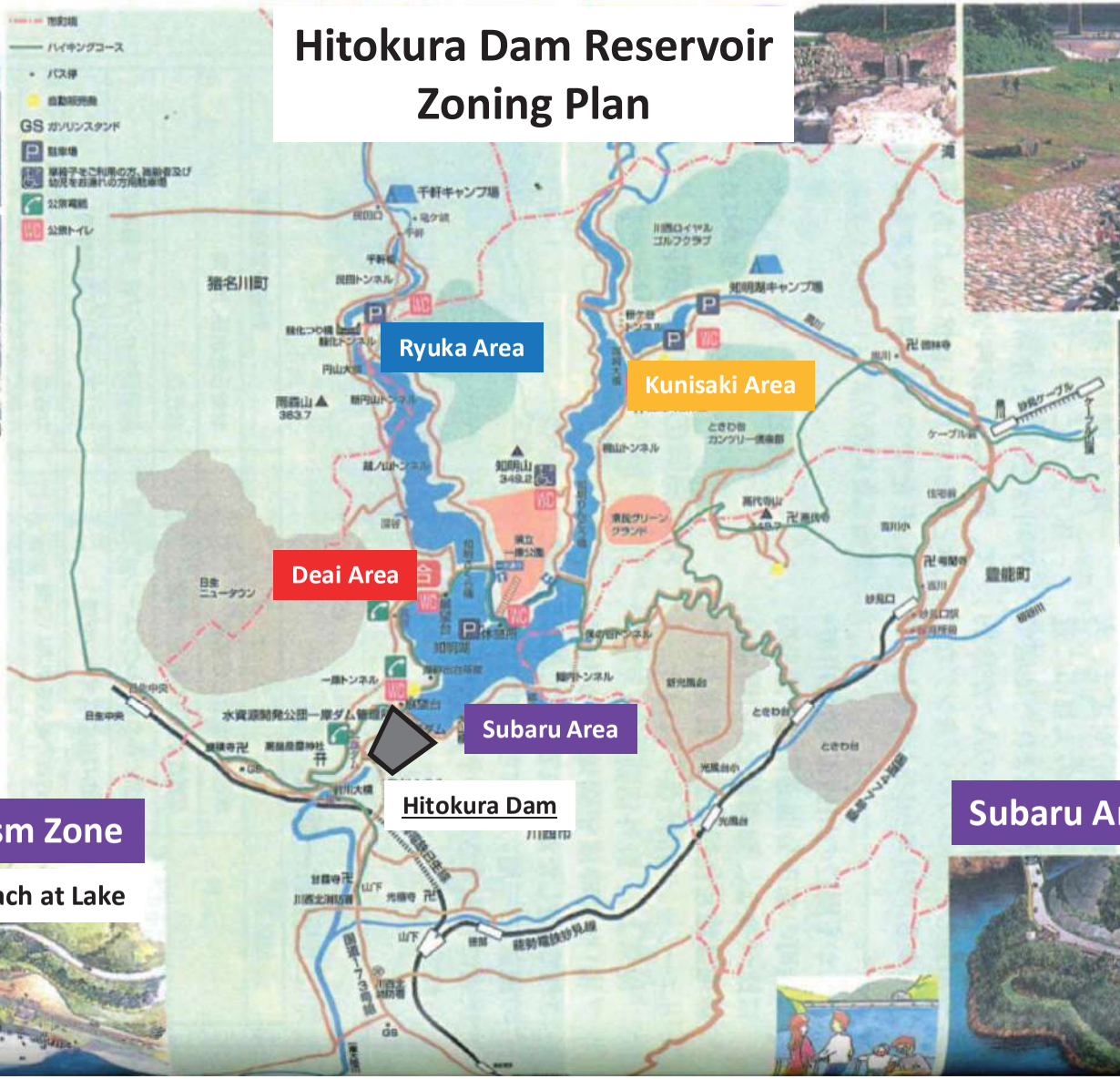
Walking Road
Fishing Area
Camping

Kunisaki Area: Water Friendly Zone

●せせらぎ水路
●池
●滝
●なぎさ
●知明湖キャンプ場
●多目的広場
●ロンフィールド

Water Friendly Canal
Pond
Water Fall
Camping

Hitokura Dam Reservoir Zoning Plan



Deai Area: Tourism Zone

Beach at Lake

Subaru Area: Tourism Zone

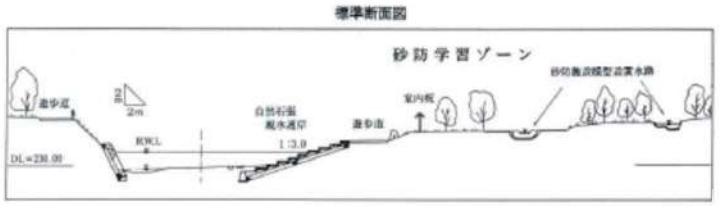
Observatory Deck

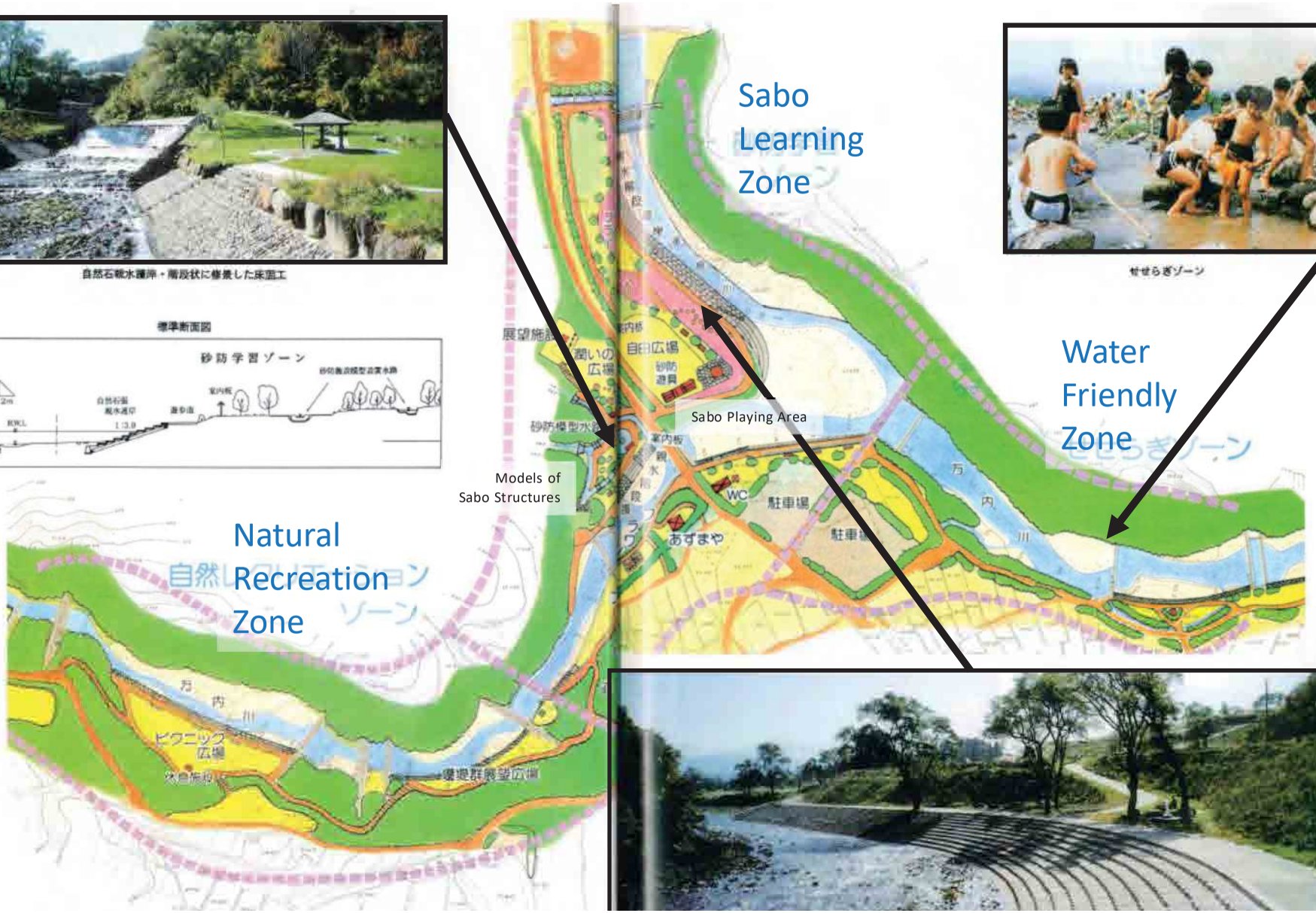
2. Examples at Environment Development with Sabo Projects

2. Examples of Environment Development with Sabo Projects

Bannai River: Model Project for Learning Sabo

自然石積水護岸・階段状に修景した床固工

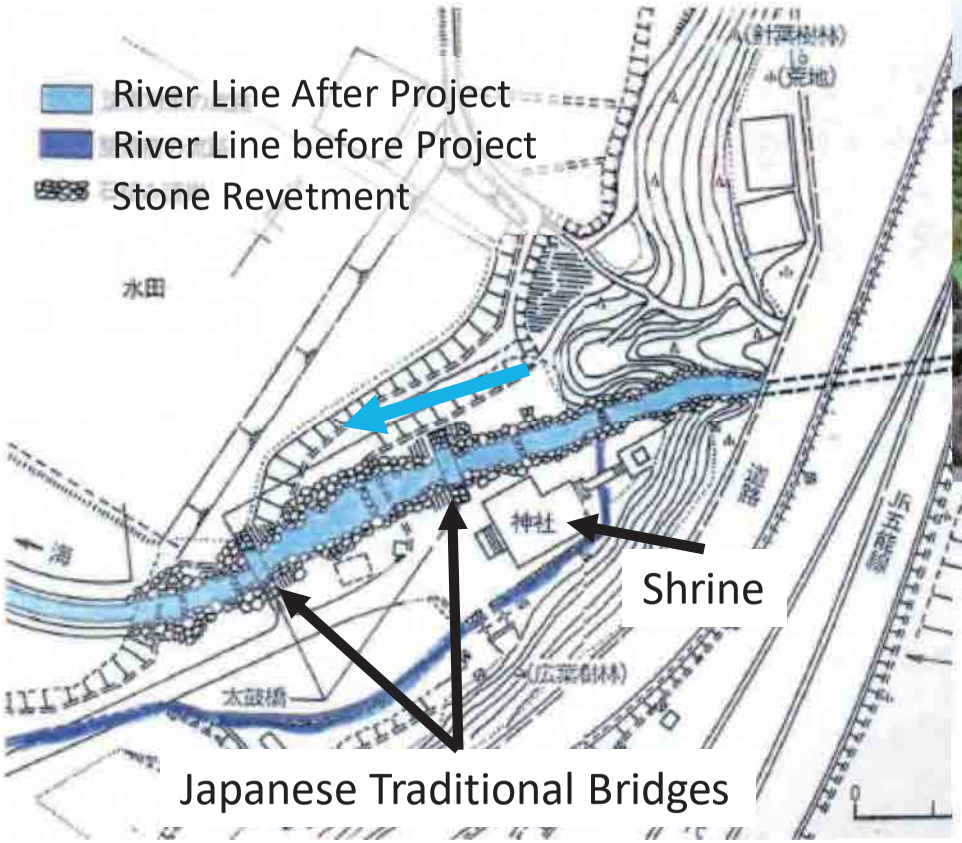




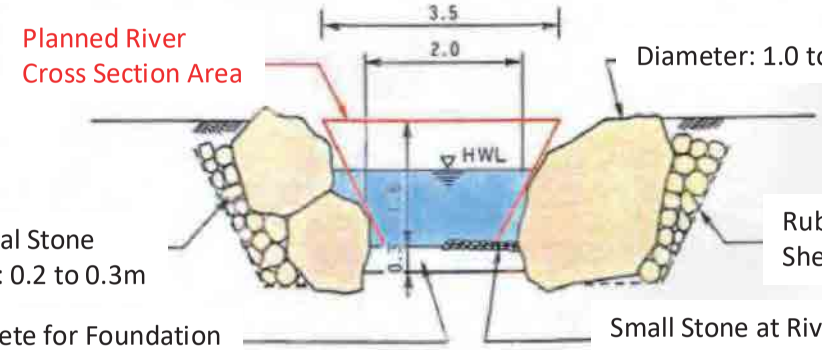
せせらぎゾーン

2. Examples of Environment Development with Sabo Projects

Sugino sawa River: Revetment by natural stones and Japanese Bridge



Standard Cross Section

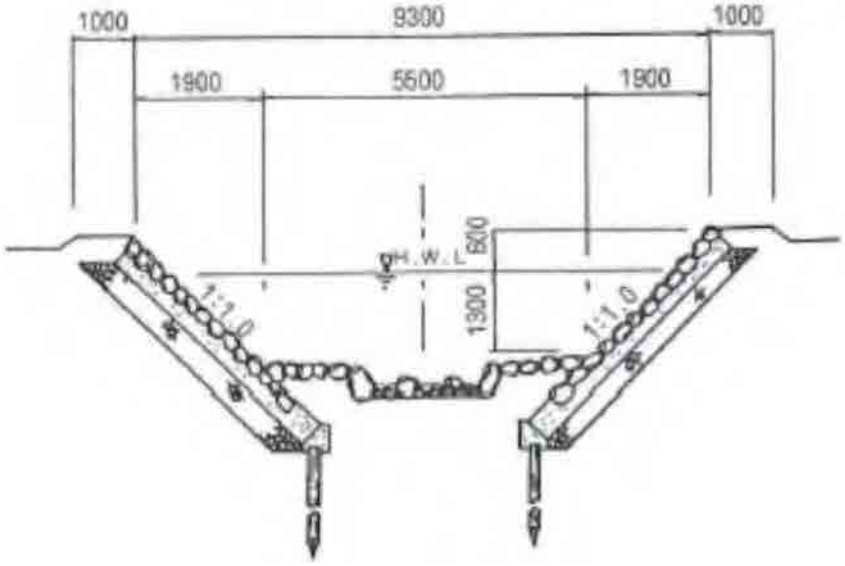


（注）すべての石は，設計上必要な最大流量断面のなかに入り込んでいない。洪水時に必要な空間は確保してある

2. Examples of Environment Development with Sabo Projects

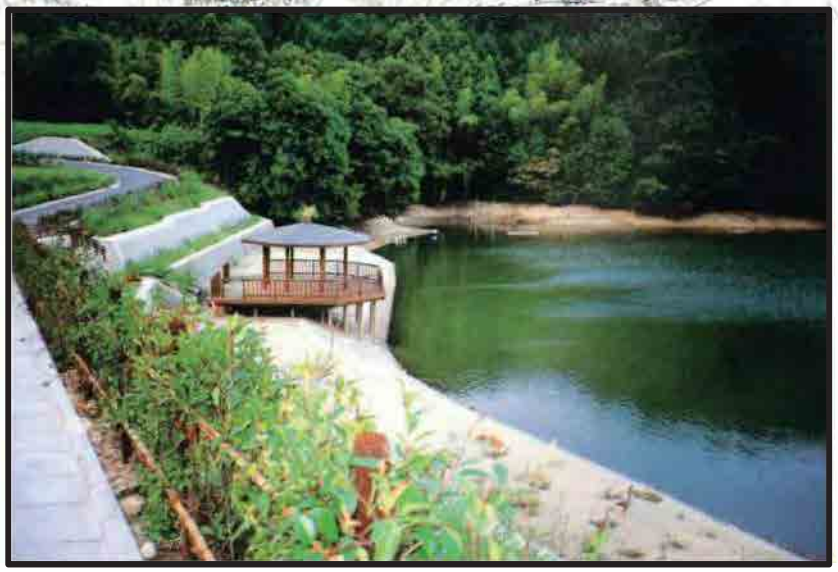
Soga River: Revetment with Landscape Design for Shrine

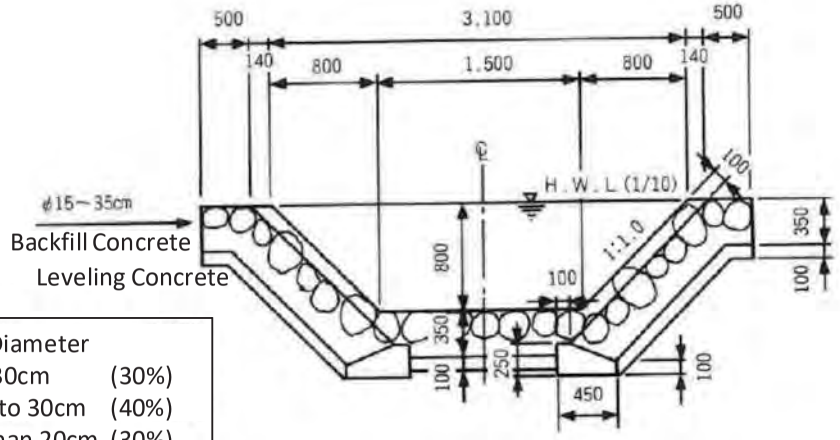
Standard Cross Section



2. Examples of Environment Development with Sabo Projects

Hatsuta River: Canal and Pond

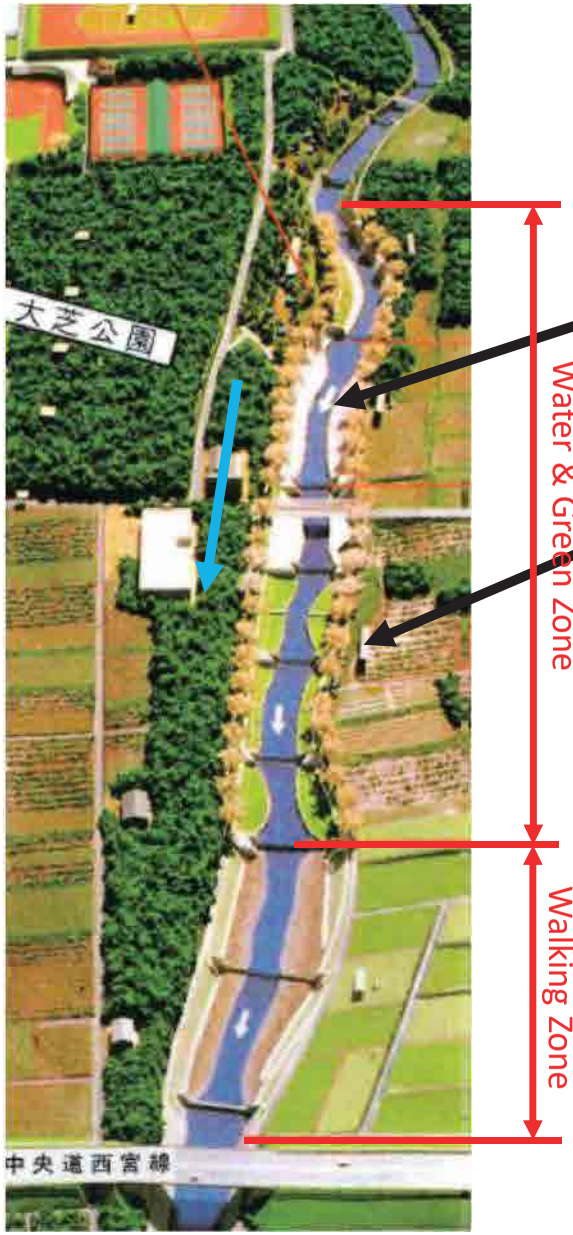


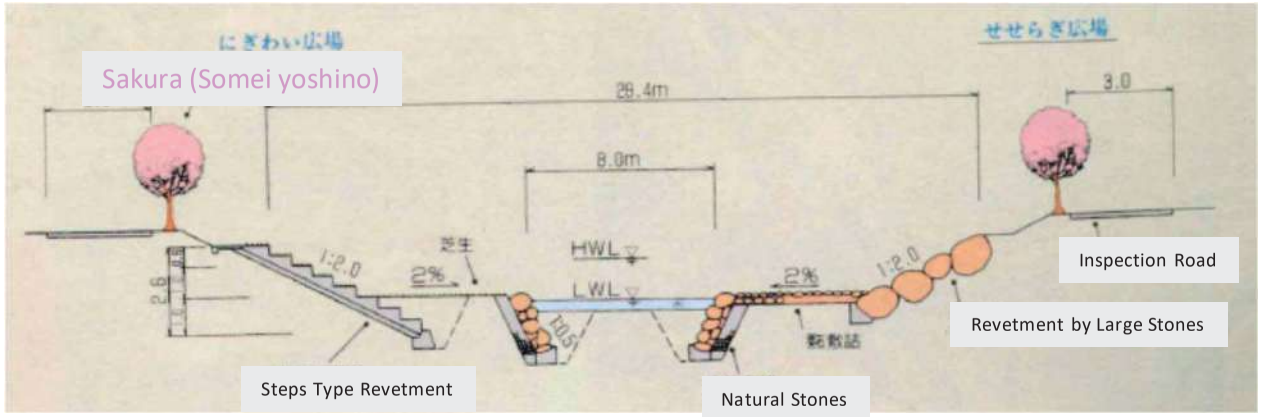


Stone Diameter
- Over 30cm (30%)
- 20cm to 30cm (40%)
- Less than 20cm (30%)

2. Examples of Environment Development with Sabo Projects

Oizumi River: Planting Sakura





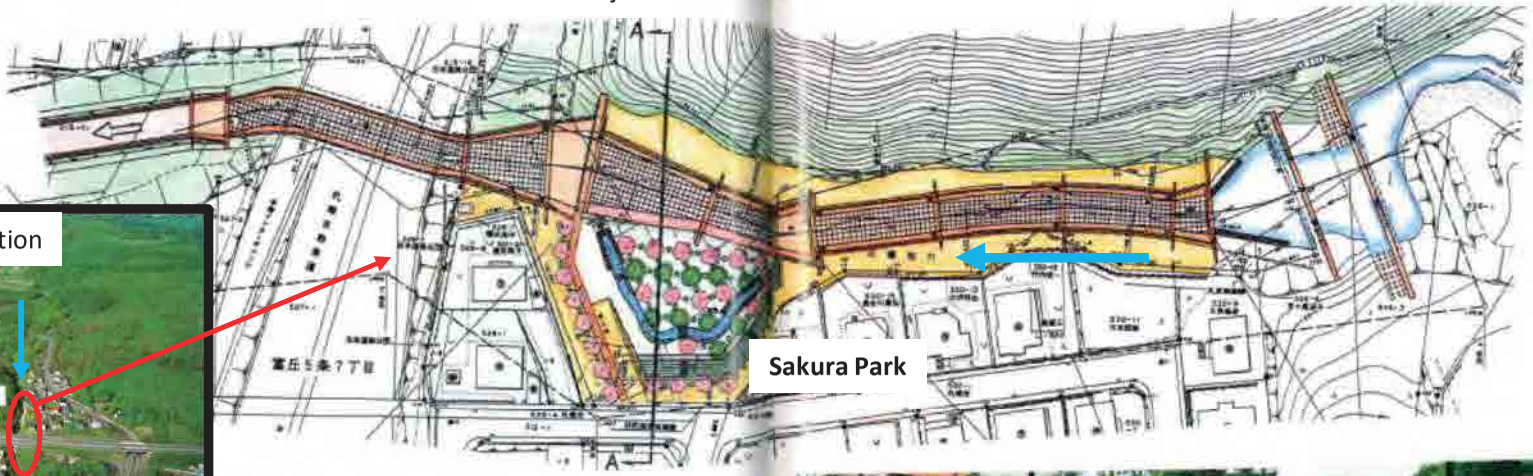
2. Examples of Environment Development with Sabo Projects

Mitarubetu River: Planting Sakura with Water Friendly Space

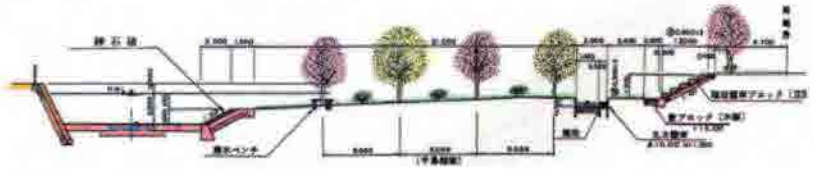
Image of Sakura Park

Before Project

Before Project



A –A Cross Section



@5.0m

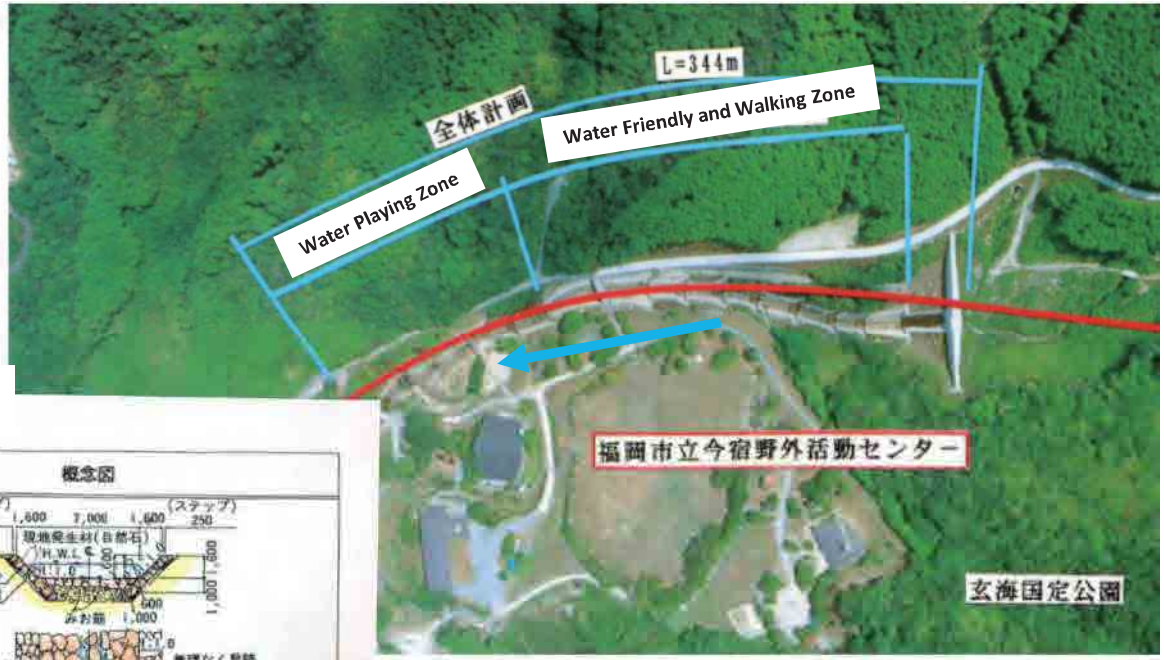
Water Friendly for Children Zone

Sabo Project Outline Board

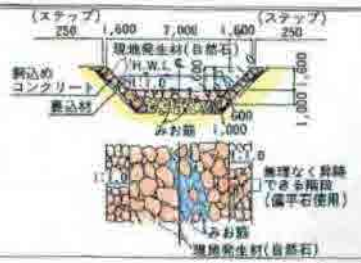
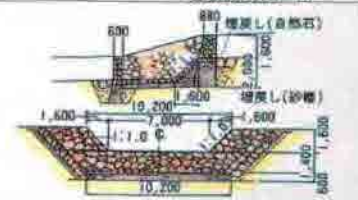
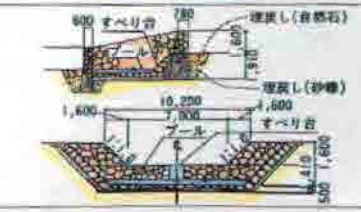
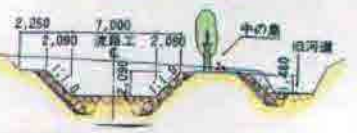
A6-1-No.002-36

2. Examples of Environment Development with Sabo Projects

Nanadera River



Points for Structures

工種	ポイント	概念図
Revetment	・管理用道路から、河床への昇降が可能なように、法[illegible]自然石にて凹凸に積む。但し、コンクリート目地表面から見えないように小石を詰める。 ・[illegible]年生については、安全に昇降できるように階段を数ヶ所設ける。	
River Bed	・底張りコンクリートを設けないで自然石及び砂礫を敷き詰めることによってみお筋を形成し、親水活動ができるようにする。	
Ground Sill	・自然石にてステップを設け昇降できるようにし、流路工縦断方向全区間にわたり親水活動に連続性を持たせる。 クリート目地については、護岸工と同様。	
Water Playing Zone	・当計画で重要視されている親水性の向上を図るため、床固工の水叩きに30cmのプールと落差を利用したすべり台を設け「水遊び場」とする。	
Island on the Lake	・流路工と旧河道の間は、中の島として残し、植樹等を行い「憩いの場」として利用する。	

3. Suitable “Sakura” for Situ Telaga Saat

3. Suitable “Sakura” for Situ Telaga Saat

Yama zakura (Kan zakura)

Yama zakura for TOYOTA

3. Suitable “Sakura” for Situ Telaga Saat

Yama zakura

Temperature has to be less than 20℃
Yama zakura already planted in Cibodas (EL. 1.400m) and bloomed

Some yoshino

Temperature has to be less than 10℃
It has not been planted in Indonesia yet

(Suggestion of Secretary attached from Forestry Agency Japan in Embassy of Japan)

A6-1-No.002-40

Conclusion

Concept and Zoning for Situ Telaga Saat
-Environment Conservation of Upstream Area
-River Water Friendly
-Tourism

Good Examples in Cibodas Botanical Garden

River Water Friendly
-Water Playing Area for Children

Promoting Environment Conservation
-Information Board on
River Environment
Water Quality

Promoting Environment Conservation
-Information Board on;
Animals
Birds and
Eco-system

Tourism Promoting
-Sakura Park and Tourism Information

ANNEX 6-1

Report No.003

Report on Activity 1 -1 to 1-5 at BWS Sulawesi 1

Report on Activity 1-1 to 1-5 for BWS Sulawesi I

Contents

1. Activity 1-1

Activity 1-1 *"Analyze and break down the expected RBO's functions and roles into daily work activities"* is divided into 2 (two) portions for effective analyze and break down, 1) Analyze the expected RBO's functions and roles, 2) Break down daily work activities of expected functions and roles.

1.1. Analyse the expected RBO's functions and roles

1.1.1. Methodology of Analysis on expected RBO's function

In the past meeting with BWS Sulawesi I on April and May, functions / roles / issues on Integrated Water Resources Management (hereafter referred to IWRM) have been clear, however priority items have not been identified. Therefore, proposal on priority items as expected functions and roles should be analyzed by collected information. The analysis result is confirmed at discussion with BWS Sulawesi I.

Analysis has been conducted in 3 (three) steps as in below box;

Step 1: Comparing between current functions by Needs Survey and various items
Step 2: Integrating result of above "Step1" to find candidate expected functions and roles as proposal
Step 3: Discussion to decide expected functions and roles

1.1.2. (Step 1) Comparing between current functions by Needs Survey and various items

- **Current functions by Need Survey**

According to Need Survey that is carried on April and May 2015, current functions of BBWS and BWS is mentioned on Ministerial Regulation No.34/PRT/M/2015 (No. 21/PRT/M/2010). The functions are common one among all BBWS and BWS in Indonesia.

On the other hands, result of Output 1 will be reflected to activities of Output 2. Activity of Output 2 is for all BBWS and BWS. It is effective and understandable, if we use common functions between output 1 and output 2 as indicators on CD activities.

Therefore, we decided functions and roles on No.34/PRT/M/2015 (No.21/PRT/M/2010) as current functions and roles for this analysis.

[Reference] Relation and reflection between outputs 1 to output 2

(1) Outputs of activities 1-1 and 1-2 will be reflected to activity 2-5 on evaluation of capacity of RBOs and improvement of benchmarking mechanism

(2) Outputs of activities from 1-3 to 1-9 as "Field Practice" will be considered into activity 2-3 on making and carrying out short- and mid-term plans of CD activities

Current Functions and Roles for analysis of output 1*

a. Compilation of the pattern and plan of water resources management in the river basin;
b. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources;
c. Preparation, compilation of plan and document of goods and services procurement;
d. Implementation of goods and services procurement as well as determination of the winner (winner of the tender) as a Procurement Service Unit (ULP);
e. Control and supervision of construction of water resources development;
f. Compilation of plan and implementation of the management of protected water source area in the river basin;
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin;
h. Hydrology system management;
i. Water resources information system management;
j. Implementation of O&M of water resources in the river basin;
k. Implementation of technical guidance for water resources management under the authority of province and regency/city;
l. Preparation of technical recommendation for granting permission on supply, allocation, utilization and exploitation of water resources in the river basin;
m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin;
n. Public empowerment in the water resources management;
o. Implementation of compilation of financial accounting and state property accounting report as a Regional Accounting Unit;
p. Implementation of collection, reception and usage of water resources management service fee (BJPSDA) in accordance with the provisions of legislation; and
q. Implementation of administration and housekeeping affair of the BBWS as well as coordination with related institution.

**from No.34/PRT/M/2015 (No.21/PRT/M/2010) (English translation is unofficial)*

- Various items

The project team received draft RENCANA, Assessment Report and Accountability Report during Needs Survey from BWS Sulawesi I as additional information for analysis.

And also, the project was suggested that capacity of BBWSs and BWSs should be improved to same level of PJT I and II.

Therefore, various items of below are used for analysis.

Various Items

(1) Draft RENCANA on TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN
(2) Draft RENCANA on Dumoga Sangkub River Basin
(3) Peer Review Report of Performance Assessment of BWS Sulawesi I (Aug. 2013)
(4) Accountability Report, Fiscal Year 2014 of BWS Sulawesi I
(5) Functions and Roles of PJT I and II

- **Comparing between Current Functions / Roles and Various Items**

Table-1 shows 5 (five) items, information sources and results of our analysis to find candidate current functions as expected functions / roles. We have picked up much information from each items as important / prioritized / necessary / recommended works to put on adequate current functions / role. Then, to find expected functions / roles, we put value on each current function accordance with each criteria, such as number of works, score gap between current and goal, etc.

Result of each analysis is referred to Appendix 1 to 5.

Table-1 Items for analysis to identify expected functions and roles of BWS Sulawesi I

No.	Items	Information Sources	Analyzed Result	Reference
(1)	RENCANA (TONDANO-SANGIHE-TALAUD-MIANGAS)	Physical and Non-Physical Efforts	Important functions with detail works	Appendix-1
(2)	RENCANA (Dumoga Sangkub)	Physical and Non-Physical Efforts	Important functions with detail works	Appendix-2
(3)	Assessment Report	Recommendations and score	Prioritized functions with detail works	Appendix-3
(4)	Accountability Report	Things that are needed to improve performance and, Completed or Continued activity	Performance needs to improve and, Necessary works	Appendix-4
(5)	PJT I and II	Function and duty of PJT I and II	Recommended function and duty (to reach PJT's Capacity)	Appendix-5

1.1.3. (Step 2) Integrating result of above "Step1" to find candidate expected functions and roles (Duties) as proposal

Table-2 shows integrating analyzed result of "Comparing between current functions / roles and various items" from each analysis (from Appendix 1 to 5), and describes total score and candidate current functions as expected functions / roles.

Table-2 Integrating analyzed result and total score

No.	Current Functions	RENCANA (TONDANO-SANGIHE-TALAUD-MIANGAS)	RENCANA (Dumoga Sungkub)	Assessment Report	Accountability Report	PJT I and II	Total	
a	Compilation of Pattern qand Plan of WRM	Middle	Low	Middle	Low		Low	6
b	Program, Plan, FS of WRM	Middle	High	Middle	Middle	Low	Middle	10
c	Plan and Ducument of procurement	Low	Middle	Low	Low	Low	Low	6
d	Implementation of Procurement	Low	Middle	Low	Low	Low	Low	6
e	Control and Supervision of Construction	High	High	Low	Middle		Middle	9
f	Management of Protected area	High	High	Low	Low	Middle	Middle	10
g	WRM, Conservation, Utilization, Damage Control	High	High	High	High	High	High	15
h	Hydrology System	Middle	High	High	Middle	Middle	High	12
i	WR Information System	High	High	High	Middle	Middle	High	13
j	O/M of WR	Middle	High	Middle	Middle	High	High	12
k	Technical Guidance to Aouthority	Middle	High	Low	Low	Low	Middle	8
l	Technical Reccommendation for Permission	Middle	High	Middle	Low		Middle	8
m	WRM Coodination Team	High	High	Middle	High	Low	High	12
n	Public Empowerment	High	High	Low	Low	Middle	Middle	10
o	Financial and Property Accounting Report	Low	Middle	Low	Low		Low	5
p	BJPSDA	Middle	Middle	Middle	Low	High	Middle	10
q	Administrative and general affairs	Low	Low	Low	Middle	High	Middle	8

Criteria: Total is 12 and more "High" Point Distribution: High 3, Middle 2, Low 1

Total is from 8 to 11 "Middle"

Total is 7 and less "Low"

According to total score on table-2, candidate functions as expected functions / roles are recognized temporarily into 5 (five) functions as below box;

Temporary expected functions / roles

g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin;

h. Hydrology system management;

i. Water resources information system management;

j. Implementation of O&M of water resources in the river basin;

m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin;

1.1.4. (Step 3) Discussion to decide expected functions and roles

From BWS Sulawesi I

- ✓ Current Functions are acceptable, because from Ministerial Regulation
- ✓ Recognized 5 (five) expected functions / roles are acceptable as temporary one
- ✓ Information from one more RENCANA should be included

From Sub-Directorate of Water Resources Institutions, DGWR, PUPR

- ✓ Works on procurement and finance should be surveyed to put on Appendix 1 to 4

From Head of BWS Sulawesi I

1.1.5. Confirmed expected functions in BWS Sulawesi I

Confirmed expected functions / roles

g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin;
h. Hydrology system management;
i. Water resources information system management;
j. Implementation of O&M of water resources in the river basin;
m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin;

1.2. Break down daily work activities of expected functions and roles

1.2.1. Methodology of breakdown of daily and important activities on expected RBO's function

In the analysis of above 1.1, important / prioritized / necessary / recommended works already picked up from each items such as draft RENCANA, Assessment Report, Accountability Report and PJT functions, and put on adequate current functions (refer to Appendix 1 to 4). Therefore, candidate daily / important works for expected functions / roles can be sorted out from appendix 1 to 4. After that, we choose suitable daily / important works and break down into details on daily activities and important duties.

Step 1: Sort out detail duties from bellows for analyzed expected functions
1) RENCANA, 2) Assessment Report, 3) Accountability Report, 4) PJT functions
Step 2: Break down of daily activity for detail duties

1.2.2. (Step 1) Sort out detail duties from 1)RENCANA, 2)Assessment Report, 3)Accountability Report and 4)PJT function and roles, for analyzed expected functions

Detail Duties from RENCANA, Assessment Report, Accountability Report and PJT functions are sorted out and classified as candidate daily / important works for expected functions / roles. Table-3.1 to 3.5 shows candidate daily / important works for each expected functions / roles.

Table-3.1 Candidate daily / important works for expected functions / roles of "g."

g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin
RENCANA
Water Quality Monitoring at Rivers (add test equipment BOD, COD)
Development and Improvement of Drinking Water
Planting Mangrove for coastal protection
Early flood warning system and evacuation route
Maintain ground water resources
Assessment Report
Water Quality; human resource development and monitoring point
Improve raw water facility and infrastructure
Accountability Report
Disaster Management (Flood Control, landslide, tidal wave and coastal protection)
PJT Functions
Flood Control
Supply water for daily needs
Water resources conservation
Maintenance of facility and infrastructure

Table-3.2 Candidate daily / important works for expected functions / roles of “h.”

h. Hydrology System Management	
	RENCANA
	Rehabilitation and repair of hydro meteorological station
	Construction of telemeter system for of rain and water level
	Assessment Report
	Procurement of ARR logger and AWLR logger
	Accountability Report
	Activity of Hydrology Unit
	PJT Functions
	Management of Hydro meteorological and water quality data

Table-3.3 Candidate daily / important works for expected functions / roles of “i.”

i. Water resources information system management	
	RENCANA
	Development and update of information system and its database
	Socialization of information system with stakeholders
	Assessment Report
	Formulation of WR Information System Unit
	Quality Control of data for publication
	Provision of Internet service to be accessibly for public, especially community
	Accountability Report
	Activity of SNVT implementation of water resources network Sulawesi I
	PJT Functions
	Dissemination of monitoring and evaluation of water quantity and quality to water users and community

Table-3.4 Candidate daily / important works for expected functions / roles of “j.”

j. Implementation of O&M of water resources in the river basin	
	RENCANA
	Improvement of WR facility and infrastructure O/M
	O/M of sedimentation
	Rehabilitation and repair of riverbank protection
	Assessment Report
	Implementation of asset management for WR facility and Infrastructure
	Applying SOP for O/M
	Accountability Report
	Activity of SNVT O/M
	PJT Functions
	Implementation of routine, periodic, minor repair and emergency O/M for WR facility and infrastructure
	O/M for Safety for WR facility and infrastructure and secure of WR

Table-3.5 Candidate daily / important works for expected functions / roles of “m.”

m. Facilitation of the activity of Coordination Team of Water Resources Management
RENCANA
Improvement of institution and function of P3A
Smooth implementation of construction of Kuwil Dam and Laule retention area
Settlement of potential conflict between stakeholders in Pulau Bangka area
Assessment Report
Immediately activate of function and duty of coordination team refer to Presidential Decree No.12 / 2012 and Ministry of PUPR's regulation No.4 / 2008
Accountability Report
Coordination with relevant agencies has to be done before implementation of activity
Activity of TKPSDA for Tondano – Sangihe – Talaud - Miangas river basin, TKPSDA for Dumoga - Sangkub river basin
PJT Functions

1.2.3. (Step 2) Discussion for confirmation of daily and important activities

The project team had discussion with BWS Sulawesi I to confirm of daily / important activities (works). We got new ideas and revisions of candidate daily / important activities for each expected functions / roles as below;

g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin

- ✓ Candidates are suitable as daily / important activities
- ✓ As an additional information, BWS Sulawesi I will establish small laboratory on water quality analysis
- ✓ BWS Sulawesi I struggles on checking plan / design of coastal protection infrastructures because there is no practical / technical standard and guideline

h. Hydrology system management

- ✓ Candidates are suitable as daily / important activities
- ✓ It is also important for BWS Sulawesi I to cooperate with Meteorological Agency and Agricultural Agency to share hydro meteorological data

i. Water resources information system management

- ✓ Candidates are suitable as daily / important activities
- ✓ It is also important for BWS Sulawesi I to develop human resource for operation of GIS software

j. Implementation of O&M of water resources in the river basin

- ✓ Candidates are suitable as daily / important activities
- ✓ As an additional information, BWS Sulawesi I conducts O/M of groundwater intake facility

m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin;

- ✓ Candidates are suitable as daily / important activities
- ✓ Coordination on Water Allocation of Lolak Dam is included river maintenance flow
- ✓ Necessary efforts on RENCANA are been selecting with TKPSDA (Coordination team)
- ✓ BWS Sulawesi I coordinates a variety of issues on planning / construction / O/M with TKPSDA

1.2.4. Confirmed daily and important activities

g. WRM which includes Conservation, Utilization, Damage Control

Flood Management

- Implementation of Flood Control Project
- Rehabilitation and repair Early Warning System
- Flood Hazard Mapping and support for arrangement of evacuation sites and routes
- Flood Management Planning on preparation, response and operation and rehabilitation with stakeholders

Water Quality Management

- Sampling 2 times/1 years, at 67 points
- Analyzing 15 parameters and data management
- Patrol rivers and lakes (periodically and emergency)
- Sharing water quality situation with stakeholders and water users
- Utility of Small laboratory, equipment and human development

Coastal Protection

- Implementation coastal protection construction works (check design, quality control of construction works)
- Evaluation of existing structures, including impact to residence and fishery

- Coordination of planting and conservation of mangrove
- Patrol coastal area and Maintenance of existing structures

h. Hydrology System Management

- Evaluation of hydro-meteorological observation station network
- Rehabilitation and repair equipment to be able to measure flood situation
- Flow measurement (low and high water) and update H-Q formulation
- Patrol and data collection
- Maintenance of building, equipment (Periodically and emergency)
- Human resource development of technician on electric and telecommunication equipment
- Survey Cross Section at River and Sedimentation in Reservoirs

i. Management of Water Resources Information System (SISDA)

- Data collection and management on 1) Hydrology (Water Level, Flow rate), 2) Meteorology (Rainfall…), 3) Water quality (15 parameters), 4) Infrastructures, with GIS system
- Update format for easy input to SISDA

j. Operation and Maintenance of Water Resources

- Update, formulation and implementation of O/M rule of water resources facilities and infrastructures
- Patrol and maintenance of facilities and infrastructures, such as Sabo dam and Check dam, Irrigation (4 areas), Coastal protection (revetment, sea wall)
- Planning maintenance and rehabilitation, considering with assets management
- Low water management (Water distribution, river maintenance flow)
- High water management (flood control operation with stakeholders, especially hydropower sector)
- Sediment Management (Survey of Cross Section at River and Reservoirs)

m. Facilitate of Activity of Coordination Team for WRM

- Management of TKPSDA team's activity as secretariat
- Coordination for dam project
- Coordination on water allocation/distribution plan for dam project
- Formulation of "RENCANA PENGELOLAAN SUMBER DAYA AIR WILAYAH SUNGAI"
  (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN)
  (Dumoga Sungkub River Basin)
- Plan-Design-Construction-Operation/Maintenance of each projects

2. Activity 1-2

Sort out the activities to be strengthened by comparing the actual activities with the ideal functions and roles mentioned above in 1-1

Through discussion between BWS Sulawesi I and JICA project team, activities to be strengthened had been sorted out as below;

g. WRM which includes Conservation, Utilization, Damage Control

Flood Management

- Rehabilitation and repair Early Warning System

Water Quality Management

- Sharing water quality situation with stakeholders and water users
- Utility of Small laboratory, equipment and human development

Coastal Protection

- Evaluation of existing structures, including impact to residence and fishery

h. Hydrology System Management

- Rehabilitation and repair equipment to be able to measure flood situation
- Flow measurement (low and high water) and update H-Q formulation
- Human resource development of technician on electric and telecommunication equipment
- Survey Cross Section at River and Sedimentation in Reservoirs

i. Management of Water Resources Information System (SISDA)

- Data collection and management on 1) Hydrology (Water Level, Flow rate), 2) Meteorology (Rainfall…), 3) Water quality (15 parameters), 4) Infrastructures, with GIS system
- Update format for easy input to SISDA

j. Operation and Maintenance of Water Resources

- Update, formulation and implementation of O/M rule of water resources facilities and infrastructures
- Low water management (Water distribution, river maintenance flow)
- High water management (flood control operation with stakeholders, especially hydropower sector)
- Sediment Management (Survey of Cross Section at River and Reservoirs)

m. Facilitate of Activity of Coordination Team for WRM

- Management of TKPSDA team's activity as secretariat
- Formulation of "RENCANA PENGELOLAAN SUMBER DAYA AIR WILAYAH SUNGAI"
  (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN)
  (Dumoga Sungkub River Basin)
- Plan-Design-Construction-Operation/Maintenance of each projects

3. Activity 1-3

3.1. Identify priority issues, which are necessary to be tackled with stakeholders as common and important targets,

Candidate issues which are necessary to be tackled with stakeholders are selected from result of Activity 1-2 "activities to be strengthened" as below. The issues will be selected by discussion with PUPR, BWS Sulawesi I and stakeholders if necessary.

g. WRM which includes Conservation, Utilization, Damage Control

Flood Management

- Rehabilitation and repair Early Warning System

Water Quality Management

- Sharing water quality situation with stakeholders and water users

Coastal Protection

- Evaluation of existing structures, including impact to residence and fishery

h. Hydrology System Management

- Human resource development of technician on electric and telecommunication equipment

i. Management of Water Resources Information System (SISDA)

- Data collection and management on 1) Hydrology (Water Level, Flow rate), 2) Meteorology (Rainfall…), 3) Water quality (15 parameters), 4) Infrastructures, with GIS system

j. Operation and Maintenance of Water Resources

- Update, formulation and implementation of O/M rule of water resources facilities and infrastructures
- Low water management (Water distribution, river maintenance flow)
- High water management (flood control operation with stakeholders, especially hydropower sector)

m. Facilitate of Activity of Coordination Team for WRM

- Management of TKPSDA team's activity as secretariat
- Formulation of "RENCANA PENGELOLAAN SUMBER DAYA AIR WILAYAH SUNGAI"
  (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN)
  (Dumoga Sungkub River Basin)
- Plan-Design-Construction-Operation/Maintenance of each projects

4. Activity 1-4

4.1. Identify concrete work activities to tackle the priority issues recognized in "1-3"

Through discussion between BWS Sulawesi I and JICA Project Team, the priority issues to formulate concrete work activities are selected from the result of Activity 1-3. However, some of the priority issues are raised from the result of Activity 1-2, about hydrology management. Observation of river water level and rainfall can be conducted by BWS Sulawesi I selves, but hydrological data and information is a basis of almost all activity on water resources management including stakeholder coordination. This is why we including "Hydrology management" as priority issues even the topic is not included in the result of Activity 1-3.

g. WRM which includes Conservation, Utilization, Damage Control

Flood Management

- Rehabilitation and repair Early Warning System

h. Hydrology System Management

- Rehabilitation and repair equipment to be able to measure flood situation

- Flow measurement (low and high water) and update H-Q formulation
- Human resource development of technician on electric and telecommunication equipment
- Survey Cross Section at River and Sedimentation in Reservoirs

j. Operation and Maintenance of Water Resources

- Update, formulation and implementation of O/M rule of water resources facilities and infrastructures
- Low water management (Water distribution, river maintenance flow)
- High water management (flood control operation with stakeholders, especially hydropower sector)

m. Facilitate of Activity of Coordination Team for WRM

- Plan-Design-Construction-Operation/Maintenance of each projects

4.2. Identify area of the capacity development necessary for those work activities

Areas and concrete activity of capacity development for these priority issues is identified into several activities as below. Some of topics is related with several priority issues. For examples;

An activity of "Conduct flow observation and update H-Q formulation of high water for warning System" is firstly identified as concrete activity for *Flow measurement (low and high water) and update H-Q formulation in* ***h. Hydrology System Management.*** However flow measurement is contributed to flood warning system. Because, a master plan on flood management has been created by JICA-Sector Loan Project (IP-555). In the plan, flood control plan is based on "flood discharge", it is written as a river flow volume. And new dam, Kuwil and Lolak, will be constructed and start operation. Discharge from dam is indicated by flow volume. Therefore, flow measurement and update H-Q formulation that can make conversion between river water level and river flow volume is essential for rehabilitation for flood warning system. So, the topic is also identified as concrete activity for *Rehabilitation and repair Early Warning System for* ***Flood Management*** *at* ***g. WRM which includes Conservation, Utilization, Damage Control.***

Figure-1 shows concrete activities as "Activity" for priority issues that are identified at above 4.1.

Figure-1 Concrete activity as “Activity” for priority issues

Topic	Activity
Water Resources Management which includes Conservation, Utilization and Damage Control	
Flood Management	
Rehabilitation and repair Early Warning System	
	Conduct flow observation and update H-Q formulation of high water for warning System
	Update/create maintenance manual and conduct maintenance work of hydrological equipment for warning system
	Flood Hazard Mapping
Water Quality Management	
Sharing water quality situation with stakeholders and water users	
Utility of Small laboratory, equipment and human development	
	Create manual of patrol and implement patrol
	Create potential hazard and risk map of water quality
Coastal Protection	
Evaluation of existing structures, including impact to residence and fishery	
	Create technical manual for structural design of coastal protection
Hydrology System Management	
Rehabilitation and repair equipment to be able to measure flood situation	
	Improve maintenance work of hydrological equipment
Flow measurement (low and high water) and update H-Q formulation	
Human resource development of technician on electric and telecommunication equipment	
Survey Cross Section at River and Sedimentation in Reservoirs	
	Improve maintenance work of hydrological equipment
	Improve flow observation and update H-Q formulation
Management of Water Resources Information System	
Data collection and management with GIS system	
Update format for easy input to SISDA	
	Update format of data input
	Update/create manual on data input
Operation and Maintenance of Water Resources	
Update, formulation and implementation of O/M rule of water resources facilities and infrastructures	
Low water management (Water distribution, river maintenance flow)	
High water management (flood control operation with stakeholders, especially hydropower sector)	
Sediment Management (Survey of Cross Section at River and Reservoirs)	
	Creat/update/improve O/M rules of facilities and infrastructures
	Low Water Management (Water allocation/distribution)
	High Water Management (Coordination with stakeholders for flood control)
Facilitation of activity of coordination team of water resources management	
Management of TKPSDA team activity as secretariat	
Formulation of “RENCANA PENGELOLAAN SUMBER DAYA AIR WILAYAH SUNGAI” (TONDANO-SANGIHE-TAL	
Plan-Design-Construction-Operation/Maintenance of each projects	
	Support for Coordination of Kuwil Dam project
	Support for Coordination of Water Allocation/Distribution of Lolak dam project

5. Activity 1-5

5.1. Make short- and middle- term CD plans to accomplish the capacity development recognized in "1-4" in the selected RBOs

For accomplishment of CD recognized in Activity 1-4, it is a best way that project can implement a many activities to fulfill of CD for priority issues. However, the project should concentrate only several activities due to current resources of JICA experts and availability of member in BWS Sulawesi I. Therefore, we, JICA project team and BWS Sulawesi I, agreed that we concentrate three (3) activities,

1) Implement flow observation of high water and update H-Q formulation

2) Update/create maintenance manual and conduct trainings for hydrological instrument

3) Support for making O/M rule of Kuwil Dam.

Figure-2 shows CD plan until end of the project as a middle-term plan. Figure-3 shows detail schedule and procedure for CD activity as a short-term plan for implementation of CD activity as On the Job Training (OJT). Short- and middle- term CD plan are created through discussion between BWS Sulawesi I and JICA project team.

Figure-2 CD Plan until end of the project as middle-term plan

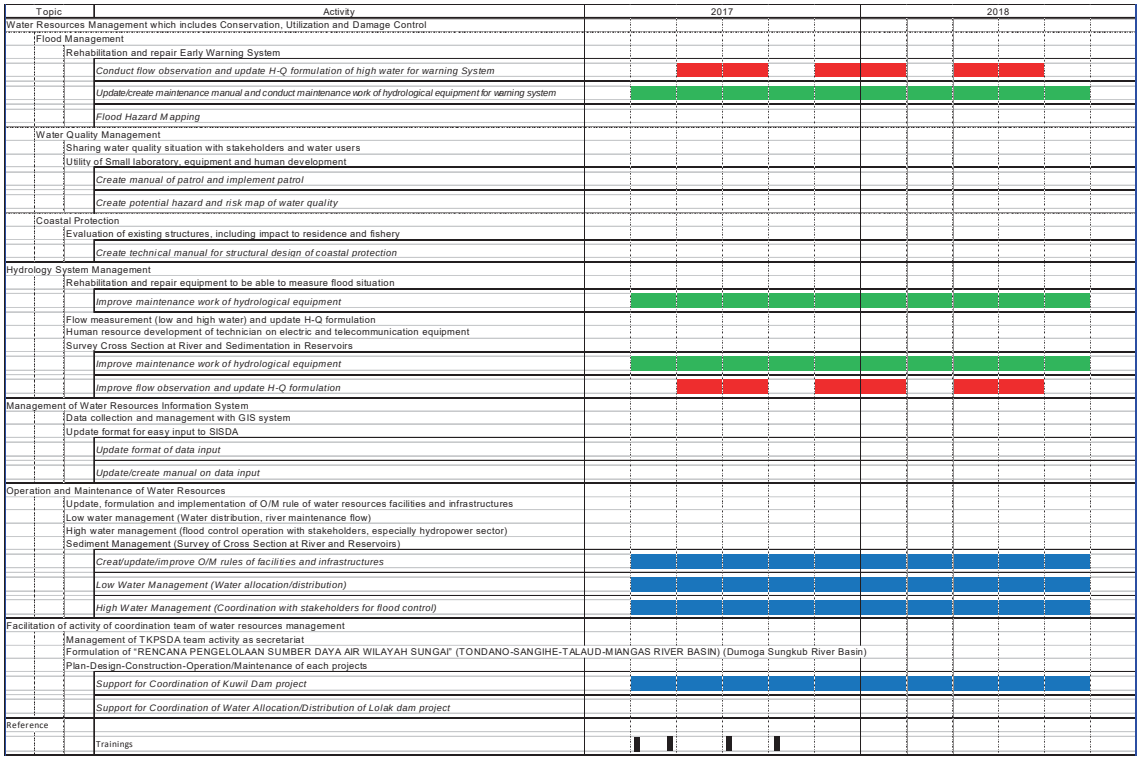


Figure-3 Detail schedule and procedure for CD activity

END

Appendix-1

Activity 1-1

Table 1: RENCANA (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
a. Compilation of the pattern and plan of water resources management in the river basin	Review of RTRW in relation with water resources management program and policy	Water Resources Utilization	Water resources protection and conservation	Middle
	Control and supervision of space usage in upstream and downstream to solve conflicts on land protection			
	Evaluation, review of RTRW and supervision and control of space utilization	Water Damage Control	Prevention	
b. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources	Feasibility study on northern dam of Tondano Lake to increase capacity of the Lake	Water Resources Utilization	Procurement of water resources	Middle
	Study on raw water potentials, geoelectrical investigation, development and management of ground water, creation of rain water containment facility and desalinization of sea water for fulfillment of needs for clean water in islands			
	Development of Sawangan-Air Madidi reservoir for industrial water in Kabima industrial zone and hydropower 16MM PLTA		Development of water resources	
	Development of Abuang Dam for raw water and hydropower			
	Study on needs for sediment control structures	Water Damage Control	Prevention	
	Identification and study on flood control in flood prone area			
	Follow up on result of SID on flood, sediment control and coastal protection		Handing	
c. Preparation, compilation of plan and document of goods and services procurement				Low
d. Implementation of goods and services procurement as well as determination of the winner (winner of the tender) as a Procurement Service Unit (ULP)				Low
e. Control and supervision of construction of water resources development	Construction of Kuwil reservoir and Lalue retention area for control of water during rainy season	Water Resources Conservation	Water Preservation	High
	Revitalization of Kapeta Lake in Pulau Siau watershed			
	Continuity of irrigation network and creation of irrigation network and farm access road			
	Construction of northern dam of Tondano Lake to increase capacity of the Lake	Water Resources Utilization	Water Resources Usage Management	
	Improvement of clean water service "65% citizens in Tondano-Sangihe-Talaud-Miangas River Basin have access to clean water"		Procurement of water resources	
	Development Irrigation area			

Activity 1-1

Table 1: RENCANA (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
e. Control and supervision of construction of water resources development	Construction of Kuwil reservoir for raw water and flood control	Water Resources Utilization	Development of water resources	High
	Construction of Girian Dam for raw water		Water Resources Enterprise	
	Construction of coast protection at islands	Water Damage Control	Prevention	
	Construction of sediment control structures, and Laine river Dam in Tabukan Utara district			
	Development of drainage network system to flood disaster risk			
	River channel improvement of Tondano river in Manado city and Abuang river in Minanga		Operation	
f. Compilation of plan and implementation of the management of protected water source area in the river basin	Conservation of water catchment area in Tondano Lake	Water Resources Conservation	Water resources protection and conservation	High
	Creation of wood nursery and planting woods in Tondano watershed			
	Construction of soil conservation infrastructures to control and decrease sedimentation			
	Control growth of water hyacinth in Tondano Lake			
	Socialization and training on organic fertilizer to famers around Tondano lake			
	Execution of exploitation zoning in Tondano lake			
	Stipulation of border of protected forest area			
	Stipulation, socialization and implementation of local regulation on spatial detail plan			
	Review of spatial layout plan for water resource management			
	Integrated protected conservation area to recover the water absorption function			
	Control and supervision of non-mineral rock mining activity			
	Detail survey of potential and design for Development of PLTMH in North Sulawesi			
	Stipulation and Socialization to control the conservation of land function			
	Integrated conservation of vegetative, technical and other conservation methods			
	Law enforcement on the public against forest burning and illegal logging for maintenance of ecosystem in forest area			
	Management of coastal area, study to identify damage on ecosystem, mangrove forest, reforestation of coastal line and construction of coastal protection facility			
	Management of mining activity can be supervised to reduce river water pollution and land damage			
	Restoring the functions of recharge area in various spring catchment area to fulfill the needs for water -Management of mining activity can be supervised to reduce river water pollution and land damage			
	Implementation of proper irrigation technology and control of ground water exploitation by industry with SIPA arrangements to prevent and conserve ground water			
	Management of mining activity can be supervised to reduce river water pollution and land damage			

Activity 1-1

Table 1: RENCANA (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
f. Compilation of plan and implementation of the management of protected water source area in the river basin	Construction and rehabilitation of sanitation facility and infrastructure -Management of mining activity can be supervised to reduce river water pollution and land damage	Water Resources Conservation	Water resources protection and conservation	High
	Swamp and mangrove protection			
	Arrangement of "Water Front" concept			
	Development of Green Belt on riverside, lake side and coastal area			
	Rehabilitation and public participation for protecting conservation forest area and private forest management			
	Creation of seeding and nursery center			
	Stipulation of zone of water resources usage which takes into account various water resources exploitation	Water Resources Utilization	Water Resource Usage Management	
	Development of ferry transport network system and water transport network system in Tondano river			
	Identification of new water resource potentials for raw water		Water Resources Enterprise	
	Compilation of DED SPAM in all area			
	Settlement of layout planning in forest enclave	Empowerment and Improvement of Public Business Sector Participation	Public and Business Sector's Roles during Execution	
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	Creation of absorption well to prevent rainwater from running on surface '-Construction of Kuwil reservoir and Lalue retention area for control of water during rainy season	Water Resources Conservation	Management of Water Quality and Water Pollution Control	High
	Control sanitation system and floating fishery net system around Tondano Lake, and supervise on water quality to fill full to standard for Tondano Lake			
	Mitigate water acidity in Tondano Lake			
	Implement of water quality test at Totok, Buyat, Abuang, Kawiwi, Palaus Rivers and Lakes, and add test equipment on BOD and COD			
	Training on laboratory equipment for operational staff			
	Mapping locations and identifying sources and potential pollution			
	Monitoring water quality at rivers			
	Management of cultivated land use in Kepulauan Talaud regency	Water Resources Utilization	Water Resources Usage Management	
	Socialization of local regulations related with spatial layout			
	Improvement of clean water service to reach 62% in 2015 according to MDG's and PDAM Sulut's plans		Procurement of water resources	
	Development of drinking water processing installation		Water Resources Enterprise	

Appendix-1

Activity 1-1

Table 1: RENCANA (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	Planting mangrove for coastal protection	Water Damage Control	Prevention	High
	Creation of early flood warning system			
	Supervision and development of "building code" and "evacuation route" in flood prone area	Water Damage Control	Prevention	
	Socialization on the usage and maintenance of ground water resources	Empowerment and Improvement of Public Business Sector Participation	Public and Business Sector's Roles during Execution	
h. Hydrology system management	Rehabilitation of hydro meteorological outposts	Water Resources Information System	Development of SISDA Network	Middle
	Construction of telemetry system of rain and water level			
	Repair, update and O/M of rain and water level posts		Development of Information technology	
i. Water resources information system management	Evaluation of MOU on water resources management in coordination forum	Water Resources Information System	SISDA Management of Water Resources and Institutionality	High
	Socialization of Integrated Water Resources information system for all stakeholders			
	Creation of database system and information service and consequence of an accountable information supply			
	Utilization of grants and aids for water resources information system operations			
	Training on compilation of integrated water resources management database			
	Training database update			
	Evaluation of socialization of water resources information system with functions and roles of relevant institutions			
	Development of water resources information system (Hardware and software) at BWS / Provincial level		Development of SISDA Network	
	Compilation of water resources management database			
	Development of SISDA with website support			
	Development of water resources information system		Development of Information technology	
j. Implementation of O&M of water resources in the river basin	Improvement of O/M activity for water resources facility and infrastructure for effective and efficient water exploitation	Water Resources Conservation	Water Preservation	Middle
	O/M of sediment control structure	Water Damage Control	Prevention	
	Rehabilitation and repair of damaged / collapsed river bank protection structures		Recovery	
	Maintenance of river bank protection structures on Tarun river			

Appendix-1

Activity 1-1

Table 1: RENCANA (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
j. Implementation of O&M of water resources in the river basin	Involvement of all stakeholders in financing commitment for integrated water resources management during planning, constructions and O/M	Empowerment and Improvement of Public Business Sector Participation	Public and Business Sector's Roles during Execution	Middle
k. Implementation of technical guidance for water resources management under the authority of province and regency/city	Stipulating waste water quality standard on drainage to river	Water Resources Conservation	Management of Water Quality and Water Pollution Control	Middle
	Improvement of O/M of irrigation facility to improve irrigation water supply and increase crop productions	Water Resources Utilization	Water Resources Usage Management	
	Administration and reinforcement of central, local water resources management institutions	Empowerment and Improvement of Public Business Sector Participation	Public and Business Sector Participation in Planning	
l. Preparation of technical recommendation for granting permission on supply, allocation, utilization and exploitation of water resources in the river basin	Supervising, monitoring and certificating brandless packaged water for safety consumption	Water Resources Utilization	Procurement of water resources	Middle
	Clear distribution of duties and authorities between relevant institutions for surface water exploitation and business licensing	Empowerment and Improvement of Public Business Sector Participation	Public and Business Sector Participation in Planning	
	Improvement of public participation in developing, managing and maintaining environmental facilities and infrastructures	Empowerment and Improvement of Public Business Sector Participation	Public and Business Sector's Roles during Execution	
m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin	Improvement of water utilization and optimization of P3A institutionality function	Water Resources Conservation	Water Prevention	High
	Construction of Kuwil reservoir and Lalue retention area for control of water during rainy season			
	Settlement of potential conflict between stakeholders in Pulau Bangka area [monitoring environmental conditions, preparing provision of law/regulation, law enforcement			

Appendix-1

Activity 1-1

Table 1: RENCANA (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin	Monitoring and supervising to construction work of industry on waste water management	Water Resources Conservation	Management of Water Quality and Water Pollution Control	High
	Socialization of water resources management regulation and policy with various stakeholders	Water Resources Utilization	Water Resources Usage Management	
	Creation of water resources management coordination unit at provincial level	Empowerment and Improvement of Public Business Sector Participation	Public and Business Sector Participation in Planning	
	Consolidation of PSDA			
	Improvement of coordination through disaster (flood, landslide and drought) management coordination between institutions			
	Socialization, construction, usage and maintenance of PSDA facilities and infrastructures		Public and Business Sector's Roles during Execution	
	Coordination between institutions related with integrated water resources management financing			
n. Public empowerment in the water resources management	Demonstration and training on organic fertilizer '-Construction of Kuwil reservoir and Lalue retention area for control of water during rainy season	Water Resources Conservation	Water Prevention	High
	Creation of DEMPLOT of all agriculture development '-Construction of Kuwil reservoir and Lalue retention area for control of water during rainy season			
	Facilitating urban domestic and industrial waste water management		Management of Water Quality and Water Pollution Control	
	Control and supervise drainage of domestic and industrial waste water			
	Increasing participation and cooperation between public, entrepreneurs and government in water resources management to solve conflicts on land protection	Water Resources Utilization	Water Resources Usage Management	
	Legal approach and law enforcement on conservation of forest loggers	Water Damage Control	Prevention	
	Stipulation of Lake forum on integrated water resources management	Empowerment and Improvement of Public Business Sector Participation	Public and Business Sector Participation in Planning	
	Empowerment of human resources in execution and function of work units			
	Involvement and empowerment of of people living in forest enclave for water resources management		Public and Business Sector's Roles during Execution	
	Socialization, supervision and management of farm and plantation commodity development according to land suitability and supporting capacity			
	Management of farmers through P3A groups and motivating farmers to develop a specific farming system through filed study			

Appendix-1

Activity 1-1

Table 1: RENCANA (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
n. Public empowerment in the water resources management	Creation of new paddy field according to irrigation area, supported with procurement of farming tools, equipment and trainings	Empowerment and Improvement of Public Business Sector Participation	Public and Business Sector's Roles during Execution	High
	Socialization and supervision of provision of law on water resources management, and empowerment of impositions and sanctions		Public and Business Sector's Roles in Supervision	
	Public education on water resources facilities and infrastructures			
	Socialization of provision of law on water resources management for all stakeholders			
o. Implementation of compilation of financial accounting and state property accounting report as a Regional Accounting Unit				Low
p. Implementation of collection, reception and usage of water resources management service fee (BJPSDA) in accordance with the provisions of legislation	Involvement of all stakeholders in financing commitment for integrated water resources management during planning, constructions and O/M	Empowerment and Improvement of Public Business Sector Participation	Public and Business Sector's Roles during Execution	Middle
q. Implementation of administration and housekeeping affair of the BWS as well as coordination with related				Low

*Criteria of Evaluation

High: Number of Physical and Non-Physical Efforts is 10 or more
Middle: Number of Physical and Non-Physical Efforts is 10 or less
Low: No Physical and Non-Physical Efforts

Appendix-2

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
a. Compilation of the pattern and plan of water resources				Low
b. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources	Improvement of conservation techniques for land and water processing in agricultural business lands	Conservation	Protection and Preservation of WR	High
	Compilation of Silviculture Model Areal Design			
	Inventorisation and Identification of Village Forest Development Potentials in 6 Regencies / Cities			
	Review of Dam Design Study a. Buko Reservoir (1.350 ha) b. Pontak Reservoir (653 ha) c. Ollot Reservoir (854 ha) d. Saleo Reservoir (150 ha) e. Ayong Maelang Reservoir (2.293 ha) f. Lolak Pinogaluman Reservoir (2.040 ha) g. Tombolikat Sita Reservoir (1.070 ha) h. Katulidan Sinantakan Reservoir (650 ha) i. Poigar Reservoir (1000 ha) and Antiggalo Reserver	Utilization	Secure of WR	
	Development of Interconnected Kotamobagu Plains Irrigation Network			
	Planning Optimum Water Resources Usage	Utilization	WR Usage	
	Development and stipulation of water-efficient irrigation method (SRI)			
	Potential Studies on PLTA Poigar II and III	Utilization	WR Development	
	Studies on Potential Availability and Water Resources in Dumoga Sangkub River Basin			
	Study on landslide risk level along the trans-Sulawesi line in Dumoga Sangkub River Basin and Master Plan on Landslide Management	Water Damage	Prevention of Water Damage	
	Action Research Study by involving public institutions, to identify flood-prone areas and to identify potential retention basin for control floods in Dumoga Sangkub River Basin			
	Assessing impacts on the environment (JRBM)			
	Action research study with involving public institutions around Sub-Basin in planning and Developing slope reinforcement structure			
	Planning Check dam SID on Tonom river			
	Compiling Tsunami Emergency Response Masterplan			
	Coastal Protection Structure SID in North Bolmong beach, South Bolmong beach and East Bolmong beach; Beach Inventorisation Study in Dumoga Sangkub River Basin, beaches in Tondano – Likupang River Basin and UKL (Environmental Management Program) & UPL (Environmental Monitoring Program) Study on Nanusa, Karakelang, Para, Kalama, Bebalang and Batunderang (Sangihe Talaud River Basin) Coastal Protection Structure			
	Planting and seeding mangrove plants as natural coastal protection			

Appendix-2

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
b. Compilation of program and plan, feasibility study and planning of	Studies on flood management policy at regency / city level and Natural Disaster Evacuation Planing	Water Damage	Water Damage Management	High
	Designing and constructing new protective structures according to safety capacity	Water Damage	Water Damage Recovery	
	Studies on potential mined minerals			
c. Preparation, compilation of plan and document of goods and services procurement	Procurement of public assistance and empowerment for recovery of lands after disaster	Water Damage	Water Damage Recovery	Middle
d. Implementation of goods and services procurement as well as determination of the winner (winner of the tender) as a Procurement Service Unit (ULP)	Procurement of reforestation seeds for public empowerment and conservation of upstream area	Conservation	Protection and Preservation of WR	Middle
	Procurement of 4 units of water pumps in Boltim regency and creation of Kotamobagu pump irrigation channel	Utilization	Secure of WR	
	Procurement of Water Energy Development Facilities to Generate Power	Utilization	WR Development	
	Procurement of SIG software and hardware for conducting SIG (Geographical Information System) Training and SISDA	SISDA	Development of SISDA Network	
	Procurement of Book Reference in the Library in relation with the Geographical Information System Materials	SISDA	Improvement of Quality of SISDA Team	
	Procurement of Equipment and Hardware of Database System Computer Application and Online Information			
e. Control and supervision of construction of water resources development	Other Conservations (Check dams, Reservoirs, Retention Basins, Absorption Wells, Springs Protection)	Conservation	Maintenance of Water Sustainability	High
	Construction of drainage channels / household waste channels through absorption holes and/or containers	Conservation	Management of Quality and Water Pollution Control	

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
e. Control and supervision of construction of water resources development	dam, long storage, reservoir, irrigation network and clean water network) Potential Dam: a. Lolak Reservoir b. Ongkak Biyou Reservoir c. Ongkak Sangkub Reservoir d. Onggagu Bolangitang Reservoir e. Mataindo Reservoir f. Wakat Reservoir g. Tapa Taudan Reservoir h. Bolangaso Reservoir i. Kombot Reservoir j. Tobayangan Reservoir k. Nuangan Reservoir l. Salango Reservoir m. Pinolosian Reservoir n. Mopungu Reservoir o. Dumagin Reservoir p. Tapa Mau Reservoir q. Minanga Reservoir r. Ongkak Ayong Minanga s. Ongkak Kaidipang Reservoir t. Ongkak Mawao Reservoir u. Tubig Buyat Reservoir v. Saibuah Reservoir w. Pilolahunga Reservoir x. Potoiya Reservoir y. Onggagu Reservoir z. Onggagu Saleo Reservoir	Utilization	Stipulation of Water Source Usage Zone and Water Resources Purposes	High

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
e. Control and supervision of construction of water resources development	**Water Retention Basin Construction:** a. Tuntung Retention Basin b. Kaidipang Retention Basin c. Maelang Retention basin d. Kuai Retention Basin e. Kosinggolan Retention Basin f. Tumpah Retention Basin g. Tadoy Retention Basin h. Potaay Retention Basin i. Limbonugo Retention basin j. Tombolikat Retention Basin k. Nuangan Retention Basin l. Moyopang Retention Basin m. Iyoyang Retention Basin n. Totoloyan Retention Basin o. Linawan-moloben Retention Basin p. Salang Retention Basin q. Biniha Retention basin r. Batoro Retention Basin s. Sikusikuan Retention Basin t. Mobuku Retention Basin u. Tayap Retention Basin v. Pos Retention Basin **Irrigation Network Construction and Planning (according to RTRW):** a. Buko Retention Basin b. Pontak Retention Basin c. Saleo Retention Basin d. Saleo Retention Basin e. Sangkub Retention Basin f. Sangkub Primary Irrigation Channel (Kn) g. Sangkub Primary Irrigation Channel (Ki) h. Buko-Tuntung Primary Irrigation Channel i. Dadapuli Primary Irrigation Channel j. Buko-Tuntung Secondary Irrigation Channel k. Ayong Maelang Reservoir l. Lolak Pinogaluman Reservoir m. Tombolikat-Sita Reservoir n. Katulidan-Sinantakan Reservoir o. Poigar Reservoir p. Ayong Maelang Irrigation Channel q. Pusian Molong Irrigation Channel r. Lolak Pinogaluman Irrigation Channel s. Tombolikat Sita Irrigation Channel u. Katulidan Sinantakan Irrigation Channel	Utilization	Stipulation of Water Source Usage Zone and Water Resources Purposes	High

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
e. Control and supervision of construction of water resources development	Clean Water Network Development / Construction Planning (According to RTRW): a. Sunga Springs b. Sangkub-Lolak River Raw Water Source c. Sangkub River (200 l/s) d. Bintauna River (250 l/s) e. Bolangitang River (150 l/s) f. Kaidipang River (200 l/s) g. Buko river (200 l/s) i. Dumoga River (200 l/s) j. Kaiya River (500 l/s) k. Sang Tombolang River (300 l/s) l. Poigar River (300 l/s) m. Lolak River (200 l/s) n. Dumoga River (300 l/s) o. Molibagu River (500 l/s) p. Bolaang Uki River (250 l/s) q. Pinolosian River (150 l/s) r. Lion River (100 l/s)	Utilization	Stipulation of Water Source Usage Zone and Water Resources Purposes	High
	Compilation of Drinking Water Supply System Master Plan in Kotamobagu city, Bolaang Mongondow regency, Bolmut regency, Bolsel regency and Boltim regency			
	Development of River and lake Water Source as follows: a. Sangkub River (200 l/s) b. Bintauna River (250 l/s) c. Bolangitang River (150 l/s) d. Kaidipang River (200 l/s) e. Buko river (200 l/s) f. Dumoga River (200 l/s) g. Kaiya River (500 l/s) h. Sang Tombolang River (300 l/s) i. Poigar River (300 l/s) j. Lolak River (200 l/s) k. Dumoga River (300 l/s) l. Lake Moat (400 l/s) m. Molibagu River (500 l/s) n. Bolaang Uki River (250 l/s) o. Pinolosian River (150 l/s) p. Lion River (100 l/s)		Secure of WR	
	Raw Water Infrastructures: Bolmut: Buroko District (0.01 m3/s) Bolmong: Lolak District (0.02 m3/s), Bolaang Mongondow district (0.06 m3/s) Boltim: East Bolmong District (0.07 m3/s) Development of Raw Water Infrastructures in Bolmut & Bolsel Regency (0.07 m3/s)			

Activity 1-1
Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
e. Control and supervision of construction of water resources development	Clean water (IPA) Treatment Installation consists of: a. Sangkub River (200 l/s) b. Bintauna river (250 l/s) c. Bolangitang river (150 l/s) d. Kaidipang river (200 l/s) e. Buko river (200 l/s) f. Dumoga river (300 l/s) g. Kaiya River (500 l/s) h. Sang Tombolang River (300 l/s) i. Poigar River (300 l/s) j. Lolak River (200 l/s) k. Dumoga River (300 l/s) l. Dumoga River (300 l/s)	Utilization	Secure of WR	High
	Development of Primary Irrigation Channel -Torosik Irrigation Area Network (Cont.) (2.87 km, 300 ha), -Pinaingan Irrigation Area Network (cont.) (1.45 km, 200 ha)		WR Usage	
	Development of reservoirs to serve irrigation areas; 2521 ha in Poyowa Besar II village of South Kotamobagu district, 1476 ha on Tangaton-Tumubui-Pangi-Yuyak irrigation channel and 650 ha on Katulidan-Sinantakan irrigation channel;			
	Development of the following reservoirs a. Buko reservoir (1.350 ha) b. Pontak Reservoir (653 ha) c. Ollot reservoir (854 ha) d. Saleo reservoir (150 ha) e. Ayong Maelang Reservoir (2.293 ha) f. Lolak Pinogaluman Reservoir (2.040 ha) g. Tombolikat Sita Reservoir (1.070 ha) h. Katulidan Sinantakan Reservoir (650 ha) i. Poigar Reservoir (1000 ha)			
	Development of Irrigation facilities and infrastructures; -2.077 Ha of Functional Irrigation Area. Development of Taingkukuk Irrigation Area (5.77 km, 200 ha), -Poigar Irrigation Area (cont.) (789 ha), Sangkub Irrigation Area (100 ha), -Sangkub Kanan Irrigation Area (1800 ha)			
	Construction and development of strategic clean water for: Regency Capitals, Tourism Areas and Public Areas, clean water in District Capitals (IKK), rural areas and Development of Drinking Water Supply Network	Utilization	WR Development	
	Construction of drinking Water Supply			
	Constructing proper drainage system for slopes, minimizing slope load, narrowing slope inclination, evacuating people from the slopes along the southern part of trans-Sulawesi route	Water Damage	Prevention of Water Damage	
	Construction of levees and flood retention structures			
	Creating levees in flood-prone areas			

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
e. Control and supervision of construction of water resources development	Construction of Retention Basin, Check dam in Togulu, Togid-Tutuyan, Tombolikat, Paret Sub-Basin	Water Damage	Prevention of Water Damage	High
	Construction of slope reinforcement structure			
	Construction of drainage channels for water and soil			
	Creation of check dam on Tonom river			
	Construction of sabo dam			
	Construction of dams with flood control	Water Damage	Water Damage Recovery	
f. Compilation of plan and implementation of the management of protected water source area in the river basin	Socialization of Minister of Public Works Number 63/PRT/1993 and Government Regulation number 26/2008, Settlement Area must abide by the river terraces.	Conservation	Protection and Preservation of WR	High
	Reforestation and Rehabilitation of Forest Area			
	Village RHL Plan in Priority Sub-Basin Through Construction of Micro Sub-Basin Model (MDM)			
	Supervision of illegal logging and law enforcement, HPH (Forest Commercialization rights) and other exploitation activities			
	Lad usage by planting trees with high economic value and land use plan			
	Compilation of Public Forest Planting Plans under Coconut Trees, Seed Planting Plan			
	Verification of potential KBR location			
	Selecting locations with relatively flat terrain (slope inclination 0-8%), formerly flooded, adequate sunlight and water availability			
	Planting is conducted in state forest areas, including conservation forest, protected forest, production forest and outside forest areas / usage areas			
	Development of supporting facilities and infrastructures such as forest produce processing facility, etc.			
	Attempts to convert land function from non-productive dry land agricultural areas (with low fertility level) to other purposes, Management of dry land Agricultural Area (food and crop) and law enforcement, Control of cultivation activities			
	Recovery of hydrological functions through reforestation and acceleration of forest rehabilitation / protected forest reforestation with plants suitable with the function			
	Rehabilitation of Conservation Forest Area, and ecosystem			
	Monitoring of activities allowed in protected forest area so as not to disturb its protective function			
	Cultivation activities are not allowed except for those related with its functions and which do not change the natural topography, land usage condition and the current natural			
	Management natural reserve area according to its protective purpose			
	Stipulation of area and borders and construction of permanent seeding field of Bogani Nani Wartabone National Park			
	Stipulation of safe zone and coastal area planning which refers to disaster mitigation			

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Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
f. Compilation of plan and implementation of the management of protected water source area in the river basin	Coastal rehabilitation through greenbelt program by planting productive annual plants	Conservation	Protection and Preservation of WR	High
	Planning, managing and Mangrove Rehabilitation and protection them in 6 Regencies and other areas			
	Creation of green belt alongside the river and planting on river terrace			
	Prevention of vegetation reduction activities, implementation of soil and water conservation such as planting according to contour and terracing			
	Supervision and Licensing of mining by the Mining Agency or by the Department of Energy and Mineral Resources and monitoring including environmental impact			
	Management of unauthorized mining business activities (PETI)			
	Development of mining areas, which must provide garbage disposal site, drainage and IPAL / waste water disposal system			
	Socialization of Local Regulations on exploitation of oil and minerals			
	Monitoring of waste disposal by the BLH on a regular basis, especially concerning the quality standard for waste , garbage, toxic and hazardous waste and IPAL.			
	Compilation of Local Regulation on land conversion	Water Damage	Prevention of Water Damage	
	Socializing green areas in settlements in Bolaang Uki District			
	Contour planting System for all types of plants			
	Protection of natural reserves area controlling forest logging activities for			
	Preparing Local Regulation drafts on flood management in Regencies / Cities	Water Damage	Water Damage Management	
	Compiling standard operations on natural disaster emergency response			
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	Compilation of Springs Rehabilitation Plan	Conservation	Maintenance of Water Sustainability	High
	Rehabilitation and conservation of lands as follows: accelerating the recovery of absorption areas through reforestation			
	Acceleration of public land rehabilitation, including water absorption areas, by planting trees / reforestation to protect the lower levels. The products can be non-wood			
	Reorganization and reinforcement of water absorption areas and creation of water absorption wells			
	Maintenance of public forests and reforestation by planting forest trees			
	Compilation and implementation of Local Regulations on garbage and waste management directly to rivers.	Conservation	Management of Quality and Water Pollution Control	
	Protection of river water quality for usage as raw water			
	Development of industry is performed using environmental impact control mechanism to preserve the environment.			
	Strict regulations and licensing through the Industrial Agency			
	Monitoring IPAL and water quality on a periodical basis			
	Action Research study by involving public institutions around Sub-Basin in inventorying water resources in Dumoga Sangkub River Basin for WR Utilization			

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	Involvement of public institutions around Sub-Basin in conducting Planning, Stipulation and Supervision of Water Resources Usage zone in Dumoga Sangkub River Basin for accommodation in the RPJM-Kab	Utilization	Stipulation of Water Source Usage Zone and Water Resources Purposes	High
	Analyzing environmental liability and potential conflicts of interest between different types of water sources			
	Stipulating water source usage zone in the Map of Local Layout Plans for North Sulawesi, Gorontalo Provinces and Regency / City RTRW			
	Stipulation of river, lake and springs terrace area in Dumoga Sangkub River Basin a. Biontong River b. Kaekar River c. Tuntung River d. Andegile River e. Bolangitang River f. Sangkub River g. Bintik River h. Poigar river i. Ongkak Dumoga river j. Ongkak Mongondow river k. Sangkub River l. Milangodaa River m. Kotulidan River n. Potule river o. Moyosiboi river p. Sonduk river q. Salongo river			
	Reforestation of landslide-prone areas	Water Damage	Prevention of Water Damage	
	Engineering the proper drainage system on slopes and slope reinforcement system using vegetation			
	Terracing and land management over 432,07 sq.km land area			
	Reforestation with implementation of system contour			
	Stipulation of Landslide-prone Zone and Installation of EWS (Early Warning System) in Landslide-Prone Areas			
	Implementation of proper drainage system on the slope to minimize slope saturation			
	Inventorisation and recovery of coastal area (illegal exploitation of coastal			
	Requiring mining license holder companies / individuals to conduct reclamation through reforestation and construction of Talud based on studies on reclamation documents			
	Inventorization and socialization of river sedimentation usage as sustainable and eco-friendly mined materials.			
	Reforestation through implementation of contour system in flooded area			
	Conservation of upstream river to add rain absorption capacity and reduce surface run-off speed			
	Socializing mitigation during flood disasters and its management in Dumoga Sangkub River Basin			

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	Controlling forest logging activities, land conversion and mining activities in Dumoga-Sangkub River Basin	Water Damage	Prevention of Water Damage	High
	Flood Control SID - Planting 1 billion trees along the river banks (3.a) - Protection of water catchment area - Normalization of river - Drainage repairs			
	All critical forests must be reforested, around 20% out of the total 165,908 ha (total forest area in South Bolaang)			
	controlling usage of space in River Basin			
	Reforestation of the entire Sub-basin			
	Creation of Aeration blocks Improvement of self-purification abilities Studies on Potential wetland distribution			
	Rehabilitating mangrove forest area through public empowerment			
	Creation of evacuation route and evacuation location			
	Coordination with Prov/Reg/City BPBD in preparing evacuation facilities / infrastructures			
	Installation of EWS in strategic areas			
	Planting and seeding of Mangrove plants as natural coast barrier			
	Planning and installing EWS on all structures with the support from local regulations			
	Planting and seeding mangroves to protect beaches naturally			
	Planning and Construction of Beach Securement Structure			
	Planning and constructing 5-package Wave Breaker Levees (the work site must be stipulated)			
	Stipulating disaster-prone zones and socializing volcanic disaster mitigation			
	Socialization and simulation training on the importance of evacuation route to rescue disaster victims for the public			
	Installing EWS in areas prone to volcanic eruption			
	Monitoring volcanic activities			
	Socialization and inventorization of policy on flood disaster management in regencies / cities	Water Damage	Water Damage management	
	Conducting simulation on flood management with relevant institutions			
	Stipulating SOP on Natural Disaster (Flood, Drought, Tsunami, earthquakes, landslides and environmental disaster)			
	Selection of public management / rescue under BPBD's responsibility			
	Compiling NSPK on Forest Fires and SOP on Natural Disaster Emergency Response (Flood, Drought, Tsunami, Earthquake, Landslides and environmental disasters), including Planning evacuation plans, establishing Team and management of Natural Disasters and Procuring equipment for the Emergency Response Team			

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Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	Improvement of coordination through inter-institution disaster management coordination agency	Public Empowerment	Public and Private Roles in Planning	High
	Establishment of Eco-Friendly and Clean Movement (GEBERSELING)	Public Empowerment	Public and Private Roles During Execution	
	Management of public empowerment in forest supporting area in Water Resources Management			
	Settlement Rearrangement Program in Forest Supporting Area			
	Inventorisation of forests and people inhabiting forest area			
	Managing agricultural and plantation commodities			
	Developing agricultural and plantation commodity according to land supportability in each Sub-basin in Dumoga Sangkub River Basin			
h. Hydrology system management	Controlling and monitoring the dynamics of developed areas and river water debit in Dumoga-Sangkub River Basin according to RTRW	Water Damage	Prevention of Water Damage	High
	Evaluation and Review of Monitoring RTRW			
	Installation of debit measurement device for controlling debit on Tonom river, Iboyan river			
	Compilation River RTRW			
	Installation of tidal measurement device			
	Rationalization of hydro meteorological posts in Dumoga Sangkub River Basin	SISDA	Development of SISDA Network	
	Replacement, rehabilitation and maintenance of hydro climatological equipment			
	Developing water projection post and telemetric rainfall, especially in Dumoga Sangkub Sub-Basin on 3 locations			
	Collecting and upgrading field data			
	Addition of hydrological observation – debit observation network			
	Replacement, rehabilitation and maintenance of hydro climatological tools			
	Replacement, rehabilitation and maintenance of hydro climatological tools	SISDA	Development of Water Resources Information System Management, including the main duties and	
	Upgrades of hydro climatological equipment			
	Replacement, rehabilitation and maintenance of hydro climatological equipment			
	Addition of hydrological observation network – debit observation			
	Replacement, rehabilitation and maintenance of hydro climatological equipment			
	Socializing Government Regulation Number 46 / 2012 regarding MKKUG Data observation and management	SISDA	Development of H3 Equipment Quality	
	Preparing guide to calibrating MKKUG equipment			
	Socializing guide to calibrating MKKUG equipment			
	Improving Central UPT and UPTD's capacity in calibrating regular hydrological observation equipment			
	Improving the capacity of hydrogeological information and data management at provincial and regency / city level in calibrating hydrogeological observation equipment on a regular basis			

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Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
i. Water resources information system management	Evaluation on Memorandum of Understanding in Water Resources Management on river areas and coordination forums in Dumoga Sangkub River Basin.	SISDA	Management of Human Resources and Institution for SISDA	High
i. Water resources information system management	Compilation of Memorandum of Understanding in Water Resources Management on river basin and coordination forum in Dumoga Sangkub River Basi			
	Conducting trainings related with development of SISDA technology to improve the personnel's capacity			
	Training Water Resources Management database in Dumoga Sangkub River basin in an integrated manner across the entire Sub-Basin (from data collection at the source up to the data center)			
	Creation of Water Resources database system and website in Dumoga Sangkub River Basin			
	Database upgrade training (including spatial data) for Water Resources Management in Dumoga Sangkub River Basin			
	Development of information system (hardware and software) on Water Resources at provincial / BWS level		Development of SISDA Network	
	Hydro climatological data website management			
	Development of Geographical Information System (SIG) in ESDM Agency in East Bolmong Regency			
	Compiling Water Resources management database in Dumoga Sangkub River Basin in an integrated manner across the entire Sub-Basin (starting from the source all the way to the data center)			
	Conducting trainings related with the development of SISDA technology to improve the personnel's abilities			
	Procuring Technical Training for Inventorization of Stumps and Potential Forest (1			
	Development of Water Resources Information System Management, including the main duties and functions of institution agencies in Water Resources Management			
	Training hydro climatological data website management personnel			
	Conducting trainings related with development of SISDA technology to improve the personnel's abilities			
	Monitoring and Evaluation of Water Resources Information System including main duties and functions of institution agencies in Water Resources Management			
	Collection, update and analysis of data and information on program and activity performance target achievement			
	Developing SISDA complete with website			
	Training hydro climatological data website management personnel			
	Assigning personnel who are competent and able to adapt with the development of information technology			
	Improvement of SIDA media technology in providing SIDA information access to the public through printed media or online, issued regularly		Development of Water Resources Information	

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Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
	Cooperating with public institutions around sub-basins and the private sector in applying the needs for water resources data and information		System Management, including the main	
i. Water resources information system management	Development and Training of Geographical Information System Operations	SISDA	Improvement of Quality of SISDA Team	High
	Development and Operational training for PDSDA, PAI and PDSDA Web Application			
	Compilation of Manual Program on PDSDA, PAI and Web PDSDA			
	Introduction of Equipment and Tools to the SISDA operational team for System Operations, Function and Result			
	Compilation of Database System Module and Information			
	Creation of Database System Application			
	Effective consulting between institutions according to the duties and functions, especially in compiling Norms, Standards, Guides and Criteria (NSPK) on data management (observation, recording, compilation, processing, archiving and distribution), information management, financing, observation station management, equipment and human		Improvement of Coordination Between Institutions	
	Create effective consulting between institutions in compiling NSPK (Norm, Standard, guide and Criteria) according to TUSI KEM of Public Works related with the needs and management of Information Database Application development supporting data on PDSDA, PAI and Web PDSDA			
	Improvement of synergy in data management and H3 information between central and local institutions			
	Reinforcement of hydro meteorological information and data management at central level or UPT BMKG and SKPD			
	To create effective communication, coordination and development of cooperation pattern between SISDA management in synergizing PDSDA, PAI and Web PDSDA Information Database Application development information and data management program			
	Improving the hydrogeological information and data management system between the Ministry of Energy and Mining Resources, Government Institution, Province and Regency / City Government			
	Conducting national data management for every integrated hydrological cycle component and SIH3 subsystem at national level			
	Developing H3 data management system at national level			
	Improving the abilities of UPT and UPTD in managing hydrological data integrated with H3 data management at national level			
	Improving the Quality of SISDA Team			
	Integrating hydrogeological data management system at SIH3			
	Developing hardware and software system for processing and analyzing hydro meteorological data compatible with the existing system, data exchange integration and adaptively with the development of information technology		Development of H3 Equipment	

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Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
	Creating hydrological data processing and analysis hardware and software system compatible with the existing system, data exchange integration capacity and adaptively with the development of information technology		H3 Equipment Quality	
i. Water resources information system management	Developing hydrogeological data processing and analysis hardware and software compatible with the existing system, data exchange integration capacity and adaptively with the development of information technology	SISDA	Development of H3 Equipment Quality	High
	Arrangement of metadata standards, basic data specifications and data validation to facilitate H3 data and information management tasks		Data Format Standardization	
	Human Resources empowerment for execution of work units related with Water Resources Management	Public Empowerment	Public and Private Roles in Planning	
j. Implementation of O&M of water resources in the river basin	Operations and maintenance of the following retention basins (post construction): a. Tuntung Retention basin b. Kaidipang retention basin c. Maelang retention basin d. Kuai retention basin e. Kosinggolan retention basin f. Tumpah retention basin g. Tadoy retention basin h. Potaay retention basin i. Limbonugo retention basin j. Tombolikat retention basin k. Nuangan retention basin l. Moyopang retention basin m. Iyoyang retention basin n. Totoloyan o. Linawanmoloben retention basin p. Salang retention basin q. Biniha retention basin r. West Dumoga retention basin s. Tote retention basin t. Tabilaa retention basin u. Dudepo retention basin v. Torosik retention basin	Utilization	Secure of WR	High

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Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
j. Implementation of O&M of water resources in the river basin	a. Lolak Reservoir b. Ongkak Biyou Reservoir c. Ongkak Sangkub Reservoir d. Onggagu Bolangitang Reservoir e. Mataindo Reservoir f. Wakat Reservoir g. Tapa Taudan Reservoir h. Bolangaso Reservoir i. Kombot Reservoir j. Tobayangan Reservoir k. Nuangan Reservoir l. Salango Reservoir m. Pinolosian Reservoir n. Mopungu Reservoir o. Dumagin Reservoir p. Tapa Mau Reservoir q. Minanga Reservoir r. Ongkak Ayong Reservoir s. Ongkak Kaidipang Reservoir t. Ongkak Mawawo Reservoir u. Tubig Buyat Reservoir v. Saibuah Reservoir w. Pilolahunga Reservoir x. Potoiya Reservoir y. Onggagu Bohabak Reservoir z. Onggagu Saleo Reservoir	Utilization	Secure of WR	High
	Operations and maintenance of irrigation: a. Sangkub Reservoir (North Bolaang Mongondow), 4.02 m3/s capacity, serving 3.601 ha of land area b. Sangkub Primary Irrigation Channel (North Bolaang Mongondow): 12,525 km-long (right side); c. Sangkub Primary Irrigation Channel to the left of North Bolaang Mongondow, approximately 11,600 km-long d. Sangkub Irrigation Area in North Bolaang Mongondow Regency: 3.601 Ha e. Lolak Reservoir, 10.160.000 m3 to serve 2.500 ha of land area f. Torout Reservoir (11.70 m3/s capacity, serving 7.803 ha of land area) g. Torout primary irrigation channel (29,32 km on the left, 4,56 km on the right) and Kosinggolan Primary Irrigation Channel (33.22 km) h. Secondary Irrigation Channels which consist of: Torout Secondary Irrigation Channel and Kosinggolan Secondary Irrigation Channel (14,594 km)			
	Raw Water Networks, which consist of the following: a. Sangkub River (SMA) Water Springs with a debit of approximately 30,000 l/s b. Sangkub-Lolak River Raw Water Source (SAB) in Bolaang Mongondow and North Bolaang Mongondow along approximately 10 km c. Dumoga River Water Springs (Bolaang Mongondow, Kotamobagu), 40.000 l/s debit and Lolak River SMA (Bolaang Mongondow), 20.000 l/s debit. d. Lolak Raw Water Channel (Bolaang Mongondow) 10 km-long e. Lolak Clean Water Pipes (bolaang Mongondow), 30.00 km-long			

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
j. Implementation of O&M of water resources in the river basin	Irrigation Channel Repairs to Improve Animal Husbandry and Fishery Services a. Sangkub Reservoir (North Bolaang Mongondow), 4.02 m3/s capacity, serving 3.601 ha of land area b. Sangkub Primary Irrigation Channel (North Bolaang Mongondow): 12,525 km-long (right side); c. Sangkub Primary Irrigation Channel to the left of North Bolaang Mongondow, approximately 11,600 km-long d. Sangkub Irrigation Area in North Bolaang Mongondow Regency: 3.601 Ha e. Lolak Reservoir, 10.160.000 m3 to serve 2.500 ha of land area f. Torout Reservoir (11.70 m3/s capacity, serving 7.803 ha of land area) g. Torout primary irrigation channel (29,32 km on the left, 4,56 km on the right) and Kosinggolan Primary Irrigation Channel (33.22 km) h. Secondary Irrigation Channels which consist of: Torout Secondary Irrigation Channel and Kosinggolan Secondary Irrigation Channel (14,594 km)	Utilization	Secure of WR	High
	Rehabilitation of raw water facilities and infrastructures in Dumoga Sangkub River Basin: a. Sangkub River Springs (SMA) with approximate debit of 30.000 l/s b. Sangkub-Lolak Raw Water Springs (SAB) in Bolaang Mongondow and North Bolaang Mongondow, approximately 10 km-long c. Dumoga River Springs (Bolaang Mongondow, Kotamobagu), 40.000 l/s debit and Lolak River SMA (Bolaang Mongondow) with 20.000 l/s debit. d. Lolak Raw Water Channel (Bolaang Mongondow), 10 km-long e. Lolak Clean Water Pipes (Bolaang Mongondow), 30.00 km-long			
	OP for raw water facilities and infrastructures a. Sangkub River Springs (SMA) with approximate debit of 30.000 l/s b. Sangkub-Lolak Raw Water Springs (SAB) in Bolaang Mongondow and North Bolaang Mongondow, approximately 10 km-long c. Dumoga River Springs (Bolaang Mongondow, Kotamobagu), 40.000 l/s debit and Lolak River SMA (Bolaang Mongondow) with 20.000 l/s debit. d. Lolak Raw Water Channel (Bolaang Mongondow), 10 km-long e. Lolak Clean Water Pipes (Bolaang Mongondow), 30.00 km-long			
	Improvement and Development of Operations and Maintenance (O&P) Business in the Existing Irrigation Area			
	O&M of Toraut Reservoir, Kosinggolan Reservoir, Sangkub Reservoir, Kosinggolan Irrigation Area (Network), Sangkub Irrigation Area (Network), Otam Network (Bolmong Regency), Nunuk Network (Bolsel Regency)			

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
j. Implementation of O&M of water resources in the river basin	O&M of Irrigation facilities / infrastructures in Bolaang Mongondow Regency, Bolsel Regency, Boltim Regency and Bolmut Regency as follows: a. Bakotuntung Reservoir (1166 ha) b. Sangkub Reservoir (3601 ha) c. Ayong Maelang Reservoir (2293 ha) d. Lolak Pinogaluman Reservoir (2040 ha) e. Toraut Reservoir (7803 ha) f. Kosinggolan Reservoir (5381 ha) g. Pusian Molong Reservoir (1171 ha) h. Moayat Pawak Reservoir (2521 ha) i. Poigar Reservoir (1000 ha) j. Buyat Reservoir (769 ha) k. Tombilikat Sita Reservoir (1070 ha)	Utilization	WR Usage	High
	Rehabilitation and Upgrades; Biniha Irrigation Area: 162 Ha Halabolu Irrigation Area: 238 Ha Matandoi Irrigation Area: 135 Ha Dumagin Irrigation Area: 50 Ha Onggunoi Irrigation Area: 55 Ha Koombot Irrigation Area: 65 Ha Indungin irrigation Area: 75 Ha Mataindo Irrigation Area: 88 Ha Nunuk Irrigation Area: 595 Ha Torosik Irrigation Area: 177 Ha Salongo Irrigation Area: 452 Ha Bolangaso Irrigation Area: 472 Ha Bunto Irrigation Area: 89 Ha Dumagin Irrigation Area: 238 Ha Linawan I, II Irrigation Area: 187 Ha Motompot Irrigation Area: 52 Ha Tangaga Irrigation Area: 150 Ha Tobayangan Irrigation Area: 346 Ha, Tolondadu Irrigation Area: 450 Ha Tolotoyan Irrigation Area: 356 Ha, Matandoi Irrigation Area: 45 Ha Ponodu Irrigation Area: 55 Ha			
	Construction & OP of Micro-Hydro Power Plant (PLTMH) and PLTM across the entire River basin		WR Commercialization	
	Construction and O&M of Lolak Reservoir			
	O&M of vegetative construction on locations with high landslide potentials	Water Damage	Prevention of Water Damage	
	flood control			
	Controlling and monitoring the dynamics of developed areas and river water debit in Dumoga-Sangkub River Basin according to RTRW			
	Control of Tonom river, Iboyan river debit and rearrangement of Lolak and Poigar			
	O&M Review in sediment control structure			
	Maintenance of Coastal Securement Infrastructures through O&P along 3450 m			

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Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
j. Implementation of O&M of water resources in the river basin	Construction, rehabilitation and operations and maintenance of flood control structures and beach securement structure 28)	Water Damage	Prevention of Water Damage	High
	Rehabilitation of mangrove forest with the public			
	Operations and Maintenance on Check dams Sikala and Tungoi, Sabodam Moayat and Kobo			
	Reconstructing protective structures, conservation activities and land rehabilitation		Water Damage Recovery	
	Rehabilitation and maintenance of Water Resources and Mineral Resources infrastructure	SISDA	Management of Human Resources and Institution for SISDA	
	Management of construction, usage and maintenance of facilities and infrastructures in Dumoga Sangkub	Public Empowerment	Public and Private Roles During Execution	
	Management and supervision of construction, usage and maintenance of environmental facilities and infrastructures activity program in Dumoga Sangkub River Basin			
	Ground water supply allocation management			
	Prevention of damages and or degradation to ground water infrastructure			
	Management of construction, management and maintenance of ground water resources in Dumoga Sangkub River Basin			
	Socializing provisions of law related with Water Resources Management to all			
k. Implementation of technical guidance for water resources management under the authority of province and regency/city	Supervision of activities around the river terrace	Conservation	Protection and Preservation of WR	High
	Supervision and Law Enforcement regarding water source usage zone and water usage in Dumoga Sangkub	Utilization	Stipulation of Water Source Usage Zone and Water Resources Purposes	
	Supervision and Law Enforcement on river, lake and spring terrace area in Dumoga Sangkub River Basin			
	Planning / Developing Drinking Water Processing Installation in areas which do not yet have access to clean water and Development of Clean Water Piping (PAB)	Utilization	Secure of WR	
	Stipulating reclamation regulations through revegetation and construction of Talud for companies / individuals who own mining licenses on river	Water Damage	Prevention of Water Damage	
	Inventorization of mining license sites prone to landslides due to water damage			
	Training public institutions around sub-basin in supervising the construction of levees and flood retention			
	Training of public institutions around sub-basin in monitoring river flow			
	Trainings on planting trees with high economic values for the public			
	Training for public institutions around sub-basin in reforestation program after logging			
	Socializing and simulation training to the public on the importance of evacuation route to rescue disaster victims			
	Creation of evacuation routes and shelters			

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Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
k. Implementation of technical guidance for water resources management under the authority of province and regency/city	Coordination with Prov / Regency / City BPBD in managing floods	Water Damage	Water Damage Management	High
	Compiling local regulation on flood disaster management in regencies / cities			
	Socializing policy on flood disaster management in regencies / cities			
	Studies on compilation of standard operational procedure on disaster management in regencies / cities			
	Training public institution officials tupoksi around Dumoga Sangkub River Basin in improving the water resources supervisory capacity	Public Empowerment	Public and Private Roles During Execution	
	Managing and supervising agricultural and plantation commodities according to each land supportability in each Sub-Basin in Dumoga Sangkub River Basin			
	Farmer management through P3A group by relevant institutions.			
	Motivating farmers to develop agricultural system through comparative study to advanced agricultural areas			
	Supervision of provisions of law related with Water Resources management			
	Compilation of technical guide on management and guide to rearrangement of local facilities and infrastructures, Public Works Agency, Facilities and Infrastructures Division			
l. Preparation of technical recommendation for granting permission on supply, allocation, utilization and exploitation of water resources in the river basin	Involvement of TKPSDA and public institutions around Sub-Basin and P3A in compiling plans for allocation of water and inventorisation of water resources	Utilization	Secure of WR	High
	Review of Drinking Water Supply System Planning in Kotamobagu city, Bolaang Mongondow regency, Bolmut regency, Bolsel regency and Boltim regency			
	Raw Water Liability Study / SID Bolmut Regency: Buroko District, Bolmong Regency: Sangkub District, Tamako district, Lolak district, Likupang district, Dumoga district Boltim & Bolsem Regencies			
	Limiting licenses issued by the Ministry, especially to mining companies	Water Damage	Prevention of Water Damage	
	Socialization to miners on restricted disposal of mercury waste into river			
	Supervision of public mining activity rearrangement			
	Establishment of Disaster management agency at provincial and regency / city level	Water Damage	Water Damage Management	
	Improving coordination between natural disaster management institutions	Water Damage	Water Damage Recovery	
	Issuing Mining Business Licenses (IUP) based on studies on usage of space in RTRW and other Technical Institutions			
	Developing hydrogeological data management system at Provincial and Regency / City level	SISDA	Improvement of Coordination Between Institutions	
	Integrating hydrological data management system at Province and Regency /City			
	Developing hydrological data management system at Province and Regency /City			
	Issuance of surface water usage and commercialization license			

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin	Involvement of TKSPDA and public institutions around River Basin in Issuing Local Regulation on water resources usage zone in every Regency / City related with Dumoga Sangkub River Basin	Utilization	Stipulation of Water Source Usage Zone and Water Resources Purposes	High
	Socialization with TKSPDA and public institutions around Sub-Basin and P3A in stipulation regulations and laws related with regarding water source usage zone and water usage			
	Action Research Study on environmental liability and potential conflicts by involving TKSPDA in evaluating Water Resources Management Plan and Pattern			
	Socialization with TKPSDA for public institutions around Sub-Basin regarding the stipulation of water source usage zone in the Map of Local Layout Plans for North Sulawesi, Gorontalo Provinces and Regency / City RTRW			
	Action Research Study through the involvement of TKSPDA in conducting Water Springs Development Plan (SMA)	Utilization	Secure of WR	
	Involvement of TKPSDA and public institutions around Sub-Basin and P3A in reviewing Drinking Water Supply System Master Plan			
	Action Research Study by involving TKSPDA in conducting Raw Water Liability Study / SID in Bolmut Regency: Buroko District, Bolmong Regency: Sangkub District, Tamako district, Lolak district, Likupang district, Dumoga district Boltim Regency			
	Involvement of TKSPDA and P3A and public institutions around Sub-Basin in conducting Water Source Development Plans			
	Involvement of TKSPDA in compiling Local Regulations on water usage rights in optimum water resources usage / empowerment	Utilization	WR Usage	
	Conducting joint study with TKSPDA regarding the Potentials of PLTMH in Dumoga Sangkub	Utilization	WR Development	
	nvolvement of TKSPDA and public institutions around Sub-Basin in compiling Local Regulation on criteria for water resources commercialization by the public / private sector	Utilization	WR Commercialization	
	Involvement of public institutions around Sub-Basins into industrial organizations when inventorizing water usage by industry and commerce: volume, water source, waste disposal and calculation of water usage service fee (or any other term applicable) stored to			
	Involvement of TKSPDA and public institutions around Sub-Basin in stipulating local regulation on water procurement service fee, rejuvenating drinking water service institutions in Dumoga Sangkub River Basin			
	Involvement of TKSPDA and public institutions around Sub-basin in Stipulation of Landslide-prone zone	Water Damage	Prevention of Water Damage	
	Involvement of TKSPDA and public institutions around Sub-Basin in Compiling Landslide RTD			
	Training with TKPSDA and public institutions around sub-basin in mapping flood-prone			

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin	Involvement of TKSPDA in establishing TAGANA	Water Damage	Prevention of Water Damage	High
	Involvement of TKSPDA and public institutions around sub-basin in compiling RTD			
	Involving TKSPDA and public institutions around sub-basin in compiling Local Regulation on illegal logging, illegal mining and imposition of sanctions			
	Empowerment of public institutions around Sub-Basin in installing river debit measurement device			
	Involvement of TKSPDA and public institutions around Sub-Basin in reviewing Local Regulations on conservation areas			
	Involvement of TKSPDA in compiling local regulations on illegal gold mining and its sanctions			
	Involvement of TKSPDA and public institutions around Sub-Basin in creating Local Regulation on Disposal of Waste into rivers			
	Involvement of TKSPDA in stipulating the maximum volume of waste disposable into rivers / bodies of water			
	Involvement of TKSPDA and public institutions around Sub-Basin in compiling schedule and fertilizing farmlands, involvement of local government in managing drainage and sanitation system in settlements			
	Involving TKSPDA and public institutions around Sub-Basin in creating regulations relevant with disaster management		Water Damage Management	
	Involvement of TKSPDA and public institutions around sub-basin in compiling Natural Disaster SOP			
	Coordination of integrated activities on natural disaster management (3.a)		Water Damage Recovery	
	Involvement of public institutions around sub-basin in monitoring the causes of natural disaster			
	Involvement of TKSPDA in compiling memorandum of understanding on Water Resources management in coordination forum in Dumoga Sangkub River Basin	SISDA	Management of Human Resources and Institution for SISDA	
	Involvement of TKSPDA in distributing the responsibility of each institutions according to the provisions of law in Water Resources Management			
	Involvement of TKSPDA in workshop activities regarding the allocation of routine budget for O&M and development of Water and Mineral Resources infrastructures			
	Involvement of TKSPDA in equipping SISDA with hardware and software and technological innovation aligned with its development			
	Involvement of TKSPDA in perfecting the compilation of procedure for easy access to data and information			
	Involvement of TKSPDA in database training for Dumago Sangkub management			
	Involvement of TKSPDA in equipping SISDA with hardware and software and technological innovation aligned with its development			

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Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
	Involvement of TKSPDA in monitoring and evaluating Sisda related with tupoksi of relevant institutional agency	SISDA	Development of SISDA Network	
m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin	Involvement of TKSPDA in creating website and water resources database system in Dumoga Sangkub			High
	Involvement of TKSPDA in Preparing Access to hydro climatological data website			
	Involvement of TKSPDA in coordination between Water resources management institutions at provincial level in North Sulawesi and Dumoga Sangkub River Basin	Public Empowerment	Public and Private Roles in Planning	
	Involving TKSPDA in consolidating with North Sulawesi Water Resources Council			
	Involving TKSPDA in consolidating with North Sulawesi Water Resources Council at central, provincial and local level in regencies / cities of Dumoga Sangkub River Basin			
	Reinforcement of TKPSDA institutions in Dumoga Sangkub River Basin			
	Consolidation of TKPSDA in Dumoga Sangkub River Basin			
	Coordinating with TKPSDA in Dumoga Sangkub River Basin			
	Involvement of TKSPDA in compiling provisions of law on usage of ground water at operational level.			
	Involvement of TKSPDA in socializing the provisions of law to the public institutions around the Sub-Basin			
	Strict law enforcement on the violations against preservation of nature			
	Involvement of public institutions around the sub-Basin in enforcing the provisions of law against violators			
n. Public empowerment in the water resources management	Sub-Basin Support Capacity Function Improvement Program Based on Public Empowerment	Conservation	Protection and Preservation of WR	High
	Development of potential areas for Eco-Tourism Park which combines the functions of conservation and natural tourism / recreation site			
	Development of tourism facilities and infrastructures in National Park Area			
	Promotion and Empowerment of the public to bolster local economy			
	Briefing and empowerment of agriculture through agroforestry (mix of long-leaf plants and seasonal plants)			
	Public empowerment for monitoring protected forest			
	Development of Public Toilet, Communal IPAL and Public Garbage Disposal Site	Conservation	Management of Quality and Water Pollution Control	
	Briefings on how the public should not use the river for bathing, washing and toilet			
	Empowerment public institutions around Sub-Basins in monitoring Water Source quality in Dumoga Sangkub River basin	Utilization	Stipulation of Water Source Usage Zone and Water Resources Purposes	
	Empowerment of public institutions for WR Utilization			
	Socialization for public institutions around Sub-Basin and P3A Institutions regarding the stipulation of river terrace, lake and springs area			
	Involvement of TKPSDA and public institutions around Sub-Basins in stipulating regulations and laws related with river, lake and springs terrace area in Dumoga Sangkub			

Activity 1-1
Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
n. Public empowerment in the water resources management	Socialization for public institutions around Sub-Basin in constructing Raw Water Infrastructures	Utilization	Secure of WR	
	Socialization for public institutions around Sub-Basin in development of clean water treatment installation (IPA)			High
	Socialization for public institutions around dams and reservoirs before physical			
	Involvement of public institutions around retention basins during and after the construction			
	Involvement of public institutions around dams and retention basins in operations and maintenance through productive means			
	Involvement of public institutionally around Sub-Basin in Rehabilitation of Raw Water Infrastructures for Drinking Water through productive mean			
	Socialization and technical management for public institutions around Sub-Basin and farmers, especially regarding the implementation of SRI method	Utilization	WR Usage	
	Involvement of public institutions around Sub-Basin and P3A in developing primary irrigation channels through productive means			
	Involving public institutions around Sub-Basins and P3A in developing primary irrigation channel through work-intensive activities			
	Involving the public institutions around Sub-Basins and P3A in maintaining irrigation facilities / Infrastructure			
	Involving the public institutions around Sub-Basin and P3A in developing primary irrigation channel through work-intensive activities			
	Involving the public institutions around Sub-Basin and P3A in Supervising the Construction of Irrigation Area Network			
	Involving public institutions around Sub-Basin in supervising the Rehabilitation and			
	Involvement of public institutions around Sub-Basins in constructing and developing strategic clean water supply for regency capitals, tourism areas and public areas	Utilization	WR Development	
	Local Regulation on River Usage Conservation			
	Involvement of public institutions around Sub-Basin in Constructing and Developing clean water in District Capitals (IKK), rural areas and Development of clean water supply for villages, Regency Capital Drinking Water Network in Dumoga Sangkub River Basin			
	Involvement of public institutions around Sub_basin in participative evaluation during O&M of Lolak Reservoir			
	Empowerment of public institutions around sub-basins in reducing landslide risks through conservation and improvement of public awareness of the dangers of landslide		Prevention of	
	Empowerment of public institutions around sub-basin to determine which plants can reinforce slopes in vegetative method			

Activity 1-1
Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
n. Public empowerment in the water resources management	Empowerment of public institutions around disaster-prone areas to adapt with disasters (Outlet Harmony) Socialization of public institutions around sub-basins in constructing houses / renovations must take into account the road / river terrace and must have permission (IMB) from the local government	Water Damage	Prevention of Water Damage	
	Public involvement in maintaining drainage system, especially around areas with high landslide potentials			High
	Trainings for public institutions around sub-basins in supervision of land usage around Dumoga-Sangkub River Basin water catchment area			
	Creation of disaster-aware community by involving elements from TAGANA and the local government			
	Involvement of public institutions around Sub-Basin in constructing drainage channels for soil and water			
	Involvement of public institutions around Sub-Basin in vegetative conservation			
	Involvement of public institutions around Sub-Basin in reviewing O&M of sediment control structures			
	Involvement of TKSPDA and public institutions around Sub-Basin in compiling Local Regulation on forest logging			
	Empowerment to public institutions around Sub-Basin regarding the impacts of forest logging			
	Involvement of public institutions around Sub-Basin in compiling Tsunami RTD		Prevention of Water Damage	
	Involvement of public institutions around sub-basin in installing EWS in strategic areas			
	Involvement of public institutions around Sub-Basin in procurement of seeds, rehabilitation, reforestation of mangrove areas			
	Planning and installing EWS on all structures with the support from local regulations			
	Involvement of public institutions around Sub-Basin in mapping areas prone to tsunami and tidal waves	Water Damage		
	Socialization of institutions around sub-basin in areas prone to tsunami and tidal wave			
	Involvement of public institutions around sub-basins in constructing wave breaker levees			
	Involvement of public institutions around Sub-Basin in constructing wave breaker levees			
	Involvement of public institutions in monitoring the tides and mitigating disasters			
	Involvement of public institutions in mapping evacuation routes			
	Involvement of public institutions around Sub-Basin in compiling RTD			
	Involvement of public institutions around sub-basin in installing EWS in areas prone to volcanic eruptions			
	Involvement of public institutions around Sub-Basin in conducting reviews on Check dam O&M			
	Involvement of public institutions around sub-basin in compiling Natural Disaster SOP			
	Involvement of TKSPDA and public institutions around sub-basin in compiling RTD			

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
n. Public empowerment in the water resources management	Involvement of public institutions around Sub-Basin in creating map of distribution of disaster / flood-prone areas		Water Damage Management	
	Involvement of public institutions around Sub-Basin in creating regulations related with disaster management			
	Socializing Emergency Response among the Public through schools, PKK, Karangtaruna and other public organizations			
	Socializing Natural Disaster Emergency through printing media, electronic, poster, etc.			High
	Participative Evaluation and Monitoring by public institutions around Sub-Basin in providing assistance to disaster victims	Water Damage	Water Damage Recovery	
	Training public institutions around the sub-basin for the purpose of recovering the environment to its original state before the disaster			
	Training public institutions around sub-basin in rehabilitating and recovering the functions of flood control facilities and infrastructures to fulfill the basic needs of the people			
	Providing assistance to the public and empowerment for post-disaster recovery			
	Training public institutions around the Sub-Basin on environmental response to the public			
	Involvement of public institutions around Sub-Basin and TPA in cooperating with the public and private sectors to apply the needs for data and information on water resources	SISDA	Management of Human Resources and Institution for SISDA	
	Involvement of public institutions around Sub-Basin in rehabilitation and maintenance of hydro climatological equipment	SISDA	Improvement of Coordination Between Institutions	
	Creation of Provincial Water Resources Management coordination in North Sulawesi and Dumoga Sangkub River Basin	Public Empowerment	Public and Private Roles in Planning	
	Establishment of Water Resources Council institution at city / regency level in Dumoga Sangkub River Basin			
	Consolidating with North Sulawesi Water Resources Council			
	Organization and reinforcement of water resources management institutions at central, provincial and local level in regencies / cities in Dumoga Sangkub River Basin			
	Training the abilities of Water Resources management officials at central, provincial and local level in regencies / cities of Dumoga Sangkub River Basin in conducting their roles and functions and implementation of network project development for water resources			
	Socialization of main duties and functions of National Movement on Water Rescue Partnership (GNKPA) and GERHAN at province, regency, district and village levels			
	Execution of GNKPA and GERHAN programs			
	Management and supervision of GNKPA and GERHAN programs			
	Involvement of TKSPDA in compiling Local Regulations regarding the usage and commercialization of surface water			
	Coordinating with North Sulawesi Water Resources Council			

Activity 1-1
Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
n. Public empowerment in the water resources management	Involvement of TKSPDA and public institutions around Sub-Basins and optimizing coordination between relevant institutions in disaster management			
	Involvement of public institutions around Sub-Basin in encouraging public self-sufficiency in planning the development and operations and maintenance of environmental facilities and infrastructures in Dumoga Sangkub River basin	Public Empowerment	Public and Private Roles During Execution	
	Briefing the public in management and supervision of construction, usage and maintenance of environmental facilities and infrastructures in Dumoga Sangkub River			High
	Public empowerment in improving public participation in the development, management and maintenance of environmental facilities and infrastructures			
	Increasing public participation in supervising and spreading information on Water Resources facilities and infrastructures			
	Establishing partnership between public institutions around Dumoga Sangkub River Basin and the business world in Water Resources Management			
	Public empowerment in the execution, supervision and maintenance of water resources			
	Developing environmental awareness			
	Involvement of public institutions around Sub-Basin in socializing and executing Eco-Friendly and Clean Movement (GEBERSELING)			
	Involvement of public institutions around the Sub-Basin in improving public participation in the management of public empowerment in forest supporting area in Water Resources Management in supporting areas			
	Involvement of public institutions around Sub-Basin in socializing suitable commodities for cultivation around the Sub-Basin to the farmers			
	Involvement of public institutions around the Sub-Basin in restricting supervision of ground water usage for commercial purposes			
	Involvement of public institutions around the Sub-Basin in minimizing the usage of ground water by making use of the surface water			
	Socialization of provisions of law related with Management of Water Resources to all stakeholders			
o. Implementation of compilation of financial accounting and state property accounting report as a Regional Accounting Unit	Routine fund allocations for OP and development of Water Resources and Human Resources infrastructure	SISDA	Management of Human Resources and Institution for SISDA	Middle
	Usage of donations or assistance for Water Resources information system operations			
	Coordination between relevant institutions regarding integrated Water Resources Management financing	Public Empowerment	Public and Private Roles During Execution	
	Involvement of all stakeholders in the Water Resources Management financing commitment during planning, development and maintenance operations			
p. Implementation of collection,	Perfection of partnership requirements and procedure in commercializing water resources		WR	

Appendix-2

Activity 1-1

Table 2 : RENCANA (Dumoga Sungkub River Basin)

Current Functions	RENCANA			Evaluation
Ministerial Regulation No.34/2015	*Structural and Non-Structural Efforts Matrix (Executive Summary of RENCANA)*	Source		
		Aspect	Sub-Aspect	
reception and usage of water resources management service fee (BJPSDA) in accordance with	Compilation of guide on how to calculate water resources procurement service costs and billing method to users in Dumoga Sangkub River Basin	Utilization	WR Commercialization	Middle
q. Implementation of administration and housekeeping affair of the BWS as well as coordination with related				Low

*Criteria of Evaluation

High: Number of Physical and Non-Physical Efforts is 10 or more
Middle: Number of Physical and Non-Physical Efforts is 10 or less
Low: No Physical and Non-Physical Efforts

Activity 1-1
Table 3: Assessment Report

Current Functions	Assessment Report					Evaluation
Ministerial Regulation No.34/2015	*Indicator*	*Recommendation to achieve target score at 2017*	Score			
			2012	Target 2017	Gap	
a. Compilation of the pattern and plan of water resources management in the river basin	1. Mission 1.2 WRM	Need to closely monitor the process of establishing the pattern of WRM pf river basin that refers to Presidential Decree No.12 / 2012	1.5	2.5	1.0	Middle
	1. Mission 1.2 WRM	Need to design the socialization of legislation in the field of water resources to all lines and staff, so that all staff can understand	1.5	2.5	1.0	
b. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources	4. Internal Management 4.1 Management Planning within WRM group	Need to implement the preparation of the draft plan of WR management of the river basin as mentioned above in 2014	1.0	2.0	1.0	Middle
c. Preparation, compilation of plan and document of goods and services procurement	5. Financial 5.2 Financial Efficiency	Implement a public auction by using Full-E-Procurement	2.5	3.0	0.5	Low
d. Implementation of goods and services procurement as well as determination of the winner (winner of the tender) as a Procurement Service Unit (ULP)						Low
e. Control and supervision of construction of water resources development						Low
f. Compilation of plan and implementation of the management of protected water source area in the river basin						Low

Activity 1-1
Table 3: Assessment Report

Current Functions	Assessment Report					Evaluation
Ministerial Regulation No.34/2015	*Indicator*	*Recommendation to achieve target score at 2017*	Score			
			2012	Target 2017	Gap	
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	2. Stakeholders 2.3 Environmental Audit	Need to build an adequate water quality laboratory and improve the human resources capacity in the field of water quality	1.5	2.5	1.0	High
	2. Stakeholders 2.3 Environmental Audit	Need to request additional human resources to the Central which related to the qualified human resources on water quality issues	1.5	2.5	1.0	
	2. Stakeholders 2.3 Environmental Audit	Need to add the water quality monitoring point (location)	1.5	2.5	1.0	
	2. Stakeholders 2.3 Environmental Audit	Need to increase the frequency of water quality sampling	1.5	2.5	1.0	
	2. Stakeholders 2.4 Viability in related River basin	Improve the development of raw water facility and infrastructure in order to achieve the target of MDGs year 2015, by improving cooperation with PDAM (Water Supply Company) and Cipta Karya (Human Settlement)	3.0	3.5	0.5	
h. Hydrology system management	4. Internal Management 4.3 Data Processing	Development of information system on WRM as following; 4. Need the procurement of equipment such as ARR logger & AWLR logger in order to fulfill the provision of ready to use data	1.5	3.0	1.5	High
i. Water resources information system management	4. Internal Management 4.3 Data Processing	Development of information system on WRM as following; 1. Spatial planning for the WR Information System activity 2. Need to control the quality of the data before being published 3. The provision of internet service to be accessible to the community 5. Forming the Unit of WR Information System formally by the Head of the RBO	1.5	3.0	1.5	High

Activity 1-1
Table 3: Assessment Report

Current Functions	Assessment Report					Evaluation
Ministerial Regulation No.34/2015	*Indicator*	*Recommendation to achieve target score at 2017*	Score			
			2012	Target 2017	Gap	
j. Implementation of O&M of water resources in the river basin	3. Education and Development 3.2 Technical Development	Assets management has been implemented in accordance with the procedure	2.5	3.0	0.5	Middle
	3. Education and Development 3.2 Technical Development	The O&M of WR's Assets has been fully implemented adjusted to the availability of the existing budget	2.5	3.0	0.5	
	3. Education and Development 3.3 Development of WRM Group	Need to draft SOP for each activity that implemented, both technical activity and non-technical activity	2.5	3.5	1.0	
	3. Education and Development 3.3 Development of WRM Group	Applying the SOP as guideline	2.5	3.5	1.0	
k. Implementation of technical guidance for water resources management under the authority of province and regency/city						Low
l. Preparation of technical recommendation for granting permission on supply, allocation, utilization and exploitation of water resources in the river basin	4. Internal Management 4.2 Water Allocation	Need to draw up the basic framework of water allocation that involves all stakeholders	1.0	2.0	1.0	Middle
	4. Internal Management 4.2 Water Allocation	Need to make water allocation plan for river basin which under the authority of Sulawesi I RBO for various purposes	1.0	2.0	1.0	Middle

Activity 1-1
Table 3: Assessment Report

Current Functions	Assessment Report					Evaluation
Ministerial Regulation No.34/2015	*Indicator*	*Recommendation to achieve target score at 2017*	Score			
			2012	Target 2017	Gap	
m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin	1. Mission 1.1 Status of WRM Group	Immediately activate the secretariat of Coordination Team of WRM of river basin which refers to Presidential Decree No.12 / 2012	2.5	3.5	1.0	Middle
	1. Mission 1.1 Status of WRM Group	Excite and implementation of the duties and functions of Coordination Team of WRM that refers to Ministry of PUPR's regulation No.4 / 2008	2.5	3.5	1.0	
	1. Mission 1.2 WRM	Need to establish and assign the Coordination Team of WRM of river basin which refers to Presidential Decree No.12 / 2012	1.5	2.5	1.0	
n. Public empowerment in the water resources management						Low
o. Implementation of compilation of financial accounting and state property accounting report as a Regional Accounting Unit						Low
p. Implementation of collection, reception and usage of water resources management service fee (BJPSDA) in accordance with the provisions of legislation	5. Financial 5.1 Cost Recovery	In preparation for the implementation of the WR Management Service Fee which is currently being discussed at the national level, Sulawesi I RBO is expected to start conduct inventory of potentials surface water uptake	1.0	2.0	1.0	Middle
	5. Financial 5.1 Cost Recovery	Develop a water user database in Dumoga-Sangkub River Basin & Tondano-Sangihe-Talaud-Mianngas River Basin	1.0	2.0	1.0	
	5. Financial 5.1 Cost Recovery	Propose acceleration of the drafting of legal framework that regulating the WR Management Service Fee to Directorate General of Water Resources	1.0	2.0	1.0	

Activity 1-1
Table 3: Assessment Report

Current Functions	Assessment Report					Evaluation
Ministerial Regulation No.34/2015	*Indicator*	*Recommendation to achieve target score at 2017*	Score			
			2012	Target 2017	Gap	
q. Implementation of administration and housekeeping affair of the BWS as well as coordination with related institution						Low
Others (Stakeholders Coordination)	2. Stakeholders 2.1 User Involvement	Improve communication, coordination and collaboration with various government institutions and water user community	3.0	4.0	1.0	High
	2. Stakeholders 2.1 User Involvement	Always seeking the record of complaints from the water user and follow it up in a responsive way	3.0	4.0	1.0	
	2. Stakeholders 2.2 User Feedback	Improve the quality and the quantity of two-way communication with the water user	1.5	3.5	2.0	
	2. Stakeholders 2.2 User Feedback	Conduct routine and scheduled survey for the overall activities in the field of WR	1.5	3.5	2.0	
	2. Stakeholders 2.2 User Feedback	Conduct standardized survey by using questionnaire so that the trend can be identified	1.5	3.5	2.0	
	2. Stakeholders 2.3 Environmental Audit	Cooperate with other institutions to follow up the monitoring result	1.5	2.5	1.0	

Activity 1-1
Table 3: Assessment Report

Current Functions	Assessment Report					Evaluation
Ministerial Regulation No.34/2015	*Indicator*	*Recommendation to achieve target score at 2017*	Score			
			2012	Target 2017	Gap	
Others (Education and Development)	3. Education and Development 3.1 Human Resources Development	Develop the human resources in accordance with the needs of position analysis, supported by and adequate budget (for example: internal training)	3.0	3.5	0.5	Middle
	3. Education and Development 3.1 Human Resources Development	Update the information regarding the skills & competencies of the existing staff and an adequate training to meet the needs of human resources at every level	3.0	3.5	0.5	
	3. Education and Development 3.1 Human Resources Development	Draw up human resources development plan in terms of quality and quantity	3.0	3.5	0.5	
	3. Education and Development 3.1 Human Resources Development	The placement of employees in the organizational structure should refers to the principle of The Right Man on The Right Job	3.0	3.5	0.5	
Others (Financial)	5. Financial 5.2 Financial Efficiency	Improve integration of technical and financial planning	2.5	3.0	0.5	Middle
	5. Financial 5.2 Financial Efficiency	Apply a system of technical planning and budget allocation by pric	2.5	3.0	0.5	
	5. Financial 5.2 Financial Efficiency	Held regular meeting of financial control every 1 (one) month to m	2.5	3.0	0.5	

*Criteria of Evaluation
High: Number of Recommendation is 5 or more, or Gap of score is over 1.0
Middle: Number of Recommendation is between 2 - 4, or Gap of score is 1.0
Low: Number of Recommendation is 1 or less, or Gap of score is under 1.0

Appendix-4

Activity 1-1
Table 4: Accountability Report

Current Functions	Accountability Report		Evaluation
Ministrial Regulation No.34/2015	*Field*	-Key Issues and Challenges and Solution Strategy -Completed or Continued activity	
a. Compilation of the pattern and plan of water resources management in the river basin			Low
b. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources	Quality of plannning	Quality of planning activity is not good, so we should be Improve planning activity (Planned activity can be carried out more effectively)	Middle
c. Preparation, compilation of plan and document of goods and services procurement			Low
d. Implementation of goods and services procurement as well as determination of the winner (winner of the tender) as a Procurement Service Unit (ULP)			Low
e. Control and supervision of construction of water resources development	Coordination of Implementation of activity with related institution	SNVT weir Construction	Middle
f. Compilation of plan and implementation of the management of protected water source area in the river basin			Low

Appendix-4

Activity 1-1
Table 4: Accountability Report

Current Functions	Accountability Report		Evaluation
Ministrial Regulation No.34/2015	*Field*	-Key Issues and Challenges and Solution Strategy -Completed or Continued activity	
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	Water-related disaster damage (Flood on January 15 2014)	-Manado city Overflow from 5 rivers (Tondano, Tikala, Sario, Malalayang, Bailang) Most of Manado city area was flooded Damaged Kairagi Hydrological station -Minahasa Raya Regency Damaged houses in Sawangan village of North Minahasa Regency Damaged irrigation channel and weir in Minahasa Regency, North Minahasa Regency, South Minahasa Regency Damaged raw water network in Minahasa Regency Damaged Some hydrological styations -Bolaang Mongowdon Raya Regency Flooded in paddy filed Damaged irrigation channel and weir Damaged raw water network Damaged some hyfrological stations	High
	Water-related disaster damage (Landslide on January 15 2014)	-Highway of Manado - Tomohon Tinoor village, some point in the road segment was broken (there were 3 fatalities, preliminary data). - Highway of Airmadidi - Tondano, Sawangan village, road was broken. - North Beach Trans Sulawesi road, Bridge End at Tateli Village Pineleng District	
	Water-related disaster damage (Tidal Wave on January 15 2014)	-South Minahasa Regency 3 houses swept away and some houses submerged Damaged 20m of concreat structure for coastal protection -Sitaro Regency Damaged structure for coastal protection in Pehe Village -Sangihe Regency Alomost collaped coastal protection strucuture in Tahuna District -Talaud Regency Damaged barge	

Appendix-4

Activity 1-1
Table 4: Accountability Report

Current Functions	Accountability Report		Evaluation
Ministrial Regulation No.34/2015	*Field*	-Key Issues and Challenges and Solution Strategy -Completed or Continued activity	
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	Water-related disaster damage (Flood on January 25, 26 2014)	-Manado city Overflow from Sario and Tikala Rivers to road -Kepulauan Sitaro Regency a. Disaster type : flash floods, landslide, and tidal waves b. Occurring Place : The Nameng Village, North West Siau District c. Casualties : Nameng Village 3 dead, 6 injured, ± 33 people missing -Kepulauan Sangihe Regency a. Disaster type : flash floods, landslides and tidal waves b. Occurring place : Malebur Village East Tahuna District, Laine Village South Manganitu District, Salurang Village Central South Tabukan District, Soataloara Village Tahuna District, Santiago Village East Tahuna District. c. Casualties : Malebur Village 1 person died by riverbank landslides d. Damage : Laine village: Flooded 174 houses (215 families) Salurang village: Swept away 1 house and damaged 21 houses Soataloara village: Slope failure affected to road, residences and building Santiago Village : Damaged about 18 houses and about 109 houses affected by coastal erosion	High
	Flood Control Works	Construction of Flood Control Structures -TOGID RIVER (COMPLETION) -LOLAK RIVER (COMPLETION) -MATANDOI RIVER -SALONGO RIVER (COMPLETION) -MONGKOINIT RIVER -TONOM AND KOSIO RIVER -SARIO RIVER -PANIKI TANAWANGKO	

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Activity 1-1
Table 4: Accountability Report

Current Functions	Accountability Report		Evaluation
Ministrial Regulation No.34/2015	*Field*	-Key Issues and Challenges and Solution Strategy -Completed or Continued activity	
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	Coastal Protection Works	Construction of Coastal Protection Structures -KAMENTI in the Kamenti village area of Minahasa Regency (Continue) -RUMBIA in the South Langowan District, Minahasa Regency (Continue) -BUKIT TINGGI in village of Bukit Tinggi, Minahasa Regency (Continue) -AMURANG in the Amurang Bay, in South Minahasa Regency (Continue) -DODEPO in in the Dodepo village Bolangitang District South Mongondow Regency (Completion) -PINOLOSIAN in the Ilomata village of Pinolosian District (Comletion) -MAMALIA in in Iloheluma village, Mamalia Induk Village and Mamalia 1 Village Posigadan District of South Bolaang Mongondow Regency (Conpletion) -POSIGADAN MILANGODAA & MOTOLUHU in Posigadan District -TADOY in in Tadoy village of bolaang District -MIANGAS ISLAND (Continue) -PEHE -KALASUGE ISLAND (Continue) -TAHUNA ISLAND (Continue)	High
	Raw Water works	Construction of raw water transmission structures -Intake and Piping network of raw water transmission IKK Remboken SA, Tondano Lake -Intake and Piping network of raw water transmission IKK Tumpaan -Raw Water Infrastructure Kayuuwi Village -Submersible Pump and Transmission Piping IKK Kalawat -Submersible Pump and Transmission Piping IKK Tomohon -Raw Water -Infrastructure Likupang Village Repair Lokak Intake	

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Activity 1-1
Table 4: Accountability Report

Current Functions	Accountability Report		Evaluation
Ministrial Regulation No.34/2015	*Field*	-Key Issues and Challenges and Solution Strategy -Completed or Continued activity	
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	Ground Water Works	Spronkler Sysyem for irrigation; -Construction in 5 locations -Rehabilitation and improvement in 4 locations in Minahasa Regency -Rehabilitation and improvement in 3 locations in South Minahasa Distric -Rehabilitation and improvement in 4 locations in Bolaang Mongondow Regency Submersible pump -Procurement 9 units Self managed work -Redriling Work in 5 locations spread in a) Talikuran Villages Tompaso District b) Tondegesan I Village Tompaso District c) Tompaso 2 Village Tompaso SubRegency d). Tempok village Tompaso District e). Solok Village Lolak District -Redevelop Work in 10 locations in Minahasa Regency and Bolaang Mongondow Regency	High
	Coordination of Implementation of activity with related institution	SNVT Implementation of Water Utilization Network Sulawesi I	
h. Hydrology system management	Institution	Hydrology Unit	Middle
i. Water resources information system management	Coordination of Implementation of activity with related institution	SNVT Implementation of Water Resource Network Sulawesi I	Middle
j. Implementation of O&M of water resources in the river basin	Coordination of Implementation of activity with related institution	SNVT Operation and Maintenance	Middle

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Activity 1-1
Table 4: Accountability Report

Current Functions	Accountability Report		Evaluation
Ministrial Regulation No.34/2015	*Field*	-Key Issues and Challenges and Solution Strategy -Completed or Continued activity	
k. Implementation of technical guidance for water resources management under the authority of province and regency/city			Low
l. Preparation of technical recommendation for granting permission on supply, allocation, utilization and exploitation of water resources in the river basin			Low
m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin	Coordination with relevant agencies	Coordination with relevant agencies has to be done before implementation of activity (Coordination and activity can be carried out more smoothly and effectively)	High
	Institution	TKPSDA for Tondano – Sangihe – Talaud - Miangas river basin TKPSDA for Dumoga - Sangkub river basin	
n. Public empowerment in the water resources management			Low
o. Implementation of compilation of financial accounting and state property accounting report as a Regional Accounting Unit			Low
p. Implementation of collection, reception and usage of water resources management service fee (BJPSDA) in accordance with the provisions of legislation			Low

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Activity 1-1
Table 4: Accountability Report

Current Functions	Accountability Report		Evaluation
Ministrial Regulation No.34/2015	*Field*	-Key Issues and Challenges and Solution Strategy -Completed or Continued activity	
q. Implementation of administration and housekeeping affair of the BWS as well as coordination with related institution	Coordination of Implementation of activity with related institution	Working Unit for office	Middle
Others (Education and Development)	Lack of Human Resource	Lack of human resources, so excessive load to staff (development of human resources)	Middle
Others (Financial)	Finance	Revision process is quite lengthy and complicated, thus hindering implementation of the work (KPPN late received DIPA letter of endorsement)	Middle
	Finance and Land acquisition	The absence of funds for land acquisition for construction of the raw water intake so it takes time to approaching to the land owners.	
Others	Reporting	E-Monitoring reporting applications that often has an error, thus inhibiting report submission	
	Land acquisition	Access to job sites is often impaired due to lack of land acquisition	
	Land acquisition	Land acquisition procedures are quite lengthy and involved third parties (agencies, BPN, the Regency and local government);	
	office space	Office space is not enough (move to new building)	

*Criteria of Evaluation

High: Number of "key Issues and Challenges and Solution Strateg" or "Completed or Continued activity" is 2 or more
Middle: Number of "key Issues and Challenges and Solution Strateg" or "Completed or Continued activity" is 1
Low: Number of "key Issues and Challenges and Solution Strateg" or "Completed or Continued activity" is 0

Activity 1-1
Table 5: PJT I and II

Current functions	PJT I		PJT II		Evaluation
Ministrial Regulation No.34/2015	*Duty, function and role*	*Responsible Section*	*Duty, function and role*	*Responsible Section*	
a. Compilation of the pattern and plan of water resources management in the river basin					
b. Compilation of program and plan, feasibility study and planning of technical/design/development of water resources			Planning of implementation on O/M, conservation of Water Resources Management	Water Management Division I, II, III, IV	Low
c. Preparation, compilation of plan and document of goods and services procurement			Carry out the management and supervision of the administration of assets, household and general procurement of goods and services.	Bureau of Asset Management and Public Administration	Low
			Procurement of electrical equipment, heavy equipment, and other goods and services	General Service Unit	
d. Implementation of goods and services procurement as well as determination of the winner (winner of the tender) as a Procurement Service Unit (ULP)			Carry out the procurement of goods / services conducted through auction / selection to assign a provider of goods / services	Procurement Service Unit	Low
e. Control and supervision of construction of water resources development					

Activity 1-1
Table 5: PJT I and II

Current functions	PJT I		PJT II		Evaluation
Ministrial Regulation No.34/2015	*Duty, function and role*	*Responsible Section*	*Duty, function and role*	*Responsible Section*	
f. Compilation of plan and implementation of the management of protected water source area in the river basin	safety of infrasturactures and secure of water resources		Implemtation of conservation of water resources	Water Management Division I, II, III, IV	Middle
g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin	Implementation of Water Resources Conservation and water power control		Provide technical guidances on water resources management; -operation -maintenance of infrastructures -water-related disaster management -conservation of water resources -utilization of water resources -information, data management on hydrology and water quality for decision support	Bureau of data management and water allocation	High
	Implementation of flushing in the context of the maintenance of rivers		Provide technical guidances on water resources management; -Hydropower to ensure the availability of electricity supply according to the needs of society, and the target company's supply capacity	Bureau of Concession and Customer Service	
	Monitoring and evaluating water and quantity quality		Implementation of; -O/M of infrastructures -water utilization -water-related disaster management -data management of water resources management	Water Management Division I, II, III, IV	

Activity 1-1
Table 5: PJT I and II

Current functions	PJT I		PJT II		Evaluation
Ministrial Regulation No.34/2015	*Duty, function and role*	*Responsible Section*	*Duty, function and role*	*Responsible Section*	
	Utilization of water resources shall be maintained with harmony among social function, environmental function and economy, cooperation with related government and organizations; -Supply of surface water for daily needs -Irrigation water supply for existing irrigation system -flood control -Conservation of water resources -Development of drinking water and sanitation for household use		Implementation of hydropower station and power distribution	Hydropower Division	
	Meet the basic need for daily and irrigation for small holder agriculture in irrigation system		Operation of laboratory for water resources management, such as water quality.	General Service Unit	
h. Hydrology system management	Monitoring and evaluating water quantity and quality		Hydrological and water quality data management	Bureau of data management and water allocation	Middle
			Data Management on water resources management	Water Management Division I, II, III, IV	
i. Water resources information system management	Dessemination of monitoring and evaluation of water quantity and quality to users and community		Hydrological and water quality data management	Bureau of data management and water allocation	Middle

Activity 1-1
Table 5: PJT I and II

Current functions	PJT I		PJT II		Evaluation
Ministrial Regulation No.34/2015	*Duty, function and role*	*Responsible Section*	*Duty, function and role*	*Responsible Section*	
j. Implementation of O&M of water resources in the river basin	Implementation of Operation and Maintenance (routine, periodic, minor repair and emergency) infrastructure of water resources		Implementation of O/M and safety security of water resources management and infrastructures	Water Management Division I, II, III, IV	High
	safety of infrasturactures and secure of water resources		O/M of hydropower infrastructures	Hydropower Division	
k. Implementation of technical guidance for water resources management under the authority of province and regency/city	Provision of technical consideration and advice to water resources managers for their preparation of technical reccommendation and plan of water use				Low
l. Preparation of technical recommendation for granting permission on supply, allocation, utilization and exploitation of water resources in the river basin					
m. Facilitation of the activity of Coordination Team of Water Resources Management in the river basin					Low
n. Public empowerment in the water resources management	Counseling to community to inprove community empowerment with other managers of water resources		Coordination with government and community for public empowerment on water distribution	Water Management Division I, II, III, IV	Middle

Activity 1-1
Table 5: PJT I and II

Current functions	PJT I		PJT II		Evaluation
Ministrial Regulation No.34/2015	*Duty, function and role*	*Responsible Section*	*Duty, function and role*	*Responsible Section*	
o. Implementation of compilation of financial accounting and state property accounting report as a Regional Accounting Unit					
p. Implementation of collection, reception and usage of water resources management service fee (BJPSDA) in accordance with the provisions of legislation	Levy, receive, use the service costs for Water Resources Management to finance all the duties and responsibility		Water service fee is decided mutually, based on agreement among stakeholders based on government regulation		High
	Rate of service fee for Water Resources Management use of surface water for drinking water business, business industry, and hydroelectric power generation business, Technical determined by the Minister on the proposed Board of Directors				
	Provisions on procedures for the implementation of collection and management services fee receipt for Water Resources directed by a Board of Directors				
q. Implementation of administration and housekeeping affair of the BWS as well as coordination with related institution	O/M Water Resources Infrastructure which are hannded over from government		Carry out the management and supervision of the administration of assets, household and general procurement of goods and services.	Bureau of Asset Management and Public Administration	High
	O/M and secure of government assets		Management of electrical equipment for workshops, heavy equipment, mechanical equipment and laboratory service and drinking water	General Service Unit	

Activity 1-1
Table 5: PJT I and II

Current functions	PJT I		PJT II		Evaluation
Ministrial Regulation No.34/2015	*Duty, function and role*	*Responsible Section*	*Duty, function and role*	*Responsible Section*	
Others (Stakeholders coordination)	Dessemination of monitoring and evaluation results of water quantity and quality to users, community and owner interest		Implementation of public relations	Company Secretary	High
	Counseling to community to inprove community empowerment with other managers of water resources		representing the Board of Directors to communicate with stakeholders	Company Secretary	
	Provision of technical consideration and advice to water resources managers for their preparation of technical reccommendation and plan of water use		Manage and improve the function of marketing and partnerships, and improve service to customers, including in dealing with customer complaints in the field of hydropower	Bureau of Concession and Customer Service	
			Coodination with local government and community for administrative matter for water resources management	Water Management Division I, II, III, IV	
			Coordination with relevant agencies for hydropower operation	Hydropower Division	
			Formation of internal investigation team to carry out internal evaluation, assessment and investigation of efficiency and effectiveness on financial, operational, management, human resources, information technology and other activities	Internal Control Unit	

Activity 1-1
Table 5: PJT I and II

Current functions	PJT I		PJT II		Evaluation
Ministrial Regulation No.34/2015	*Duty, function and role*	*Responsible Section*	*Duty, function and role*	*Responsible Section*	
Others (Internal Evaluation and investigation)			Develop, monitor, evaluate and review the inplementation of policy and guideline for performance management	Performance Contrl Unit	Low
			Quality management, like ISO	Performance Contrl Unit	
Others (Human Resources)			Planning in the field of human resources, employment, development, coaching, education and training, welfare, health and safety Employee health services and personnel administration	Bureau of Human Resources	Low

*Criteria of Evaluation

High: Number of function, duty and role is 2 or more from each PJT I and PJT II
Middle: Number of function, duty and role is 1 or more from each PJT I and PJT II

Table List of Analysis Result from 1-1 to 1-3

g. Water resources management which includes water resources conservation and utilization as well as water damage control in the river basin

Activity 1-1 (Step 1)	Activity 1-1 (Step 2)	Activity 1-2	Activity 1-3
RENCANA	**Flood Management**	**Flood Management**	**Flood Management**
Water Quality Monitoring at Rivers (add test equipment BOD, COD)	• Implementation of Flood Control Project	• Rehabilitation and repair Early Warning System	• Rehabilitation and repair Early Warning System
Development and Improvement of Drinking Water	• Rehabilitation and repair Early Warning System		
Planting Mangrove for coastal protection	• Flood Hazard Mapping and support for arrangement of evacuation sites and routes		
Early flood warning system and evacuation route	• Flood Management Planning on preparation, response and operation and		
Maintain ground water resources	**Water Quality Management**	**Water Quality Management**	**Water Quality Management**
Assessment Report	• Sampling 2 times/1 years, at 67 points	• Sharing water quality situation with stakeholders and water users	• Sharing water quality situation with stakeholders and water users
Water Quality; human resource development and monitoring point	• Analyzing 15 parameters and data management	• Utility of Small laboratory, equipment and human development	
Improve raw water facility and infrastructure	• Patrol rivers and lakes (periodically and emergency)		
Accountability Report	• Sharing water quality situation with stakeholders and water users		
Disaster Management (Flood Control, landslide, tidal wave and coastal protection)	• Utility of Small laboratory, equipment and human development		
PJT Functions	**Coastal Protection**	**Coastal Protection**	**Coastal Protection**
Flood Control	• Implementation coastal protection construction works (check design, quality control of construction works)	• Evaluation of existing structures, including impact to residence and fishery	• Evaluation of existing structures, including impact to residence and fishery
Supply water for daily needs	• Evaluation of existing structures, including impact to residence and fishery		
Water resources conservation	• Coordination of planting and conservation of mangrove		
Maintenance of facility and infrastructure	• Patrol coastal area and Maintenance of existing structures		

Table List of Analysis Result from 1-1 to 1-3

h. Hydrology System Management

Activity 1-1 (Step 1)	Activity 1-1 (Step 2)	Activity 1-2	Activity 1-3
RENCANA			
Rehabilitation and repair of hydro meteorological station	• Evaluation of hydro-meteorological observation station network	• Rehabilitation and repair equipment to be able to measure flood situation	• Human resource development of technician on electric and telecommunication equipment
Construction of telemeter system for of rain and water level	• Rehabilitation and repair equipment to be able to measure flood situation	• Flow measurement (low and high water) and update H-Q formulation	
Assessment Report	• Flow measurement (low and high water) and update H-Q formulation	• Human resource development of technician on electric and telecommunication	
Procurement of ARR logger and AWLR logger	• Patrol and data collection	• Survey Cross Section at River and	
Accountability Report	• Maintenance of building, equipment (Periodically and emergency)		
Activity of Hydrology Unit	• Human resource development of technician on electric and telecommunication		
PJT Functions	• Survey Cross Section at River and Sedimentation in Reservoirs		
Management of Hydro meteorological and water quality data			

Table List of Analysis Result from 1-1 to 1-3

i. Management of Water Resources Information System (SISDA)

Activity 1-1 (Step 1)	Activity 1-1 (Step 2)	Activity 1-2	Activity 1-3
RENCANA			
Development and update of information system and its database	• Data collection and management on 1) Hydrology (Water Level, Flow rate), 2) Meteorology (Rainfall…), 3) Water quality (15 parameters), 4) Infrastructures, with GIS system	• Data collection and management on 1) Hydrology (Water Level, Flow rate), 2) Meteorology (Rainfall…), 3) Water quality (15 parameters), 4) Infrastructures, with GIS system	• Data collection and management on 1) Hydrology (Water Level, Flow rate), 2) Meteorology (Rainfall…), 3) Water quality (15 parameters), 4) Infrastructures, with GIS system
Socialization of information system with stakeholders	• Update format for easy input to SISDA	• Update format for easy input to SISDA	
Assessment Report			
Formulation of WR Information System Unit			
Quality Control of data for publication			
Provision of Internet service to be accessibly for public, especially community			
Accountability Report			
Activity of SNVT implementation of water resources network Sulawesi I			
PJT Functions			
Dissemination of monitoring and evaluation of water quantity and quality to water users and community			

Table List of Analysis Result from 1-1 to 1-3

j. Operation and Maintenance of Water Resources

Activity 1-1 (Step 1)	Activity 1-1 (Step 2)	Activity 1-2	Activity 1-3
RENCANA			
Improvement of WR facility and infrastructure O/M	• Update, formulation and implementation of O/M rule of water resources facilities and infrastructures	• Update, formulation and implementation of O/M rule of water resources facilities and infrastructures	• Update, formulation and implementation of O/M rule of water resources facilities and infrastructures
O/M of sedimentation	• Patrol and maintenance of facilities and infrastructures, such as Sabo dam and Check dam, Irrigation (4 areas), Coastal protection (revetment, sea wall)	• Low water management (Water distribution, river maintenance flow)	• Low water management (Water distribution, river maintenance flow)
Rehabilitation and repair of riverbank protection	• Planning maintenance and rehabilitation,	• High water management (flood control	• High water management (flood control
Assessment Report	• Low water management (Water	• Sediment Management (Survey of Cross	
Implementation of asset management for WR facility			
Applying SOP for O/M			
Accountability Report			
Activity of SNVT O/M			
PJT Functions			
Implementation of routine, periodic, minor repair and			
O/M for Safety for WR facility and infrastructure and			

Table List of Analysis Result from 1-1 to 1-3

m. Facilitate of Activity of Coordination Team for WRM

Activity 1-1 (Step 1)	Activity 1-1 (Step 2)	Activity 1-2	Activity 1-3
RENCANA			
Improvement of institution and function of P3A	• Management of TKPSDA team's activity	• Management of TKPSDA team's activity	• Management of TKPSDA team's activity
Smooth implementation of construction of Kuwil Dam and Laule retention area	• Coordination for dam project	• Formulation of "RENCANA PENGELOLAAN SUMBER DAYA AIR WILAYAH SUNGAI" (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN) (Dumoga Sungkub River Basin)	• Formulation of "RENCANA PENGELOLAAN SUMBER DAYA AIR WILAYAH SUNGAI" (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN) (Dumoga Sungkub River Basin)
Settlement of potential conflict between stakeholders in Pulau Bangka area	• Coordination on water allocation/distribution plan for dam project	• Plan-Design-Construction-Operation/Maintenance of each projects	• Plan-Design-Construction-Operation/Maintenance of each projects
Assessment Report	• Formulation of "RENCANA PENGELOLAAN SUMBER DAYA AIR WILAYAH SUNGAI" (TONDANO-SANGIHE-TALAUD-MIANGAS RIVER BASIN) (Dumoga Sungkub River Basin)		
Immediately activate of function and duty of coordination team refer to Presidential Decree No.12 / 2012 and	• Plan-Design-Construction-Operation/Maintenance of each projects		
Accountability Report			
Coordination with relevant agencies has to be done before implementation of activity			
Activity of TKPSDA for Tondano – Sangihe – Talaud - Miangas river basin, TKPSDA for Dumoga - Sangkub river basin			
PJT Functions			

Activity 1-1 (Step 1) Sort out detail duties from 1)RENCANA, 2)Assessment Report, 3)Accountability Report and 4)PJT function and roles, for analyzed expected functions
Activity 1-1 (Step 2) Discussion for confirmation of daily and important activities
Activity 1-2 Sort out the activities to be strengthened by comparing the actual activities with the ideal functions and roles mentioned above in 1-1
Activity 1-3 Identify priority issues, which are necessary to be tackled with stakeholders as common and important targets,

ANNEX 6-1

Report No.004

Report of TOPOGRAPHIC (River Cross Section) SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI WILAYAH SUNGAI SULAWESI I
Jl. MR. A.A. Maramis Kairai Dua. Telp / Fax (0431) 81161 Manado

LAPORAN
TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER
FOR
CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT
(Phase 2)

NOMOR KONTRAK :
JICA/RBOs.01/OJT.01/BWSS-I/12/2017

MARET 2018

CV. ATRIUM ARSITEK KONSULTAN PERANCANG
KOMPLEKS WALE LESTARI INDAH BLOK AA NO 5 TELP.0431-871692 MANADO

LEMBAR PENGESAHAN

LAPORAN SURVEI TOPOGRAFI SUNGAI TONDANO, SUNGAI TIKALA, DAN SUNGAI SARIO

PEKERJAAN:

CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT

Konsultan Pelaksana	: CV Atrium Arsitek Konsultan Perancang
Konsultan Pemilik Pekerjaan	: JICA Expert
Disahkan di	: Manado
Tanggal	: 26 Februari 2018

PIHAK
THE JICA EXPERT TEAM:

Hirohisa MIURA
JICA Long Term Expert

PIHAK
CV. ATRIUM ARSITEK
KONSULTAN PERANCANG:

Galih M. Fatian
Director

KATA PENGANTAR

Sehubungan dengan Kontrak Kerja antara pihak **JICA Expert Team dan CV ATRIUM ARSITEK KONSULTAN PERANCANG** pada tanggal 15 Desember 2017 dengan nomor kontrak **JICA/RBOs.01/OJT.01/BWSS-I/12/2017** untuk pekerjaan **"Topographic Surveys at Tondano River, Tikala River, and Sario River"**, maka dengan ini kami sampaikan laporan hasil pekerjaan. Laporan ini disusun untuk memberikan gambaran hasil dari pelaksanaan kegiatan ini dan menjadi bahan diskusi guna mendapatkan hasil perencanaan yang memadai, semoga bermanfaat dan dapat memenuhi tujuan. Atas kepercayaannya yang telah diberikan, kami ucapkan terimakasih.

Manado, 1 Maret 2017
CV ATRIUM ARSITEK
KONSULTAN PERANCANG

Galih M. Fatian
Direktur

DAFTAR ISI

LAMPIRAN

1. **Dokumentasi**
2. **Deskripsi BM dan CP**
3. **Peta Situasi Sungai (A3)**
4. ***Cross Section* (A3)**
5. **Poligon Pengukuran (A3)**
5. **Data Ukur Sungai**

DAFTAR GAMBAR

DAFTAR TABEL

BAB I
PENDAHULUAN

1.1 Latar Belakang

Sungai memainkan peran penting dan memiliki nilai strategis dalam pengembangan kawasan suatu daerah, dan mempengaruhi semua aspek kehidupan masyarakat yang tinggal di Daerah Aliran Sungai. Hal ini dibuktikan dengan berkembangnya banyak permukiman dan peradaban masyarakat di tepian sungai termasuk kemunculan dan perkembangan kekaisaran dan daerah perkotaan di sepanjang sungai seperti sekarang ini. Sungai juga merupakan sarana untuk menghubungkan antara kota dan daerah.

Air sungai memiliki fungsi seperti infrastruktur pengangkutan air / air, sumber air PDAM, sumber air irigasi, pengembangan budidaya perikanan, infrastruktur rekreasi dan pariwisata, dan juga fungsi sosial. Pemanfaatan air di masa depan di daerah aliran sungai diperkirakan akan meningkat, terutama karena meningkatnya populasi dan meningkatnya aktivitas / keragaman kehidupan. Jumlah kegiatan di daerah aliran sungai, terutama kegiatan sektor unggulan pembangunan ekonomi seperti kehutanan, pertambangan, perkebunan, pariwisata dan pertanian mengakibatkan munculnya berbagai masalah, termasuk penurunan kualitas air, erosi, sedimentasi, banjir, dan adanya lahan kritis

Ada banyak kendala dalam pengelolaan sungai, salah satunya data hidrologi masih terbatas seperti penampang sungai dan debit aliran. Oleh karena itu, untuk mewujudkan pengelolaan DAS terpadu, data hidrologi sungai harus dikalikan dan dipenuhi sesuai kebutuhan perencanaan dan pemantauan kondisi hidrologi sungai. Mengingat hal ini, BWS Sulawesi saya anggap penting untuk melakukan pengukuran cross-sectional sungai dan terutama untuk membuat prediksi, dan untuk mengevaluasi perubahan di lingkungan daerah aliran sungai.

1.2 Tujuan

Tujuan kegiatan ini antara lain:

1. Memberikan informasi pengukuran *cross-section* dari 3 profil Sungai Tondano, Sungai Tikala dan Sungai Sario.

2. Membuat titik referensi tetap (fixed reference point / CP) di Sungai Tondano, Sungai Tikala dan Sungai Sario.
3. Mendapatkan informasi posisi (X, Y, Z) dari Mark Bench terdekat ke posisi titik Bench Mark yang baru ditunjuk di sungai Tondano dan Sario.
4. Memasang patokan marmer baru di sungai Tondano dan Sario
5. Mendapatkan informasi posisi (X, Y, Z) dari Bench Mark ke titik tetap (CP) untuk pengukuran melintang di sungai Tondano, Tikala dan Sario.

1.3 Hasil Kegiatan

Luaran kegiatan pemetaan ini adalah:

1. Data / informasi pengukuran *cross-section* (3 profil di setiap sungai).
2. Data / informasi BM dan CP dari referensi BM terdekat.
3. Memasang 6 CP (Control Point) di setiap sungai (Sungai Tondano, Sungai Tikala dan Sungai Sario)

1.4 Manfaat

1. Informasi penampang sungai berguna sebagai data pendukung untuk mendukung pelaksanaan kegiatan pengukuran aliran sungai pada tingkat air menengah dan tinggi dengan *buoys*.
2. Referensi tetap berupa BM (Bench Mark) dan CP (Control Point) di setiap sungai
3. Ketersediaan informasi debit aliran, yang berguna untuk memprediksi debit aliran dan kecenderungannya terutama terkait dengan upaya mengatasi masalah banjir.

BAB II
DASAR TEORI

2.1. Umum

Di dalam beberapa bidang pekerjaan, kita sering menggunakan sebuah peta sebagai dasar rencana kerja. Untuk mengetahui kondisi topografi sungai, maka diperlukan pengukuran dan pemetaan. Pengukuran sendiri adalah sebuah teknik pengambilan data yang dapat memberikan nilai panjang, tinggi dan arah relatif dari sebuah obyek ke obyek lainnya. Pengukuran terletak diantara ilmu geodesi dan ilmu pemetaan. Hasil penelitian geodesi dipakai sebagai dasar referensi pengukuran, kemudian hasil pengolahan data pengukuran adalah dasar dari pembuatan peta. Sedang pemetaan adalah proses pembuatan peta berdasarkan olahan data hasil pengukuran. Pada saat ini, pembuatan peta lebih banyak dilakukan secara digital karena lebih cepat, lebih teliti, tidak memakan ruang dan dapat dianalisis ulang sebelum diproduksi. Pemahaman yang baik mengenai sistem proyeksi dan sistem koordinat bumi merupakan hal dasar dalam pembuatan peta.

2.2. Poligon

Metode Pengukuran poligon Poligon digunakan apabila titik-titik yang akan di cari koordinatnya terletak memanjang sehingga terbentuk segi banyak (poligon). Pengukuran dan Pemetaan Poligon merupakan salah satu pengukuran dan pemetaan kerangka dasar horizontal yang bertujuan untuk memperoleh koordinat planimetris (X,Y) titik-titik pengukuran. Pengukuran poligon sendiri mengandung arti salah satu metode penentuan titik diantara beberapa metode penentuan titik yang lain. Untuk daerah yang relatif tidak terlalu luas, pengukuran cara poligon merupakan pilihan yang sering di gunakan, karena cara tersebut dapat dengan mudah menyesuaikan dengan keadaan daerah/lapangan. Penentuan koordinat titik dengan cara poligon ini membutuhkan :

- Koordinat awal.

  Koordinat awal bisa berupa titik koordinat yang sudah diikat ke jaring nasional dengan sistem koordinat tertentu, atau bisa juga menggunakan koordinat lokal.
- Koordinat akhir.

Untuk memenuhi syarat Geometri hitungan koordinat dan tentunya harus di pilih titik yang mempunyai sistem koordinat yang sama dengan koordinat awal.

- Azimuth awal

  Digunakan untuk mengetahui arah orientasi dari sistem koordinat yang dihasilkan. Azimuth ini bisa diketahui dengan hasil hitungan titik yang telah diketahui yang akan dipakai titik acuan, atau bisa juga diketahui dari hasil pengamatan astronomis (matahari) pada salah satu titik poligon.

- Data ukuran sudut dan jarak

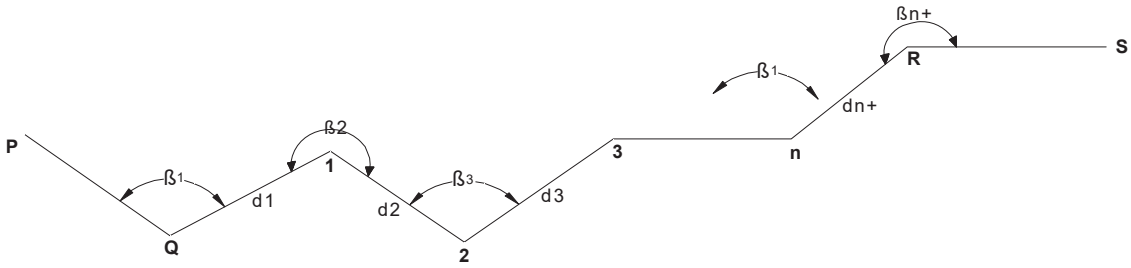
  Sudut mendatar pada setiap stasiun dan jarak antara dua titik kontrol perlu diukur di lapangan

2.2.1. Poligon Terbuka

Poligon terbuka adalah poligon yang dibentuk dengan titik awal dan titik akhir tidak saling bertemu. poligon terbuka terdiri atas :

a. Poligon terbuka terkait sempurna

adalah poligon yang titik awal dan akhirnya merupakan titik tetap yang sudah diketehui koordinatnya.



Gambar 2.1. Poligon Terbuka Terkait Sempurna

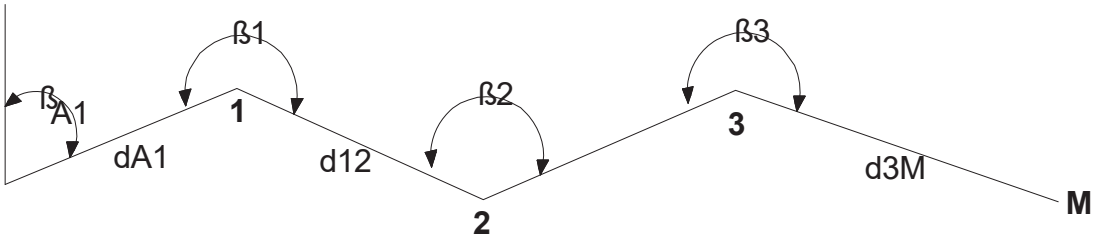
Syarat yang dipenuhi oleh suatu poligon terbuka terikat sempurna adalah :

1. $\Sigma \beta = (\alpha_{akhir} - \alpha_{awal}) + (n - 1)\ 180^0$
2. $\Sigma d \sin \alpha = (X_{akhir} - X_{awal})$
3. $\Sigma \cos \alpha = (Y_{akhir} - Y_{awal})$

Dari hasil pengukuran dilapangan, syarat-syarat tersebut diatas tidak dapat dipenuhi, karena masih ada kesalahan dalam pengukuran. Sehingga untuk memenuhi persyaratan tersebut diberikan koreksi pada masing-masing syarat.

b. Poligon terbuka terikat sepihak

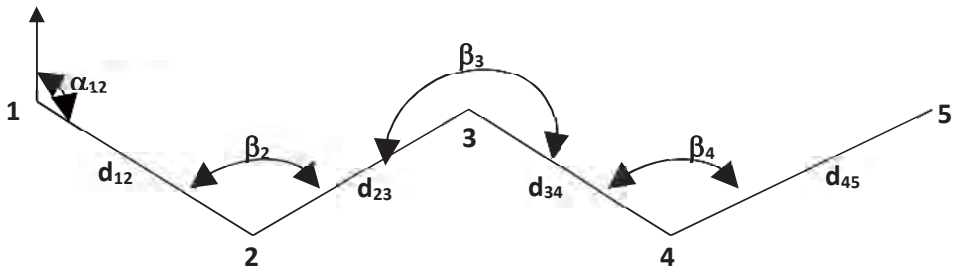
Adalah poligon yang diikatkan pada salah satu titik tetap yang diketahui koordinat maupun aimuth-nya, maka tidak ada koreksi sudut maupun koreksi jarak. Pada poligon terikat sepihak ayarat geometris dan perhitungannya sama seperti pada poligon terbuka terikat sempurna.



Gambar 2.2. Poligon Terbuka Terikat Sepihak

c. Poligon terbuka lepas

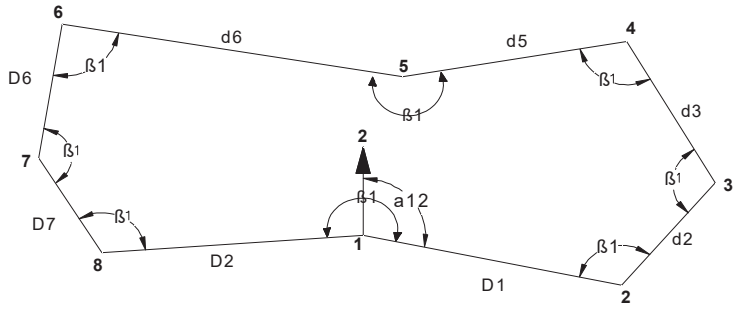
Adalah poligon yang tidak terikat pada suatu titik tetap. Sehingga koordinat yang terukur bersifat lokal dan penyelesaian koordinatnya dengan orientasi sembarang atau koordinat lokal. Pada poligon ini syarat geometris perhitungannya sama seperti pada poligon terbuka terikat sempurna.



Gambar 2.3 Poligon Terbuka Lepas

2.2.2 Poligon Tertutup

Poligon tertutup adalah poligon dengan titik awal dan titik akhir bertemu dalam satu titik.



Gambar 2.4. Poligon Tertutup

Keterangan gambar :

α_{12} = azimuth sisi poligon 1-2

β_1 = sudut dalam poligon

d_1 = panjang sisi poligon

Syarat-syarat geometris pada poligon tertutup adalah sebagai berikut :

1. $\Sigma \beta - (n - 2)\ 180^0 = (\alpha_{akhir} - \alpha_{awal}) = 0$
2. $\Sigma d \sin \alpha = (X_{akhir} - X_{awal}) = 0$
3. $\Sigma \cos \alpha = (Y_{akhir} - Y_{awal}) = 0$

Dalam hal ini :

$\Sigma \beta$ = jumlah sudut dalam poligon

n = jumlah titik sudut poligon

Σd = jarak masing-masing poligon

Ketiga syarat tersebut diatas belum dapat dipenuhi, karena dalam pengukuran sudut dan jarak poligon masih terdapat kesalahan, sehingga perlu adanya koreksi. Dengan demikian rumus diatas menjadi sebagai berikut :

1. $\Sigma \beta - (n - 2)\ 180^0 = \pm f_\alpha$
2. $\Sigma d \sin \alpha = \pm f_x$
3. $\Sigma \cos \alpha = \pm f_y$

Dalam hal ini :

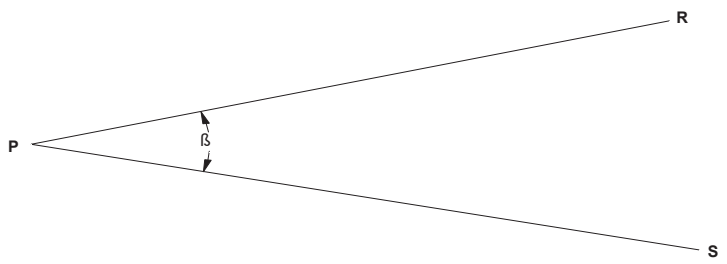
$\pm f_\alpha$ = kesalahan penutup sudut

$\pm f_x$ = kesalahan penutup terhadap sumbu Y

$\pm f_y$ = kesalahan penutup terhadap sumbu X

2.3 Kerangka Kontrol Horisontal

Kerangka Kontrol Horisontal (KKH) merupakan kerangka dasar pemetaan yang memperlihatkan posisi horisontal (X,Y) antara satu titik relatif terhadap titik yang lain di permukaan bumi pada bidang datar. Untuk mendapatkan posisi horisontal dari KKH dapat digunakan banyak metode, salah satu metode penentuan posisi horisontal yang sering digunakan adalah metode poligon. Metode poligon digunakan untuk penentuan posisi horisontal banyak titik dimana titik yang satu dan lainnya dihubungkan dengan jarak dan sudut sehingga membentuk suatu rangkaian sudut titik-titik (polygon). Pada penentuan posisi horisontal dengan metode ini, posisi titik yang belum diketahui koordinatnya ditentukan dari titik yang sudah diketahui koordinatnya dengan mengukur semua jarak dan sudut dalam poligon.



Gambar 2.5. Sudut Horisontal

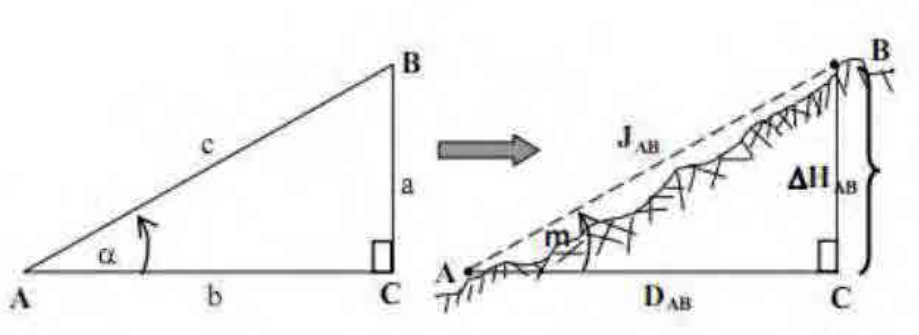
2.4. Kerangka Kontrol Vertikal

Kerangka dasar vertikal merupakan teknik dan cara pengukuran kumpulan titik-titik yang telah diketahui atau ditentukan posisi vertikalnya berupa ketinggiannya terhadap bidang rujukan ketinggian tertentu. Pengukuran tinggi adalah menentukan beda tinggi antara dua titik. Hingga saat ini, pengukuran beda tinggi dengan menggunakan metode sipat datar optis masih merupakan cara pengukuran beda tinggi yang paling teliti. Sehingga ketelitian kerangka dasar vertikal (KDV) dinyatakan sebagai batas harga terbesar perbedaan tinggi hasil pengukuran sipat datar pergi dan pulang.

2.5. Metode Trigonometrik

Pengukuran detail dilapangan berguna untuk pengambilan data planimetri dan ketinggian. Pengukuran situasi menggunakan Metoda trigonometrik. Metode ini menerapkan hitungan segi-tiga siku bidang datar vertikal. Bila dinyatakan dalam sistem koordinat Cartesius, bidang datar vertikal ini adalah bidang yang tegak lurus ($\perp$)

bidang X-O-Y dan melalui garis bidik alat ukur. Parameter ukuran dalam metoda ini adalah jarak dan sudut. Mengingat masalah utama adalah posisi vertikal suatu titik, maka sudut yang diukur adalah Sudut vertikal.



Gambar 2.6. Penerapan segitiga siku pada vertikal

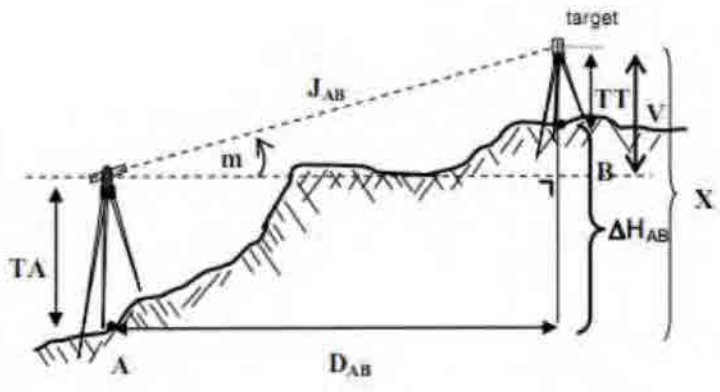
Dari gambar diatas dilihat bahwa bila segitiga siku diterapkan pada permukaan bumi, maka hanya notasi atau istilah yang berubah. Notasi segi-tiga tersebut di lapangan dapat dikatakan sebagai berikut:

JAB : jarak miring dari titik A-B

DAB : jarak mendatar dari titik A-B (pada bidang mendatar X-O-Y)

m : sudut miring

Penerapan semacam di atas akan sukar dilaksanakan, karena pengukuran sudut dan titik bidikan tepat pada muka tanah, sehingga di gunakan penambahan ukuran, berupa tinggi alat dan tinggi target, sehingga seolah-olah segi-tiga tersebut digeserkan ke atas. Disamping itu, pada metoda ini, alat ukur yang digunakan adalah alat ukur jarak dan alat ukur sudut.



Gambar 2.7. Metode Trigonometrik

Keterangan :

TA = tinggi alat dari titik A

TT = tinggi target dari titik B

M = sudut miring

J_{AB} = jarak miring A-B

D_{AB} = jarak mendatar A-B

V = sisi tegak segi-tiga siku ΔH_{AB} = beda tinggi A-B

Dari segi-tiga siku, dapat dihitung besar V, yaitu :

$V = J_{AB}$ Sin m ; atau

$V = D_{AB}$ Tan m

Jarak vertikal dari titik tertinggi pada gambar (target) sampai dengan garis terbawah (garis mendatar

melalui titik A), dapat dinyatakan panjangnya, yaitu sebesar :

X = ΔHAB + TT = V + TA , sehingga :

ΔH_{AB} = V + TA - TT

dengan harga V sebesar :

untuk jarak miring : $V = J_{AB}$ x Sin m

untuk jarak mendatar : $V = D_{AB}$ x Tan m

BAB III
METODOLOGI PELAKSANAAN

3.1 Tahapan Pelaksanaan Pekerjaan

Tahapan pelaksanaan pekerjaan merupakan salah satu faktor yang menentukan keberhasilan pekerjaan tersebut. Tahapan pekerjaan yang terperinci, logis dan tertata sesuai dengan jadwal yang telah ditetapkan akan sangat membantu pelaksanaan pekerjaan dilapangan. Berikut ini adalah tahapan pelaksanaan pekerjaan yang dilaksanakan.

3.1.1 Tahap Persiapan

Pada tahap persiapan, pekerjaan yang dilaksanakan berkaitan dengan survei topografi adalah :

1. Pengurusan ijin khususnya yang berkaitan dengan pemerintah setempat
2. Persiapan tenaga dan alat ukur serta perlengkapannya
3. Kalibrasi dan penyiapan alat ukur yang akan di gunakan
4. Mempersiapkan fasilitas akomodasi dan transportasi yang dapat memperlancar pekerjaan dilapangan.

Adapun peralatan yang digunakan dalam pelaksanaan pekerjaan pengukuran sungai ini adalah sebagai berikut :

Tabel 3.1 Peralatan Dan Bahan Yang Digunakan

No	Nama Alat	Jumlah
1.	Total Staion Nikon ES 105	1
2.	Waterpass Wild Nak-2	1
3.	GPS Navigasi	1
4.	Statif	1
5.	Jalon	2
6.	Rambu Ukur	2
7.	Prisma	2
8.	Pita Ukur	1
9.	Kamera	1

3.5.2. Orientasi Lapangan

Sebelum menentukan langkah atau menyusun jadwal pelaksanaan pekerjaan terlebih dahulu dilakukan orientasi lapangan, sehingga nantinya kebutuhan peralatan maupun tenaga dapat diprediksi dengan baik. Dalam orientasi lapangan beberapa kegiatan orientasi lapangan adalah :

1. Menyiapkan *basecamp*, tenaga lokal dan sarana transportasi lapangan
2. Bersama-sama dengan Konsultan perencana menentukan titik awal pengukuran dan batas pengukuran.
3. Menentukan titik referensi (BM) pengukuran yang sudah diketahui koordinatnya (X,Y,Z).
4. Menentuka lokasi pemasangan Control Point (CP).
5. Menentukan metode pengukuran yang akan digunakan berdasarkan kondisi daerah yang akan dipetakan.
6. Menentukan alat-alat pengukuran yang akan digunakan berdasarkan kondisi daerah yang akan dipetakan.
7. Melakukan pemotretan lokasi pengukuran sebagai dokumentasi.
8. Menentukan lama proses pengukuran topografi

3.5.3. Pemasangan Patok

Pemasangan patok meliput patok Bench Mark dan patok kayu sebagai patok bantu dengan rincian sebagai berikut :

1. Patok Bench Mark, akan dilakukan penempatan patok dengan persetujuan konsultan perencana
2. Patok Control Point (CP) ditempatkan pada titik – titik tertentu di lokasi pengukuran. Jumlah CP masing – masing sungai adalah 6 dengan rincian 3 CP di sebelah kiri, dan 3 di sebelah kanan sungai. Pemasangan CP tegak lurus dengan alur sungai.

3.5.4. Pengukuran Kerangka Kontrol Horizontal

Alat ukur yang digunakan mengukur sudut horisontal adalah alat ukur Total Station yang dilengkapi dengan beberapa alat bantu seperti statif, rambu (jalon) dan prisma untuk membalikkan sinyal. Pengukuran sudut horisontal dilakukan dengan

metode repetisi. Dalam metode tersebut sudut diukur secara berulang-ulang, dalam pelaksanaannya, dilakukan dua kali bacaan, yaitu bacaan biasa dan luar biasa. Pengukuran ini dilakukan untuk mendapatkan 2 macam data, yaitu sudut dan jarak. Kerangka kontrol horizontal menghasilkan titik ikat horizontal (x,y) pada titik poligon utama.

3.5.5. Pengukuran Kerangka Kontrol Vertikal

Kerangka kontrol vertikal diukur dengan alat waterpass atau penyipat datar. Oleh karena itu, metode ini disebut juga Metode sipat datar. Prinsipnya adalah Mengukur tinggi bidik alat sipat datar optis di lapangan menggunakan rambu ukur. Beda tinggi antar titik ditentukan berdasarkan selisih bacaan dari rambu ukur. Beda tinggi tersebut yang digunakan untuk acuan elevasi (z).

3.5.6. Pengukuran Cross Section

Pengukuran topografi area sungai dilakukan dengan metode tachymetry. Pengukuran ini dilakukan dengan mengukur titik-titik yang terdapat pada area sungai dengan posisi melintang (tegak lurus alur sungai). Sehingga didapatkan posisi x, y, dan z pada potongan melintang tersebut. Pada pengolahan lebih lanjut, cross section sungai dapat ditentukan kontur sungai, dimana dengan kontur tersebut gambaran umum topografi dapat dipresentasikan dengan baik.

3.5.7. Analisa Data

Analisa data dilakukan setelah dilakukan pengukuran dilapangan. Khusus untuk pekerjaan pengukuran topografi, analisa dilakukan meskipun belum semua data hasil pengukuran terkumpul. Hal ini dilakukan agar pekerjaan cepat terselesaikan dan juga tenaga pengukur lebih mudah untuk mengingat kondisi lapangan yang baru diukur sehingga bila terdapat kejanggalan data cepat diselesaikan atau dilakukan pengecekan kembali. Beberapa analisa yang dilakukan antara lain :

1. Menghitung sudut datar serta angka koreksi
2. Menghitung sudut datar berdasarkan angka koreksi
3. Menghitung azimuth – azimuth poligon
4. Melakukan koreksi absis dan ordinat
5. Menghitung koordinat poligon.

BAB IV
PELAKSANAAN PEKERJAAN

4.1 Pemasangan BM

Patok benchmark merupakan patok permanen yang terbuat dari beton dengan ukuran tertentu. Titik ini sudah mempunyai koordinat yang tetap (sudah diketahui nilai XYZ). Fungsi benchmark ini sebagai referensi atau acuan dalam pengukuran di sekitar titik tersebut. Penentuan koordinat BM tersebut dapat digunakan 2 cara, yaitu dengan alat GPS Geodetik, ataupun dengan pengukuran lapangan dengan pengikatan pada BM sebelumnya. Pada pekerjaan ini, koordinat BM ditentukan dengan pengukuran lapangan dengan referensi BM yang sudah ada. BM 01 Sario ditentukan dari BM 04, dan BM 01 Tondano dihitung dari referensi BM 13 yang berlokasi di jembatan.

Gambar 4.1. BM 01 Sungai Tondano

4.2 Pemasangan CP (*Control Point*)

Pemasangan CP (*Control Point*) dilakukan secara berpasangan dalam satu *cross section*, yaitu berada di sebelah kanan dan kiri sungai. Patok CP dibuat dengan pipa PVC diameter 5 inch yang disertai dengan tulangan dan cor semen. Pada CP memiliki nomor dan kode sungai sebagai penanda, yaitu TDN untuk Sungai Tondano, TKL untuk Sungai Tikala, dan SRO untuk Sungai Sario. Urutan penamaan CP dimulai dari hulu sungai.

Gambar 4.2. Titik *Control Point* (CP)

4.3 Pengukuran *Cross-Section*

Pengukuran *cross section* sungai dilakukan untuk mengetahui profil masing – masing sungai. Pengukuran ini dilakukan sebanyak 3 kali di masing – masing sungai dengan titik ikat CP di kiri dan kanan sungai. Penyajian *cross section* sungai terdapat pada lampiran. Detail pengukuran *cross section* sungai adalah seperti penjelasan gambar berikut:

Gambar 4.3. Lokasi Pengukuran Sungai Tondano

Gambar 4.3 menunjukkan lokasi dan pengukuran dan posisi CP di Sungai Tondano. Jarak antara *cross section* I dan II (warna merah) adalah ±50 m. *Cross section* III berada di bangunan pemantau yang berada sekitar 25 meter di bawah jembatan.

Gambar 4.4. Lokasi Pengukuran dan Posisi CP Sungai Tikala

Gambar 4.4. menunjukkan lokasi dan pengukuran dan posisi CP di Sungai Tikala. Jarak antara *cross section* I dan II adalah ±50 m. *Cross section* III berada berjarak sekitar 30 meter ke arah hulu *Cross section* II.

Gambar 4.5. Lokasi Pengukuran dan Posisi CP Sungai Sario

Gambar 4.5. menunjukkan lokasi dan pengukuran dan posisi CP di Sungai Sario. Jarak antara *cross section* I dan II (warna merah) adalah ±50 m. *Cross section* III berada berjarak sekitar 30 meter ke arah hulu *Cross section* II.

4.4 Penyajian Data

Pekerjaan survei sungai ini dilakukan dengan mengabaikan kelengkungan bentuk bumi karena objek pengukurannya relatif kecil atau kurang dari 50 x 50 km. Produk yang dihasilkan antara lain sebagai berikut:

1. Gambar dan Peta Hasil Pengukuran

   Hasil dari survei pengukuran adalah berupa peta situasi eksisting sungai beserta potongan melintang (*cross section*).

2. Data Ukur

   Memuat data hasil pengukuran dan pengolahan hingga mendapat nilai koordinat (X, Y, Z) dalam sistem Proyeksi UTM.

3. Deskripsi BM dan CP

   Deskripsi BM dan CP dibuat sebagai inventaris data dan penegasan koordinat tetap suatu titik. Deskripsi BM dan CP memuat informasi seputar titik referensi mengenai lokasi, sketsa, dan foto.

BAB V
KESIMPULAN

5.1. Kesimpulan

1. Pekerjaan survey topografi dilaksanakan di tiga sungai, yaitu Sungai Tondano, Sungai Tikala, dan Sungai Sario dengan pengukuran *cross section* masing – masing sungai berjumlah tiga penampang.
2. Pembuatan garis kontur (elevasi) berdasarkan pengukuran *cross section.*
3. Koordinat titik ikat adalah sebagai berikut:

Lokasi	Nama Titik	Koordinat				
		Easting	Northing	Lintang	Bujur	Elevasi
Sungai Tondano	BM 01	710782.616	163786.340	1.481005°	124.894526°	17.244
	CP 1L	710999.727	163695.950	1.480180°	124.896475°	14.912
	CP 1R	711015.659	163786.648	1.481003°	124.896620°	15.762
	CP 2L	710942.475	163675.047	1.480000°	124.895963°	16.237
	CP 2R	710967.376	163786.610	1.481003°	124.896188°	15.257
	CP 3L	710778.754	163779.328	1.480942°	124.894490°	14.690
	CP 3R	710812.705	163819.649	1.481303°	124.894796°	18.143
Sungai Tikala	CP 1L	708036.140	163062.329	1.474479°	124.869848°	8.046
	CP 1R	708049.320	163082.399	1.474660°	124.869965°	9.172
	CP 2L	708008.789	163081.359	1.474651°	124.869606°	7.449
	CP 2R	708020.264	163098.136	1.474805°	124.869705°	7.168
	CP 3L	707968.245	163109.613	1.474905°	124.869238°	7.187
	CP 3R	707974.809	163129.100	1.475086°	124.869301°	7.385
Sungai Sario	BM 01	704952.131	161079.972	1.456572°	124.842125°	16.193
	CP 1L	704961.250	161079.776	1.456571°	124.842205°	15.813
	CP 1R	704960.650	161092.328	1.456689°	124.842196°	12.287
	CP 2L	704929.999	161089.144	1.456662°	124.841917°	14.412
	CP 2R	704930.670	161097.836	1.456734°	124.841927°	11.802
	CP 3L	704869.150	161102.286	1.456780°	124.841378°	14.671

	CP 3R	704874.931	161115.196	1.456897°	124.841423°	15.003 M

DOKUMENTASI

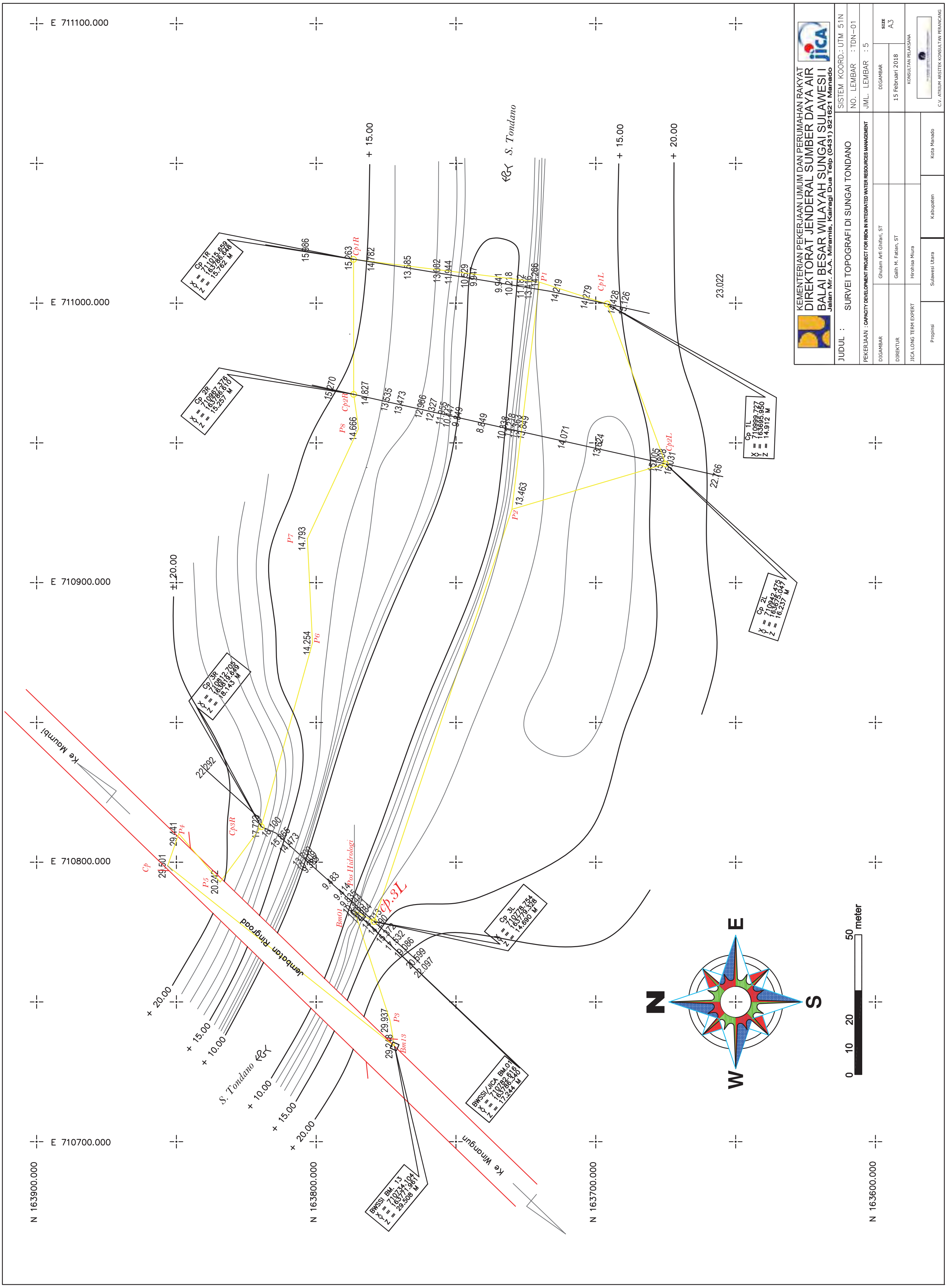




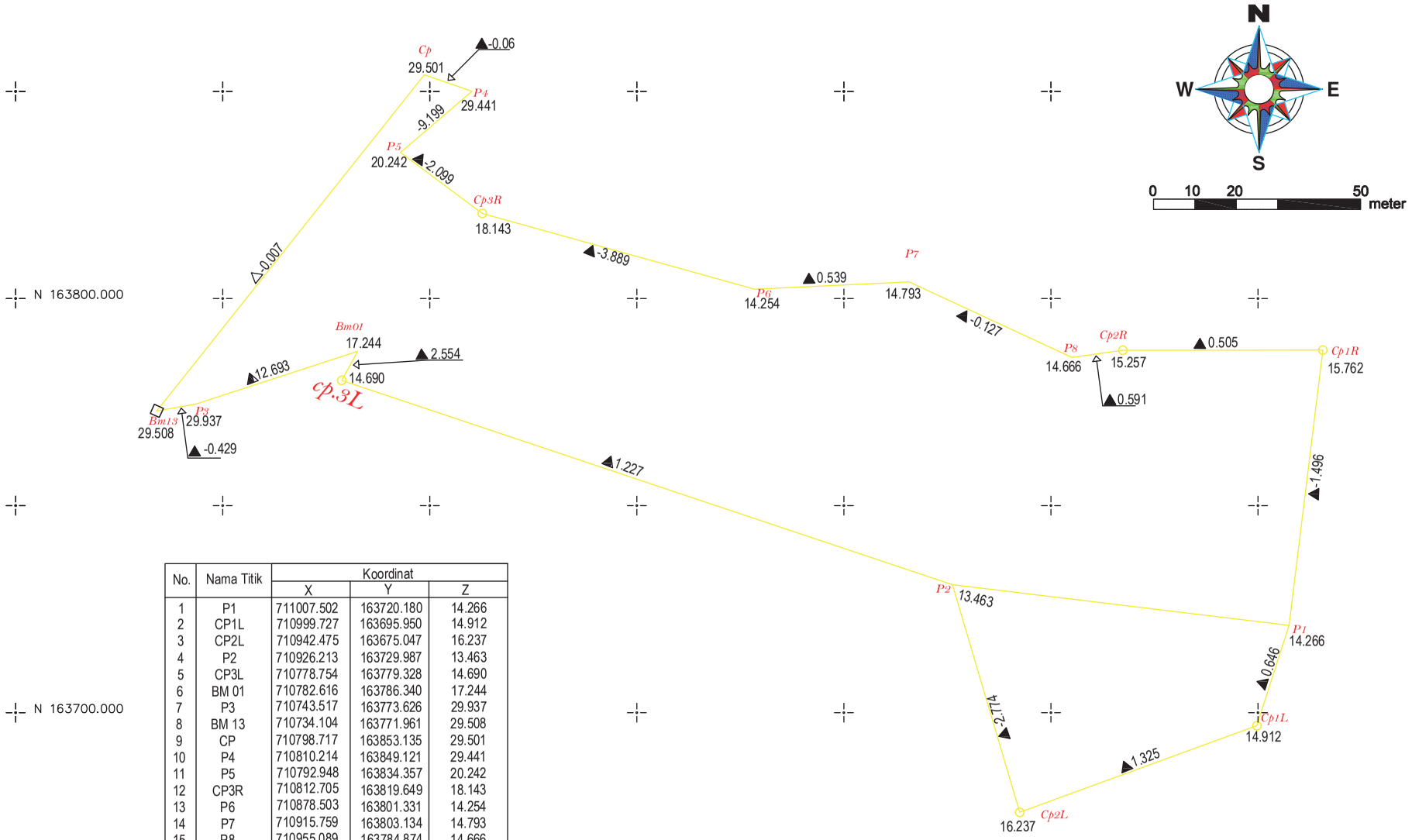


Hitungan Poligon
Pengukuran Waterpass
Hitungan Waterpass
Cross Section

Data Ukur Sungai Tondano


KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado
JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO
SISTEM KOORD.: UTM 51N
NO. LEMBAR : TDN-01
JML. LEMBAR : 5
SIZE A3
15 Februari 2018
S. Tondano
Jembatan Ringroad
Ke Maumbi
Ke Winangun
meter

A6-1-No.004-33



No.	Nama Titik	Koordinat		
		X	Y	Z
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2	CP1L	710999.727	163695.950	14.912
3	CP2L	710942.475	163675.047	16.237
4	P2	710926.213	163729.987	13.463
5	CP3L	710778.754	163779.328	14.690
6	BM 01	710782.616	163786.340	17.244
7	P3	710743.517	163773.626	29.937
8	BM 13	710734.104	163771.961	29.508
9	CP	710798.717	163853.135	29.501
10	P4	710810.214	163849.121	29.441
11	P5	710792.948	163834.357	20.242
12	CP3R	710812.705	163819.649	18.143
13	P6	710878.503	163801.331	14.254
14	P7	710915.759	163803.134	14.793
15	P8	710955.089	163784.874	14.666
16	CP2R	710967.376	163786.610	15.257
17	CP1R	711015.659	163786.648	15.762

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Maramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO			SISTEM KOORD.: UTM 51N
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT			NO. LEMBAR : TDN–05
			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR
DIREKTUR	Galih M. Fatian, ST		15 Februari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		SIZE A3
Propinsi	Sulawesi Utara	Kabupaten / Kota Manado	KONSULTAN PELAKSANA

C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

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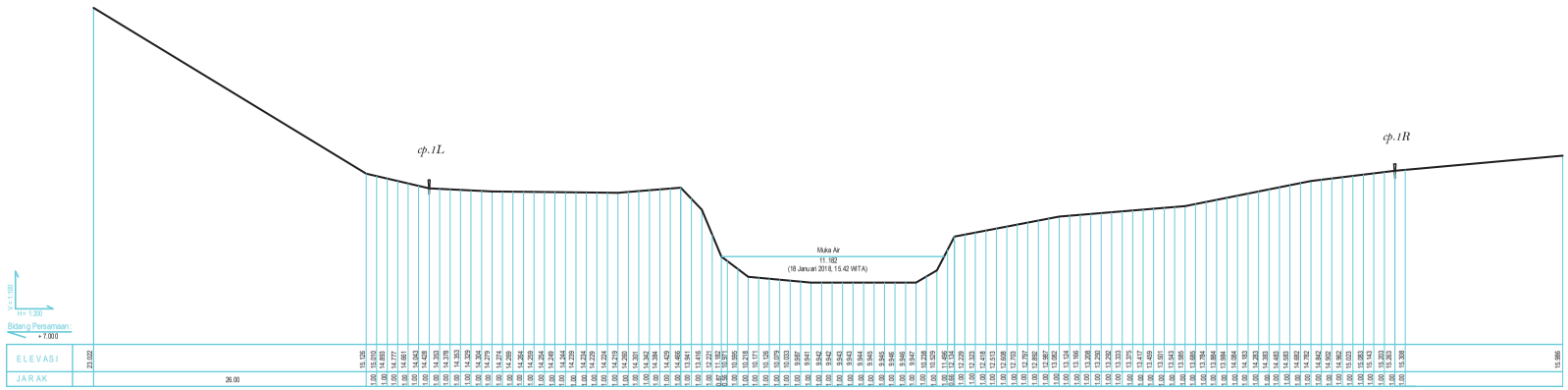

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KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO			SISTEM KOORD.: UTM 51N
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT			NO. LEMBAR : TDN–02
			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR 15 Februari 2018
DIREKTUR	Galih M. Fatian, ST		SIZE A3
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten:	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

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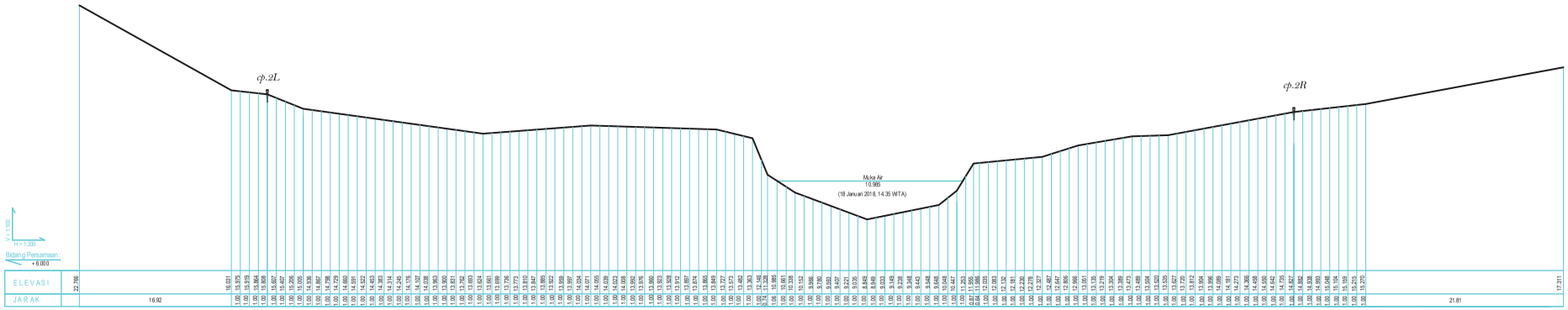

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KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO			SISTEM KOORD.: UTM 51N
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT			NO. LEMBAR : TDN–03
			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR 15 Februari 2018
DIREKTUR	Galih M. Fatian, ST		SIZE A3
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten:	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

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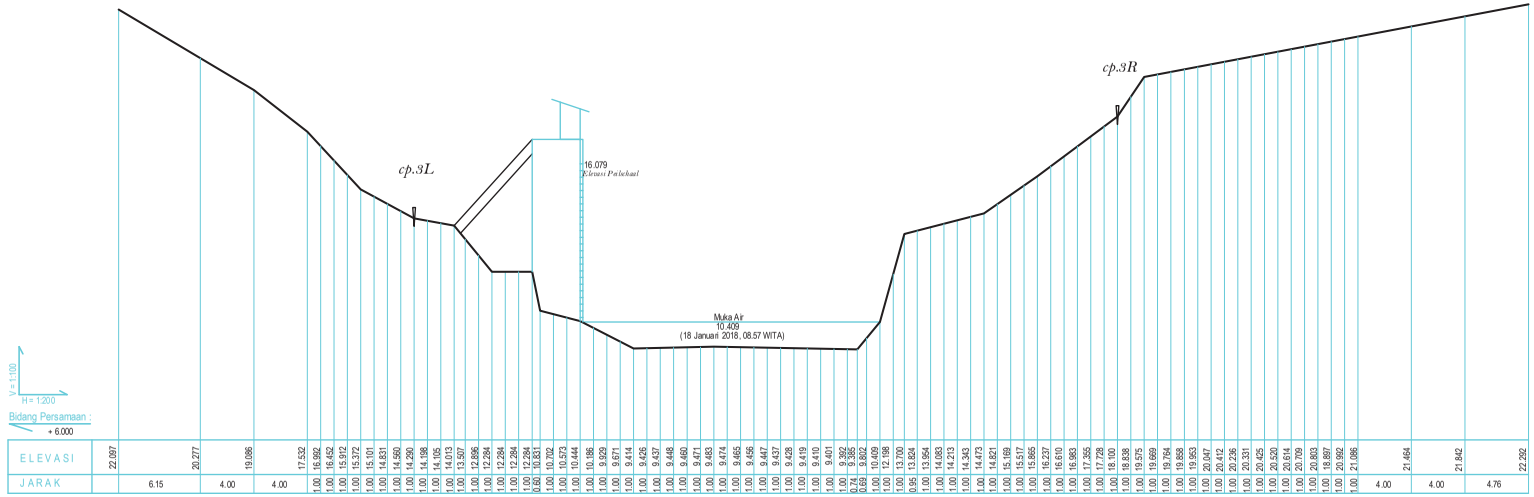


MJ HKC)UJ D O Y B WDG

MJ HKC)UJ D O F WY YOG

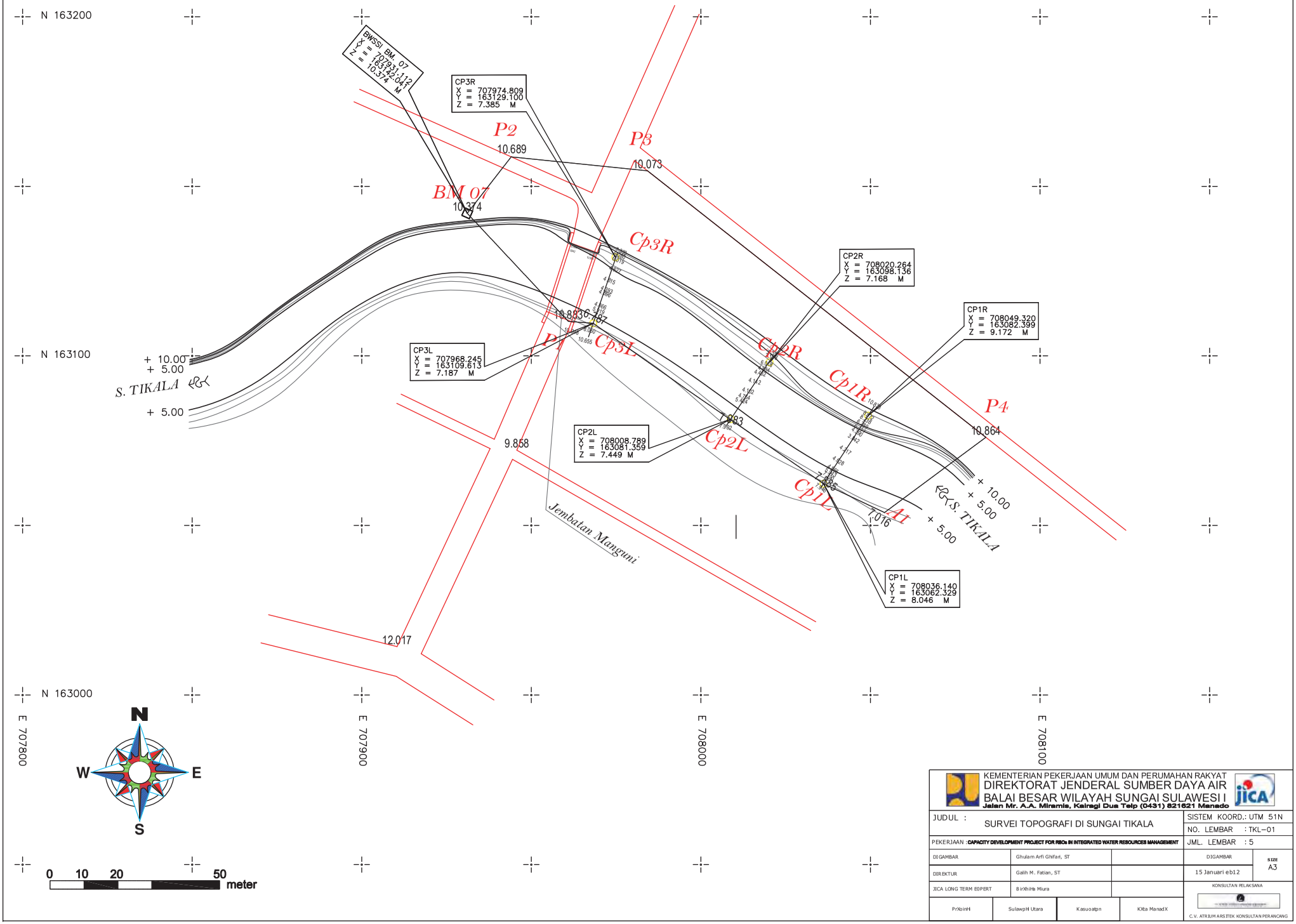
SCA CL EC (HL)VCSC 2HHL)0 A 0 A)6 HL)VC 0 A H1 HL) HSmHE
6 (CSE4 HE)2CL 6 C HK)M0 A NC)6 HmH)H(
NHKH()NCMH)T (KHmH1)M0 L R H()M0 KHT CM()(
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : M0 I C()E4 V4 R HP()6 ()M0 L R H()E4 L6 HL 4			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : TDN–04
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR 15 Februari 2018
DIREKTUR	Galih M. Fatian, ST		SIZE A3
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi	Sulawesi Utara	Kabupaten Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

Hitungan Poligon
Pengukuran Waterpass
Hitungan Waterpass
Cross Section

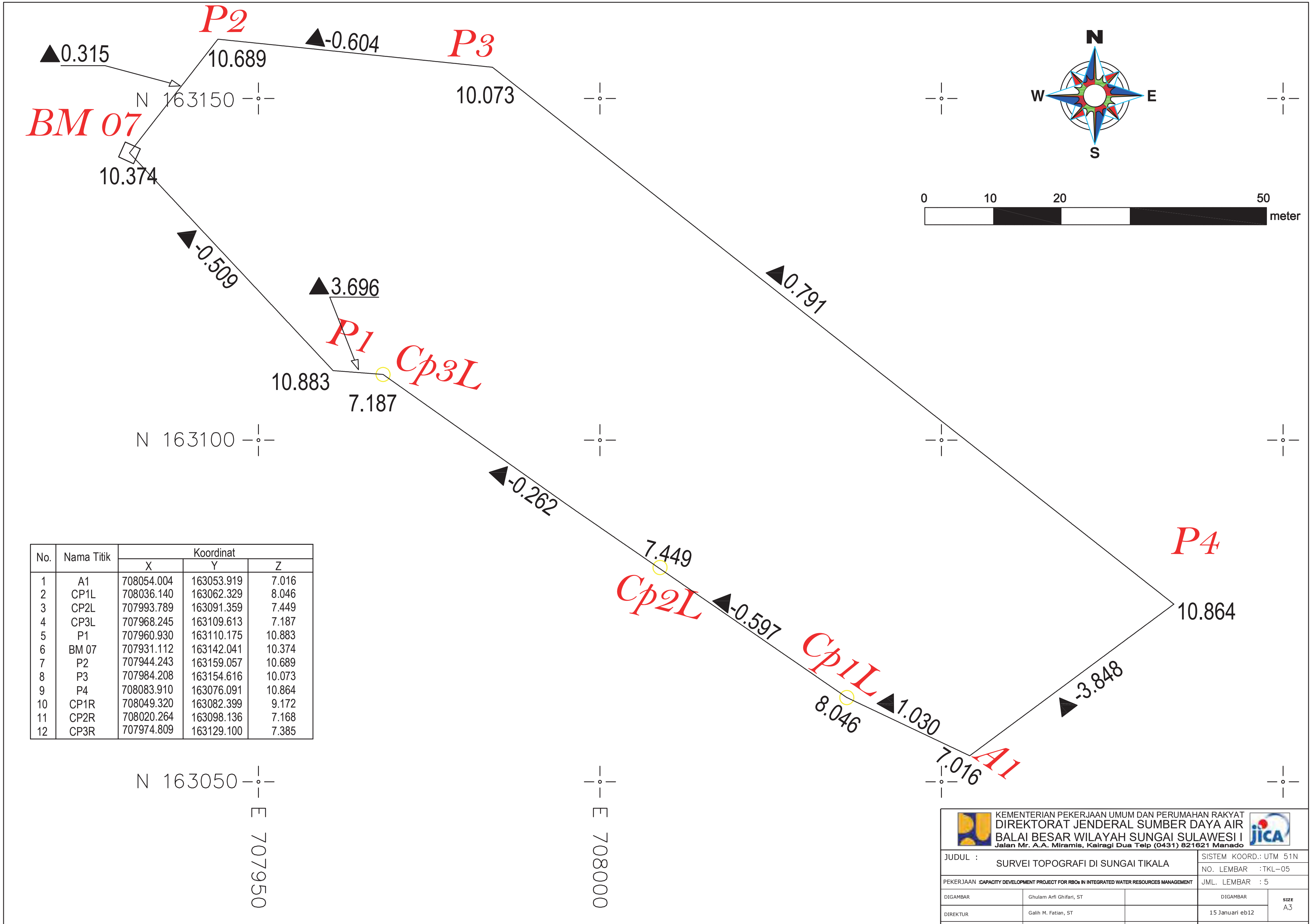
Data Ukur Sungai Tikala

A6-1-No.004-38



KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TIKALA	SISTEM KOORD.: UTM 51N
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT	NO. LEMBAR : TKL–01
	JML. LEMBAR : 5
DIGAMBAR: Ghulam Arfi Ghifari, ST	DIGAMBAR: 15 Januari eb12 — SIZE A3
DIREKTUR: Galih M. Fatian, ST	
JICA LONG TERM EDPERT: 8 irXhiHa Miura	KONSULTAN PELAKSANA
PrXoinH / SulawpH Utara / Kasuoatpn / KXta ManadX	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG



No.	Nama Titik	Koordinat		
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3	CP2L	707993.789	163091.359	7.449
4	CP3L	707968.245	163109.613	7.187
5	P1	707960.930	163110.175	10.883
6	BM 07	707931.112	163142.041	10.374
7	P2	707944.243	163159.057	10.689
8	P3	707984.208	163154.616	10.073
9	P4	708083.910	163076.091	10.864
10	CP1R	708049.320	163082.399	9.172
11	CP2R	708020.264	163098.136	7.168
12	CP3R	707974.809	163129.100	7.385

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TIKALA

SISTEM KOORD.: UTM 51N
NO. LEMBAR : TKL–05
JML. LEMBAR : 5

PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT

DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR
DIREKTUR	Galih M. Fatian, ST		15 Januari eb12
JICA LONG TERM E0PERT	8 irXhiHa Miura		SIZE A3
PrXoinH	SulawpH Utara	Kasuoatpn	KXta ManadX

KONSULTAN PELAKSANA
C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

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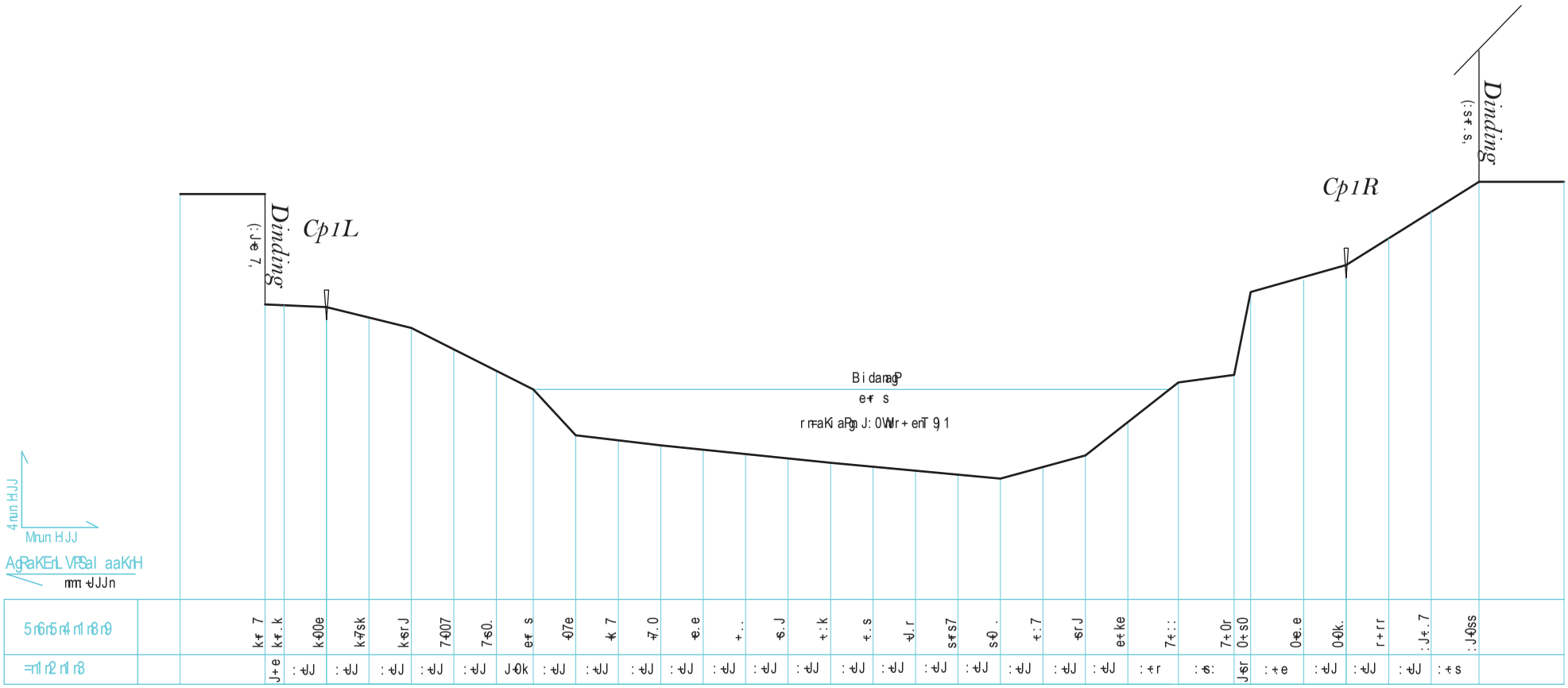

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KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TIKALA			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : TKL–02
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatian, ST		15 Januari eb12
JICA LONG TERM EXPERT	Shinichi Miura		KONSULTAN PELAKSANA
PrXoinH	SulawpH Utara	Kasuoatpn	KXta ManadX

C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

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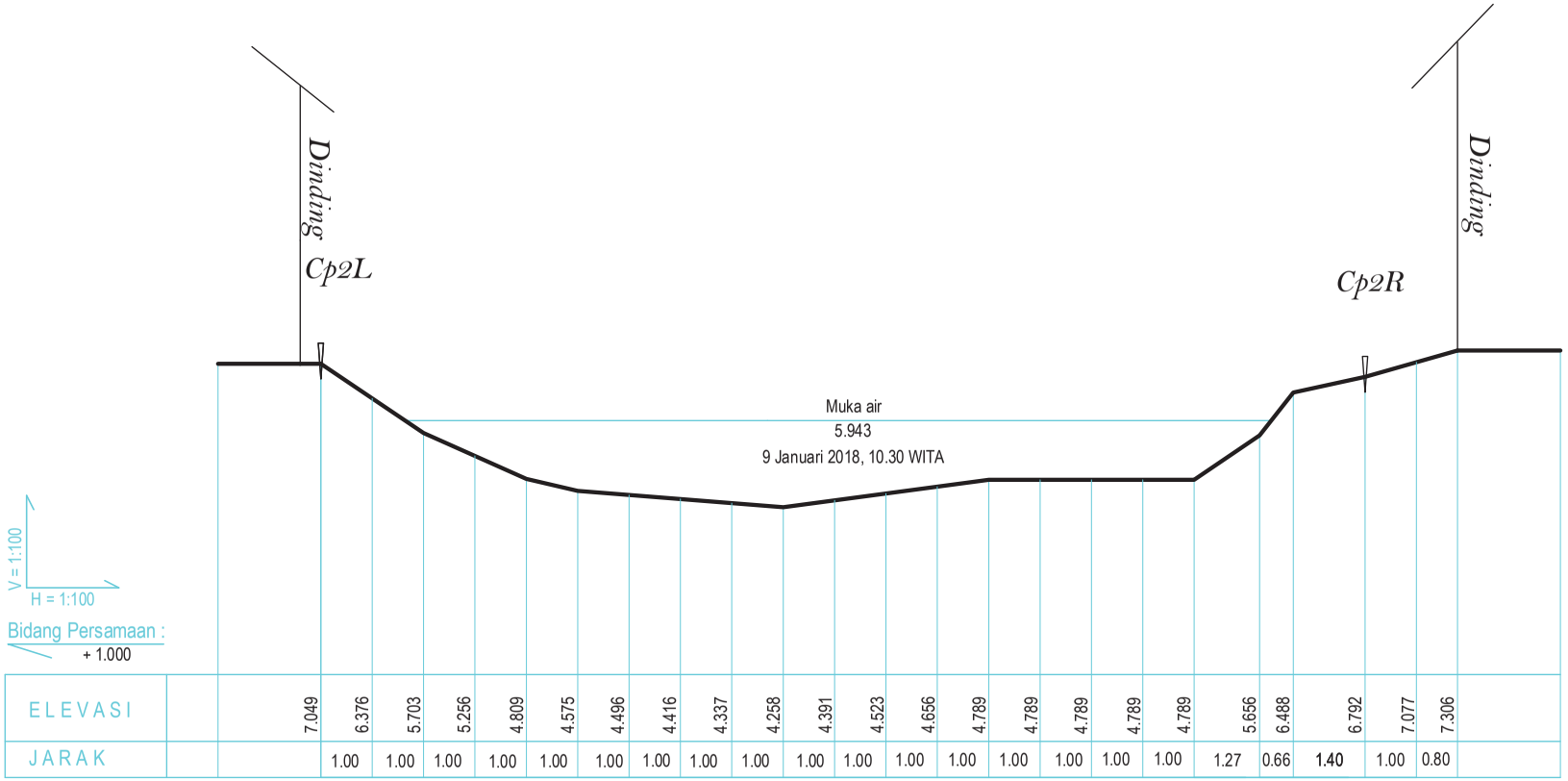

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JARAK			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.27	0.66	1.40	1.00	0.80		

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KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TIKALA			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : TKL–03
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatian, ST		15 Januari eb12
JICA LONG TERM EXPERT	Shinichi Miura		KONSULTAN PELAKSANA
PrXoinH	SulawpH Utara	Kasuoatpn	KXta ManadX

C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

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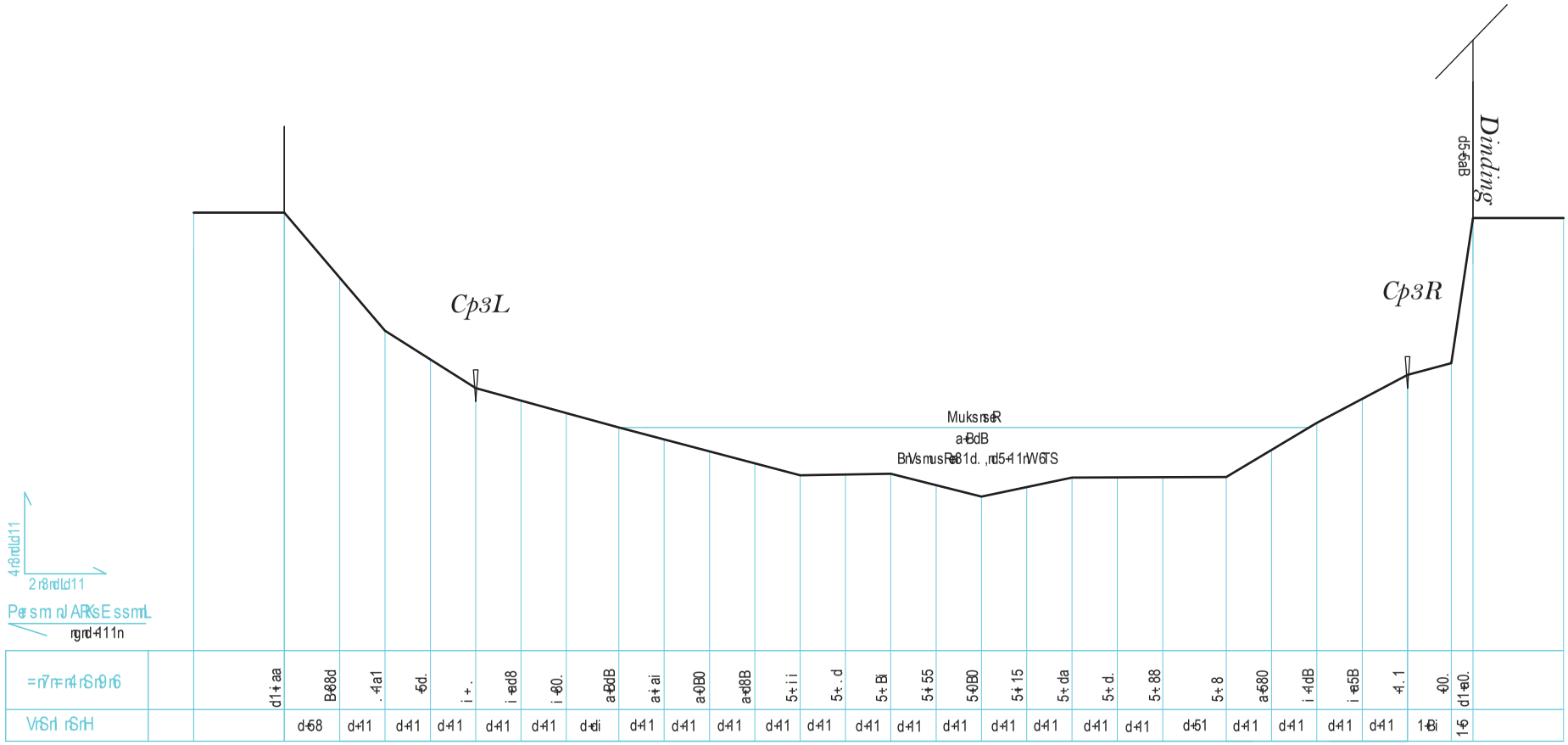

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KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TIKALA			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : TKL–04
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR 15 Januari eb12 — SIZE A3
DIREKTUR	Galih M. Fatian, ST		
JICA LONG TERM EXPERT	Shinichi Miura		KONSULTAN PELAKSANA
PrXoinH	SulawpH Utara	Kasuoatpn	KXta MaHadX

C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

Hitungan Poligon
Pengukuran Waterpass
Hitungan Waterpass
Cross Section

Data Ukur Sungai Sario

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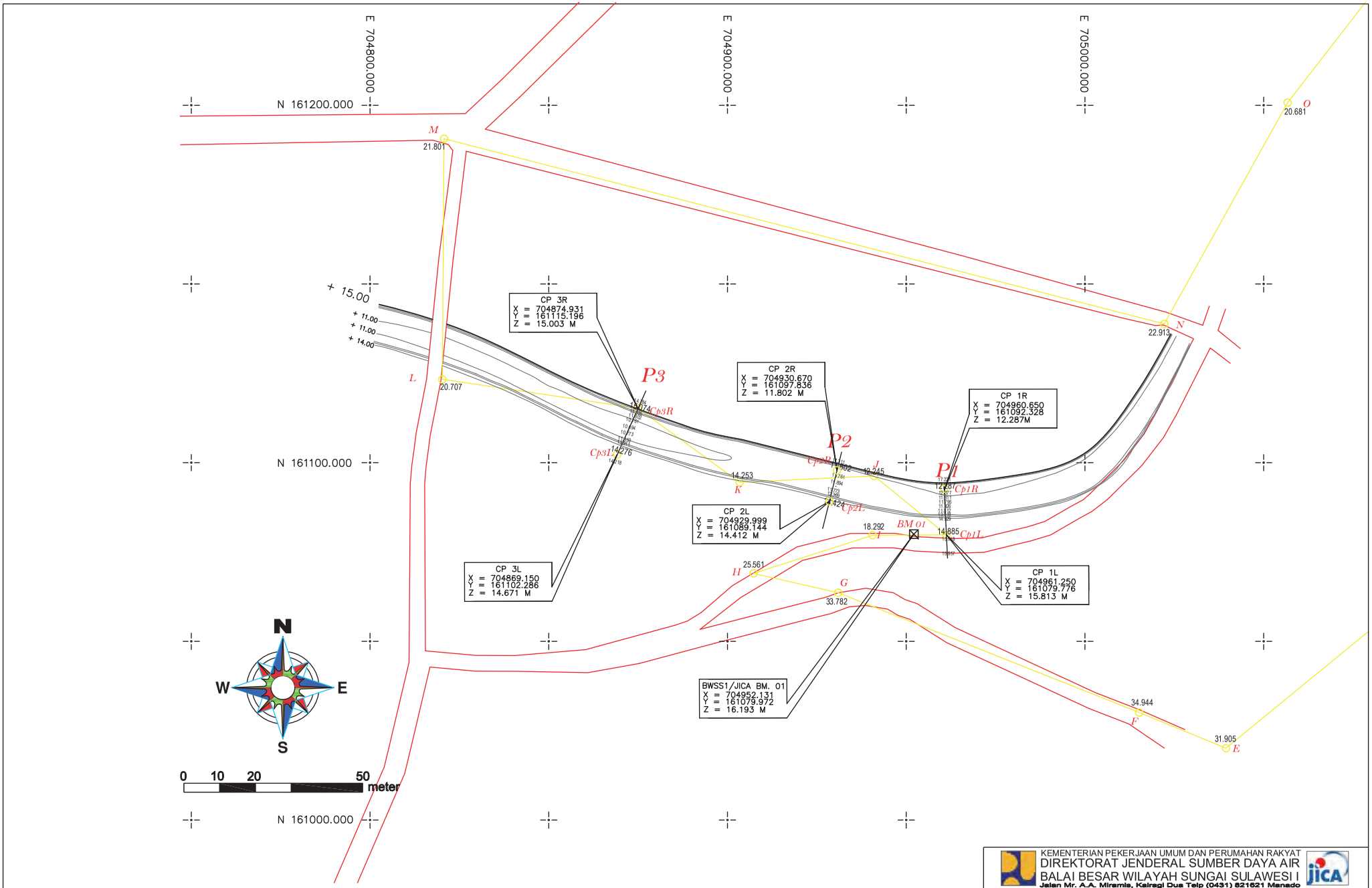
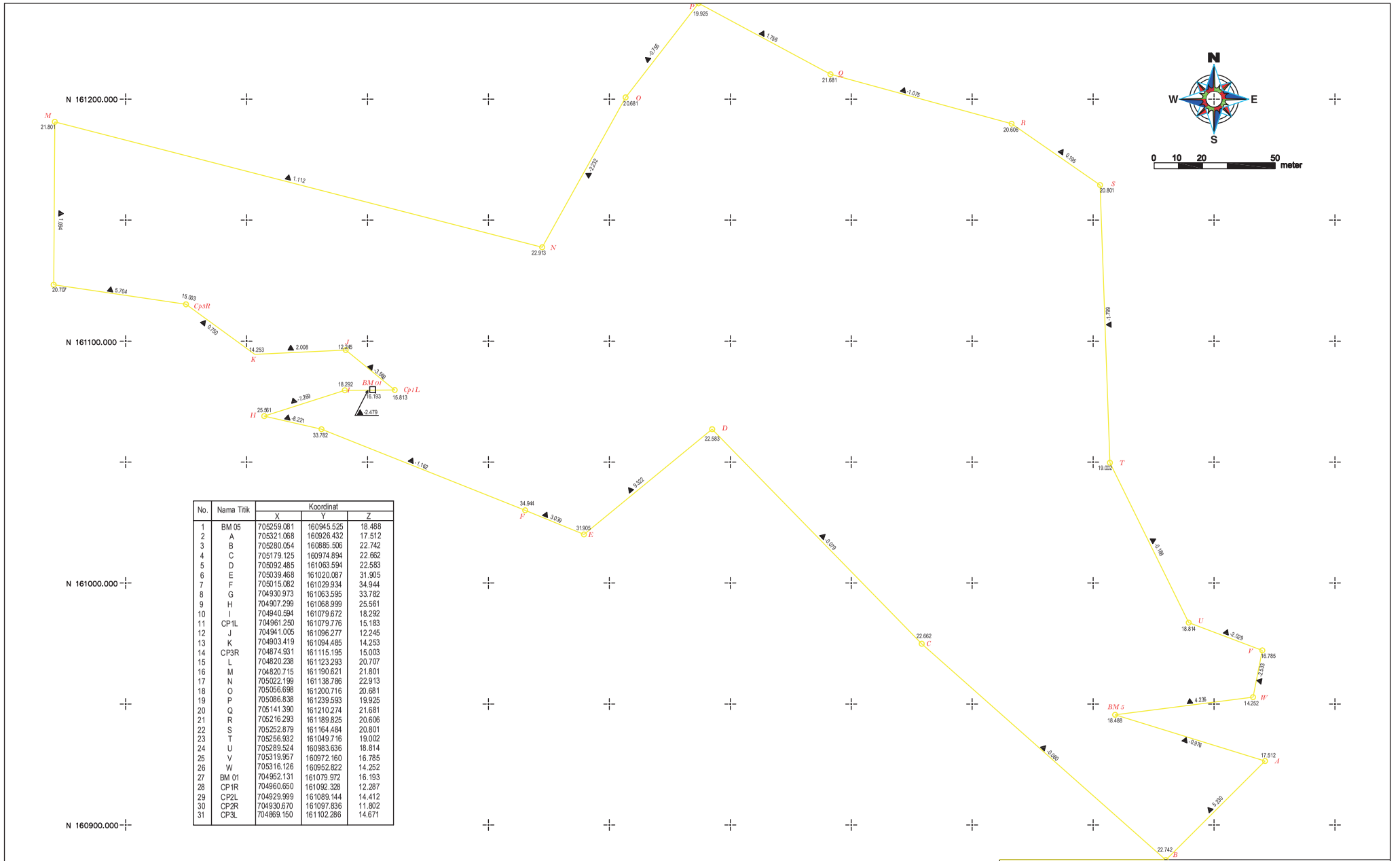


KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Maramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI SARIO			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : SRO–01
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR
DIREKTUR	Galih M. Fatian, ST		29 Januari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

SIZE A3



No.	Nama Titik	Koordinat		
		X	Y	Z
1	BM 05	705259.081	160945.525	18.488
2	A	705321.068	160926.432	17.512
3	B	705280.054	160885.506	22.742
4	C	705179.125	160974.894	22.662
5	D	705092.485	161063.594	22.583
6	E	705039.468	161020.087	31.905
7	F	705015.082	161029.934	34.944
8	G	704930.973	161063.595	33.782
9	H	704907.299	161068.999	25.561
10	I	704940.594	161079.672	18.292
11	CP1L	704961.250	161079.776	15.183
12	J	704941.005	161096.277	12.245
13	K	704903.419	161094.485	14.253
14	CP3R	704874.931	161115.195	15.003
15	L	704820.238	161123.293	20.707
16	M	704820.715	161190.621	21.801
17	N	705022.199	161138.786	22.913
18	O	705056.698	161200.716	20.681
19	P	705086.838	161239.593	19.925
20	Q	705141.390	161210.274	21.681
21	R	705216.293	161189.825	20.606
22	S	705252.879	161164.484	20.801
23	T	705256.932	161049.716	19.002
24	U	705289.524	160983.636	18.814
25	V	705319.957	160972.160	16.785
26	W	705316.126	160952.822	14.252
27	BM 01	704952.131	161079.972	16.193
28	CP1R	704960.650	161092.328	12.287
29	CP2L	704929.999	161089.144	14.412
30	CP2R	704930.670	161097.836	11.802
31	CP3L	704869.150	161102.286	14.671

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JUDUL : SURVEI TOPOGRAFI DI SUNGAI SARIO			SISTEM KOORD.: UTM 51N
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT			NO. LEMBAR : SRO–05
			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR 29 Januari 2018
DIREKTUR	Galih M. Fatian, ST		SIZE A3
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten:	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

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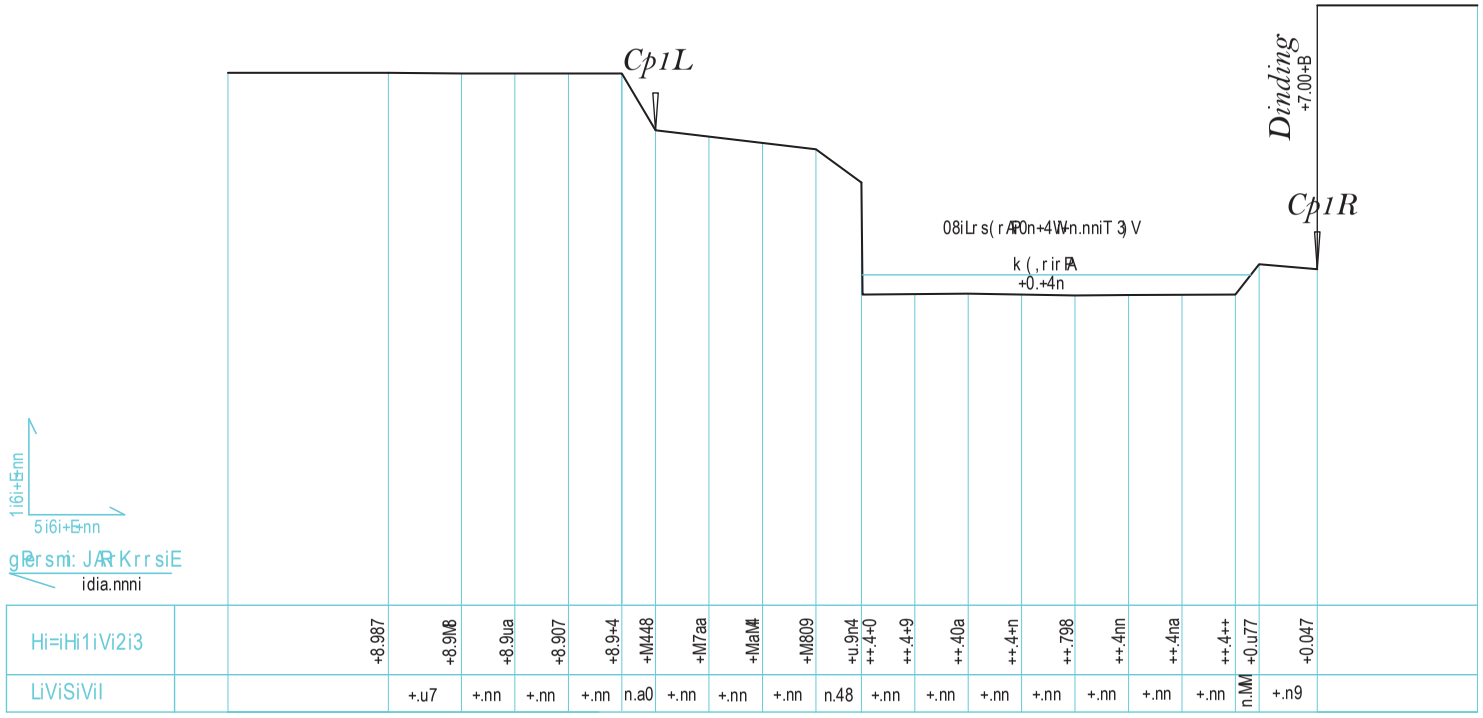

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LiViSiVil			+.u7	+.nn	+.nn	+.nn	n.a0	+.nn	+.nn	+.nn	n.48	+.nn	+.nn	+.nn	+.nn	+.nn	+.nn	+.nn	n.lM	+.n9	

SCALE (V) 0 2 6 10m

SCALE (H) 0 2 6 10m

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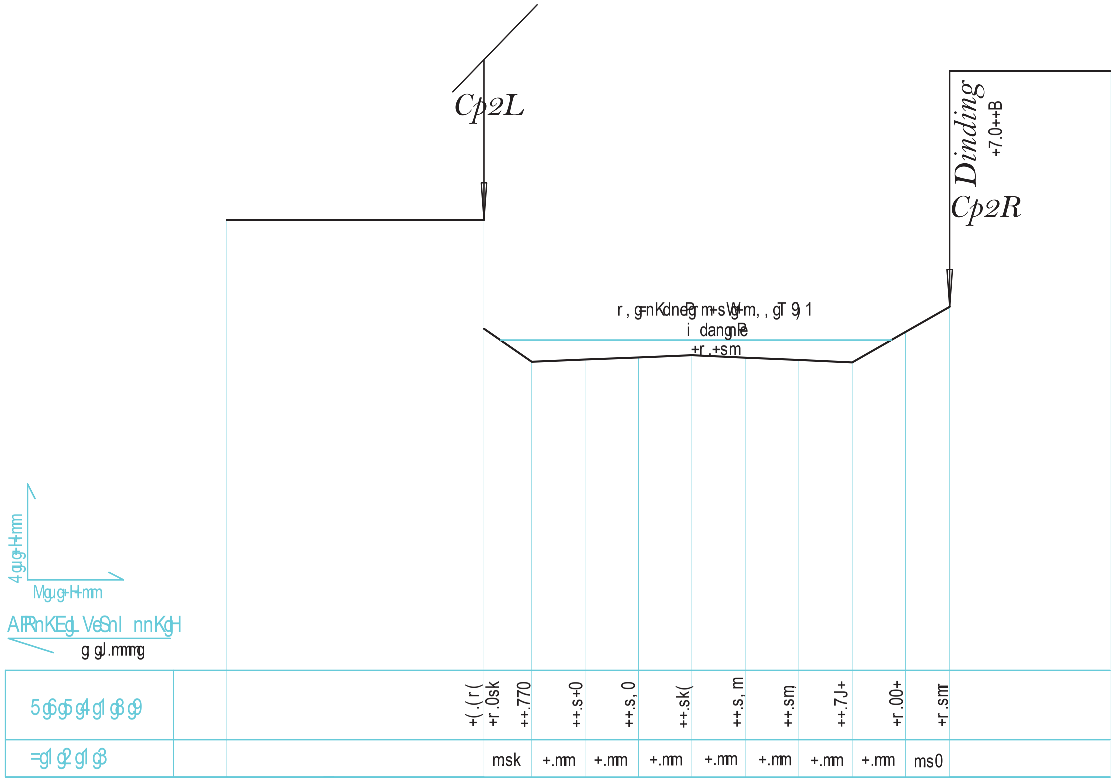
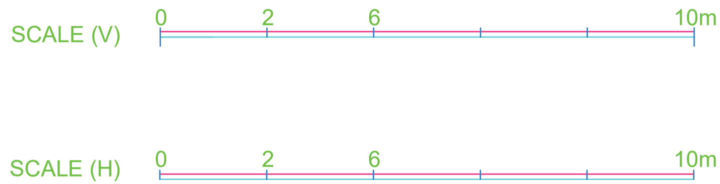
JUDUL : SURVEI TOPOGRAFI DI SUNGAI SARIO			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : SRO–02
PEKERJAAN [illegible]			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR 29 Januari 2018
DIREKTUR	Galih M. Fatian, ST		SIZE A3
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG





KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
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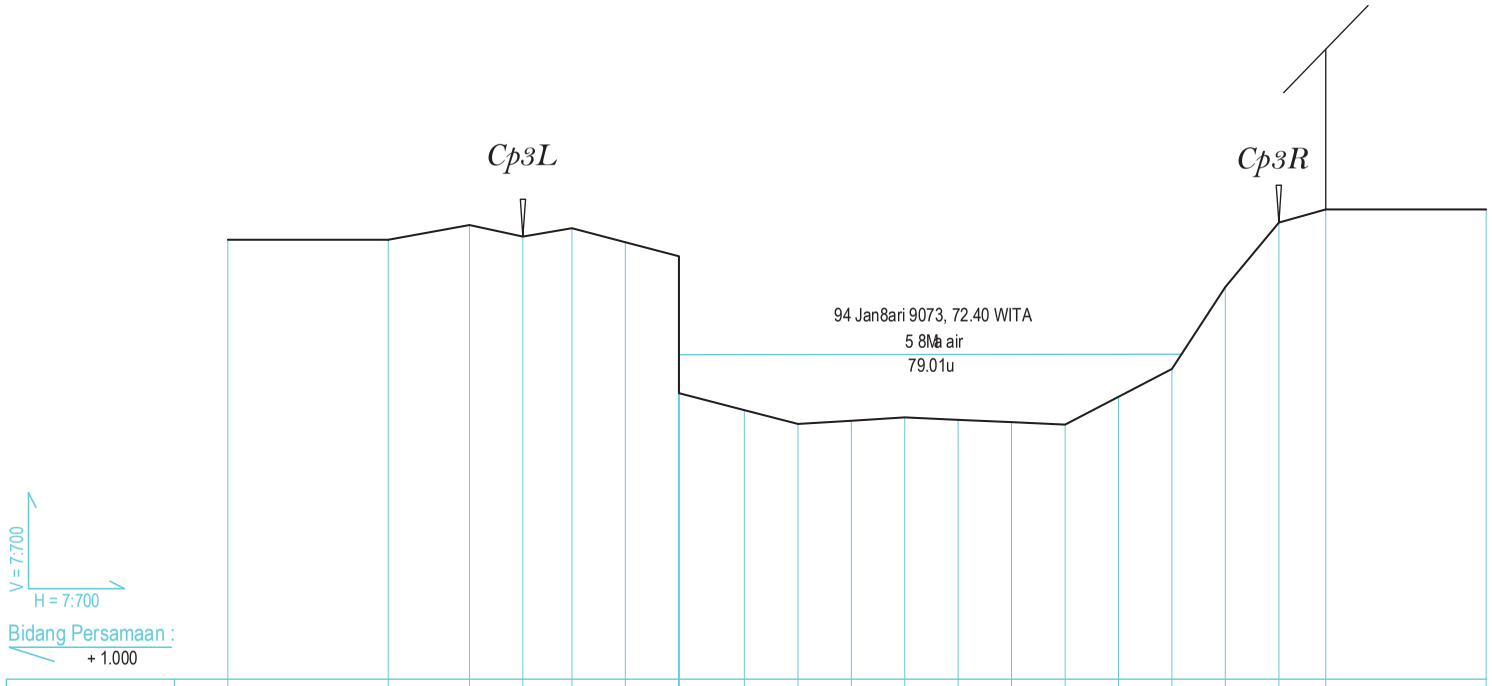
JUDUL : SURVEI TOPOGRAFI DI SUNGAI SARIO			SISTEM KOORD.: UTM 51N NO. LEMBAR : SRO-03 JML. LEMBAR : 5
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT			
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatian, ST		29 Januari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi	Sulawesi Utara	Kabupaten	Kota Manado
			C.V. ATRIUM ARSITEK KONSULTAN PERANCANG



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JARAK			7.49	7.00	0.67	7.00	7.00	7.92	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	0.33		

SCALE (V) 0 2 6 10m

SCALE (H) 0 2 6 10m

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
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JUDUL : SURVEI TOPOGRAFI DI SUNGAI SARIO			SISTEM KOORD.: UTM 51N
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT			NO. LEMBAR : SRO–04
			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR
DIREKTUR	Galih M. Fatian, ST		29 Januari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

SIZE A3

A6-1-No.004-48

ANNEX 6-1

Report No.005

Report of GEODETIC SURVEYS AT MALALAYANG RIVER (New BM Installment)

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI WILAYAH SUNGAI SULAWESI I
Jl. MR. A.A. Maramis Kairai Dua. Telp / Fax (0431) 81161 Manado

LAPORAN
GEODETIC SURVEYS AT MALALAYANG RIVER
FOR
CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)

OKTOBER 2018

NOMOR KONTRAK :

JICA/RBOs.03/OJT.01/BWSS-I/09/2018

CV. ATRIUM ARSITEK KONSULTAN PERANCANG
KOMPLEKS WALE LESTARI INDAH BLOK AA NO.5 TELP.0431-871692 MANADO

LEMBAR PENGESAHAN

LAPORAN SURVEI GPS SUNGAI MALALAYANG

PEKERJAAN:

CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)

Konsultan Pelaksana	: CV Atrium Arsitek Konsultan Perancang
Konsultan Pemilik Pekerjaan	: JICA Expert
Disahkan di	: Manado
Tanggal	: 21 Oktober 2018

PIHAK THE JICA EXPERT TEAM:	PIHAK CV. ATRIUM ARSITEK KONSULTAN PERANCANG:
Hirohisa MIURA JICA Long Term Expert	Galih M. Fatian Director

KATA PENGANTAR

Sehubungan dengan Kontrak Kerja antara pihak **JICA Expert Team dan CV ATRIUM ARSITEK KONSULTAN PERANCANG** pada 27 September 2018 dengan nomor kontrak **JICA/RBOs.03/OJT.01/BWSS-I/09/2018** untuk pekerjaan laporan hasil pekerjaan **Survei GPS Sungai Malalayang**. Laporan ini disusun untuk memberikan gambaran hasil dari pelaksanaan kegiatan ini dan menjadi bahan diskusi guna mendapatkan hasil perencanaan yang memadai, semoga bermanfaat dan dapat memenuhi tujuan. Atas kepercayaannya yang telah diberikan, kami ucapkan terimakasih.

Manado, 18 Oktober 2018

CV ATRIUM ARSITEK

KONSULTAN PERANCANG

Galih M. Fatian

Direktur

DAFTAR ISI

DAFTAR GAMBAR

DAFTAR TABEL

BAB I
PENDAHULUAN

1.1 Latar Belakang

Sungai memainkan peran penting dan memiliki nilai strategis dalam pengembangan kawasan suatu daerah, dan mempengaruhi semua aspek kehidupan masyarakat yang tinggal di Daerah Aliran Sungai. Hal ini dibuktikan dengan berkembangnya banyak permukiman dan peradaban masyarakat di tepian sungai termasuk kemunculan dan perkembangan kekaisaran dan daerah perkotaan di sepanjang sungai seperti sekarang ini. Sungai juga merupakan sarana untuk menghubungkan antara kota dan daerah. Ada banyak kendala dalam pengelolaan sungai, salah satunya data hidrologi masih terbatas seperti penampang sungai dan debit aliran. Oleh karena itu, untuk mewujudkan pengelolaan DAS terpadu, data hidrologi sungai harus dikalikan dan dipenuhi sesuai kebutuhan perencanaan dan pemantauan kondisi hidrologi sungai.

Dalam hal ini akan dikhususkan pembahasan mengenai informasi data spasial. Informasi data spasial adalah salah satu contoh informasi yang memiliki perananan sangat penting dalam kehidupan manusia. Data spasial adalah data yang memiliki referensi ruang kebumian (*georeference*) dimana berbagai data atribut terletak dalam berbagai unit spasial, informasi yang tercakup di dalamnya adalah informasi mengenai posisi. Pada penyusunan informasi data spasial diperlukan beberapa metode yang salah satunya adalah proses pengukuran.

Pengukuran *Global Positioning System* dapat diaplikasikan dalam bidang survei dan pemetaan terutama untuk menentukan penentuan posisi titik di permukaan bumi yang nantinya akan berguna dalam penyusunan informasi data spasial. *Global Positioning System* atau GPS adalah suatu sistem navigasi yang berbasis pada satelit yang tersusun pada suatu jaringan yang terletak pada garis edar bumi yang dilakukan oleh Departmen Pertahanan Amerika Serikat (Abidin, H.Z, 2007). Penentuan posisi dengan menggunakan GPS dapat memberikan koordinat titik-titik kontrol horisontal maupun vertikal dalam satu pengukuran. Dalam proses pengamatan dan pengukuran sendiri perlu diperhatikan alat dan metodenya agar hasil yang didapatkan sesuai dengan kebutuhan, utamanya dalam mendapatkan data koordinat teliti.

Oleh sebab itu pengukuran GPS goedetik sangatlah tepat dilakukan guna mendapatkan titik BM yang terikat secara pemetaan nasional. Pada pekerjaan ini, titik yang diukur menggunakan GPS adalam BM 1 Sungai Malalayang dan CP 4 yang diikat dari BM 5 Sario. Koordinat hasil pengamatan GPS ini akan dimanfaatkan untuk acuan pengukuran *longsection* dan *crosssection* sungai Malalayang.

1.2 Tujuan

Tujuan kegiatan ini antara lain:

1. Memberikan informasi koordinat BM 1 dan CP 4 sebagai acuan pengukuran *cross-section* Sungai Malalayang.
2. Membuat titik referensi tetap di Sungai Malalayang.

1.3 Hasil Kegiatan

Luaran kegiatan pengamatan GPS geodetik ini adalah:

1. Data / informasi BM dan CP dari referensi BM terdekat.

1.4 Manfaat

1. Mendapatkan koordinat referensi tetap berupa BM (Bench Mark) dan CP (Control Point) sungai Malalayang

BAB II
DASAR TEORI

2.1. Umum

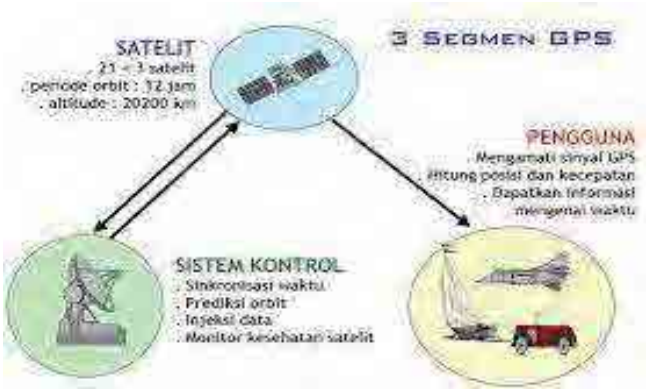
Di dalam beberapa bidang pekerjaan, kita sering menggunakan sebuah peta sebagai dasar rencana kerja. Untuk mengetahui kondisi topografi sungai, maka diperlukan pengukuran dan pemetaan. Pengukuran sendiri adalah sebuah teknik pengambilan data yang dapat memberikan nilai panjang, tinggi dan arah relatif dari sebuah obyek ke obyek lainnya. Sedang pemetaan adalah proses pembuatan peta berdasarkan olahan data hasil pengukuran. Salah satu jenis pengukuran adalah pengukuran GPS untuk mendapatkan koordinat acuan pengukuran (BM dan/atau CP). GPS (*Global Positioning System*) adalah sistem satelit navigasi dan penentuan posisi yang dimiliki dan dikelolah oleh Amerika Serikat. Dalam perkembangan lebih lanjut secara global, istilah yang lebih sesuai adalah *Global Navigation Satellite System* (GNSS) karena tidak hanya Amerika Serikat yang mengembangkan sistem penentuan posisi. GPS didesain untuk memberikan informasi posisi, kecepatan, dan waktu serta mempunyai 3 segmen, yaitu segmen satelit, segmen pengontrol, dan segmen penerima/pengguna. (Abidin,H.Z, 2007).

2.2. Segmen GPS

Pada dasarnya GPS terdiri atas tiga segmen utama dimana komponen segmen tersebut dapat dilihat dalam Gambar 2.1, yaitu:

1. Segmen angkasa (*space segment*), terdiri dari satelit-satelit GPS serta roket-roket peluncur satelit. Satelit GPS dapat dianalogikan sebagai stasiun radio di angkasa, yang dilengkapi dengan antena-antena untuk mengirim dan menerima sinyal-sinyal gelombang. Yang kemudian sinyal-sinyal tersebut diterima oleh *Receiver* GPS di/dekat permukaan Bumi, dan digunakan untuk menentukan informasi posisi, kecepatan, waktu serta parameter-parameter turunan lainnya. Setiap satelit GPS terdiri mempunyai dua sayap yang dilengkapi dengan sel-sel pembangkit tenaga matahari (*solar panel*). Satelit juga mempunyai komponen internal seperti jam atom dan pembangkit sinyal. Satelit GPS memiliki komponen eksternal yaitu beberapa antena yang digunakan untuk menerima dan memancarkan sinyal-sinyal ke dan dari satelit GPS.

2. Segmen sistem kontrol, berfungsi mengontrol dan memantau operasional semua satelit GPS dan memastikan bahwa semua satelit berfungsi sebagaimana mestinya. Secara spesifik tugas utama dari segmen sistem kontrol adalah:
   - Secara kontinyu memantau dan mengontrol sistem satelit
   - Menentukan dan menjaga waktu sistem GPS
   - Memprediksi ephemeris satelit serta karakteristik jam satelit
   - Secara periodik meremajakan (*update) navigation message* dari setiap satelit
   - Melakukan manuver satelit agar tetp berada dalam orbitnya, atau melakukan relokasi untuk menggantikan satelit yang tidak sehat, seandainya diperlukan
   - Menentukan orbit dari seluruh satelit GPS yang merupakan informasi vital untuk penentuan posisi dengan satelit.
3. Segmen pengguna, yang terdiri dari para pengguna satelit GPS, baik di darat, laut, udara, maupun di angkasa. Dalam hal ini, alat penerima sinyal GPS (GPS *receiver*) diperlukan untuk menerima dan memroses sinyal dari satelit GPS untuk digunakan dalam penentuan posisi, kecepatan, waktu maupun parameter turunan lainnya. Komponen utama dari suatu receiver GPS secara umum adalah: antena dengan *pre-amplifier*, pemroses sinyal, pemroses data (solusi navigasi), osilator presisi, unit pengontrolan receiver dan pemrosesan (*user and external communication*), catu daya, memori serta perekam data.



Gambar 2.1 Tiga Segmen GPS
(Abidin, H.Z, 2007)

2.3. Metode dan Prinsip Pengukuran

Konsep dasar pada penentuan posisi dengan GPS adalah reseksi (pengikatan kebelakang) dengan jarak, yaitu dengan pengukuran jarak secara simultan ke beberapa satelit GPS yang koordinatnya telah diketahui (Abidin, H.Z, 2007). Pada pelaksanaan

pengukuran penentuan posisi dengan GPS, pada dasarnya ada dua jenis/tipe alat penerima sinyal satelit (*receiver*) GPS yang dapat digunakan, yaitu :

- Tipe Navigasi digunakan untuk penentuan posisi yang tidak menuntut ketelitian tinggi.
- Tipe Geodetik digunakan untuk penentuan posisi yang menuntut ketelitian tinggi.

Posisi yang diberikan oleh *GPS* adalah posisi 3 dimensi (x,y,z atau φ,λ,h) yang dinyatakan dalam datum WGS (*World Geodetic System*) 1984, sedangkan tinggi yang diperoleh adalah tinggi ellipsoid. Pada pengukuran GPS masing-masing memiliki empat parameter yang harus ditentukan yaitu 3 parameter koordinat x, y, z atau L, B, h dan satu parameter kesalahan waktu akibat ketidak sinkronan jam osilator di satelit dengan jam di *receiver* GPS. Oleh karena itu, diperlukan minimal pengukuran jarak ke empat satelit. Metode penentuan posisi dengan GPS pertama-tama dibagi dua, yaitu metode absolut, dan metode diferensial. Masing-masing metode dapat dilakukan dengan cara *real time* dan atau *post-processing*. Apabila obyek yang ditentukan posisinya diam, maka metodenya disebut statik. Sebaliknya, apabila obyek yang ditentukan posisinya bergerak, maka metodenya disebut kinematik. Selanjutnya, metode yang lebih detail antara lain metode-metode seperti SPP, DGPS, RTK, Survei GPS, *Rapid* Statik, *Pseudo* Kinematik, *stop and go* serta beberapa metode lainnya.

- Metode absolut atau juga dikenal sebagai point positioning, menentukan posisi hanya berdasarkan pada 1 pesawat penerima (*receiver*) saja. Keteleitian posisi dalam beberapa meter (tidak berketelitian tinggi) dan umumnya hanya diperuntukan bagi keperluan navigasi.
- Metode relatif atau sering disebut *differential positioning*, menentukan posisi dengan menggunakan lebih dari sebuah *receiver*. Satu GPS dipasang pada lokasi tertentu dimuka bumi dan secara terus menerus menerima sinyal dari satelit dalam jangka waktu tertentu dijadikan sebagai referensi bagi yang lainnya. Metode ini menghasilkan posisi berketelitian tinggi (umumnya kurang dari 1 meter) dan diaplikasikan untuk keperluan survei geodesi ataupun pemetaan yang memerlukan ketelitian tinggi

Tabel 2.1 Metoda Penentuan Posisi Menggunakan GPS

(Abidin, H.Z, 2007)

Metode	Absolute (1 receiver)	Differensial (min 2 receiver)	Titik	Receiver
Static	√	√	Diam	Diam
Kinematik	√	√	Bergerak	Bergerak
Rapid static		√	Diam	Diam (singkat)
Pseudeo kinematic		√	Diam	Diam & bergerak
Stop and go		√	Diam	Diam & bergerak

2.3.1 Penentuan Posisi Statik

Pada prinsipnya survey GPS bertumpu pada metode-metode penentuan posisi statik secara diferensial dengan menggunakan data fase. Penentuan posisi relatif atau metode differensial adalah menentukan posisi suatu titik relatif terhadap titik lain yang telah diketahui koordinatnya. Pengukuran dilakukan secara bersamaan pada dua titik dalam selang waktu tertentu. Selanjutnya, data hasil pengamatan diproses dan dihitung sehingga akan didapat perbedaan koordinat kartesian 3 dimensi (dx, dy, dz) atau disebut juga dengan *baseline* antar titik yang diukur. Dalam hal ini pengamatan satelit GPS umumnya dilakukan *baseline* per *baseline* selama selang waktu tertentu (beberapa puluh menit hingga beberapa jam tergantung tingkat ketelitian yang diinginkan) dalam suatu kerangka titik-titik yang akan ditentukan posisinya. Karakteristik umum memerlukan minimal dua *receiver*, satu ditempatkan pada titik yang telah diketahui koordinatnya. Posisi titik ditentukan relatif terhadap titik yang diketahui. Konsep dasar adalah *differencing process*, dapat mengeliminir atau mereduksi pengaruh dari beberapa kesalahan dan bias. Ketelitian posisi yang diperoleh bervariasi dari tingkat mm sampai dengan dm.

Pada survei GPS, pemrosesan data GPS untuk menentukan koordinat dari titik-titik dalam kerangka umumnya akan mencakup tiga tahapan utama, yaitu :

- Pengolahan data dari setiap *baseline* dalam kerangka
- Perataan jaringan yang melibatkan semua *baseline* untuk menentukan koordinat dari titik-titik dalam kerangka

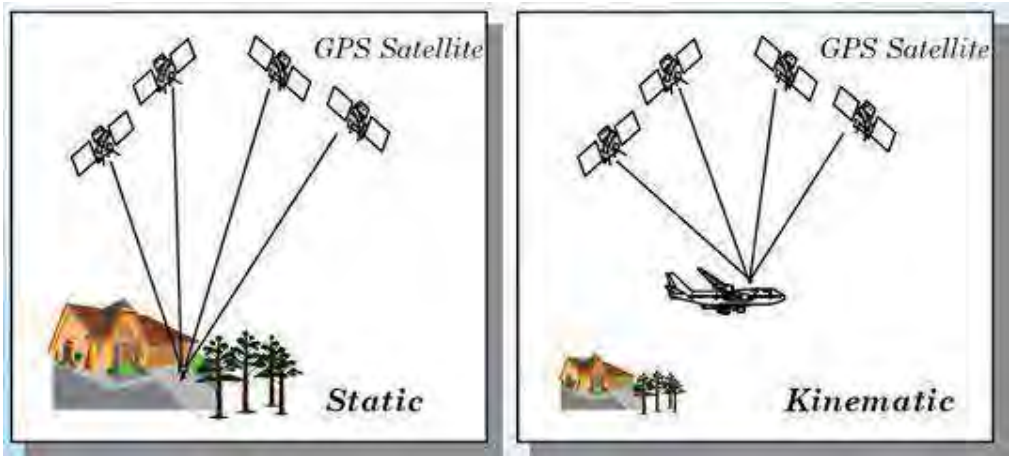
- Transformasi koordinat titik-titik tersebut dari datum WGS 84 ke datum yang dibutuhkan pengguna

2.3.2 Penentuan Posisi Kinematik

Penentuan posisi secara kinematik adalah penentuan posisi dari titik-titik yang bergerak dan receiver GPS tidak dapat atau tidak mempunyai kesempatan untuk berhenti pada titik-titik tersebut. Penentuan posisi kinematik ini dapat dilakukan secara absolut ataupun diferensial dengan menggunakan data *pseudorange* dan/atau fase. Hasil penentuan posisi bisa diperlukan saat pengamatan atau sesudah pengamatan.

Berdasarkan pada jenis data yang digunakan serta metode penentuan posisi yang digunakan, ketelitian posisi kinematik yang diberikan oleh GPS dapat berkisar dari tingkat rendah sampai tingkat tinggi. Dari segi aplikasinya metode kinematik GPS akan bermanfaat untuk navigasi, pemantauan, *guidance*, fotogrametri, *airbone gravimetry*, survei hidrografi, dan lain - lain. Terdapat beberapa karakteristik dari metode kinematik teliti yang patut dicatat yaitu :

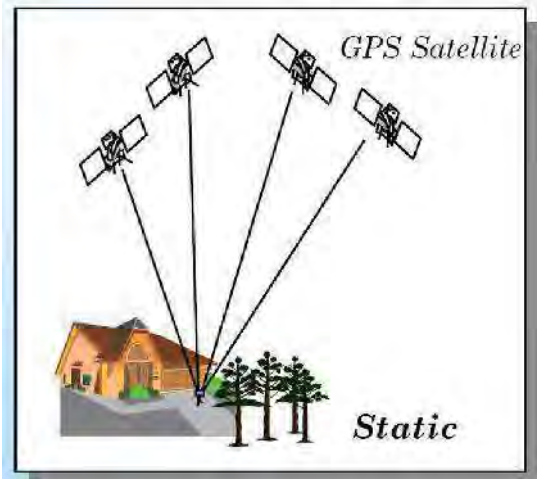
- Metode ini harus berbasiskan penentuan posisi diferensial yang menggunakan data fase
- Problem utamanya adalah penentuan ambiguitas fase secara *on-the-fly*, yaitu penentuan ambiguitas fase pada saat *receiver* sedang bergerak dalam waktu sesingkat mungkin.
- Penentuan ambiguitas secara *on-the-fly* akan meningkatkan ketelitian, keandalan, fleksibilitas dari penentuan posisi kinematik.
- Saat ini dikenal beberapa teknik penentuan ambiguitas fase.
- Hasil penentuan posisi bisa diperlukan saat pengamatan ataupun sesudah pengamatan
- Untuk moda real time, diperlukan komunikasi data antara stasiun referensi dengan *receiver* yang bergerak.



Gambar 2.2 Posisi Satelit GPS Statik dan Kinematik
(Abidin, H.Z.2007)

2.3.3 Penentuan Posisi Rapid Statik

Metode penentuan posisi dengan survei static singkat pada dasarnya adalah survei statik dengan waktu pengamatan yang lebih singkat, yaitu 5-20 menit. Prosedur operasional lapangan pada survei statik singkat adalah sama seperti pada survei statik, hanya selang waktu pengamatannya yang lebih singkat. Oleh sebab itu disamping memerlukan perangkat lunak yang handal dan canggih, metode statik singkat juga memerlukan geometri pengamatan yang baik, tingkat residu kesalahan dan bias yang relatif rendah, serta lingkungan pengamatan yang relatif tidak menimbulkan multipath. Secara umum gambaran metode ini dapat dilihat pada gambar 2.3.



Gambar 2.3. *Rapid Static*

2.4. Ketelitian GPS Geodetik

Pada sistem GPS terdapat beberapa kesalahan komponen sistem yang akan mempengaruhi ketelitian hasil posisi yang diperoleh. Kesalahan-kesalahan tersebut contohnya kesalahan orbit satelit, kesalahan jam satelit, kesalahan jam receiver, kesalahan pusat fase antena, dan *multipath*. Hal hal lain yang mempengaruhi kesalahan sistem seperti efek *imaging*, dan *noise*. Kesalahan ini dapat dieliminir dengan menggunakan teknik *differencing* data (Abidin, H.Z, 2007).

Ketelitian posisi yang didapat dari pengamatan *GPS* secara umum bergantung pada 4 faktor, yaitu:

a. Ketelitian data
   tipe data yang digunakan
   kualitas *receiver GPS*
   level dari kesalahan dan bias
b. Geometri satelit
   jumlah satelit
   lokasi dan distribusi satelit
   lama pengamatan
c. Metode penentuan posisi
   absolute dan *differensial positioning*
   static, rapid static, pseudo-kinematic, stop and go, kinematic
   one and multi monitor station
d. Strategi pemrosesan data
   real-time dan *post processing*
   strategi eliminasi dan pengkoreksian kesalahan dan bias
   metode estimasi yang digunakan
   pemrosesan baseline dan perataan jarring
   kontrol kualitas

2.5. Kesalahan dan Bias

Kesalahan dan bias GPS pada dasarnya dapat dikelompokkan menjadi (Abidin, H.Z, 2007):

a. Kesalahan *ephemeris* (orbit), yaitu kesalahan dimana orbit satelit yang dilaporkan oleh ephemeris satelit tidak sama dengan orbit satelit yang sebenarnya. Kesalahan ini akan mempengaruhi ketelitian dari koordinat titik-titik. Kesalahan orbit satelit

GPS pada dasarnya disebabkan oleh kekurang telitian pada proses perhitungan orbit satelit, kesalahan dalam prediksi orbit untuk periode waktu setelah *uploading* ke satelit, dan penerapan kesalahan orbit yang sengaja diterapkan.

b. Bias Ionosfer. Jumlah elektron dan ion bebas pada lapisan ionosfer tergantung pada besarnya intensitas radiasi matahari serta densitas gas pada lapisan tersebut. Bias ionosfer akan mempengaruhi kecepatan, arah, polarisasi, dan kekuatan sinyal GPS. Ionosfer akan memperlambat *pseudorange* (ukuran jarak menjadi lebih panjang) dan mempercepat fase (ukuran jarak menjadi lebih pendek).

c. Bias Troposfer. Lapisan troposfer merupakan atmosfer netral yang berbatasan dengan permukaan Bumi dimana temperatur menurun dengan membesarnya ketinggian. Lapisan ini memiliki ketebalan 9-16 km. Disini sinyal GPS akan mengalami refraksi, yang menyebabkan perubahan pada kecepatan dan arah sinyal GPS. Efek utama dari troposfer sangat berpengaruh pada kecepatan, atau dengan kata lain terhadap hasil ukuran jarak. Pada lapisan ini *pseudorange* dan fase diperlambat. Dan besar magnitude bias troposfer pada kedua data pengamatan tersebut adalah sama.

d. *Multipath*, yaitu fenomena dimana sinyal dari satelit tiba di antena GPS melalui dua atau lebih lintasan yang berbeda. Hal ini disebabkan karena sinyal dipantulkan oleh benda-benda disekitar antena sebelum tiba di antena. Benda-benda tersebut dapat berupa jalan raya, gedung, danau, dan kendaraan. Perbedaan panjang lintasan menyebabkan sinyal-sinyal tersebut berinteferensi ketika tiba di antena yang pada akhirnya menyebabkan kesalahan pada hasil pengamatan. Dan mempengaruhi hasil ukuran *pseudorange* maupun *carrier phase.*

e. Ambiguitas Fase (*Cycle Ambiguity)*, yaitu jumlah gelombang penuh yang tidak terukur oleh receiver GPS. Sepanjang *receiver* GPS mengamati sinyal secara kontinyu (tidak terjadi *cycle slip*), maka ambiguitas fase akan selalu sama harganya untuk setiap epok.

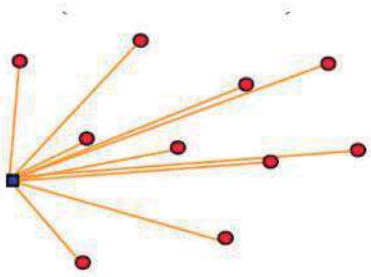
f. *Cycle Slips*, adalah ketidak-kontinyuan dalam jumlah gelombang penuh dari fase gelombang pembawa yang diamati, karena receiver yang disebabkan oleh satu dan lain hal ‘terputus’

g. *Selective Availability,* adalah metode yang pernah diaplikasian untuk memproteksi ketelitian posisi absolut secara *real-time.* Dilakukan oleh pihak militer Amerika Serikat, sebagai pemilik dan pengelola GPS, secara sengaja dengan menerapkan kesalahan-kesalahan berikut, yaitu:

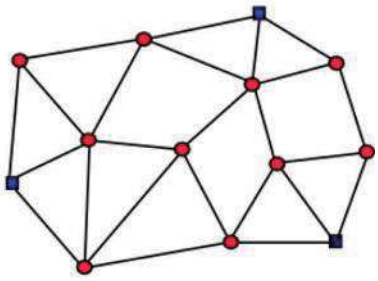
h. Kesalahan waktu satelit (*dithering technique* atau SA-□), memanipulasi frekuensi dari jam satelit
i. Kesalahan ephemeris satelit (*epsilon technique* atau SA-□), memanipulasi data ephemeris dalam pesan navigasi yang dikirimkan satelit
j. *Anti spoofing*, suatu kebijakan dari DoD Amerika Serikat, dimana kode-P dari sinyal GPS diubah menjadi kode-Y
k. Kesalahan Jam, kesalahan jam *receiver* dan jam satelit. Kesalahan dari salah satu jam, apakah itu dalam bentuk offset waktu, offset frekuensi, ataupun *frequecy drift* akan langsung mempengaruhi ukuran jarak, baik *pseudorange* maupun jarak fase. Ketelitian ukuran jarak *pseudorange* yang diperoleh akan sangat tergantung pada ketelitian dari dt.
l. *Imaging*, yaitu fenomena yang melibatkan suatu benda konduktif (konduktor) yang berada dekat dengan antena GPS, seperti reflektor berukuran besar maupun *groundplane* dari antena itu sendiri. Fenomena ini seolah-olah menjadi antena tersendiri yang dapat dilihat sebagai 'bayangan' (*image*) dari antena yang sebenarnya.

2.6. Geometri Jaring

Sebatas tahap perhitungan baseline, bentuk jaring titik-titik GPS bukanlah suatu isu yang krusial dibandingkan dengan ukuran jaringan. Panjang baseline lebih berpengaruh dibandingkan letak dan orientasinya. Untuk keperluan penentuan *cycle ambigugity*, panjang baseline dalam suatu jaring GPS sebaiknya bervariasi secara gradual dari pendek ke panjang (*bootstraping method*). Tetapi dari segi untuk menjaga tingkat serta konsistensi ketelitian titik-titik tersebut sebaiknya terdistribusi secara merata dan teratur. Karakteristik baseline sendiri terdiri dari dua jenis metoda, yaitu metoda radial dan jaring seperti pada gambnar 2.4 dan gambar 2.5.



Gambar 2.4 Metoda Radial



Gambar 2.5 Metoda Jaring

(Abidin et al.,2002 dalam Abidin,H.Z, 2007)

2.6.1 Metode Radial

Adapun karakteristik dari metoda radial ini adalah sebagai berikut :

- Geometri untuk penentuan posisi relatif lebih lemah.
- Ketelitian posisi yang diperoleh relatif akan lebih rendah.
- Waktu pengumpulan dan pengolahan data relatif akan lebih cepat.
- Jumlah *receiver* dan/atau sesi pengamatan yang diperlukan relatif lebih sedikit.
- Biaya untuk logistik, transportasi, dan akomodasi relatif akan lebih murah.
- Kontrol kualitas relatif lemah.

2.6.2 Metode Jaring

Adapun karakteristik metoda jaring ini adalah sebagai berikut :

- Geometri untuk penentuan posisi relatif lebih kuat
- Ketelitian posisi yang diperoleh relative akan lebih tinggi.
- waktu pengumpulan dan pengolahan data relatif akan lebih lambat.
- Jumlah *receiver* dan/atau sesi pengamatan yang diperlukan relative lebih banyak.
- Biaya untuk logistik, transportasi, dan akomodasi relatif akan lebih mahal.
- Kontrol kualitas relatif lebih baik.
-

2.7. Receiver GPS

Receiver GPS untuk penentuan posisi dibedakan menjadi 3 tipe yaitu :

a. GPS Geodetic

GPS Geodetic pada gambar 3.6 memiliki sistem penerima (*receivers*) dual frekuensi yaitu mampu menangkap dua signal L1 dan L2 bersamaan. GPS tersebut umumnya digunakan untuk keperluan survei dengan tingkat akurasi sangat tinggi dan tingkat kesalahan dibawah centimeter, misalnya kegiatan survei : kontruksi, jalan bebas hambatan, pengeboran, dan lain sebaginya. Tipe ini adalah tipe paling canggih, paling mahal, dan jiuga memberikan data yang paling presisi (Hasyim, 2009).

Gambar 2.6 GPS Geodetik

b. GPS *Mapping*

GPS *Mapping* memiliki frekuensi tunggal (*single* frekuensi) yang berfungsi menerima dan mengumpulkan data-data spasial untuk kemudian dituangkan dalam kegiatan GIS/SIG (sitem informasi geografis). Tingkat ketelitian GPS ini termasuk mediuum (menengah) dengan kesalahan dibawah meter hingga beberapa meter (<10m). Perangkat ini biasa digunakan untuk kegiatan pemetaan (Hasyim, Abdul Wahid.2009). Receiver pemetaan ini memberikan data pseudorange (kode C/A), data pada receiver tipe pemetaan direkam dan kemudian dipindah atau didownload ke komputer untuk diproses lebih lanjut.

c. GPS Navigasi

GPS Navigasi biasa digunakan oleh sipil. Perangkat ini memiliki kemampuan lebih rendah dari GPS *Mapping* karena keterbatasan pada *track log* maupun penyimpanan *waypoint* dan bahkan fasilitas kompas ataupun altimeter tidak ditemui (Hasyim, Abdul Wahid.2009). Umumnya tipe ini digunakan untuk penentuan posisi *absolute* secara instan yang tidak menuntut ketelitian terlalu tinggi.

2.8. Kerangka Kontrol Vertikal

Kerangka dasar vertikal merupakan teknik dan cara pengukuran kumpulan titik - titik yang telah diketahui atau ditentukan posisi vertikalnya berupa ketinggiannya terhadap bidang rujukan ketinggian tertentu. Bidang ketinggian rujukan ini biasanya berupa ketinggian muka air laut rata - rata (mean sea level - MSL) atau ditentukan lokal.

a. Metode sipat datar prinsipnya adalah Mengukur tinggi bidik alat sipat datar optis di lapangan menggunakan rambu ukur.

b. Pengukuran Trigonometris prinsipnya adalah Mengukur jarak langsung (Jarak Miring), tinggi alat, tinggi, benang tengah rambu, dan suclut Vertikal (Zenith atau Inklinasi).
c. Pengukuran Barometris pada prinsipnya adalah mengukur beda tekanan atmosfer.
d. Metode sipat datar atau waterpass merupakan metode yang paling teliti dibandingkan dengan metode trigonometris dan barometris. Hal ini dapat dijelaskan dengan menggunakan teori perambatan kesalahan yang dapat diturunkan melalui persamaan matematis diferensial parsial.

2.9. Pengukran Waterpass

Pengukuran waterpass adalah pengukuran untuk menentukan ketinggian atau beda tinggi antara dua titik. Pengukuran waterpass ini sangat penting gunanya untuk mendapatkan data sebagai keperluan pemetaan, perencanaan ataupun untuk pekerjaan konstruksi.

Hasil-hasil dari pengukuran waterpass di antaranya digunakan untuk perencanaan jalan, jalan kereta api, saluran, penentuan letak bangunan gedung yang didasarkan atas elevasi tanah yang ada, perhitungan urugan dan galian tanah, penelitian terhadap saluran-saluran yang sudah ada, dan lain-lain.

Dalam pengukuran tinggi ada beberapa istilah yang sering digunakan, yaitu:

- Garis vertikal adalah garis yang menuju ke pusat bumi, yang umum dianggap sama dengan garis unting-unting.
- Bidang mendatar adalah bidang yang tegak lurus garis vertikal pada setiap titik. Bidang horisontal berbentuk melengkung mengikuti permukaan laut.
- Datum adalah bidang yang digunakan sebagai bidang referensi untuk ketinggian, misalnya permukaan laut rata-rata.
- Elevasi adalah jarak vertikal (ketinggian) yang diukur terhadap bidang datum.
- Banch Mark (BM) adalah titik yang tetap yang telah diketahui elevasinya terhadap datum yang dipakai, untuk pedoman pengukuran elevasi daerah sekelilingnya.

Prinsip cara kerja dari alat ukur waterpass adalah membuat garis sumbu teropong horisontal. Bagian yang membuat kedudukan menjadi horisontal adalah nivo, yang berbentuk tabung berisi cairan dengan gelembung di dalamnya. Dalam menggunakan alat ukur waterpass harus dipenuhi syarat - syarat sebagai berikut :

- Garis sumbu teropong harus sejajar dengan garis arah nivo.
- Garis arah nivo harus tegak lurus sumbu I.

- Benang silang horisontal harus tegak lurus sumbu I.

Pada penggunaan alat ukur waterpass selalu harus disertai dengan rambu ukur (baak). Yang terpenting dari rambu ukur ini adalah pembagian skalanya harus betul-betul teliti untuk dapat menghasilkan pengukuran yang baik. Di samping itu cara memegangnya pun harus betul-betul tegak (vertikal). Agar letak rambu ukur berdiri dengan tegak, maka dapat digunakan nivo rambu . Jika nivo rambu ini tidak tersedia, dapat pula dengan cara menggoyangkan rambu ukur secara perlahan-lahan ke depan, kemudian ke belakang, kemudian pengamat mencatat hasil pembacaan rambu ukur yang minimum. Cara ini tidak cocok bila rambu ukur yang digunakan beralas berbentuk persegi.

Pada saat pembacaan rambu ukur harus selalu diperhatikan bahwa :

$2BT = BA + BB$

Adapun : BT = Bacaan benang tengah waterpass
BA = Bacaan benang atas waterpass
BB = Bacaan benang bawah waterpass

Bila hal diatas tidak terpenuhi, maka kemungkinan salah pembacaan atau pembagian skala pada rambu ukur tersebut tidak benar.

Rumus-rumus yang digunakan dalam pengukuran waterpass adalah

a. Pengukuran Waterpas Memanjang

Beda tinggi antara titik P1 dan P2 adalah :

$\Delta hP1P2 = BTP1 - BTP2$

dimana :

$\Delta hP1P2$ = beda tinggi antara titik P1 dan P2

BTP1 = bacaan benang tengah di titik P1

BTP2 = bacaan benang tengah di titik P2

Jarak antara A dengan P1 adalah :

$do = 100 \times (BAP1 - BBP1)$

Adapun :

dAP = jarak antara titik A dan P

BAA = bacaan benang atas di titik A

BBA = bacaan benang bawah di titik A

Dalam pengukuran waterpass memanjang, pesawat diletakkan di tengah-tengah titik yang akan diukur. Hal ini untuk meniadakan kesalahan akibat tidak sejajarnya kedudukan sumbu teropong dengan garis arah nivo.

b. Pengukuran Waterpass Melintang

Beda tinggi antara titik 1 dan 2 adalah :

$\Delta h12 = BT1 - BT2$

Adapun :

$\Delta h12$ = beda tinggi antara titik 1 dan titik 2

BT1 = bacaan benang tengah di titik 1

BT2 = bacaan benang tengah di titik 2

Pengukuran juga dapat dilakukan dengan berdiri di atas titik yang diukur. Beda tinggi antara titik 1 dan titik P adalah :

$\Delta h1P = BT1 - TP$

Adapun :

$\Delta h1P$ = beda tinggi antara titik 1 dan titik P

BT1 = bacaan benang tengah di titik 1

TP = tinggi pesawat atau alat

BAB III
METODOLOGI PELAKSANAAN

3.1 Tahapan Pelaksanaan Pekerjaan

Tahapan pelaksanaan pekerjaan merupakan salah satu faktor yang menentukan keberhasilan pekerjaan tersebut. Tahapan pekerjaan yang terperinci, logis dan tertata sesuai dengan jadwal yang telah ditetapkan akan sangat membantu pelaksanaan pekerjaan dilapangan. Berikut ini adalah tahapan pelaksanaan pekerjaan yang dilaksanakan.

3.1.1 Tahap Persiapan

Pada tahap persiapan, pekerjaan yang dilaksanakan berkaitan dengan pengamatan GPS adalah :

1. Pengurusan ijin khususnya yang berkaitan dengan pemerintah setempat
2. Persiapan tenaga dan alat ukur serta perlengkapannya
3. Kalibrasi dan penyiapan alat ukur yang akan di gunakan
4. Mempersiapkan alat dan bahan pembuatan BM dan CP
5. Mempersiapkan fasilitas akomodasi dan transportasi yang dapat memperlancar pekerjaan dilapangan.

Adapun peralatan yang digunakan dalam pelaksanaan pekerjaan pengukuran sungai ini adalah sebagai berikut :

Tabel 3.1 Peralatan Dan Bahan Yang Digunakan

No	Nama Alat	Jumlah
1.	GPS Geodetik Topcon Hiper-SR	2
2.	Waterpass Topcon AT-B3	1
3.	Roll meter	2
4.	GPS Navigasi	1
5.	Statif	3
6.	Rambu Ukur	2
7.	Kamera	1

3.1.2 Orientasi Lapangan

Sebelum menentukan langkah atau menyusun jadwal pelaksanaan pekerjaan terlebih dahulu dilakukan orientasi lapangan, sehingga nantinya kebutuhan peralatan maupun tenaga dapat diprediksi dengan baik. Dalam orientasi lapangan beberapa kegiatan orientasi lapangan adalah :

1. Menyiapkan *basecamp*, tenaga lokal dan sarana transportasi lapangan
2. Bersama-sama dengan Konsultan perencana menentukan titik peletakan BM/CP, titik awal pengukuran, dan batas pengukuran.
3. Menentukan titik referensi (BM) pengukuran yang sudah diketahui koordinatnya (X,Y,Z).
4. Menentuka lokasi pemasangan Control Point (CP).
5. Menentukan metode rencana pengukuran yang akan digunakan berdasarkan kondisi daerah yang akan dipetakan.
6. Menentukan alat-alat pengukuran yang akan digunakan berdasarkan kondisi daerah yang akan dipetakan.
7. Melakukan pemotretan lokasi pengukuran sebagai dokumentasi.
8. Menentukan lama proses pengukuran topografi

3.1.3 Pembuatan dan Pemasangan BM/CP

Pemasangan patok meliput patok Bench Mark dan CP dengan rincian sebagai berikut :

1. Benchmark, akan dilakukan penempatan patok dengan persetujuan konsultan perencana. BM berbentuk marmer dan ditempatkan pada peilschaal sungai Malalayang.
2. Control Point (CP) ditempatkan pada titik – titik tertentu di lokasi pengukuran. Jumlah CP sungai adalah 7 dengan rincian 6 CP saling berseberangan dan tegak lurus dengan alur sungai. Sementara CP ke tujuh (dinamai CP 4) sebagai titik kontrol tambahan pengukuran.

3.1.4 Proses Pengukuran

Pengukuran yang dilakukan pada tahap ini adalah pengukuran GPS dan waterpass. Tujuan pengukuran ini adalah untuk mendapatkan referensi pengukuran *crosssection* sungai. Pengukuran GPS untuk mendapatkan koordinat horizontal (x, y), dan pengukuran *waterpass* untuk mengikat tinggi patok agar memiliki referensi

elevasi yang sama. Pengukuran GPS geodetik menggunakan metode statik dengan pengolahan *post-processing* (pengolahan data setelah pengamatan). Sedangkan pengukuran *waterpass* dilakukan secara *double stand* untuk mendapatkan ukuran lebih sehingga kesalahan pengukuran dan bacaan dapat diminimalisir.

3.1.5 Analisa Data

Analisa data dilakukan setelah dilakukan pengukuran dilapangan. Analisa yang dilakukan pada pengukuran ini antara lain :

1. Melakukan pengolahan data GPS
2. Melakukan perhitungan beda tinggi
3. Menghitung elevasi titik

BAB IV
PELAKSANAAN PEKERJAAN

4.1 Pemasangan BM dan CP

Patok benchmark merupakan patok permanen yang terbuat dari marmer dengan ukuran tertentu. Fungsi benchmark ini sebagai referensi atau acuan dalam pengukuran di sekitar titik tersebut. BM dan CP yang dipasang antara lain BM 1 dan CP 4, dimana CP 4 difungsikan sebagai tambahan referensi pengukuran. Patok CP dibuat dengan pipa PVC diameter 5 inch yang disertai tulangan dan cor semen. Pada CP memiliki nomor dan kode sungai MLL yang mereprentasikan Sungai Malalayang. Selain pemasangan tersebut juga dipasang 6 CP sebagai acuan *crosssection.*

Penentuan koordinat BM tersebut dapat digunakan 2 cara, yaitu dengan alat GPS Geodetik, ataupun dengan pengukuran lapangan dengan pengikatan pada BM sebelumnya. Pada pekerjaan ini, koordinat BM ditentukan dengan pengukuran GPS geodetik untuk posisi horizontal (x, y) dan pengukuran waterpass untuk mendapatkan elevasi BM. Titik referensi adalah BM 5 Sario yang terletak sekitar 4.5 km di sebelah utara lokasi pengukuran.

4.2 Pengamatan GPS

Pengamatan atau pengambilan GPS geodetik dilakukan secara *baseline* dan diikat dengan BM 5 Sungai Sario. Berikut adalah deskripsi singkat BM referensi:

Kode titik	: BM 5
Lokasi	: Sario, Kota Manado
Tipe *receiver*	: Topcon
Tipe antenna	: Hiper SR
Koordinat (U, T)	: 160945.525, 705259.081
Elevasi	: 18.388 m
Zona	: 51 N

Gambar 4.1 Proses Pengamatan GPS BM 5

Pengamatan berikutnya ialah pada BM 1 dan CP 4. Posisi BM 1 berada di bangunan *peilschaal* yang terletak pada sisi barat sungai. Lokasi BM cukup terbuka di pada bagian atas meskipun pada beberapa bagian tertutup dedaunan. Sedangkan CP 4 berada di sebelah timur sungai diantara tanggul sungai dan jalan raya serta terbuka pada bagian atas.

a. Pengukuran BM 01

Nama titik	: BM 01
Lokasi	: bangunan *peilschaal*
Tipe *receiver*	: Topcon
Tipe antena	: Hiper SR
Cuaca	: Cerah berawan
Tanggal Pengamatan	: 13 Oktober 2018
Tinggi alat	: 1.300 m

Gambar 4.2 Pengamatan GPS Geodetik BM 1 Sungai Malalayang

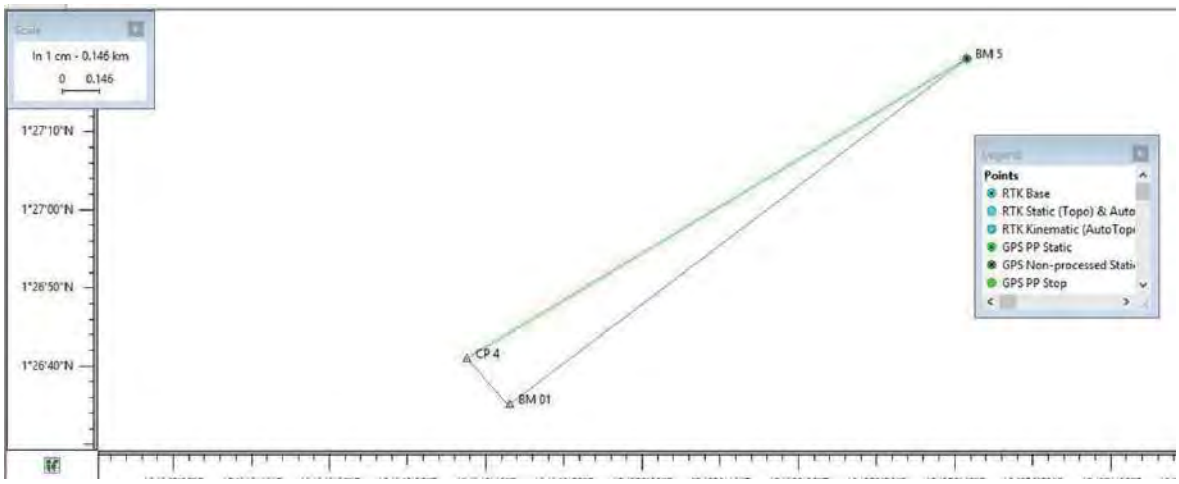
b. Pengukuran BM 03

Gambar 4.3 Pengamatan GPS Geodetik CP 4 Sungai Malalayang

Nama titik	: CP 4
Lokasi	: sebelah timur sungai diantara tanggul sungai dan jalan raya
Tipe *receiver*	: Topcon
Tipe antena	: Hiper SR
Cuaca	: Cerah
Tanggal Pengamatan	: 13 Oktober 2018
Tinggi alat	: 0.928 m

4.3 Pengelohan Data GPS Geoteknik

Proses pengolahan data pengukuran GPS menggukan secara *differensial* menggunakan metode *static* dengan membentuk *baseline*. Pengolahan data menggunakan data *RINEX* hasil pengamatan GPS pada waktu yang sama. Adapaun bentuk *baseline* pengukuran GPS statik dapat dilihat dibawah ini pada gambar 4.4 sedangkan hasil proses *baseline* dapat dilihat pada tabel berikut ini.



Gambar 4.4 *Baseline* Pengamatan GPS Geodetik

Tabel 4.1 Hasil kualitas pengamatan GPS

Name	dN (m)	dE (m)	dHt (m)	Horz RMS (m)	Vert RMS (m)
BM 5–BM 1	-1339.773	-1790.525	19.201	0.002	0.005
BM 5–CP 4	-1178.128	-1977.519	13.378	0.001	0.002
CP 4–BM 1	161.645	-186.994	-5.823	0.001	0.001

Kualitas pengamatan CP 4 dan BM 1 terhadap BM 5 memiliki nilai RMS kurang dari 1 cm (1 mm dan 2 mm untuk horizontal serta 2 mm dan 5 mm untuk vertikal). Ketelitian horizontal dan vertikal CP 4 relatif lebih baik daripada BM 1 karena memiliki nilai RMS yang lebih rendah. Beberapa penyebab nilai ini adalah lokasi BM 1 yang lebih rimbun dibanding CP 4. Sehingga berpengaruh pada penerimaan sinyal satelit. Kondisi berikutnya ialah cuaca berawan pada saat dilakukannya pengamatan, dimana perjalanan sinyal GPS sedikit mengalami pembiasan. Namun kondisi cuaca berawan bisa diabaikan pada pengukuran GPS dengan menambah waktu pengamatan.

Tabel 4.2 Hasil perhitungan koordinat Grid UTM

Titik	U	T	H (Ellipsoid)
BM 5	160945.525	705259.081	95.751
BM 1	159605.752	703468.556	114.952
CP 4	159767.397	703281.562	109.129

4.4 Pengikatan Elevasi terhadap BM 5 S.Sario

Hasil pengolahan GPS geodetik masih menghasilkan data tinggi berdasarkan ellipsoid referensi. Sehingga perlu dilakukan pengukuran sipat datar untuk mendapatkan elevasi eksisting dengan referensi sungai sario. Metode yang digunakan adalah *double stand* dimana memungkinkan pengukuran sipat datar dilakukan hanya sekali jalan. Koreksi yang digunakan adalah dilakukannya pengukuran yang berulang (minimal 2 kali) pada setiap seksi/slag. Pengikatan elevasi dilakukan dengan mengabaikan kelengkungan bentuk bumi karena objek pengukurannya relatif kecil atau kurang dari 50 x 50 km. Berdasarkan data pengukuran, maka diperoleh elevasi BM 1 dan CP 4 berturut – turut adalah 35.693 m dan 29.886 m. Jika mengacu pada Dengan demikian, maka pada tahap berikutnya ialah digunakan untuk pengolahan pengukuran *crosssection* sungai. Berikut adalah daftar koordinat referensi pengukurannya:

Tabel 4.3 Daftar Koordinat Referensi Pengukuran

Titik	U	T	Elevasi
BM 5	160945.525	705259.081	18.488
BM 1	159605.752	703468.556	35.693
CP 4	159767.397	703281.562	29.886

BAB V
KESIMPULAN

5.1. Kesimpulan

1. Pekerjaan survei GPS dilaksanakan sungai Malalayang dengan referensi pengukuran BM 5 Sario.
2. Survei GPS digunakan untuk menentukan koordinat horizontal (x, y), sedangkan untuk elevasi digunakan pengukuran waterpass.
3. Koordinat titik referensi adalah sebagai berikut:

Tabel 5.1 Daftar Koordinat Referensi Pengukuran

Titik	U	T	Elevasi
BM 5	160945.525	705259.081	18.488
BM 1	159605.752	703468.556	35.693
CP 4	159767.397	703281.562	29.886

DOKUMENTASI

DAFTAR LAMPIRAN

KEMENTRIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR

BALAI WILAYAH SUNGAI SULAWESI I

Jl. MR. A. A. Maramis Kairagi Dua. Telp/Fax (0431) 811621 Manado

NAMA TITIK

BM 5
S. Sario

Metoda Pengukuran	Statik Diffrensial		
Lokasi	KEL : Ranotana	KEC : Sario	
	KAB : Kota Manado	PROV : Sulawesi Utara	
Koordinat Geografi	L: 1°27'19.303" N	B: 124°50'41.576"E	Height : 95.751
Koordinat UTM 51North	X: 705259.081	Y: 160945.525	Elevasi : 18.488
Receiver	Topcon		
Antena	Hiper SR		
Tinggi Antena	Miring/ ~~Tegak~~ ; Sebelum : 1.303 m	Sesudah : 1.303 m	

Uraian Lokasi : BM 5 berada di sebelah barat daya sungai sario di kelurahan Ranotana

Kenampakan Menonjol : Tidak ada, berada di lahan yang cukup terbuka

Jalan Ke Lokasi : Jalan setapak

Transportasi & Akomodasi ke lokasi :Kendaraan Roda Empat dan jalan kaki

FOTO

Foto Lokasi Ke Arah UTARA

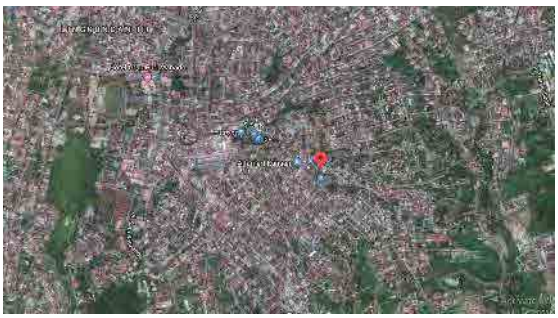
Foto Lokasi Ke Arah TIMUR

Foto Lokasi Ke Arah SELATAN

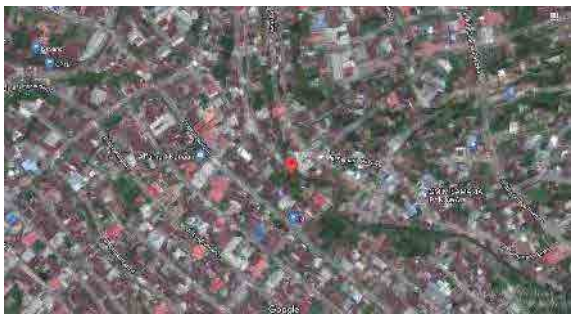
Foto Lokasi Ke Arah BARAT

SKETSA

` Sketsa Umum



Sketsa Detail



KEMENTRIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR

BALAI WILAYAH SUNGAI SULAWESI I

Jl. MR. A. A. Maramis Kairagi Dua. Telp/Fax (0431) 811621 Manado

NAMA TITIK

BM 1
S. Malalayang

Metoda Pengukuran	Statik Diffrensial		
Lokasi	KEL : Batu Kota	KEC : Malalayang	
	KAB : Kota Manado	PROV : Sulawesi Utara	
Koordinat Geografi	L: 1°26'35.147"N	B: 124°49'43.124"E	Height : 114.952
Koordinat UTM 51North	X: 703468.556	Y: 159605.752	Elevasi : 35.693
Receiver	Topcon		
Antena	Hiper SR		
Tinggi Antena	Miring/ ~~Tegak~~ ; Sebelum : 1.300 m	Sesudah : 1.300 m	

Uraian Lokasi : BM berada pada bangunan peilschaal yang terletak pada sisi barat sungai Malalayang.

Kenampakan Menonjol : Bangunan Peilschaal

Jalan Ke Lokasi : Jalan setapak

Transportasi & Akomodasi ke lokasi :Kendaraan Roda Empat dan jalan kaki

FOTO

Foto Lokasi Ke Arah UTARA

Foto Lokasi Ke Arah TIMUR

Foto Lokasi Ke Arah SELATAN

Foto Lokasi Ke Arah BARAT

SKETSA

` Sketsa Umum

Sketsa Detail

KEMENTRIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI WILAYAH SUNGAI SULAWESI I
Jl. MR. A. A. Maramis Kairagi Dua. Telp/Fax (0431) 811621 Manado

NAMA TITIK
CP 4
S. Malalayang

Metoda Pengukuran	Statik Diffrensial		
Lokasi	KEL : Batu Kota	KEC : Malalayang	
	KAB : Kota Manado	PROV : Sulawesi Utara	
Koordinat Geografi	L: 1°26'41.003"N	B: 124°49'37.580"E	Height : 109.129
Koordinat UTM 51North	X: 703281.562	Y: 159767.397	Elevasi : 29.886
Receiver	Topcon		
Antena	Hiper SR		
Tinggi Antena	Miring/ ~~Tegak~~ ; Sebelum : 0.928 m	Sesudah : 0.928 m	

Uraian Lokasi : CP04 berada di sebelah timur sungai, terletak diantara tanggul sungai dan jalan raya.

Kenampakan Menonjol : jalan dan tanggul sungai

Jalan Ke Lokasi : Jalan aspal

Transportasi & Akomodasi ke lokasi :Kendaraan Roda Empat

FOTO

Foto Lokasi Ke Arah UTARA

Foto Lokasi Ke Arah TIMUR

Foto Lokasi Ke Arah SELATAN

Foto Lokasi Ke Arah BARAT

SKETSA

` Sketsa Umum

Sketsa Detail

Quality Control Post-Processing Data GPS

Project Summary

Project name: Sungai Malalayang.ttp
Created by: CV Atrium
Comment:
Linear unit: Meters

GPS Obs Quality

Name	dN (m)	dE (m)	dHt (m)	Horz RMS (m)	Vert RMS (m)
BM 5−BM 1	-1339.773	-1790.525	19.201	0.002	0.005
BM 5−CP 4	-1178.128	-1977.519	13.378	0.001	0.002
CP 4–BM 1	161.645	-186.994	-5.823	0.001	0.001

Failed Loop Closures

Loop	dHz (m)	dU (m)	Horz Tolerance (m)	Vert Tolerance (m)	dHz (ppm)	dU (ppm)	Length (m)

no data met

AutoRejected GPS Obs

Name	dN (m)	dE (m)	dHt (m)	Horz RMS (m)	Vert RMS (m)

no data met

Adjusted Point Quality

Name	Grid Northing (m)	Grid Easting (m)	Elevation (m)	Code
BM 1	159605.752	703468.556	132.201	
CP 4	159767.397	703281.562	107.149	

Identical Points

Point 1	Point 2	Distance (m)

no data met

Misnamed GPS Occupations

Point Name	Original Name	Start Time	Nav Distance from Point (m.)

no data met

Hasil *Adjustment* Pengolahan GPS

Project Summary

Project name: Sungai Malalayang.ttp
Surveyor: CV Atrium
Comment:
Linear unit: Meters
Projection: UTMNorth-Zone_51 : 120E to 126E
Geoid:
Adjustment Summary

Adjustment type: Plane + Height, Minimal constraint
Confidence level: 95 %
Number of adjusted points: 2
Number of plane control points: 1
Number of used GPS vectors: 2
A posteriori plane UWE: 1 , Bounds: (1 , 1)
Number of height control points: 1
A posteriori height UWE: 1 , Bounds: (1 , 1)

Used GPS Observations

Name	dN (m)	dE (m)	dHt (m)	Horz RMS (m)	Vert RMS (m)
BM 5−BM 1	-1339.773	-1790.525	19.201	0.002	0.005
BM 5−CP 4	-1178.128	-1977.519	13.378	0.001	0.002
CP 4–BM 1	161.645	-186.994	-5.823	0.001	0.001

GPS Observation Residuals

Name	dN (m)	dE (m)	dHt (m)	Horz RMS (m)	Vert RMS (m)
BM 5−BM 1	-1339.773	-1790.525	19.201	0.002	0.005
BM 5−CP 4	-1178.128	-1977.519	13.378	0.001	0.002

Control Points

Name	Grid Northing (m)	Grid Easting (m)	Elevation (m)	Code
BM 5	160945.525	705259.081	95.751	

Adjusted Points

Name	Grid Northing (m)	Grid Easting (m)	Elevation (m)	Code
BM 1	159605.752	703468.556	114.952	
CP 4	159767.397	703281.562	109.129	

DATA HITUNGAN WATERPASS						
DI UKUR : Ari Zainal F., ST DI HITUNG : Ghulam Arfi G., ST						
No.Patok	BEDA TINGGI			ELEVASI		No.Patok
	Stand I	Stand II	Rata-Rata	Patok	Tanah	
BM 5				18.488		BM 5
P1	0.171	0.171	0.171	18.659		P1
P2	1.360	1.362	1.361	20.020		P2
P3	2.341	2.339	2.340	22.360		P3
P4	2.579	2.579	2.579	24.939		P4
P5	2.211	9.321	2.211	27.150		P5
P6	2.593	3.039	2.593	29.743		P6
P7	2.393	-1.161	2.393	32.136		P7
P8	1.113	-8.221	1.113	33.249		P8
P9	-2.001	-2.005	-2.003	31.246		P9
P10	-1.536	-1.534	-1.535	29.711		P10
P11	-2.333	-2.333	-2.333	27.378		P11
P12	-1.904	-1.906	-1.905	25.473		P12
P13	-1.350	-1.352	-1.351	24.122		P13
P14	2.034	2.032	2.033	26.155		P14
P15	1.374	1.376	1.375	27.530		P15
P16	2.647	2.647	2.647	30.177		P16
P17	2.559	2.559	2.559	32.736		P17
P18	2.554	2.554	2.554	35.290		P18
P19	2.733	2.733	2.733	38.023		P19
P20	2.131	2.129	2.130	40.153		P20
P21	1.432	1.436	1.434	41.587		P21
P22	2.741	2.741	2.741	44.328		P22
P23	2.631	2.631	2.631	46.959		P23
P24	2.479	2.477	2.478	49.437		P24
P25	1.291	1.291	1.291	50.728		P25
P26	2.249	2.249	2.249	52.977		P26
P27	2.429	2.429	2.429	55.406		P27
P28	1.671	1.669	1.670	57.076		P28
P29	2.015	2.015	2.015	59.091		P29
P30	2.607	2.607	2.607	61.698		P30
P31	2.387	2.389	2.388	64.086		P31
P32	-2.756	-2.756	-2.756	61.330		P32
P33	1.996	1.998	1.997	63.327		P33
P34	2.653	2.653	2.653	65.980		P34
P35	-2.419	-2.421	-2.42	63.560		P35
P36	-2.699	-2.699	-2.699	60.861		P36
P37	-2.758	-2.756	-2.757	58.104		P37
P38	2.279	2.277	2.278	60.382		P38
P39	-2.662	-2.662	-2.662	57.720		P39
P40	-2.742	-2.742	-2.742	54.978		P40

P41	-2.317	-2.317	-2.317	52.661		P41
P42	-2.819	-2.819	-2.819	49.842		P42
P43	-2.801	-2.803	-2.802	47.040		P43
P44	-1.843	-1.845	-1.844	45.196		P44
P45	-1.362	-1.362	-1.362	43.834		P45
P46	-2.534	-2.534	-2.534	41.300		P46
P47	-2.722	-2.722	-2.722	38.578		P47
P48	-2.306	-2.306	-2.306	36.272		P48
P49	-2.395	-2.395	-2.395	33.877		P49
P50	2.099	2.099	2.099	35.976		P50
P51	-1.999	-1.999	-1.999	33.977		P51
P52	-1.359	-1.359	-1.359	32.618		P52
P53	-0.901	-0.903	-0.902	31.716		P53
P54	-1.295	-1.293	-1.294	30.422		P54
CP4	-0.536	-0.536	-0.536	29.886		CP4

Daftar Koordinat Referensi

Titik	U	T	Elevasi
BM 5	160945.525	705259.081	18.488
BM 1	159605.752	703468.556	35.693
CP 4	159767.397	703281.562	29.886

ANNEX 6-1

Report No.006

Report of TOPOGRAPHIC (River Cross Section) SURVEYS AT

MALALAYANG RIVER

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI WILAYAH SUNGAI SULAWESI I
Jl. MR. A.A. Maramis Kairai Dua. Telp / Fax (0431) 81161 Manado

LAPORAN
TOPOGRAPHIC SURVEYS AT MALALAYANG RIVER
FOR
CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)

NOVEMBER 2018
NOMOR KONTRAK :
JICA/RBOs.02/OJT.01/BWSS-I/09/2018

CV. ATRIUM ARSITEK KONSULTAN PERANCANG
KOMPLEKS WALE LESTARI INDAH BLOK AA NO.5 TELP.0431-871692 MANADO

LEMBAR PENGESAHAN

LAPORAN SURVEI TOPOGRAFI SUNGAI MALALAYANG

PEKERJAAN:

CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)

Konsultan Pelaksana	: CV Atrium Arsitek Konsultan Perancang
Konsultan Pemilik Pekerjaan	: JICA Expert
Disahkan di	: Manado
Tanggal	: 11 November 2018

PIHAK THE JICA EXPERT TEAM:	PIHAK CV. ATRIUM ARSITEK KONSULTAN PERANCANG:
Hirohisa MIURA JICA Long Term Expert	Galih M. Fatian Director

KATA PENGANTAR

Sehubungan dengan Kontrak Kerja antara pihak **JICA Expert Team dan CV ATRIUM ARSITEK KONSULTAN PERANCANG** pada 27 September 2018 dengan nomor kontrak **JICA/RBOs.02/OJT.01/BWSS-I/09/2018** untuk pekerjaan **"Topographic Surveys at Malalayang River"**, maka dengan ini kami sampaikan laporan hasil pekerjaan. Laporan ini disusun untuk memberikan gambaran hasil dari pelaksanaan kegiatan ini dan menjadi bahan diskusi guna mendapatkan hasil perencanaan yang memadai, semoga bermanfaat dan dapat memenuhi tujuan. Atas kepercayaannya yang telah diberikan, kami ucapkan terimakasih.

Manado, 11 November 2018
CV ATRIUM ARSITEK
KONSULTAN PERANCANG

Galih M. Fatian
Direktur

DAFTAR ISI

LAMPIRAN

1. **Dokumentasi**
2. **Deskripsi BM dan CP**
3. **Peta Situasi Sungai (A3)**
4. **Poligon Pengukuran (A3)**
5. ***Cross Section* (A3)**
6. **Data Ukur Sungai**

DAFTAR GAMBAR

DAFTAR TABEL

BAB I
PENDAHULUAN

1.1 Latar Belakang

Sungai memainkan peran penting dan memiliki nilai strategis dalam pengembangan kawasan suatu daerah, dan mempengaruhi semua aspek kehidupan masyarakat yang tinggal di Daerah Aliran Sungai. Hal ini dibuktikan dengan berkembangnya banyak permukiman dan peradaban masyarakat di tepian sungai termasuk kemunculan dan perkembangan kekaisaran dan daerah perkotaan di sepanjang sungai seperti sekarang ini. Sungai juga merupakan sarana untuk menghubungkan antara kota dan daerah.

Air sungai memiliki fungsi seperti infrastruktur pengangkutan air / air, sumber air PDAM, sumber air irigasi, pengembangan budidaya perikanan, infrastruktur rekreasi dan pariwisata, dan juga fungsi sosial. Pemanfaatan air di masa depan di daerah aliran sungai diperkirakan akan meningkat, terutama karena meningkatnya populasi dan meningkatnya aktivitas / keragaman kehidupan. Jumlah kegiatan di daerah aliran sungai, terutama kegiatan sektor unggulan pembangunan ekonomi seperti kehutanan, pertambangan, perkebunan, pariwisata dan pertanian mengakibatkan munculnya berbagai masalah, termasuk penurunan kualitas air, erosi, sedimentasi, banjir, dan adanya lahan kritis

Ada banyak kendala dalam pengelolaan sungai, salah satunya data hidrologi masih terbatas seperti penampang sungai dan debit aliran. Oleh karena itu, untuk mewujudkan pengelolaan DAS terpadu, data hidrologi sungai harus dikalikan dan dipenuhi sesuai kebutuhan perencanaan dan pemantauan kondisi hidrologi sungai. Mengingat hal ini, BWS Sulawesi dianggap penting untuk melakukan pengukuran *cross-sectional* sungai dan terutama untuk membuat prediksi, dan untuk mengevaluasi perubahan di lingkungan daerah aliran sungai.

1.2 Tujuan

Tujuan kegiatan ini antara lain:

1. Memberikan informasi pengukuran *cross-section* dari Sungai Malalayang di Kelurahan Batukota, Kecamatan Malalayang.
2. Membuat titik referensi tetap (*fixed reference point*) di Sungai Malalayang.

3. Mendapatkan informasi posisi (X, Y, Z) dari Mark Bench terdekat ke posisi titik *Bench Mark*.
4. Memasang BM marmer baru di bagian peilscaal sungai.
5. Mendapatkan informasi posisi (X, Y, Z) dari *Bench Mark* ke titik tetap (CP) untuk pengukuran melintang atau *cross-section*.

1.3 Hasil Kegiatan

Luaran kegiatan survei topografi ini adalah:

1. Data / informasi pengukuran *cross-section*.
2. Data / informasi BM dan CP dari referensi BM 5 Sario.
3. Memasang 7 CP (*Control Point*) dan 1 BM marmer.

1.4 Manfaat

1. Informasi penampang sungai berguna sebagai data pendukung untuk mendukung pelaksanaan kegiatan pengukuran aliran sungai pada tingkat air menengah dan tinggi dengan *buoys*.
2. Referensi tetap berupa BM (*Bench Mark*) dan CP (*Control Point*).
3. Ketersediaan informasi debit aliran, yang berguna untuk memprediksi debit aliran dan kecenderungannya terutama terkait dengan upaya mengatasi masalah banjir.

BAB II
DASAR TEORI

2.1. Umum

Di dalam beberapa bidang pekerjaan, kita sering menggunakan sebuah peta sebagai dasar rencana kerja. Untuk mengetahui kondisi topografi sungai, maka diperlukan pengukuran dan pemetaan. Pengukuran sendiri adalah sebuah teknik pengambilan data yang dapat memberikan nilai panjang, tinggi dan arah relatif dari sebuah obyek ke obyek lainnya. Pengukuran terletak diantara ilmu geodesi dan ilmu pemetaan. Hasil penelitian geodesi dipakai sebagai dasar referensi pengukuran, kemudian hasil pengolahan data pengukuran adalah dasar dari pembuatan peta. Sedang pemetaan adalah proses pembuatan peta berdasarkan olahan data hasil pengukuran. Pada saat ini, pembuatan peta lebih banyak dilakukan secara digital karena lebih cepat, lebih teliti, tidak memakan ruang dan dapat dianalisis ulang sebelum diproduksi. Pemahaman yang baik mengenai sistem proyeksi dan sistem koordinat bumi merupakan hal dasar dalam pembuatan peta.

2.2. Poligon

Metode Pengukuran poligon Poligon digunakan apabila titik-titik yang akan di cari koordinatnya terletak memanjang sehingga terbentuk segi banyak (poligon). Pengukuran dan Pemetaan Poligon merupakan salah satu pengukuran dan pemetaan kerangka dasar horizontal yang bertujuan untuk memperoleh koordinat planimetris (X,Y) titik-titik pengukuran. Pengukuran poligon sendiri mengandung arti salah satu metode penentuan titik diantara beberapa metode penentuan titik yang lain. Untuk daerah yang relatif tidak terlalu luas, pengukuran cara poligon merupakan pilihan yang sering di gunakan, karena cara tersebut dapat dengan mudah menyesuaikan dengan keadaan daerah/lapangan. Penentuan koordinat titik dengan cara poligon ini membutuhkan :

- Koordinat awal.

  Koordinat awal bisa berupa titik koordinat yang sudah diikat ke jaring nasional dengan sistem koordinat tertentu, atau bisa juga menggunakan koordinat lokal.
- Koordinat akhir.

Untuk memenuhi syarat Geometri hitungan koordinat dan tentunya harus di pilih titik yang mempunyai sistem koordinat yang sama dengan koordinat awal.

- Azimuth awal

  Digunakan untuk mengetahui arah orientasi dari sistem koordinat yang dihasilkan. Azimuth ini bisa diketahui dengan hasil hitungan titik yang telah diketahui yang akan dipakai titik acuan, atau bisa juga diketahui dari hasil pengamatan astronomis (matahari) pada salah satu titik poligon.

- Data ukuran sudut dan jarak

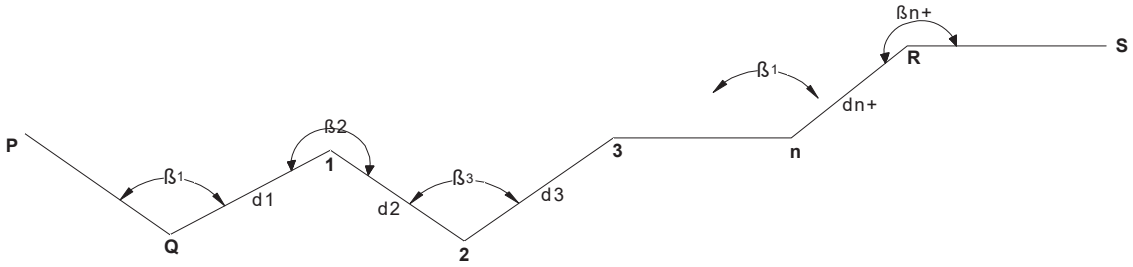
  Sudut mendatar pada setiap stasiun dan jarak antara dua titik kontrol perlu diukur di lapangan

2.2.1. Poligon Terbuka

Poligon terbuka adalah poligon yang dibentuk dengan titik awal dan titik akhir tidak saling bertemu. poligon terbuka terdiri atas :

a. Poligon terbuka terkait sempurna

adalah poligon yang titik awal dan akhirnya merupakan titik tetap yang sudah diketehui koordinatnya.



Gambar 2.1. Poligon Terbuka Terkait Sempurna

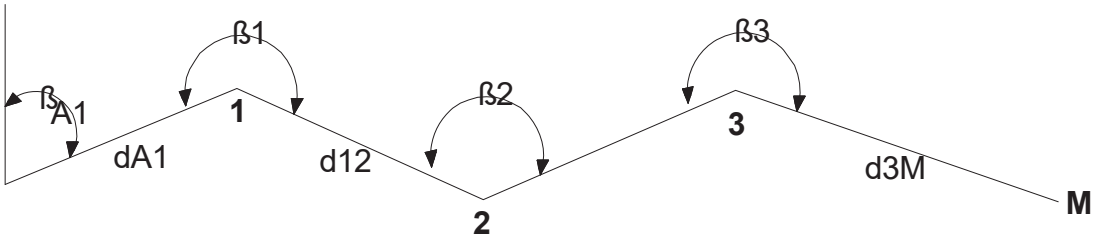
Syarat yang dipenuhi oleh suatu poligon terbuka terikat sempurna adalah :

1. $\Sigma \beta = (\alpha_{akhir} - \alpha_{awal}) + (n - 1)\ 180^0$
2. $\Sigma d \sin \alpha = (X_{akhir} - X_{awal})$
3. $\Sigma \cos \alpha = (Y_{akhir} - Y_{awal})$

Dari hasil pengukuran dilapangan, syarat-syarat tersebut diatas tidak dapat dipenuhi, karena masih ada kesalahan dalam pengukuran. Sehingga untuk memenuhi persyaratan tersebut diberikan koreksi pada masing-masing syarat.

b. Poligon terbuka terikat sepihak

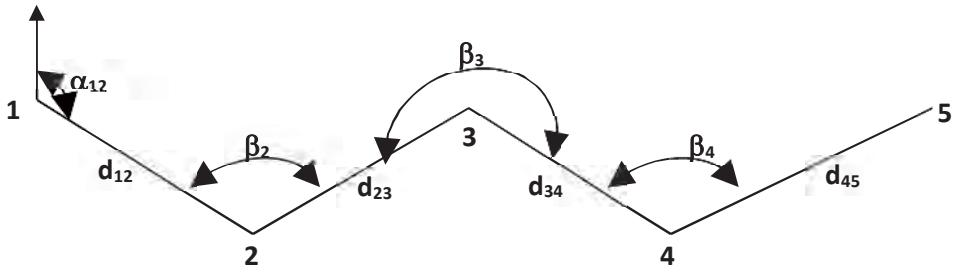
Adalah poligon yang diikatkan pada salah satu titik tetap yang diketahui koordinat maupun aimuth-nya, maka tidak ada koreksi sudut maupun koreksi jarak. Pada poligon terikat sepihak ayarat geometris dan perhitungannya sama seperti pada poligon terbuka terikat sempurna.



Gambar 2.2. Poligon Terbuka Terikat Sepihak

c. Poligon terbuka lepas

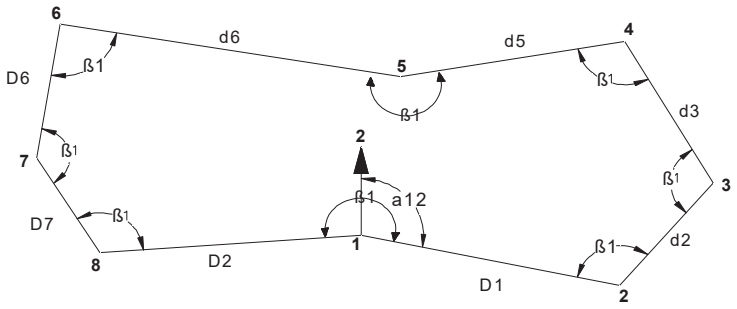
Adalah poligon yang tidak terikat pada suatu titik tetap. Sehingga koordinat yang terukur bersifat lokal dan penyelesaian koordinatnya dengan orientasi sembarang atau koordinat lokal. Pada poligon ini syarat geometris perhitungannya sama seperti pada poligon terbuka terikat sempurna.



Gambar 2.3 Poligon Terbuka Lepas

2.2.2 Poligon Tertutup

Poligon tertutup adalah poligon dengan titik awal dan titik akhir bertemu dalam satu titik.



Gambar 2.4. Poligon Tertutup

Keterangan gambar :

α_{12} = azimuth sisi poligon 1-2

β_1 = sudut dalam poligon

d_1 = panjang sisi poligon

Syarat-syarat geometris pada poligon tertutup adalah sebagai berikut :

1. $\Sigma \beta - (n - 2)\ 180^0 = (\alpha_{akhir} - \alpha_{awal}) = 0$
2. $\Sigma d \sin \alpha = (X_{akhir} - X_{awal}) = 0$
3. $\Sigma \cos \alpha = (Y_{akhir} - Y_{awal}) = 0$

Dalam hal ini :

$\Sigma \beta$ = jumlah sudut dalam poligon

n = jumlah titik sudut poligon

Σd = jarak masing-masing poligon

Ketiga syarat tersebut diatas belum dapat dipenuhi, karena dalam pengukuran sudut dan jarak poligon masih terdapat kesalahan, sehingga perlu adanya koreksi. Dengan demikian rumus diatas menjadi sebagai berikut :

1. $\Sigma \beta - (n - 2)\ 180^0 = \pm f_\alpha$
2. $\Sigma d \sin \alpha = \pm f_x$
3. $\Sigma \cos \alpha = \pm f_y$

Dalam hal ini :

$\pm f_\alpha$ = kesalahan penutup sudut

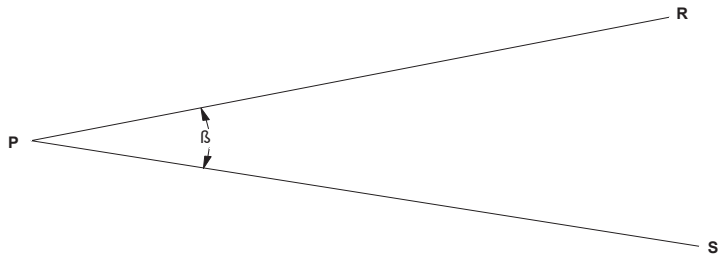
$\pm f_x$ = kesalahan penutup terhadap sumbu Y

$\pm f_y$ = kesalahan penutup terhadap sumbu X

2.3 Kerangka Kontrol Horisontal

Kerangka Kontrol Horisontal (KKH) merupakan kerangka dasar pemetaan yang memperlihatkan posisi horisontal (X,Y) antara satu titik relatif terhadap titik yang lain di permukaan bumi pada bidang datar. Untuk mendapatkan posisi horisontal dari KKH dapat digunakan banyak metode, salah satu metode penentuan posisi horisontal yang sering digunakan adalah metode poligon. Metode poligon digunakan untuk penentuan posisi horisontal banyak titik dimana titik yang satu dan lainnya dihubungkan dengan jarak dan

sudut sehingga membentuk suatu rangkaian sudut titik-titik (polygon). Pada penentuan posisi horisontal dengan metode ini, posisi titik yang belum diketahui koordinatnya ditentukan dari titik yang sudah diketahui koordinatnya dengan mengukur semua jarak dan sudut dalam poligon.



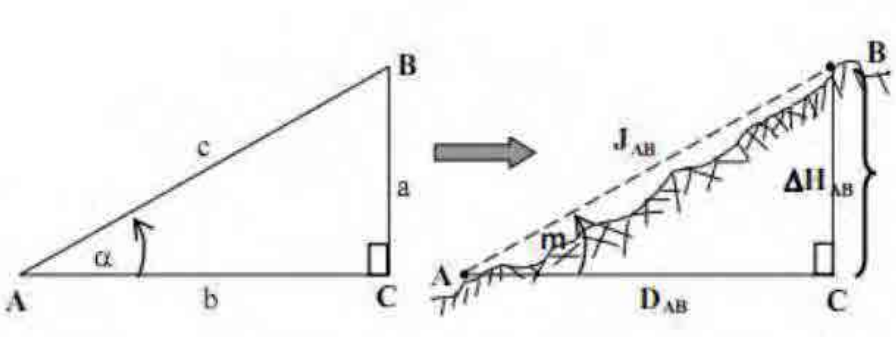
Gambar 2.5. Sudut Horisontal

2.4. Kerangka Kontrol Vertikal

Kerangka dasar vertikal merupakan teknik dan cara pengukuran kumpulan titik-titik yang telah diketahui atau ditentukan posisi vertikalnya berupa ketinggiannya terhadap bidang rujukan ketinggian tertentu. Pengukuran tinggi adalah menentukan beda tinggi antara dua titik. Hingga saat ini, pengukuran beda tinggi dengan menggunakan metode sipat datar optis masih merupakan cara pengukuran beda tinggi yang paling teliti. Sehingga ketelitian kerangka dasar vertikal (KDV) dinyatakan sebagai batas harga terbesar perbedaan tinggi hasil pengukuran sipat datar pergi dan pulang.

2.5. Metode Trigonometrik

Pengukuran detail dilapangan berguna untuk pengambilan data planimetri dan ketinggian. Pengukuran situasi menggunakan Metoda trigonometrik. Metode ini menerapkan hitungan segi-tiga siku bidang datar vertikal. Bila dinyatakan dalam sistem koordinat Cartesius, bidang datar vertikal ini adalah bidang yang tegak lurus ($\perp$) bidang X-O-Y dan melalui garis bidik alat ukur. Parameter ukuran dalam metoda ini adalah jarak dan sudut. Mengingat masalah utama adalah posisi vertikal suatu titik, maka sudut yang diukur adalah Sudut vertikal.



Gambar 2.6. Penerapan segitiga siku pada vertikal

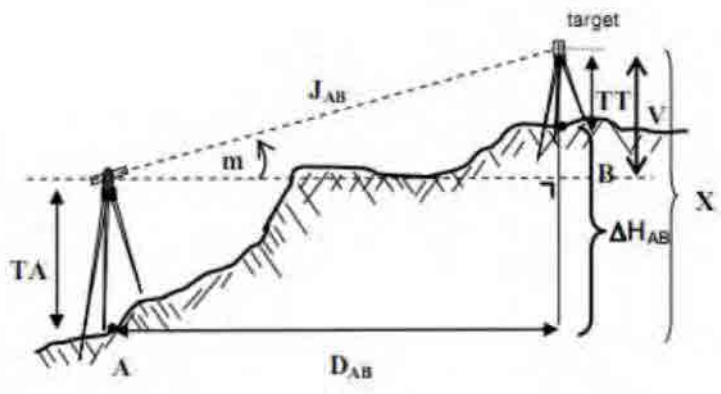
Dari gambar diatas dilihat bahwa bila segitiga siku diterapkan pada permukaan bumi, maka hanya notasi atau istilah yang berubah. Notasi segi-tiga tersebut di lapangan dapat dikatakan sebagai berikut:

JAB : jarak miring dari titik A-B

DAB : jarak mendatar dari titik A-B (pada bidang mendatar X-O-Y)

m : sudut miring

Penerapan semacam di atas akan sukar dilaksanakan, karena pengukuran sudut dan titik bidikan tepat pada muka tanah, sehingga di gunakan penambahan ukuran, berupa tinggi alat dan tinggi target, sehingga seolah-olah segi-tiga tersebut digeserkan ke atas. Disamping itu, pada metoda ini, alat ukur yang digunakan adalah alat ukur jarak dan alat ukur sudut.



Gambar 2.7. Metode Trigonometrik

Keterangan :

TA = tinggi alat dari titik A

TT = tinggi target dari titik B

M = sudut miring

J_{AB} = jarak miring A-B

D_{AB} = jarak mendatar A-B

V = sisi tegak segi-tiga siku ΔH_{AB} = beda tinggi A-B

Dari segi-tiga siku, dapat dihitung besar V, yaitu :

$V = J_{AB}$ Sin m ; atau

$V = D_{AB}$ Tan m

Jarak vertikal dari titik tertinggi pada gambar (target) sampai dengan garis terbawah (garis mendatar

melalui titik A), dapat dinyatakan panjangnya, yaitu sebesar :

$X = \Delta HAB + TT = V + TA$, sehingga :

$\Delta H_{AB} = V + TA - TT$

dengan harga V sebesar :

untuk jarak miring : $V = J_{AB}$ x Sin m

untuk jarak mendatar : $V = D_{AB}$ x Tan m

BAB III
METODOLOGI PELAKSANAAN

3.1 Tahapan Pelaksanaan Pekerjaan

Tahapan pelaksanaan pekerjaan merupakan salah satu faktor yang menentukan keberhasilan pekerjaan tersebut. Tahapan pekerjaan yang terperinci, logis dan tertata sesuai dengan jadwal yang telah ditetapkan akan sangat membantu pelaksanaan pekerjaan dilapangan. Berikut ini adalah tahapan pelaksanaan pekerjaan yang dilaksanakan.

3.1.1 Tahap Persiapan

Pada tahap persiapan, pekerjaan yang dilaksanakan berkaitan dengan survei topografi adalah :

1. Pengurusan ijin khususnya yang berkaitan dengan pemerintah setempat
2. Persiapan tenaga dan alat ukur serta perlengkapannya
3. Kalibrasi dan penyiapan alat ukur yang akan di gunakan
4. Mempersiapkan fasilitas akomodasi dan transportasi yang dapat memperlancar pekerjaan dilapangan.

Adapun peralatan yang digunakan dalam pelaksanaan pekerjaan pengukuran sungai ini adalah sebagai berikut :

Tabel 3.1 Peralatan Dan Bahan Yang Digunakan

No	Nama Alat	Jumlah
1.	Total Staion Nikon ES 105	1
2.	Waterpass Topcon AT-B3	1
3.	GPS Navigasi	1
4.	Statif	1
5.	Jalon	2
6.	Rambu Ukur	2
7.	Prisma	2
8.	Pita Ukur	1
9.	Kamera	1

3.1.2 Orientasi Lapangan

Sebelum menentukan langkah atau menyusun jadwal pelaksanaan pekerjaan terlebih dahulu dilakukan orientasi lapangan, sehingga nantinya kebutuhan peralatan maupun tenaga dapat diprediksi dengan baik. Dalam orientasi lapangan beberapa kegiatan orientasi lapangan adalah :

1. Menyiapkan *basecamp*, tenaga lokal dan sarana transportasi lapangan
2. Bersama-sama dengan Konsultan perencana menentukan titik awal pengukuran dan batas pengukuran.
3. Menentukan titik referensi (BM) pengukuran yang sudah diketahui koordinatnya (X,Y,Z).
4. Menentukan lokasi pemasangan *Control Point* (CP).
5. Menentukan metode pengukuran yang akan digunakan berdasarkan kondisi daerah yang akan dipetakan.
6. Menentukan alat-alat pengukuran yang akan digunakan berdasarkan kondisi daerah yang akan dipetakan.
7. Melakukan pemotretan lokasi pengukuran sebagai dokumentasi.
8. Menentukan lama proses pengukuran topografi

3.1.3 Pemasangan Patok

Pemasangan patok meliput patok *Bench Mark* dan patok pendukung lainnya dengan rincian sebagai berikut :

1. Patok *Bench Mark*, akan dilakukan penempatan patok dengan persetujuan konsultan perencana
2. Patok *Control Point* (CP) ditempatkan pada titik – titik tertentu di lokasi pengukuran. Jumlah CP masing – masing sungai adalah 6 dengan rincian 3 CP di sebelah kiri, dan 3 di sebelah kanan sungai. Pemasangan CP tegak lurus dengan alur sungai.

3.1.4 Pengukuran Kerangka Kontrol Horizontal

Alat ukur yang digunakan mengukur sudut horisontal adalah alat ukur Total Station yang dilengkapi dengan beberapa alat bantu seperti statif, rambu (jalon) dan prisma untuk membalikkan sinyal. Pengukuran sudut horisontal dilakukan dengan metode repetisi. Dalam metode tersebut sudut diukur secara berulang-ulang, dalam pelaksanaannya, dilakukan dua kali bacaan, yaitu bacaan biasa dan luar biasa.

Pengukuran ini dilakukan untuk mendapatkan 2 macam data, yaitu sudut dan jarak. Kerangka kontrol horizontal menghasilkan titik ikat horizontal (x,y) pada titik poligon utama.

3.1.5 Pengukuran Kerangka Kontrol Vertikal

Kerangka kontrol vertikal diukur dengan alat waterpass atau penyipat datar. Oleh karena itu, metode ini disebut juga Metode sipat datar. Prinsipnya adalah Mengukur tinggi bidik alat sipat datar optis di lapangan menggunakan rambu ukur. Beda tinggi antar titik ditentukan berdasarkan selisih bacaan dari rambu ukur. Beda tinggi tersebut yang digunakan untuk acuan elevasi (z).

3.1.6 Pengukuran Cross Section

Pengukuran topografi area sungai dilakukan dengan metode tachymetry. Pengukuran ini dilakukan dengan mengukur titik-titik yang terdapat pada area sungai dengan posisi melintang (tegak lurus alur sungai). Sehingga didapatkan posisi x, y, dan z pada potongan melintang tersebut. Pada pengolahan lebih lanjut, cross section sungai dapat ditentukan kontur sungai, dimana dengan kontur tersebut gambaran umum topografi dapat dipresentasikan dengan baik.

3.1.7 Analisa Data

Analisa data dilakukan setelah dilakukan pengukuran dilapangan. Khusus untuk pekerjaan pengukuran topografi, analisa dilakukan meskipun belum semua data hasil pengukuran terkumpul. Hal ini dilakukan agar pekerjaan cepat terselesaikan dan juga tenaga pengukur lebih mudah untuk mengingat kondisi lapangan yang baru diukur sehingga bila terdapat kejanggalan data cepat diselesaikan atau dilakukan pengecekan kembali. Beberapa analisa yang dilakukan antara lain :

1. Menghitung sudut datar serta angka koreksi
2. Menghitung sudut datar berdasarkan angka koreksi
3. Menghitung azimuth – azimuth poligon
4. Melakukan koreksi absis dan ordinat
5. Menghitung koordinat poligon.
6. Menghitung koordinat dan titik tinggi.

BAB IV
PELAKSANAAN PEKERJAAN

4.1 Pemasangan BM

Patok benchmark merupakan patok permanen yang terbuat dari beton dengan ukuran tertentu. Titik ini sudah mempunyai koordinat yang tetap (sudah diketahui nilai XYZ). Fungsi benchmark ini sebagai referensi atau acuan dalam pengukuran di sekitar titik tersebut. Penentuan koordinat BM tersebut dapat digunakan 2 cara, yaitu dengan alat GPS Geodetik, ataupun dengan pengukuran lapangan dengan pengikatan pada BM sebelumnya. Pada pekerjaan ini, koordinat BM ditentukan dengan GPS Geodetik referensi dari BM 05 Sario.

Gambar 4.1. BM 01 Sungai Malalayang

4.2 Pemasangan CP (*Control Point*)

Pemasangan CP (*Control Point*) dilakukan secara berpasangan dalam satu *cross section*, yaitu berada di sebelah kanan dan kiri sungai. Patok CP dibuat dengan pipa PVC diameter 5 inch yang disertai dengan tulangan dan cor semen. Pada CP memiliki nomor dan kode sungai sebagai penanda. Pada Sungai Malalayang memakai kode MLL. Urutan penamaan CP dimulai dari hulu sungai.

Gambar 4.2. Titik *Control Point* (CP)

4.3 Pengukuran Poligon dan *Cross-Section*

Pengukuran poligon dilakukan untuk mendapatkan koordinat kerangka titik kontrol. Kerangka Kontrol Horizontal (KKH) diukur menggunakan alat Total Station, sedangkan Kerangka Kontrol Vertikal menggunakan *waterpass*. Pengukuran *cross section* sungai dilakukan untuk mengetahui profil masing – masing sungai. Pengukuran ini dilakukan sebanyak 3 kali di masing – masing sungai dengan titik ikat CP di kiri dan kanan sungai. Penyajian *cross section* sungai terdapat pada lampiran. Detail pengukuran *cross section* sungai adalah seperti penjelasan gambar berikut:

Gambar 4.3. Lokasi Pengukuran dan Posisi CP Sungai Malalayang

Gambar 4.3. menunjukkan lokasi dan pengukuran dan posisi CP di Sungai Malalayang. Jarak antara *cross section* I dan II (CP 2 dan 3) adalah ±50 m. *Cross section* III

arah hulu sungai (bagian selatan). Pada pengukuran ini, muka air diambil lebih lebih awal untuk mengantisipasi datangnya musim penghujan.

4.4 Penyajian Data

Pekerjaan survei sungai ini dilakukan dengan mengabaikan kelengkungan bentuk bumi karena objek pengukurannya relatif kecil atau kurang dari 50 x 50 km. Produk yang dihasilkan antara lain sebagai berikut:

1. Gambar dan Peta Hasil Pengukuran

   Hasil dari survei pengukuran adalah berupa peta situasi eksisting sungai beserta potongan melintang (*cross section*).

2. Data Ukur

   Memuat data hasil pengukuran dan pengolahan hingga mendapat nilai koordinat (X, Y, Z) dalam sistem Proyeksi UTM.

3. Deskripsi BM dan CP

   Deskripsi BM dan CP dibuat sebagai inventaris data dan penegasan koordinat tetap suatu titik. Deskripsi BM dan CP memuat informasi seputar titik referensi mengenai lokasi, sketsa, dan foto.

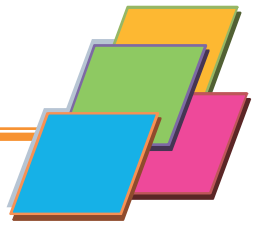
BAB V
KESIMPULAN

5.1. Kesimpulan

1. Pekerjaan survey topografi dilaksanakan di Sungai Malalayang dengan *cross section* sungai berjumlah tiga penampang.
2. Pembuatan garis kontur (elevasi) berdasarkan pengukuran *cross section.*
3. Koordinat titik ikat adalah sebagai berikut:

Nama Titik	Koordinat		
	Easting	Northing	Elevasi
BM 01	703468.556	159605.752	35.693
CP 1L	703465.034	159603.730	31.058
CP 1R	703657.701	159611.001	30.676
CP 2L	703337.8523	159721.509	30.270
CP 2R	703346.344	159736.389	30.507
CP 3L	703293.655	159742.655	30.206
CP 3R	703302.571	159755.660	29.746
CP 4	703281.562	159767.397	29.886

DAFTAR LAMPIRAN



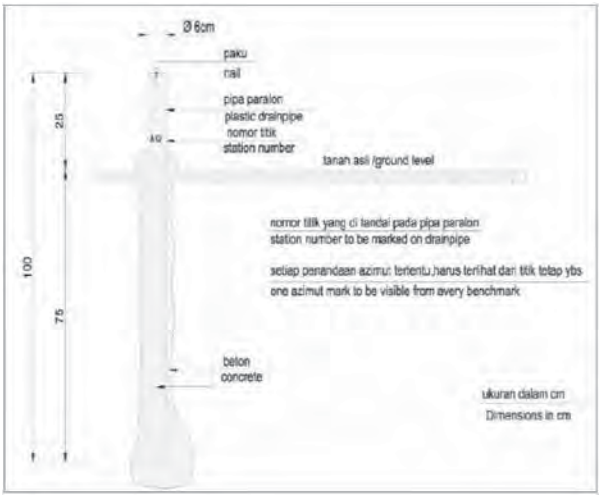
1. Dokumentasi
2. Deskripsi BM dan CP
3. Peta Situasi Sungai Skala 1:1000
4. Poligon dan Daftar Koordinat Skala 1:1000
5. *Cross Section* Sungai Skala 1:100
6. Data Ukur Kerangka Kontrol Horizontal
7. Data Ukur Kerangka Kontrol Vertikal
8. Data Ukur Cross Section

DOKUMENTASI



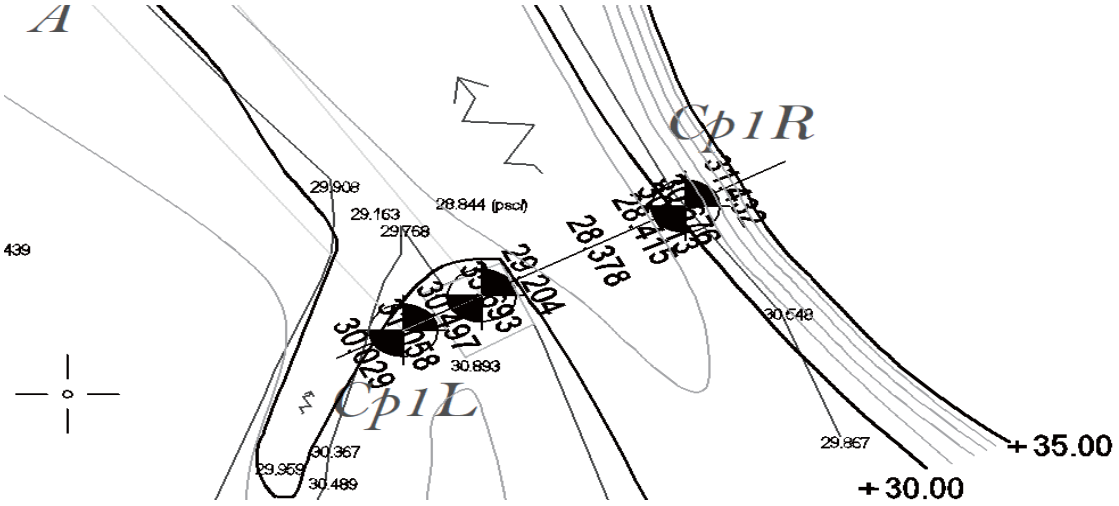



DISKRIPSI BM - CP



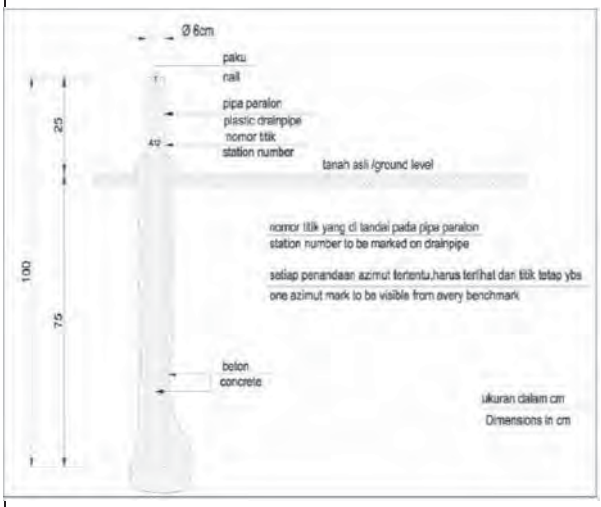
CP. 1L :	X = 703465.034	Y = 159603.730	Z = 31.058	
LOKASI :	Kelurahan Batukota, Kecamatan Malalayang, Kota Manado			

Sketsa :



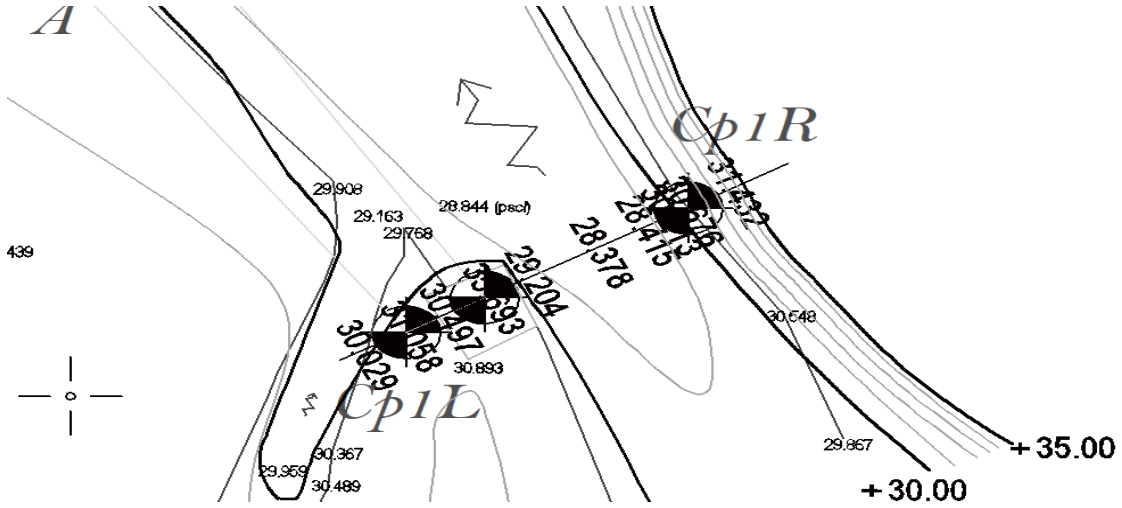
TANGGAL BUAT :	11 Oktober 2018
KETERANGAN	CP Sungai Malalayang

DISKRIPSI BM - CP



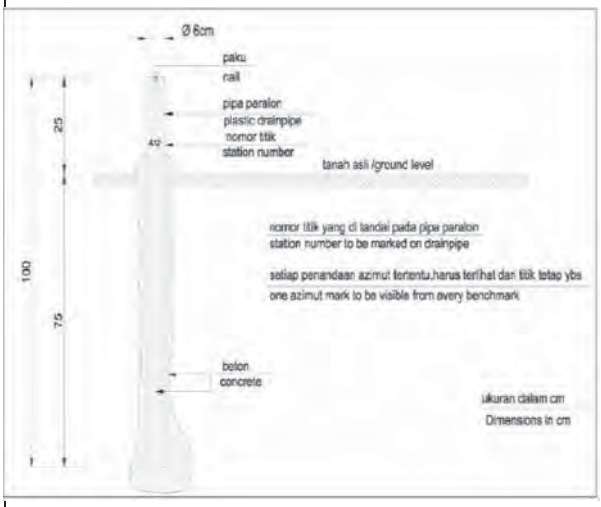
CP 1R :	X = 703657.701	Y = 159611.001	Z = 30.676	
LOKASI :	Kelurahan Batukota, Kecamatan Malalayang, Kota Manado			

Sketsa :



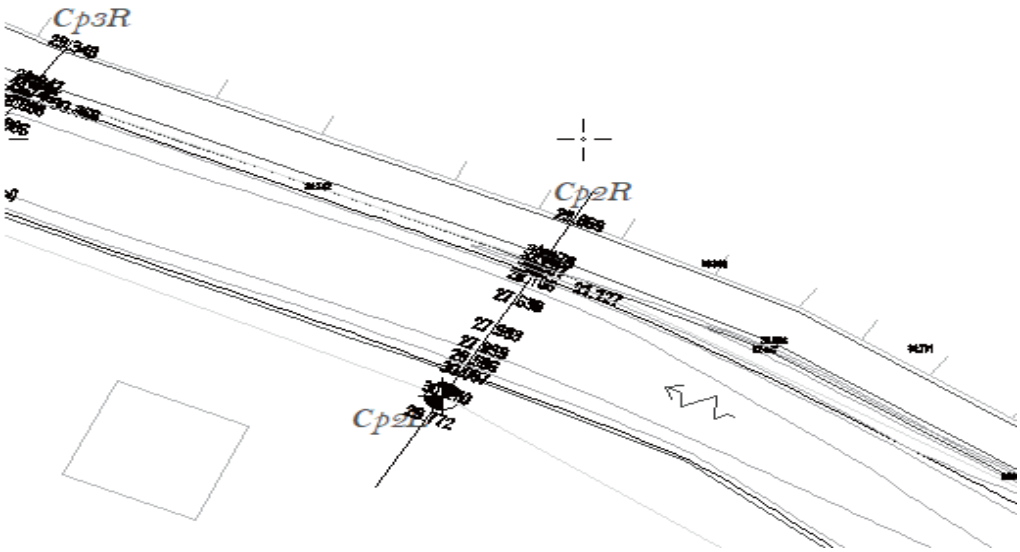
TANGGAL BUAT :	11 Oktober 2018
KETERANGAN	CP Sungai Malalayang

DISKRIPSI BM - CP



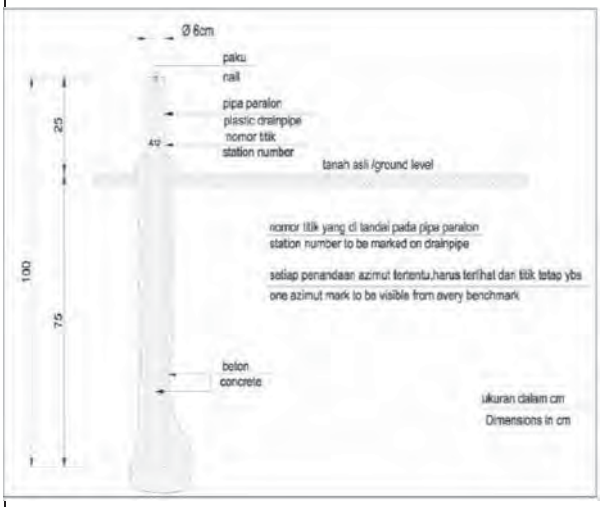
CP 2L :	X = 703337.852	Y = 159721.509	Z = 30.270	
LOKASI :	Kelurahan Batukota, Kecamatan Malalayang, Kota Manado			

Sketsa :



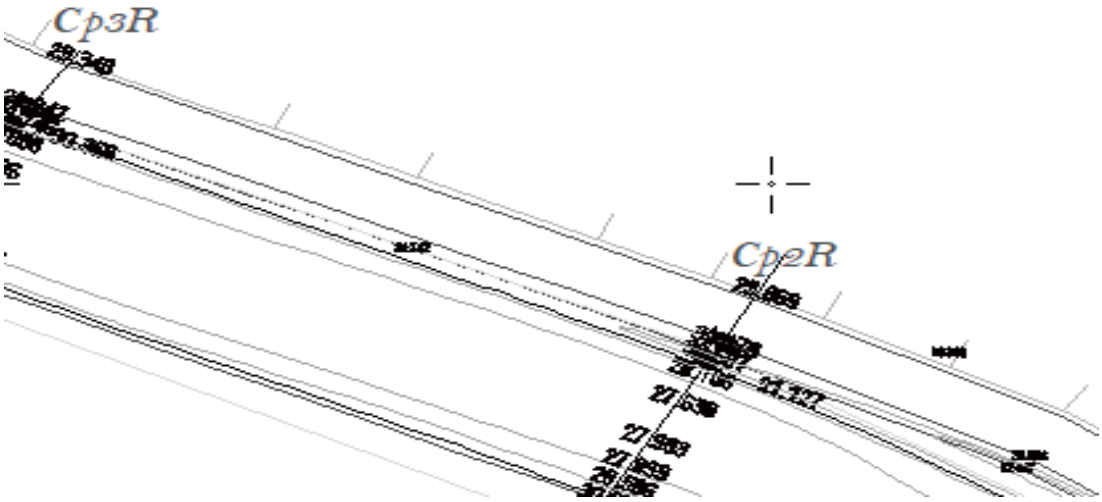
TANGGAL BUAT :	11 Oktober 2018
KETERANGAN	CP Sungai Malalayang

DISKRIPSI BM - CP



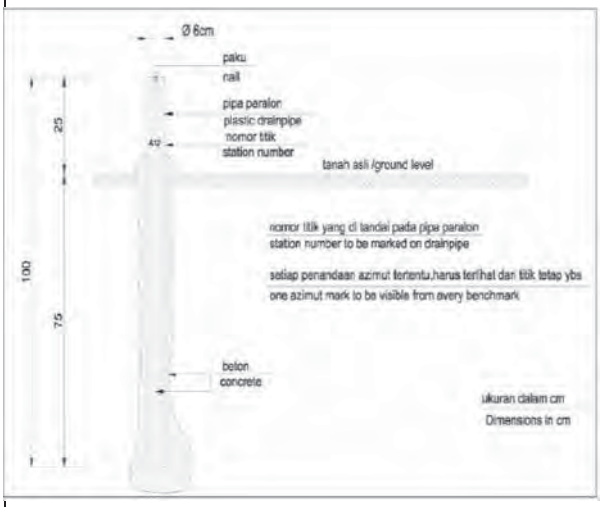
CP 2R :	X = 703346.344	Y = 159736.389	Z = 30.507	
LOKASI :	Kelurahan Batukota, Kecamatan Malalayang, Kota Manado			

Sketsa :



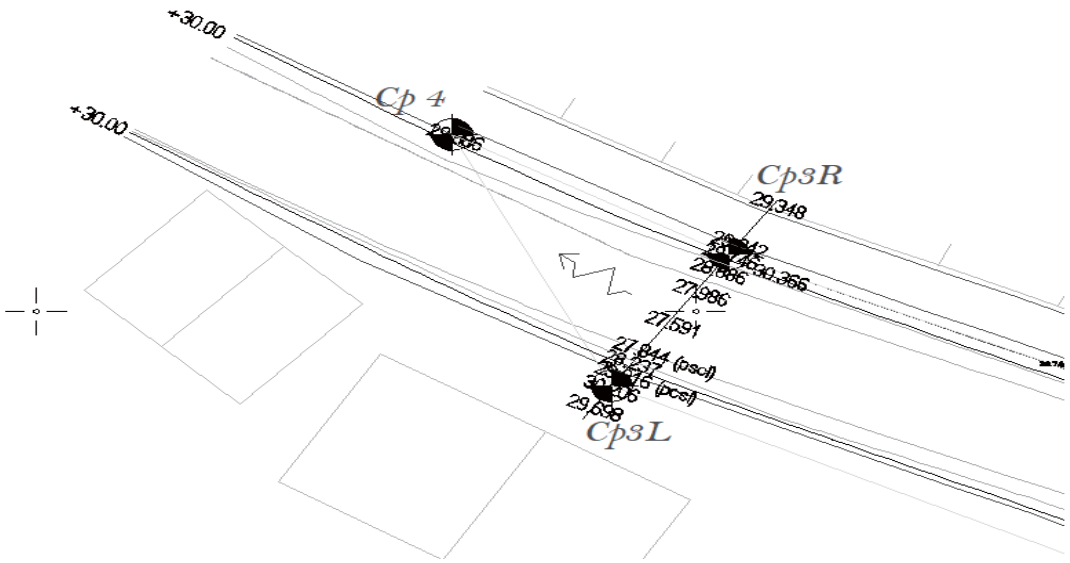
TANGGAL BUAT :	12 Oktober 2018
KETERANGAN	CP Sungai Malalayang

DISKRIPSI BM - CP



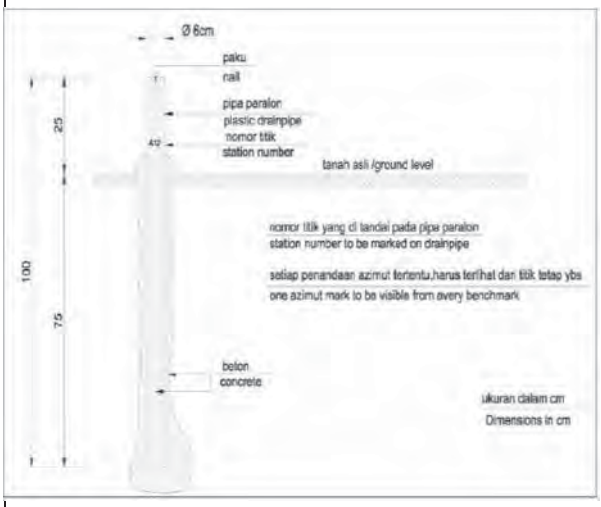
CP 3L :	X = 703293.655	Y = 159742.655	Z = 30.206 M	
LOKASI :	Kelurahan Batukota, Kecamatan Malalayang, Kota Manado			

Sketsa :



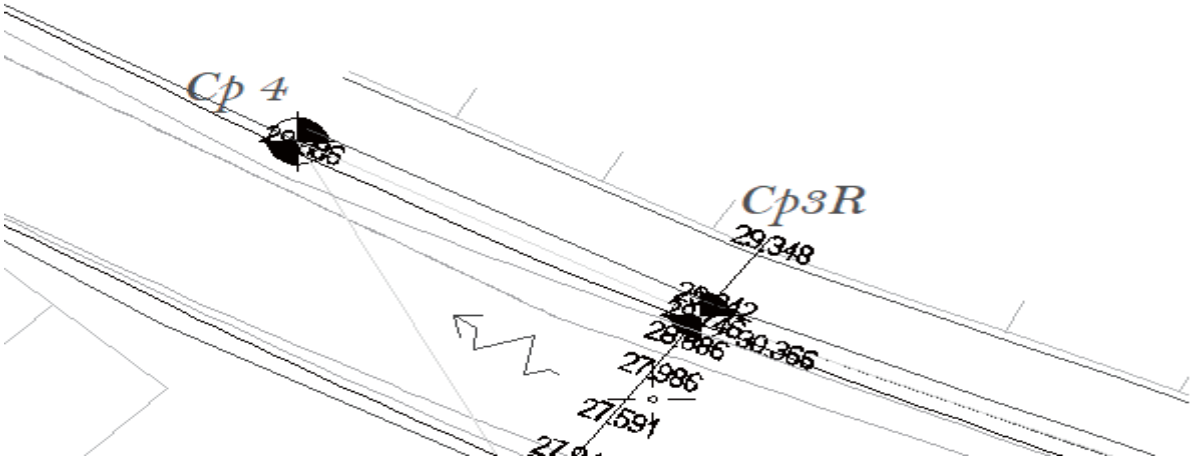
TANGGAL BUAT :	11 Oktober 2018
KETERANGAN	CP Sungai Malalayang

DISKRIPSI BM - CP



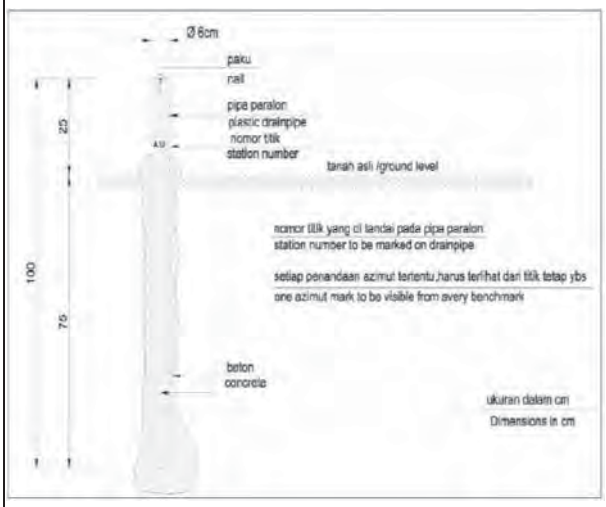
CP 3R :	X = 703302.571	Y = 159755.660	Z = 29.746 M	
LOKASI :	Kelurahan Batukota, Kecamatan Malalayang, Kota Manado			

Sketsa :



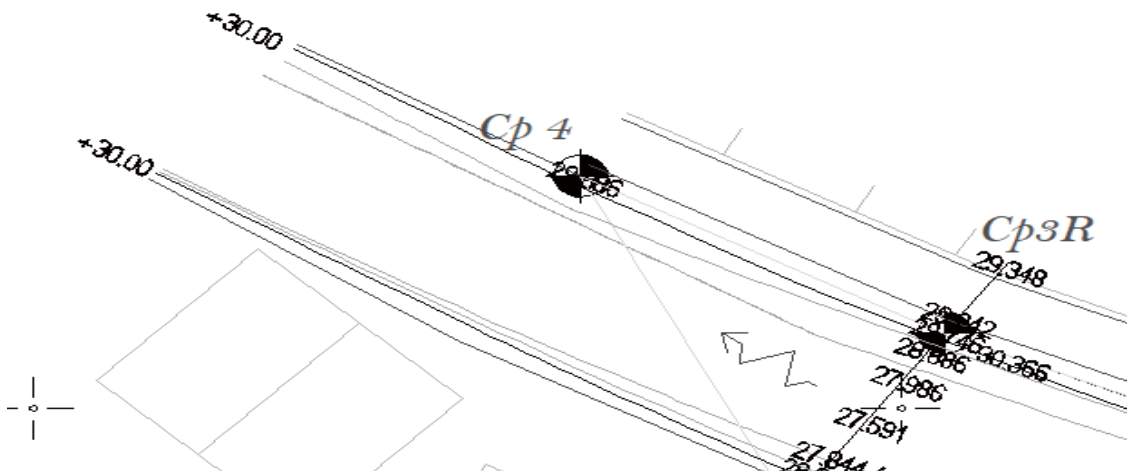
TANGGAL BUAT :	12 Oktober 2018
KETERANGAN	CP Sungai Malalayang

DISKRIPSI BM - CP



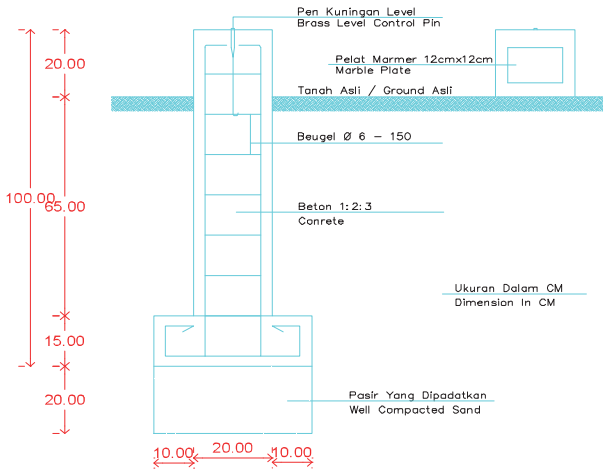
CP 04	X = 703281.562	Y = 159767.397	Z = 29.886 M	
LOKASI :	Kelurahan Batukota, Kecamatan Malalayang, Kota Manado			

Sketsa :



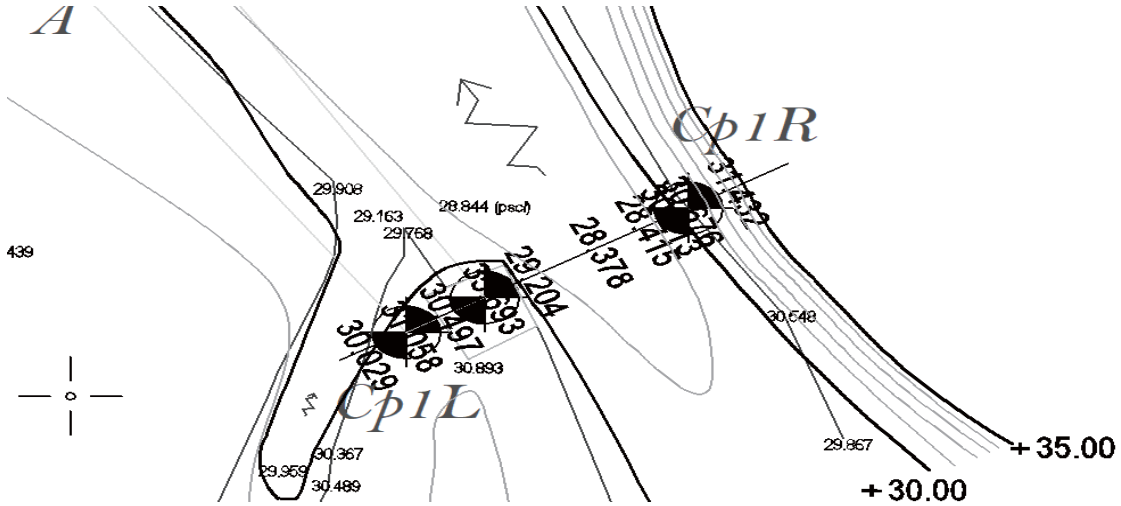
TANGGAL BUAT :	12 Oktober 2018
KETERANGAN	CP Sungai Malalayang

DISKRIPSI BM - CP



BM 01	X = 703468.556	Y = 159605.752	Z = 35.693 M	
LOKASI :	Pos Hidrologi Kelurahan Batukota, Kecamatan Malalayang, Manado			

Sketsa :



TANGGAL BUAT :	13 Oktober 2018
KETERANGAN	BM Sungai Malalayang

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI WILAYAH SUNGAI SULAWESI I
Jln. MR. A. A. Maramis Kairangi Dua Telp / Fax (0431) 811621 Manado

ALBUM
GAMBAR PENGUKURAN

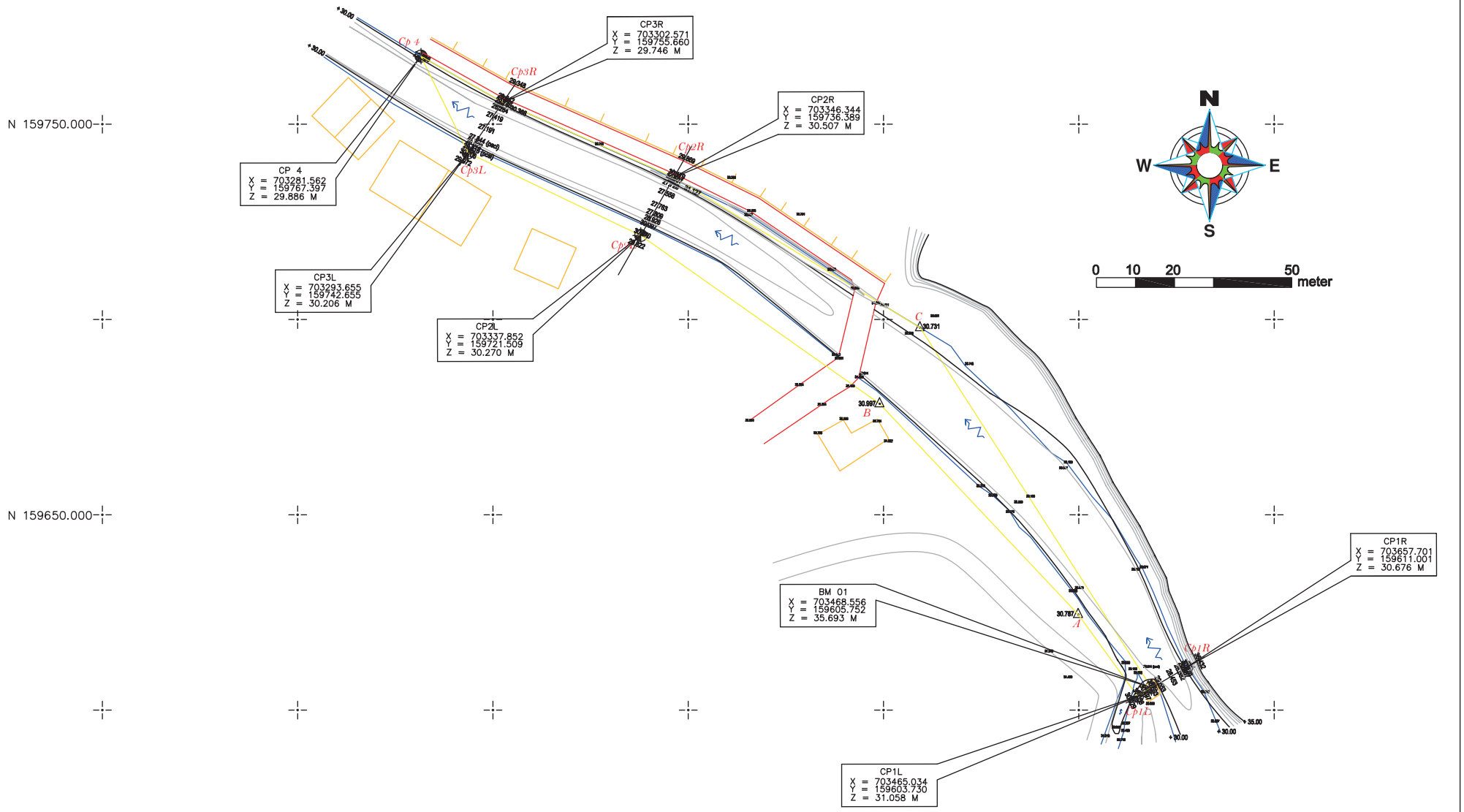
A6-1-No.006-37

PEKERJAAN

TOPOGRAPHIC SURVEYS AT MALALAYANG RIVER
FOR
CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT
(PHASE 2)

No. Kontrak
JICA/RBOs.02/OJT.01/BWSS-I/09/2018

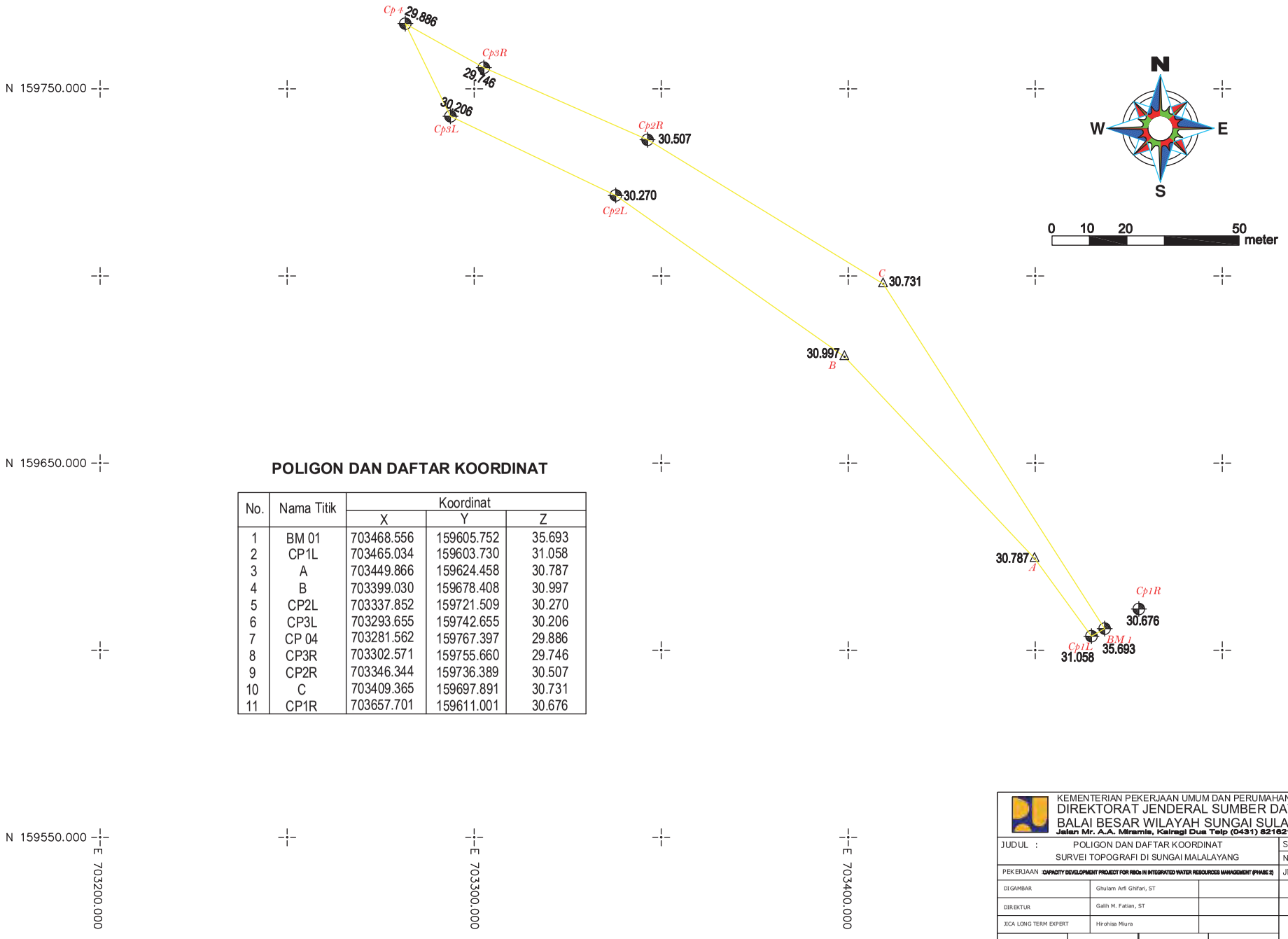
CV. ATRIUM ARSITEK KONSULTAN PERANCANG
KOMPLEKS WALE LESTARI INDAH BLOK AA NO.5 TELP.0431-871692 MANADO



KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Maramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : PETA SITUASI SUNGAI MALALAYANG SURVEI TOPOGRAFI DI SUNGAI MALALAYANG			SISTEM KOORD.: UTM 51N NO. LEMBAR : 1 JML. LEMBAR : 5
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)			
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR SIZE A3
DIREKTUR	Galih M. Fatian, ST		29 Oktober 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

A6-1-No.006-38



POLIGON DAN DAFTAR KOORDINAT

No.	Nama Titik	Koordinat		
		X	Y	Z
1	BM 01	703468.556	159605.752	35.693
2	CP1L	703465.034	159603.730	31.058
3	A	703449.866	159624.458	30.787
4	B	703399.030	159678.408	30.997
5	CP2L	703337.852	159721.509	30.270
6	CP3L	703293.655	159742.655	30.206
7	CP 04	703281.562	159767.397	29.886
8	CP3R	703302.571	159755.660	29.746
9	CP2R	703346.344	159736.389	30.507
10	C	703409.365	159697.891	30.731
11	CP1R	703657.701	159611.001	30.676

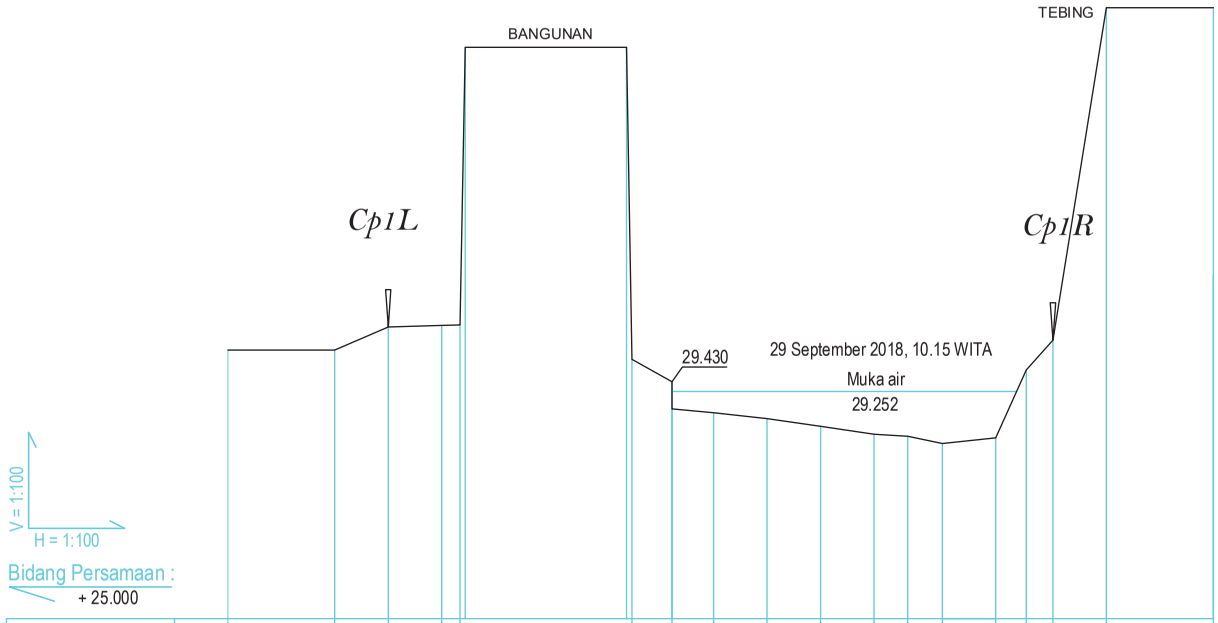
KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : POLIGON DAN DAFTAR KOORDINAT SURVEI TOPOGRAFI DI SUNGAI MALALAYANG			SISTEM KOORD.: UTM 51N
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)			NO. LEMBAR : 2
			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR SIZE A3
DIREKTUR	Galih M. Fatian, ST		29 Oktober 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten:	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

A6-1-No.006-39

A6-1-No.006-40

CROSS SECTION CP 1



ELEVASI		30.029	30.458	30.495	30.497		29.553	28.927	28.854	28.744	28.601	28.453	28.414	28.278	28.382	29.657	30.213	36.432		
JARAK			1.00	1.00	0.34	3.22		0.75	0.78	1.00	1.00	1.00	0.63	0.65	1.00	0.57	0.50	1.00		

SCALE (V) 0 2 6 10m

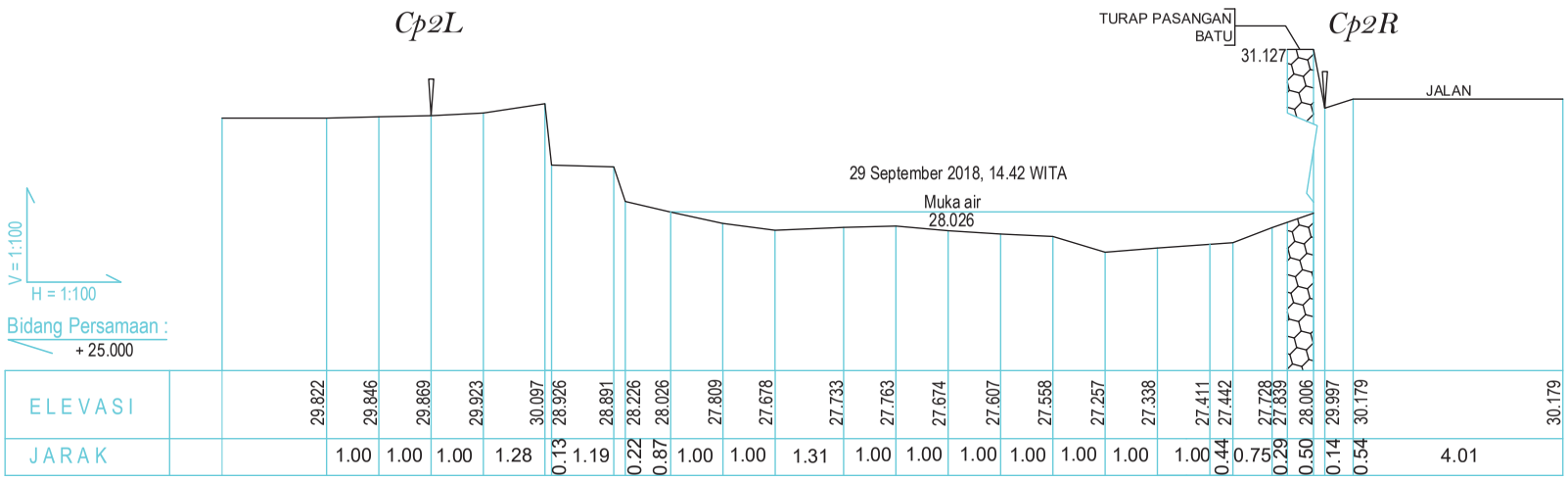
SCALE (H) 0 2 6 10m

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : CROSS SECTION CP 1 SURVEI TOPOGRAFI DI SUNGAI MALALAYANG			SISTEM KOORD.: UTM 51N NO. LEMBAR : 3 JML. LEMBAR : 5
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)			
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR 29 Oktober 2018
DIREKTUR	Galih M. Fatian, ST		SIZE A3
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten:	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

A6-1-No.006-41

CROSS SECTION CP 2



ELEVASI		29.822	29.846	29.869	29.923	30.097	28.926	28.891	28.226	28.026	27.809	27.678	27.733	27.763	27.674	27.607	27.558	27.257	27.338	27.411	27.442	27.728	27.839	28.006	29.997	30.179					30.179
JARAK			1.00	1.00	1.00	1.28	0.13	1.19	0.22	0.87	1.00	1.00	1.31	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.44	0.75	0.29	0.50	0.14	0.54	4.01				

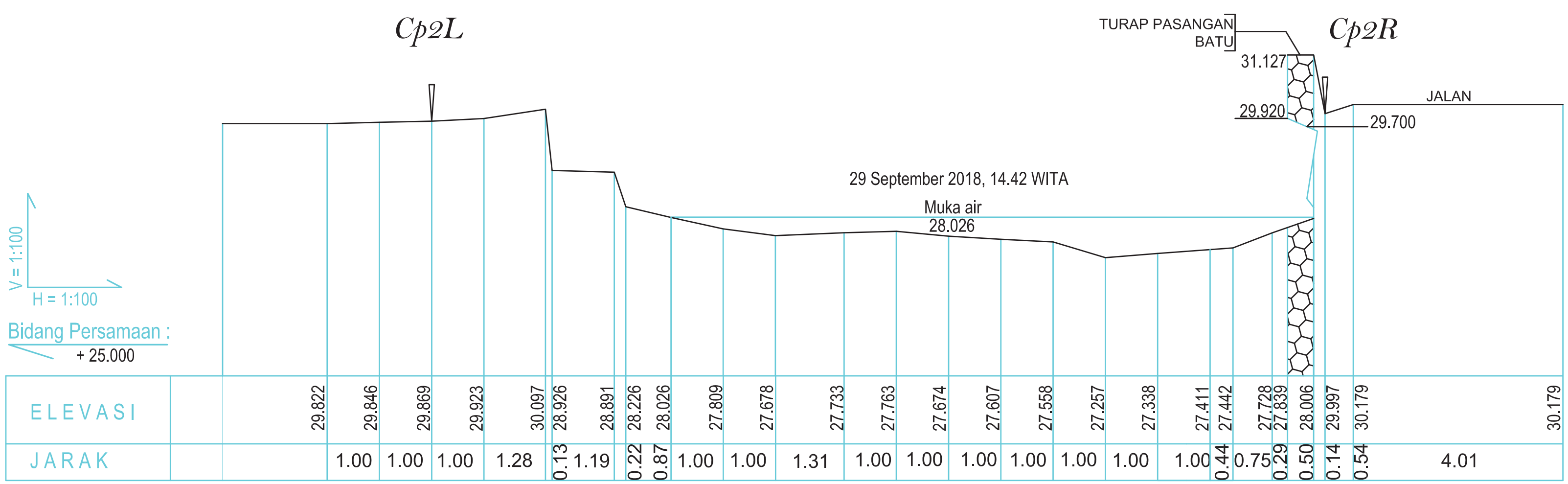
SCALE (V) 0 2 6 10m

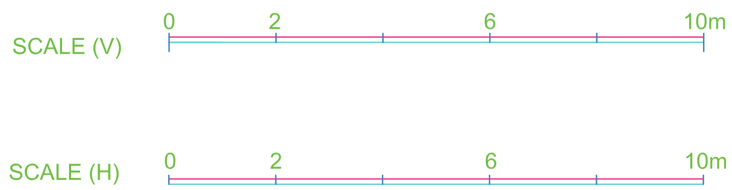
SCALE (H) 0 2 6 10m

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Maramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : CROSS SECTION CP 2 SURVEI TOPOGRAFI DI SUNGAI MALALAYANG			SISTEM KOORD.: UTM 51N NO. LEMBAR : 4 JML. LEMBAR : 5
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)			
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR 29 Oktober 2018
DIREKTUR	Galih M. Fatian, ST		SIZE A3
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten:	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

CROSS SECTION CP 2

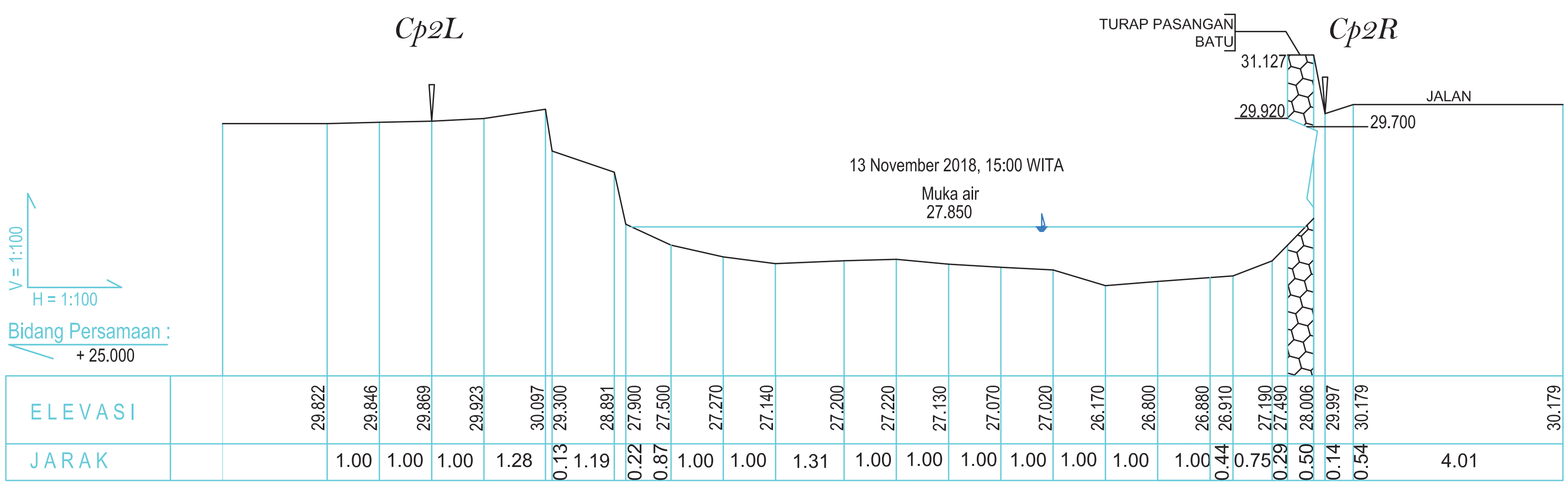


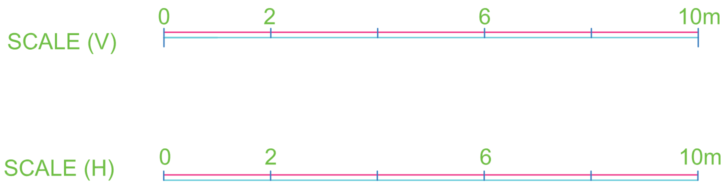


KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Maramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : CROSS SECTION CP 2 SURVEI TOPOGRAFI DI SUNGAI MALALAYANG				SISTEM KOORD.: UTM 51N NO. LEMBAR : 4 JML. LEMBAR : 5
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)				
DIGAMBAR	Ghulam Arfi Ghifari, ST			DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatian, ST			29 Oktober 2018
JICA LONG TERM EXPERT	Hirohisa Miura			KONSULTAN PELAKSANA
Propinsi	Sulawesi Utara	Kabupaten	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

CROSS SECTION CP 2





KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : CROSS SECTION CP 2
SURVEI TOPOGRAFI DI SUNGAI MALALAYANG

SISTEM KOORD.: UTM 51N
NO. LEMBAR : 4
JML. LEMBAR : 5

PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)

DIGAMBAR	Ghulam Arfi Ghifari, ST
DIREKTUR	Galih M. Fatian, ST
JICA LONG TERM EXPERT	Hirohisa Miura

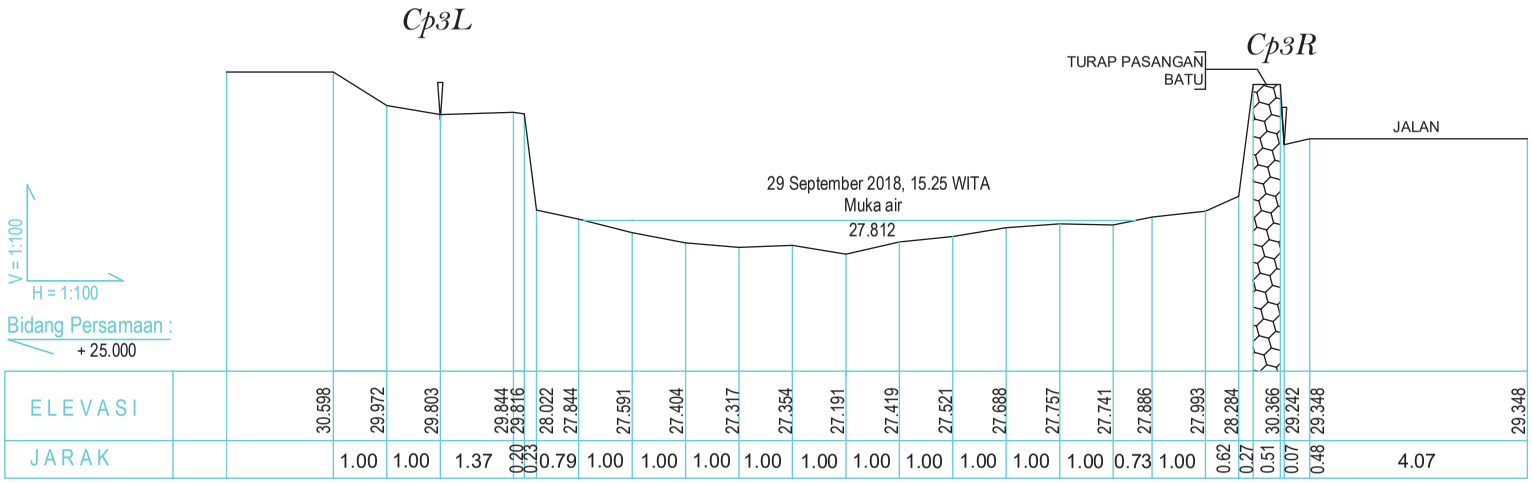
DIGAMBAR: 29 Oktober 2018
SIZE: A3

KONSULTAN PELAKSANA
C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

Propinsi	Sulawesi Utara	Kabupaten	Kota Manado

A6-1-No.006-44

CROSS SECTION CP 3



ELEVASI		30.598	29.972	29.803	29.844	29.816	28.022	27.844	27.591	27.404	27.317	27.354	27.191	27.419	27.521	27.688	27.757	27.741	27.886	27.993	28.284	30.366	29.242	29.348	29.348
JARAK			1.00	1.00	1.37	0.20	0.23	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.73	1.00	0.62	0.27	0.51	0.07	0.48	4.07

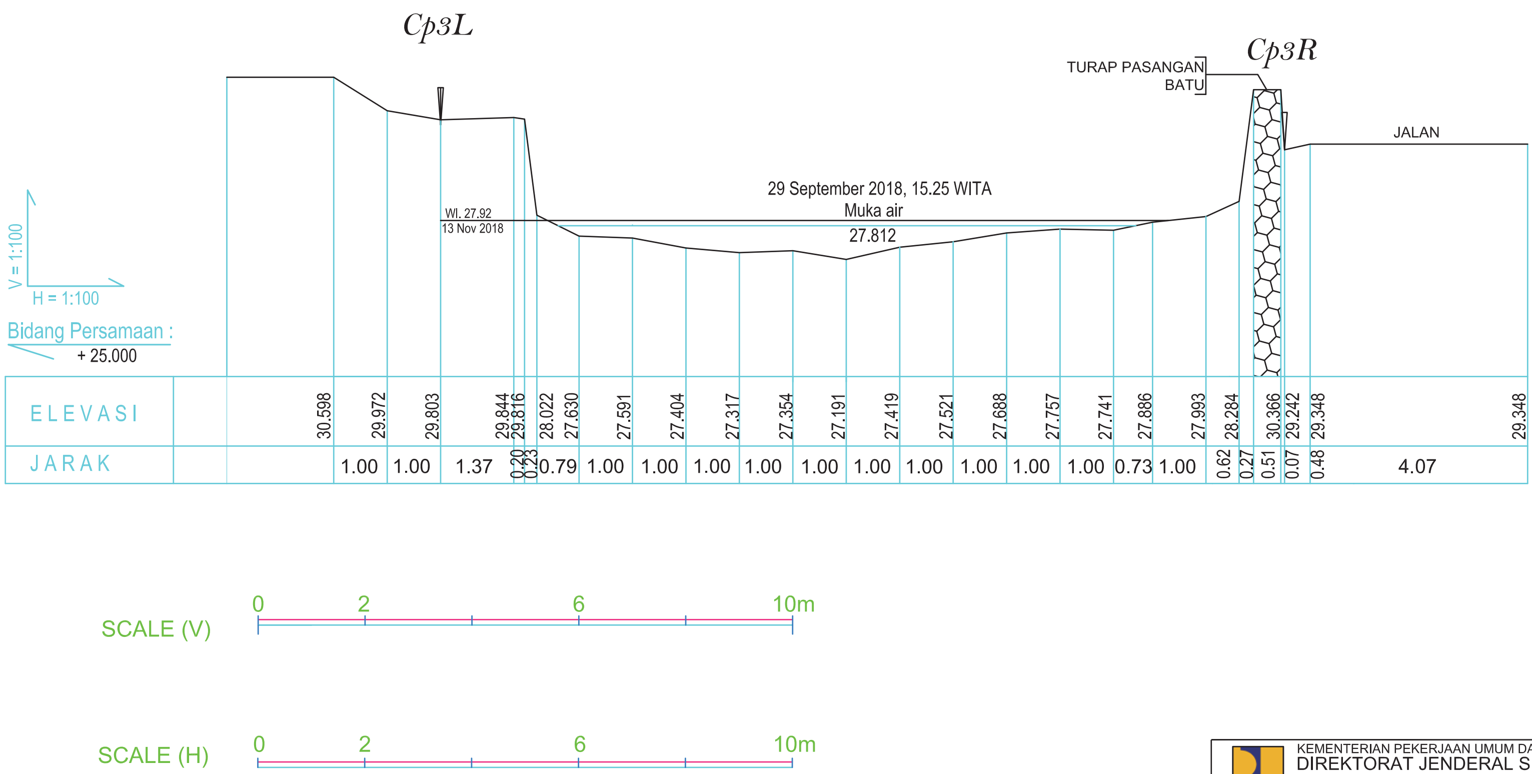
SCALE (V) 0 2 6 10m

SCALE (H) 0 2 6 10m

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

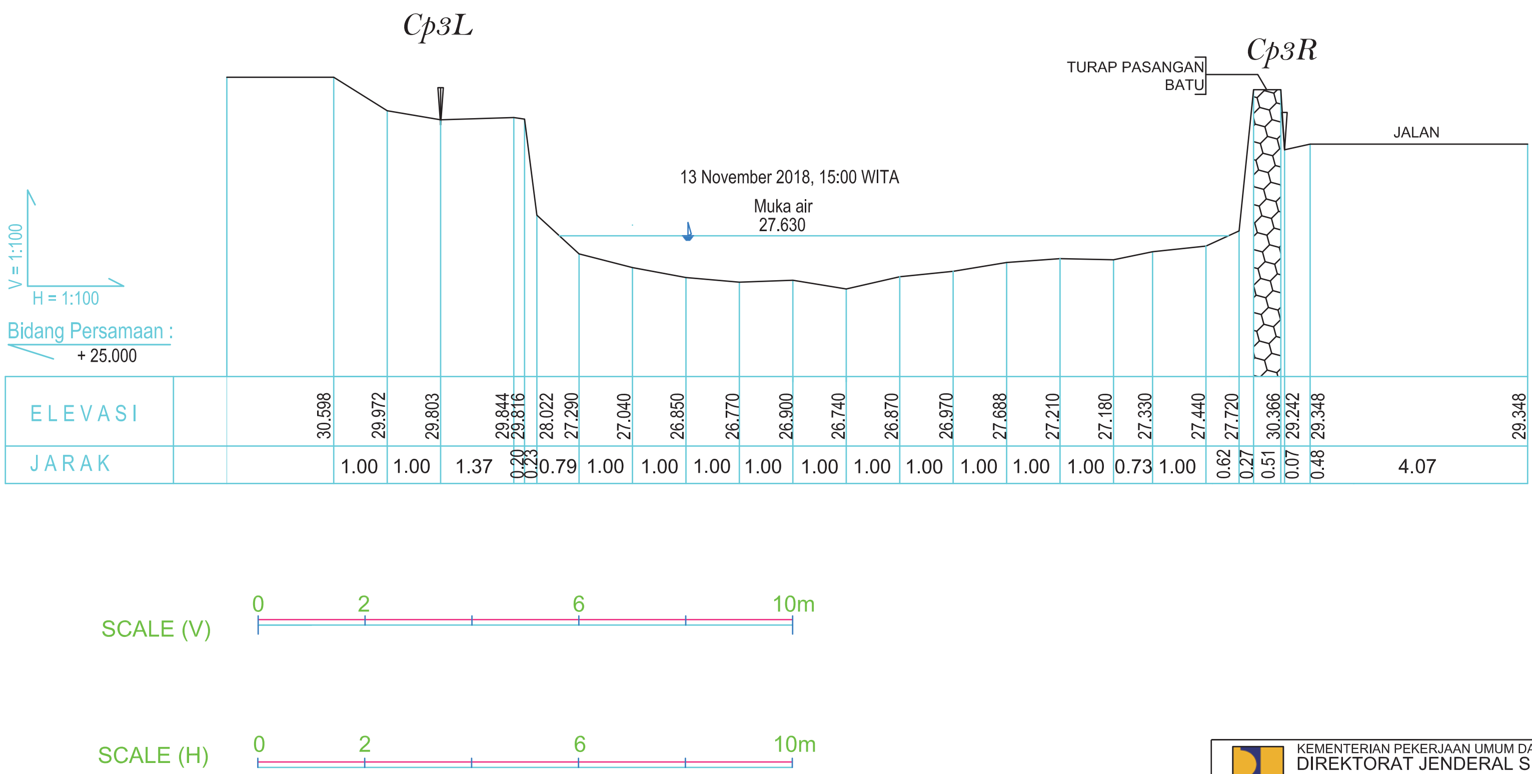
JUDUL : CROSS SECTION CP 3 SURVEI TOPOGRAFI DI SUNGAI MALALAYANG			SISTEM KOORD.: UTM 51N NO. LEMBAR : 5 JML. LEMBAR : 5
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)			
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR 29 Oktober 2018
DIREKTUR	Galih M. Fatian, ST		SIZE A3
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten:	Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

CROSS SECTION CP 3



KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT DIREKTORAT JENDERAL SUMBER DAYA AIR BALAI BESAR WILAYAH SUNGAI SULAWESI I Jalan Mr. A.A. Maramis, Kairagi Dua Telp (0431) 821621 Manado		
JUDUL : CROSS SECTION CP 3 SURVEI TOPOGRAFI DI SUNGAI MALALAYANG		SISTEM KOORD.: UTM 51N NO. LEMBAR : 5
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)		JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST	DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatian, ST	29 Oktober 2018
JICA LONG TERM EXPERT	Hirohisa Miura	KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten: Kota Manado	C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

CROSS SECTION CP 3



KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL :	CROSS SECTION CP 3 SURVEI TOPOGRAFI DI SUNGAI MALALAYANG		SISTEM KOORD.: UTM 51N NO. LEMBAR : 5
PEKERJAAN : CAPACITY DEVELOPMENT PROJECT FOR RBOs IN INTEGRATED WATER RESOURCES MANAGEMENT (PHASE 2)			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatian, ST		29 Oktober 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi	Sulawesi Utara	Kabupaten	Kota Manado
			C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

Cross Section				
No	Titik	Jarak Antar	Komulatif	Elevasi
Cp1L	a	0.000	0.00	30.029
	Cp1L	1.000	1.00	30.458
	b	1.000	2.00	30.495
	c	0.340	2.34	30.497
	d	0.000	2.34	35.693
	e	3.220	5.56	35.693
	f	0.000	5.56	29.553
	g	0.750	6.31	28.927
	h	0.780	7.09	28.854
	i	1.000	8.09	28.744
	j	1.000	9.09	28.601
	k	1.000	10.09	28.453
	l	0.630	10.72	28.414
	m	0.650	11.37	28.278
	n	1.000	12.37	28.382
	o	0.570	12.94	29.657
	Cp1R	0.500	13.44	30.213
	p	1.000	14.44	36.432
Cp2L	a	0.000	0.00	29.822
	Cp2L	2.000	2.00	29.869
	b	1.000	3.00	29.923
	c	1.280	4.28	30.097
	d	0.130	4.41	28.926
	e	1.190	5.60	28.891
	f	0.220	5.82	28.226
	g	0.870	6.69	28.026
	h	1.000	7.69	27.809
	i	1.000	8.69	27.678
	j	1.310	10.00	27.733
	k	1.000	11.00	27.763
	l	1.000	12.00	27.674
	m	1.000	13.00	27.607
	n	1.000	14.00	27.558
	o	1.000	15.00	27.257
	p	1.000	16.00	27.338
	q	1.000	17.00	27.411
	r	0.440	17.44	27.442
	s	0.750	18.19	27.728
	t	0.790	18.98	28.006
	u	0.000	18.98	31.127
	Cp2R	0.140	19.12	29.997
	v	0.540	19.66	30.179
Cp3L	a	0.000	0.00	30.598
	b	1.000	1.00	29.972
	Cp3L	1.000	2.00	29.803
	c	1.370	3.37	29.844
	d	0.200	3.57	29.816
	e	0.230	3.80	28.022
	f	1.790	5.59	27.591
	g	1.000	6.59	27.404
	h	2.000	8.59	27.354
	i	1.000	9.59	27.191
	j	1.000	10.59	27.419
	k	1.000	11.59	27.521
	l	1.000	12.59	27.688
	m	2.000	14.59	27.741
	n	0.730	15.32	27.886
	o	1.620	16.94	28.284
	p	0.270	17.21	30.366
	q	0.510	17.72	30.366
	Cp3R	0.070	17.79	29.242
	r	0.480	18.27	29.348

ANNEX 6-1

Report No.007

Collection Material & Reference on Dam Operation & Maintenance at BWS Sulawesi 1

[Report 007: Collection Material & Reference on Dam Operation & Maintenance at BWS Sulawesi 1]

List of Regulation & Guideline on Dam O/M, http://sda.pu.go.id/balai_bendungan/daftar-pedoman

1	Tata Tertib Sidang Komisi Keamanan Bendungan	01/KPTS/2002	Procedures of Dam Safety Panel Meeting
2	Tata Cara untuk Persetujuan Pembangunan dan Penghapusan Fungsi Bendungan	04/KPTS/2002	Procedures for the Development Approval and Abolition of Dam Function
3	Pedoman Pengisian Waduk	October 2002	Guideline on Reservoir Impounding
4	Pedoman Inspeksi dan Evaluasi Keamanan Bendungan	05/KPTS/2003	Guideline on Inspection and Evaluation of Dam Safety
5	Pedoman Operasi, Pemeliharaan dan Pengamatan Bendungan Bagian 1: Umum	199/KPTS/D/2003	Guideline on Operation, Maintenance and Observation of Dam Part 1: General
6	Pedoman Operasi, Pemeliharaan dan Pengamatan Bendungan Bagian 2: Pengelolaan Operasi dan Pemeliharaan	199/KPTS/D/2003	Guideline on Operation, Maintenance and Observation of Dam Part 2: Management of Operation and Maintenance
7	Pedoman Operasi, Pemeliharaan dan Pengamatan Bendungan Bagian 3: Sistem Instrumentasi dan Pemantauan	199/KPTS/D/2003	Guideline on Operation, Maintenance and Observation of Dam Part 3: Instrumentation System and Monitoring
8	Pedoman Operasi, Pemeliharaan dan Pengamatan Bendungan Bagian 4: Inspeksi Keamanan untuk Peralatan Hidromekanikal dan Elektrik	199/KPTS/D/2003	Guideline on Operation, Maintenance and Observation of Dam Part 4: Safety Inspection for Hydromechanics and Electric
9	Pedoman Operasi, Pemeliharaan dan Pengamatan Bendungan Bagian 5: Operasi & Pemeliharaan Peralatan Hidromekanikal dan Elektrik	199/KPTS/D/2003	Guideline on Operation, Maintenance and Observation of Dam Part 5: Operation and Maintenance for Hydro mechanical and Electrical Equipment
10	Pedoman Kajian Keamanan Bendungan	05/KPTS/D/2003	Guideline on Study of Dam Safety
11	Pedoman Kriteria Umum Desain Bendungan	05/KPTS/D/2003	Guideline on General Criteria for Dam Design
12	Pedoman Pengelolaan Sedimentasi Waduk	November 2004	Guideline on Management of Reservoir Sedimentation
13	Pedoman Bendungan Limbah Tambah	November 2004	Guideline on Dam for Waste
14	Pedoman Pelaksanaan Konstruksi Bendungan Urugan	November 2004	Guideline on Construction of Fill-type Dam
15	Manual Inspeksi Visual Bendungan Urugan	November 2004	Manual on Visual Inspection of Fill-type Dam
16	Pedoman Pengendalian Rembesan pada Bendungan Urugan	December 2005	Guideline on Seepage Control on Fill-type Dam
17	Pedoman Grouting untuk Bendungan	December 2005	Guideline on Grouting for Dam
18	Pedoman Pembuatan Dinding Halang (Cut-Off Wall) pada Bendungan Urugan	December 2005	Guideline on Construction of Cut-off Wall for Fill-type Dam
19	Pedoman Pembangunan Bendungan Urugan pada Pondasi Tanah Lunak	04/KPTS/D/2007	Guideline on Construction of Fill-type Dam on Soft-ground Foundation
20	Pedoman Analisa Dinamis Bendungan Urugan	27/KPTS/D/2008	Guideline on Dynamic Analysis of Fill-type Dam
21	Pedoman Analisa Dinamik Bendungan Beton Gaya Berat	38/KPTS/D/2009	Guideline on Dynamic Analysis of Concrete Gravity Dam
22	Pedoman Survei dan Monitoring Sedimentasi Waduk	39/KPTS/D/2009	Guideline on Survey and Monitoring of Reservoir Sedimentation
23	Pedoman Klasifikasi Bahaya Bendungan	257/KPTS/D/2011	Guideline on Classifications of Danger of the Dam

ANNEX 6-1

Report No.008

Report of Training on Dam Operation & Maintenance, in Malang on February 2016

Report of Training on Dam Operation & Maintenance

Date:	2nd Feb. 2016 to 5th Feb. 2016, for 4 days
Place:	Atria Hotel Malang City
Participants:	26 trainees (5 from PUPR, 14 from B(B)WS, 7 from Province and Regency)
Schedule:	1st Feb. Opening Ceremony and Classroom Lectures
	2nd Feb Field Study
	3rd Feb. Classroom Lectures
	4th Feb. Classroom Lectures and Closing Ceremony

1. 1st Day of Training

1) Opening Ceremony

Attendees: Prf. Dr. Ir. Anita, Head of Human Resource Development Agency (HRDA)
Ir. Agus Suprapto, ME, Director Directorate of Water Resources Management
Dr. Ir. Suprapto, ME, Head of Water Resources Training Office, HRDA
Mr. Muhadi, Head of Training Center in Surabaya, HRDA

Agenda: General Explanation by Mr. Rahman from Training Center in Surabaya
Welcome Remarks by Suzuki, JICA Project Coordinator
Opening Remarks by Dr. Anita

2) Pre Test

21 participants joined in Pre Test. Before the Pre Test, Mr. MIURA explained purpose of the Pre-test;

-Evaluating participants' knowledge level not for measuring
-Evaluating quality of the training

3) Lecture No.1 "Outline of Dam O/M in Japan"

Lecturer: Mr. MIURA Hirohisa, JICA Project Technical Expert

Question 1: Please explain detail of warning for discharge from dam.

Answer 1: Before one (1) hours, dam office has to implement 1) Fax and telephone to local government at downstream about starting time and volume of discharge, prediction of river water level, 2) patrol at downstream, 3) Siren from warning stations

Question 2: Please explain detail of operation & maintenance of reservoir water level at flood season and dry season.

Answer 2: Flood season in Japan is usually from June to October. Multipurpose dam should down reservoir water level until regulated reservoir water level to keep flood control capacity. But effective capacity for water use is reduced, so we always make agreement with stakeholders and water users before construction.

Question 3: Please explain detail of drawdown operation after flood control.

Answer 3: After peak cut (flood control operation), when volume of inflow and discharge become same, we keep discharge volume to down reservoir water level for next flood. But in this case, dam office always monitor river water level at downstream. If river water level still high, we continue to reduce discharge volume even volume of inflow and discharge become same.

Question 4: At Jatiluful dam in Indonesia, reservoir water level is kept at low level because of dam body condition. Therefore, it makes influence to water supply for downstream. Do you any suggestion or comment?

Answer 4: I do not know detail of about it. General speaking, dam body safety should be prioritized. I can agree with this countermeasures by PUPR from view point of risk management. Because if dam body collapse is occurred, it makes bigger impact and damage.

4) Lecture No.2 "Current Status of Dam O/M in Indonesia"

Lecturer: Ir. Joko Mulyono, ME, Head of Sub-dit of Operation and Maintenance of Dams and Lakes

5) Lecture No.3 "Maintenance Work of Telecommunication/Electrical and Mechanical Facility in Japan"

Lecturer: Dr. Sugiura Masahiro, JICA Short Term Expert (Deputy Director of International Affairs Division, Water Resources Engineering Department, Japan Water Agency)

Question 1: Balai Bendungan is now making a manual of Dam OP with Day Safety Committee. Therefore, could you explain on facility maintenance?

Answer 1: We, Japan Water Agency, firstly classify facilities of dam by function level and importance level. Then we make check/inspection/upgrade plan for facilities.

Question 2: Can you explain method of check/inspection?

Answer 2: As an example of tele-communication facility, we conduct 1) daily check: lamp test, voltage and observation data availability, 2) half year inspection: condition test of instrument/equipment and communication system, 3) yearly inspection: check and test for whole system

Question 3: Do you think staff of B(B)WS should do all maintenance work by themselves?

Answer 3: No, I do not think about it. Staff of B(B)WS has to do daily check, but half year and yearly inspection should be ordered to company that has some specialist for facility.

Question 4: B(B)WS sometimes has a difficulty for repairing facility. Because there is no spear parts…

Answer 4: I think the facility that is made outside of Indonesia. This is why there is no parts for repairing. JICA also provided many instrument/equipment that is made in Japan… I think B(B)WS should procure instrument/equipment that is made in Indonesia. If a Japanese company come to you for their product promotion, you can ask them about availability of parts in Indonesia.

6) Lecture No.4 "Briefing on Field Study"

Coordinator: Mr. MIURA Hirohisa, JICA Project Technical Expert
Mr. Sarwono, JICA Project Consultant Team Leader

- The route and schedule of the field study was confirmed
- Mr. MIURA explained general information / situation of Sutami/Lahor Dam and Senggruh Dam
- Mr. Sarwono explained Brantas river system and Dams

Opening Ceremony

Lecture on Dam OP in Japan by Mr. Miura

Lecture on Dam OP in Indonesi by Mr. Joko

Lecture by Dr. Sugiura

2. 2nd Day of Training

1) Lecture No.5 "Field Study at Sutami Dam and Lahor Dam"

Coordinator: Mr. Windianita, Infrastructure Management, PJT II
Mr. MIURA Hirohisa, JICA Project Technical Expert
Mr. Sarwono, JICA Project Consultant Team Leader

Topics at Sutami Dam;

- Dam Body Safety and Observation
- Mechanical Facility Maintenance

Topics at Lahor Dam;

- Observation and Instruments for Dam Body Safety
- Tele-communication Facility Maintenance

2) Lecture No.6 "Field Study at Sengguruh Dam"

Coordinator: Mr. Windianita, Infrastructure Management, PJT II
Mr. MIURA Hirohisa, JICA Project Technical Expert
Mr. Sarwono, JICA Project Consultant Team Leader

Topics at Sengguruh Dam

- Sediment Management

At Crest of Sutami Dam on Dam Body Safety

Operation Room of Sutami Dam

Field Study at Lahor Dam

At Senggruh Dam on Sediment Management

3. 3rd Day of Training

1) Lecture No.7 "Feedback of Field Study"

Coordinator: Mr. MIURA Hirohisa, JICA Project Technical Expert
Mr. Sarwono, JICA Project Consultant Team Leader

Commentators: Mr. Windianita, Infrastructure Management, PJT II

Topics that is mentioned in group presentations;

- Integrated Management of River "1 River, 1 Plan, 1 Management"
- Integrated Dam Operation & Maintenance, especially for sedimentation
- Dam body safety
- Countermeasure for sedimentation

2) Lecture No.8 "Dam Safety and Dam Body Observation"

Lecturer: Ir. Achmad Zubaedi, Head of Balai Bendungan, DGWR PUPR

3) Lecture No.9 "Integrated Flood Control of Dams in Japan"

Lecturer: Mr. MIURA Hirohisa, JICA Project Technical Expert

Question 1: Organization Chart for Integrated Dam O/M in Japan (Case of Kinki Region) is almost same with Indonesia's case.

Answer 1: Yes, Indonesia and Japan have special institutions for dam management, PJT in Indonesia, JWA in Japan. It makes almost same chart.

Question 2: Why is there only "Coordination" between MLIT (PUPR) and JWA (PJT) in organization chart? Is "Instruction" unnecessary?

Answer 2: Between River Management Office (BBWS) and JWA Dam office (PJT dam office), they always exchange information and BBWS gives instruction to dam office. This

is why there is only “Coordination” among upper level (PUPR and PJT Head office)

Question 3: Even small scale flood case, is the organization chart applied?

Answer 3: No, each dam has an operation rule. The rule mentions normal operation method for flood control. How if we has to conduct special/integrated operation for flood control, we apply the organization chart for the operation.

4) Lecture No.10 “Water Balance of Dam Reservoir and Operation”

Lecturer: Drs. Petrus Syariman MT, Hydrological Engineering Researcher, PUSAIR

Group Discussion

Group Presentation

Lecture by Ir. Achmad Zubaedi

Lecture by Drs. Petrus Syariman

4. 4th Day of Training

1) Lecture No.11 “Water Quality Management of Dam Reservoir in Japan”

Lecturer: Mr. MIURA Hirohisa, JICA Project Technical Expert

2) Lecture No.12 “Sediment Management in Indonesia”

Lecturer: Ir. Imam Mardjianto, Dipl, HE, Head of Sub-dit of Operation and Maintenance of River and Coastal

3) Post Test

26 participants joined in Pre-Test.

4) Closing Ceremony

Attendees:	Dr. Ir. Suprapto, ME, Head of Water Resources Training Office, HRDA
	Ir. Imam Mardjianto, Dipl, HE, Head of Sub-dit of O/M of River and Coastal
Agenda:	General Explanation on Result and Evaluation of the Training
	Closing Massage by Suzuki Kazushi, JICA Project Coordinator
	Closing Remarks by Ir. Imam Mardjianto
	Closing Remarks by Dr. Ir. Suprapto

Lecture by Ir. Imam Mardjianto

Trainees are concentrating Post Test

Closing Ceremony

Taking Name Tag at Ceremony

5) Summary

- The Training had been done successfully with good management by training Center in Surabaya and good participation of most of trainees
- The Number of trainees was less than our expectation (plan 30 people, actual 26 people)
- 7 (seven) participants from local government, and 5 (five) participants from PUPR Headquarters

- As a result of Pre/Post Test, proficiency level of trainees were lifted. Average score of questions on "Legal aspect", "Dam Safety", "Sediment Management" were lower than score of other topics. The project will consider these 2 topic for next year trainings and capacity development activities
- As a result of questionnaire, "Sediment Management" in the field of Dam O/M was raised as an important issue
- We had done 2 (two) trainings on February. We will talk about results of both trainings to improve quality and effectiveness of curriculum, lecturers, requirement of trainees and so on at PIU meeting on March
- Procedures for preparation, especially invitation for participants, was delayed, PIU and JICA Team should coordinate more closely with Employment section

END

Summary of Pre Test and Post Test
at Training on "Dam Operation & Maintenance" in Malanag, Feb. 2016

1. Individual Score Ranking

Highest Score of Pre Test

Ranking	Score	Name	Organization
1	83	Agung Kurniawan, S.T.	BBWS Cimanuk Cisanggarung
1	83	Herri Ari Panuntun, S.T.	Direktorat Bina OP
3	75	Pandhu Wiyoso Ardono, S.T., M.Eng.	Pusat Bendungan

Highest Score of Post Test

Ranking	Score	Name	Organization
1	100	Pandhu Wiyoso Ardono, S.T., M.Eng.	Pusat Bendungan
2	96	Dodo Wardoyo, S.T.	BBWS Cimanuk Cisanggarung
3	95	Yudha Dwi Hermawan	BWS Kalimantan III

Highest Score of Improvement

Ranking	Score	Name	Organization
1	50	Andi Asnaeni, S.T., M.T.	BBWS Pompengan Jeneberang
2	46	Muhammad Kafid Maskuri, S.T.	BWS Kalimantan II
3	44	Dodo Wardoyo, S.T.	BBWS Cimanuk Cisanggarung

2. Field that was improved and is necessary to improve

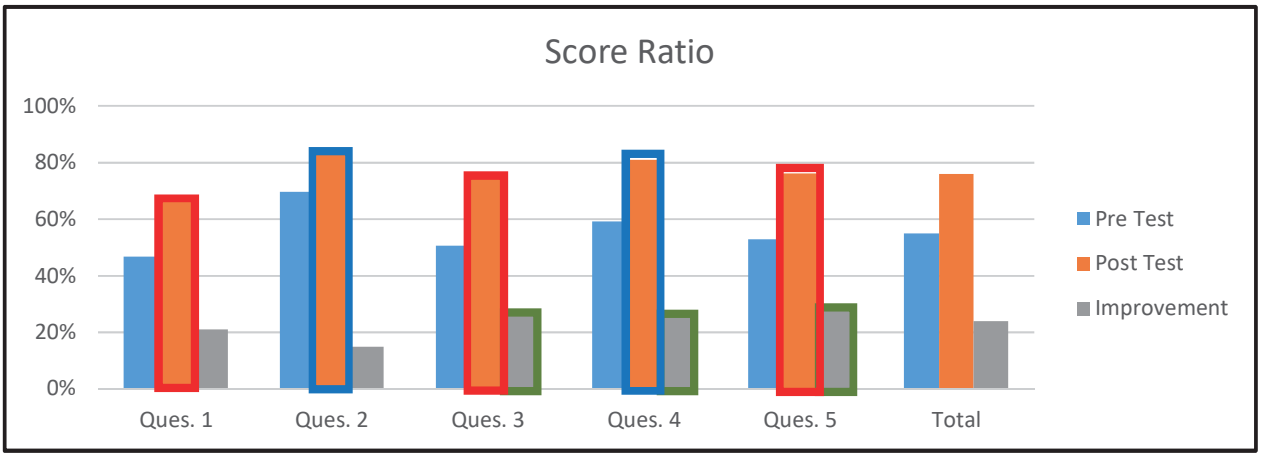
Table: Score Rate of Each Field (Question)

No.	Field	Pre Test	Post Test	Improvement
Question 1	Legal Framework	47%	66%	21%
Question 2	Facility Maintenance	70%	83%	15%
Question 3	Dam Safety (Dam Body Observation)	51%	76%	27%
Question 4	Water Balance of Reservoir	59%	81%	27%
Question 5	Sediment Management	53%	76%	29%

-Participants' knowledge of bellows is high
- Facility Maintenance
- Water Balance of Reservoir (Hydrology)

-Participants' knowledge of bellows was improved
- Dam Safety (Dam Body Observation)
- Water Balance of Reservoir
- Sediment Management

-Field of bellows should be improved more (Field should be focused at next training)
- Legal Framework
- Dam Safety (Dam Body Observation)
- Sediment Management



ANNEX 6-1

Report No.009

Report of Training on Water Allocation, in Makassar, on February 2016

Report of Training on Water Allocation

Date:	23 Feb. 2016 to 26 Feb. 2016, for 4 days
Place:	Best Western Hotel Makassar
Short Term Expert:	Mr. Kunihiro Moriyasu
Participants:	26 trainees (8 from PUPR, 16 from B(B)WS, 2 from Province and Regency)
Schedule:	23 Feb. Opening Ceremony and Classroom Lectures
	24 Feb. Classroom Lectures
	25 Feb. Field Study
	26 Feb. Classroom Lectures and Closing Ceremony)

1. 1st Day of Training

1) Opening Ceremony

Attendees: Dr. (Mrs.) Anita, Head of Human Resources Development Agency (HRDA)
Dr. Suprapto, Head of Water Resources Training Center, HRDA
Mrs. Sisuka, Head of Training Center in Makassar, HRDA
Mr. Hariyono, BBWS Pompengan Jeneberang

Agenda: General Explanation by Mr. Joney from Training Center in Makassar
Welcome Remarks by MIURA, JICA Project Technical Expert
Opening Remarks by Dr. Anita

2) Pre Test

24 participants joined in Pre Test. Before the Pre Test, Mr. MIURA explained purpose of the Pre-test;

-Evaluating participants' knowledge level not for measuring
-Evaluating quality of the training

3) Lecture No.1 "Water Balance Calculation and Preparation"

Lecturer: Dr. Eka, Head of Sub-dit of Hydrology and Environment, PUPR

Question: Unfortunately, There was no question from the trainees. I think it was the first lecture in the training and it was given in English.

4) Lecture No.2 "Water Use Right System and Water User Charge System in Japan"

Lecturer: Mr. Moriyasu, JICA Policy Advisor on Water Resources Management

Question 1: Are there any differences of water use right between A class rivers and B class?

Answer 1: Licensors are different, A class river by national government, B class by local government.

Question 2: How about water use right of groundwater?

Answer 2: There is no water use right of groundwater in Japan. It belongs to land owners. However local governments can regulate groundwater intake for subsidence countermeasure

Question 3: Are there any priority for water use right?

Answer 3: Customary water rights have priority. However, during drought, all water users are coordinated to agree upon reducing intake volume by the same percentage

Question 4: Do water users have any obligation on environment conservation?

Answer 4: Water users have responsibility for no influence to environment, such as customary water users, river maintenance flow, river environment around intake facility, etc. Licensors also have to check those things.

Question 5: I am wandering if hydropower users have to pay occupancy of stream water fee? My understanding that water can be returned to river without any changes of volume…

Answer 5: River flow and environment will be change duty to intake and discharge by hydropower water users. This is why we have to apply occupancy of stream water fee.

5) Lecture No.3 "Water Allocation Planning and Current Status"

Lecturer: Mr. Sudarsono, Functional Officer, Directorate of Water Resources Management, PUPR

Comment 1: BBWS Pompengan Jeneberang has an annual Water Allocation plan. But, it is difficult to apply to sites. For example, we have water allocation plan of dam, and it has not applied yet because there are 3 regencies in benefit area. (BBWS Pompengan Jeneberang)

Question 1: How to monitor the implementation of water allocation planning? For the case example in our Benteng Weir, which is originally only for irrigation but currently it is used also for non-irrigation purposes. (PSDA South Sulawesi)

Question 2: Is the water allocation planning just for surface water or also ground water? How about if the water allocation planning is not yet updated, can we still use it? How about small users, are they also taken into consideration in the planning? (BBWS Sumatera 8)

Opening Ceremony

Lecture on Water Balance by Dr. Eka

Mr. Ishigaki from JICA Indonesia Office

Lecture by Mr. Moriyasu

Questions during Mr. Moriyasu's Lecture

Lecture on Water Allocation Planning by Mr. Sudarsono

2. 2nd Day of Training

1) Lecture No.4 "SIPA (Water Use Permit System"

Lecturer: Mr. Saroni, Head of Sub-dit of Water Resources Utilization, PUPR

Question 1: In our case, there are many mining activities in the river where the permits are given and issued by the local government without technical recommendation from our Balai. How to face this problem? (BBWS Sumatera 8, BBWS Pompengan

Jeneberang)

Answer 1: In case of Bili Bili Dam in BBWS Pompengan Jeneberan, mining permission should be done by local government. Please check No.23 Government Regulation. It stimulates coordination among province/Regency on WRM

Question 2: Before issuing technical recommendation, some proposed activities of taking water should be having Environmental Impact Analysis and/or Environmental Permit. What is the legal base for that? Is water use right transferable? How about old water right, can the holder still use it before the new one is issued? (BBWS Pompengan Jeneberang)

Question 3: As many aspects such as health, forestry, environment etc should be considered, then the technical recommendation team consists of who? Who should control the water right implementation? (PSDA Central Sulawesi)

Question 4: There is a case where PDAM off taking water from secondary canal of irrigation. How about that? (PSDA Central Sulawesi)

Question 5: We once received a proposal from tourism department submitting their intention to construct something like small restaurant above the drainage canal in Makassar. How about this? (BBWS Pompengan Jeneberang)

2) Lecture No.5 "Water Service Fee System"

Lecturer: Mr. Tulus, Head of Sub-dit of Water Resources Institution, PUPR

Question 1: What is the difference between surface water tax and water service fee based on the Ministerial Regulation? (BBWS Sumatera 8)

Question 2: There is a case where irrigation canal passes through plantation area, then the local community change their land from plantation to paddy field. How about this case? Are there any possibilities that the Irrigation Fee (IPAIR) will be collected again in the future? (BWS Sulawesi 4)

Answer 2: As long as the system and water availability is sufficient, then such water taking can be allowed. However, there should be a special offtake structure constructed for that water taking. BJPSDA (Water Service Fee) is not applicable to irrigation. The fee can be collected by farmers themselves for O/M through their organization so called Water User Association.

Question 3: Where can we find the price unit of BJPSDA ? How about the old Hydroelectricity Power Plant, which has been operating before the regulation about BJPSDA isapplied? How to negotiate with local government about this? (BBWS Pompengan Jeneberang)

3) Lecture No.6 "Water User Coordination and Water Distribution Management for Irrigation in Japan"

Lecturer: Mr. Ochii, JICA Short Term Expert (Senior Engineer of Water Resources Engineering of Japan Water Agency)

Question 1: Who decides maximum volume of water use right and coordination for drought? (BWS Sulawesi I)

Answer 1: It is decided by river administrators, MLIT and Local Government. But water users are coordinated to make agreement how much % should be reduce, during drought.

Question 2: LID is called "P3A" in Indonesia. How do LID manage 107km of main canal and secondary canal? It is difficult for P3A in Indonesia to manage them. P3A manages only 5km of 3rd canal, but it is still difficult for P3A… (BWS Sulawesi 4)

Answer 2: LID has own technical staff case by case. LID can receive membership fee from formers. Therefore, some of LID can manage canal system by themselves.

Question 3: Japan Water Agency (JWA) can collect Water Service Fee? I would like to know financial mechanism of JWA.

Answer 3: JWA can collect water user charge. JWA uses the charge to convert the cost of O/M. Regarding financial mechanism, JWA and PJT I organized a workshop on financial system this month. Therefore, if you want to know details, please contact PJT I.

Question 4: JWA has installed automatic operation system by IT. How much cost can be reduced by IT?

4) Lecture No.7 "Briefing on Field Study"

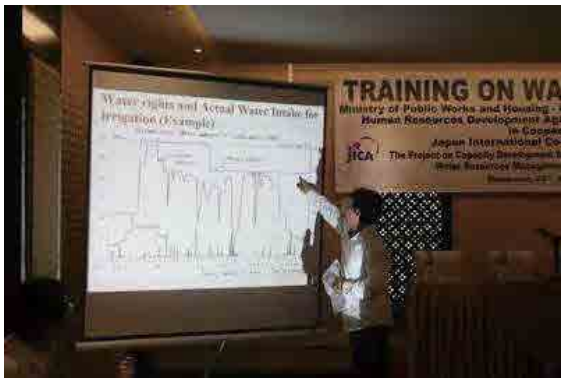
Coordinator: MIURA, JICA Project Technical Expert
Mr. Sarwono, JICA Project Consultant Team Leader

Presenters: Mr. Firdaus from BBWS Ponpenmgan Jeneberan
Mr. Askar from Dinas PU GOWA Regency
Mr. Edward from Samba Opu Water Treatment Plant of PDAM kota Makassar

Lecture on SIPPA by Mr. Saroni

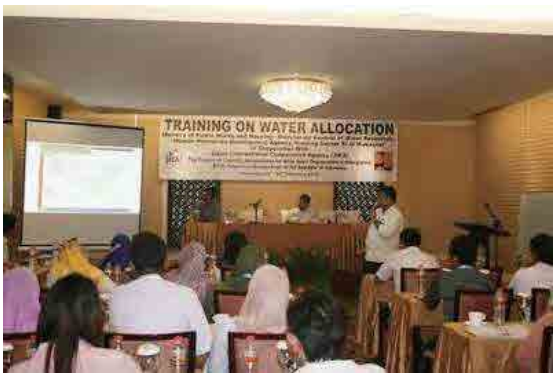
Lecture on Water Service Fee by Mr. Tulus

Lecture by Mr. Ochii



Question from one trainee on Mr. Ochii's Lecture

Explanation by Mr. Miura
at Briefing on Field Study



Explanation by Mr. Firdaus on Bili Bili Dam
at Briefing on Field Study

3. 3rd Day of Training

1) Lecture No.8 "Field Study at Bili Bili Dam and Bili Bili Irrigation Area"

2) Lecture No.9 "Field Study at Sambu Opu Water Treatment Plant, PDAM Makassar City"

Operation Room in Bili Bili Dam Office

Intake Facility for Bili Bili Irrigation Area

Settling Pond at Samba Opu WTP

Pomp System at Samba Opu WTP

4. 4th Day of Training

1) Lecture No.10 "Feedback of Field Study"

Coordinator: MIURA, JICA Project Technical Expert

Mr. Sarwono, JICA Project Consultant Team Leader

Commentators: Mr. Askar from Dinas PU GOWA Regency

Mr. Edward from Samba Opu Water Treatment Plant of PDAM kota Makassar

Presentation by Group IV "Water Allocation of Bili-Bili Dam"

Question:

Group I

Considering the huge sedimentation in Bili-Bili Dam, what measures are taken to control the excessive sediment? Structural and non-structural measures.

Group II

Besides dredging, what else can we do to control the sediment coming into the reservoir?

Group III

Raw water allocated from Bili-Bili Dam for Water Treatment Plant of Somba Opu is 3,300 liter. The

plant can only treated 1,350 liter to date. What is plan for the 2,000 liter by PDAM?

Group V

What do you mean by recommendation for improvement in the upstream catchment area of the River?

Presentation by Group V "Water Allocation of Bili-Bili Dam"

Question:

Group I

The raw water quality seems to be contaminated with other content, even after treatment in the water treatment plant. Why? Is that because of the distribution pipe?

Group II

Irrigation water management is not yet good until the downstream of the agricultural area, why?

Group IV

What is the role and participation of the local government in managing irrigation water? Is there reward and punishment system?

Group V

What do you think about water allocation implemented by management of Bili-Bili Dam?

Presentation by Group II "Water Allocation of Bili-Bili Dam"

Question:

Group III

Can you describe the water loss rate in the irrigation canal?

Group IV

Irrigation area from day to day becomes less and less but water quantity allocated still the same. Why?

Group V

Why consumers of drinking water still hesitate to directly drink water from the tap?

Group I

Does PDAM of Makassar already have SIPA?

Presentation by Group III "Water Allocation of Bili-Bili Dam"

Question:

Group I

How is the operation and maintenance cost of the Bili-Bili dam? Routine and periodical O/M?

Group IV

From agricultural use, how much the potential revenue of water service fee? What is the plan of

PDAM to expand their service area?

Presentation by Group I "Water Allocation of Bili-Bili Dam"

Group II

What is the community participation in the vegetation for the upstream catchment area?

Group IV

Land use is changed from agriculture area to non-agriculture area. But the water demand is constant. Why?

Group V

What do you think about water allocation, which has been practiced by Bili-Bili Dam?

Answer by PSDA Gowa

-There is always a coordination meeting from the water user association level until irrigation commission level.

- Farmers in Gowa Regency, most of them are not fully farmer. They have other side jobs
- Cost allocation for O/M of 7 secondary canals under the responsibility of the Gowa is not sufficient.

Answer by PDAM Makassar

- Raw water from Bili-Bili Dam is classified into Class I according to Government Regal action No. 28 of 2001 and No. 492 of 2012 regarding drinking water quality standard.
- Water quality from the plant and from the tap in the household is different because of the distribution pipe quality

2) Lecture No.11 "Calculation and Collection of Water Service Fee"

Lecturer: Mr. Nugroho Hari Anggoro, Staff of PJT I

3) Lecture No.12 "Water User Coordination for Water Allocation"

Lecturer: Mr. Agung wicak sono, staff of PJT I

4) Post Test

22 participants joined in Pre-Test.

5) Closing Ceremony

Attendees:	Mr. Johny H Pailang, Training Center in Makassar
Agenda:	General Explanation on Result and Evaluation of the Training
	Closing Massage by MIURA, JICA Project Technical Expert
	Closing Remarks by Mr. Johny H Pailang, Training Center in Makassar

Group Presentation

Question from Trainee on Group Presentation

Lecture by Mr. Hari from PJT I

Lecture by Mr. Agung from PJT I

Trainees are concentrating Posttest

Closing Ceremony

5. Summary

- The Training had been done successfully with good management by training Center in Makassar and good participation of most of trainees
- The Number of trainees was less than our expectation (plan 30 people, actual 23 people)

- 2 (two) staff from Central Sulawesi Province (Palu) also joined in the training
- As a result of Pre/Post Test, proficiency level of trainees were lifted. Average score of questions on "Water Balance Calculation", "SIPA", "Water Service Fee System" and "Water User Coordination" were lower than score of other topics. The project will consider these 4 topics for next year trainings and capacity development activities
- As a result of questionnaire, "Water Balance" and "Water Allocation Planning" in the field of Water Allocation was raised as important issues.
- We had done 2 (two) trainings on February. We will talk about results of both trainings to improve quality and effectiveness of curriculum, lecturers, requirement of trainees and so on at PIU meeting on March
- Procedures for preparation were different between training on Dam O/M in Malang and training on Water Allocation in Makassar. Therefore, we will discuss and confirm standard procedure at PIU meeting with HRDA

END

Summary of Pre Test and Post Test
at Training on "Water Allocation" in Makassar, Feb. 2016

1. Individual Score Ranking

Highest Score of Pre Test

Ranking	Score	Name	Organization
1	63	Silviani Junita, SIA., MT	Direktorat Bina PSDA
2	50	Insan Prasasti, ST.	BBWS Citanduy
3	46	Tommy Miran, AMD	BWS Sulawesi I

Highest Score of Post Test

Ranking	Score	Name	Organization
1	90	Mariani Syam Akil, SP., MT.	Dinas SDA Prov. Sul.Teng.
2	85	Ariani	BBWS Pompengan-Jeneberang
3	83	Tsabitah Aditya, ST., MPSDA	Direktorat Bina OP SDA

Highest Score of Improvement

Ranking	Score	Name	Organization
1	61	Ariani	BBWS Pompengan-Jeneberang
2	54	Meilisa Asmarani, ST.	BWS Sumatera II
2	54	Mariani Syam Akil, SP., MT.	Dinas SDA Prov. Sul.Teng.

2. Field that was improved and is necessary to improve

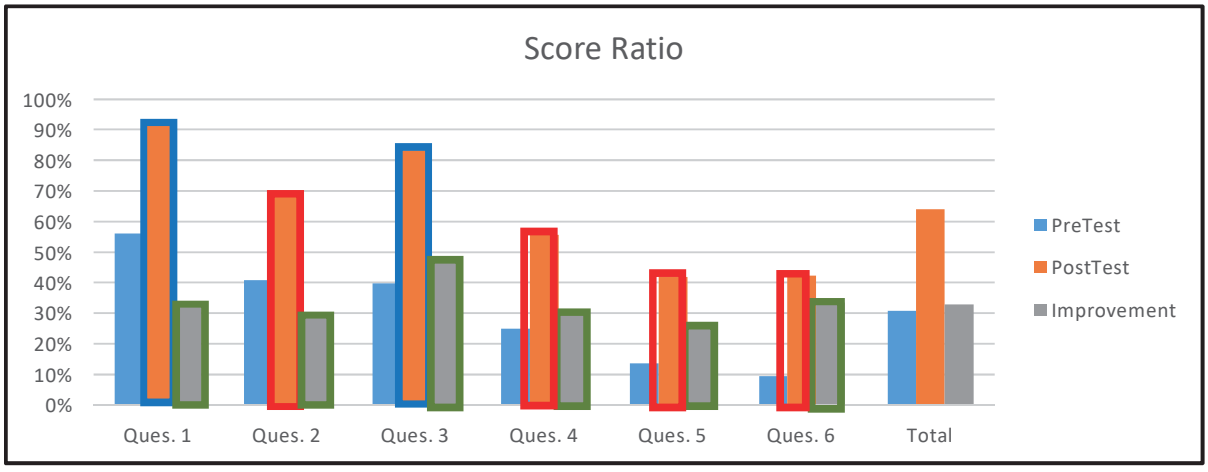
Table: Average Score Rate of Each Field (Question)

No.	Field	Pre Test	Post Test	Improvement
Question 1	Legal Framework	56%	92%	33%
Question 2	Water Balance Calculation	41%	68%	29%
Question 3	Water Allocation Planning	40%	83%	47%
Question 4	SIPPA	25%	56%	31%
Question 5	Water Service Fee	14%	42%	26%
Question 6	Water User Coordination	9%	42%	34%

-Participants' knowledge of bellows is high
- Legal Framework
- Water Allocation Planning

-Participants' knowledge of bellows was improved
- Legal Framework
- Water Balance Calculation
- Water Allocation Planning
- SIPPA
- Water Service Fee
- Water User Coordination

-Field of bellows should be improved more (Field should be focused at next training)
- Water Balance Calculation
- SIPPA
- Water Service Fee
- Water User Coordination



ANNEX 6-1

Report No.010

Report of Training on Flood Management, in Manado on May 2016

Report of Training on Flood Management

Date:	10 May 2016 to 13 May 2016, 4 days	
Venue:	Quality Hotel Manado	
Participants:	33 trainees (8 from PUPR, 16 from B(B)WS, 2 from Province and Regency)	
Schedule:	10 May	Opening Ceremony and Classroom Lectures
	11 May	Classroom Lectures
	12 May	Field Study
	13 May	Classroom Lectures and Closing Ceremony

1. 1st Day of Training

1) Opening Ceremony

Attendees: Dr. Suprapto, Head of Water Resources Training Center, HRDA
Mrs. Sisuka, Head of Training Center in Makassar, HRDA
Mr. Joney H Pailang, Training Center in Makassar

Agenda: General Explanation by Mr. Joney from Training Center in Makassar
Welcome Remarks by SUZUKI, JICA Project Coordinator
Opening Remarks by Dr. Suprapto

2) Pre Test

32 participants joined in Pre Test. Before the Pre Test, Mr. MIURA explained purpose of the Pre-test;

-Evaluating participants' knowledge level not for measuring
-Evaluating quality of the training

3) Lecture No.1 "Current Status and Basic Knowledge of Flood Management in Indonesia"

Lecturer: Ir. Birendrajana, MT, Head of Sub-dit of Planning, Directorate of River and Coastal

Question 1: Procedure of Inspection on groundwater intake.
Answer 1: The procedure has not indicated. New guideline should be make.
Question 2: How to identify and decide river area?
Answer 2: Method of identification and decide river area and protected area is described in a guideline. However, the guideline does not cover all river cases.
Question 3: How do we manage river area if residents have landownership?

Answer 3: We have to compensate for their relocations. If tap water or electricity are supplied, it is understood resident has landownership even illegal house.

Question 4: Responsibility and management area of PUPR and Ministry of Agriculture overwraps for irrigation. To which agriculture group should apply their construction / water use plan?

Answer 4: In the urban area, to PUPR. In other area, to Ministry of Agriculture.

Question 5: How to make priority of permission on structure in river area?

Answer 5: Public facility should be prioritized. However, necessary condition of acceptance is no obstacle for river flow, no influence to river facility.

4) Lecture No.2 "Early Flood Warning System"

Lecturer: Mr. Pradah, chief of section, Sub-dit of Hydrology and Environment, Directorate of Water Resources Management

Comment 1: Are there any conditions on location of stations and observation frequency?

Question 1: It is indicated by guidelines.

Opening Ceremony

Pre-test

Lecture by Mr. Birendrajana

Lecture by Mr. Pradah

2. 2nd Day of Training

1) Lecture No.3 "Comprehensive Structural Measures against Flood in Japan"

Lecturer: Mr. Miura, JICA project technical expert

Question 1: I would like to know system and structure of permeable pavement and seepage pits.

Answer 1: This system is promotion of infiltration. Permeable pavement makes easy infiltration of rain water for surface to underground. Seepage pits can storage rain water, but capacity of storage is limited, therefore pits are connected pipe as seepage trench for drainage the water.

2) Lecture No.4 "Regional Disaster Management Planning in Japan -Focusing on Flood-"

Lecturer: Mr. Shinya, JICA Policy Advisor on Disaster Management for BNBP

Question 1: B(B)WS does not have any budget for emergency response. BNBP or BPBD have such kinds of budget?

Answer 1: BNBP has budget for emergency response and allocates to BPBD. BPBD can allocate budget for emergency response to B(B)WS.

3) Lecture No.6 "Master Planning of Flood Management -Example of Tondano River Basin-"

Lecture No.7 "Example of Structural Measures for Flood Control in Tondano River Basin"

Lecturer: Mr. Mizuno Naoto, Yachiyo Engineering Co. LTD

Question 1: Return period for flood control plan at Tondano River as a small scale river is 50 years. It is a little big.

Answer 1: Peak of runoff from Tondano and Tikala River is same time at downstream. That scale is almost same scale of 50 year return period.

Question 2: Target return period is 25 years for master plan for flood control. Is the scale enough?

Answer 2: The 25 year scale is initial target. For 25 years return period, river channel improvement and diversion channel is necessary. For 100 years return period, flood control by dam is additionally necessary.

Question 3: Is the plan including internal inundation?

Answer 3: The simulation for the master plan is considered internal inundation. It means simulation includes drainage calculation in city area.

4) Lecture No.7 "Briefing on Field Study"

Coordinator: MIURA, JICA Project Technical Expert

Presenters: Mr. Lahida, Chief of implementation, BPBD North Sulawesi

Lecture by Mr. MIURA

Lecture by Mr. SINYA

Lecture by Mr. MIZUNO

Question from trainee on Mr. MIZUNO's Lecture

3. 3rd Day of Training

1) Lecture No.8 "Field Study at BPBD Province Sulawesi North (JICA Project for Enhancement of Disaster Management Capacity of BNPB and BPBD)"

Lecturer: Mr. Lahida, Chief of implementation, BPBD North Sulawesi

Question 1: Responsibility of BPBD includes nuclear disaster?

Answer 1: Yes, there is no nuclear plan to North Sulawesi Province, but it is included. For example, explosion of chemical factory, defluxion of harmful substance.

Question 2: Please introduce relocation of residents against volcano disaster of Syinabun

Answer 2: 1) Explanation on related laws, regulation to residents, 2) Construction of temporally houses. We should consider occupations of residents for location of temporally houses. And one of difficulties is lack of understanding from residents. It causes by lack of education level of residents…

Question 3: How about organization structure for disaster management in BPBD? Especially emergency response.

Answer 3: There are several team in BNBD. Team for initial response. Team for information collecting. Team for coordination with related organizations.

Question 4: Please explain on reconstruction of 2014 flood disaster.

Answer 4: BNBD conducted survey and analysis of damages. Then, reconstruction plan was made. Budged was available from 2016.

Question 5: How about cost of regional disaster management plan making?

Answer 5: The plan was made by cooperation between JICA project team and BPBD. JICA provided experts and BPBD prepared necessary budget. Therefore, I cannot show the cost exactly.

Question 6: What kinds of equipment dost BPBD have?

Answer 6: BPBD has 1) Vehicles including ambulance, 2) Communication equipment, 3) Water treatment equipment, 4) tents. And new offices is building with earthquake resistance structure. But problem is lack of human resources. Lack of number of staff for using and maintaining equipment…

Lecture at BPBD North Sulawesi Office

Information Control Room of BPBD North Sulawesi

2) Lecture No.9 "Field Study at inundated areas at Tondano, Tikara and Sario River, and Demonstration of AR technology for River Water Level Observation"

Instructor: Mr. Refly, chief of hydrology unit, BWS Sulawesi I
Mr. Mizuno Naoto, Yachiyo Engineering Co. LTD
Mr. Yamashita, Mr. Kawahara, Fujitsu Indonesia Co. LTD

Site survey at Tondano River

AR technology for River Water Level Observation

4. 4th Day of Training

1) Lecture No.10 and 11 "Feedback of Field Study"

Coordinator: MIURA, JICA Project Technical Expert

Commentators: Mr. Refly, chief of hydrology unit, BWS Sulawesi I

Mr. Lahida, Chief of implementation, BPBD North Sulawesi

Main Contents of Presentation by Each Group

Group 4: Dam is more effective than river improvement in case of Tondano River

Group 5: River environment improvement is one of important issues, but most difficult to do

Group 6: Obstacles of flood water flow, driftwood at bridge and sedimentation should be considered

Group 1: Protection of forest is one of solution to reduce runoff. And coordination is also important

Group 2: AR technology is very effective but we should study accuracy and reliability

Group 3: "Normalization of river channel" should consider relocation of residents in river area

Group Presentation

Questions and discussion from Participants

2) Post Test

31 participants joined in Pre-Test.

3) Closing Ceremony

Attendees: Mr. Joney H Pailang, Training Center in Makassar

Agenda: General Explanation on Result and Evaluation of the Training

Closing Massage by MIURA, JICA Project Technical Expert

Closing Remarks by Mr. Joney H Pailang, Training Center in Makassar

Trainees are concentrating Post-test

Closing Ceremony

5. Summary

- The Training had been done successfully with good management by training Center in Makassar and good participation of most of trainees
- The Number of trainees was less than our expectation (plan 30 people, actual 23 people)
- Six (6) staff from Province and Kabupatan also joined in the training
- As a result of Pre/Post Test, proficiency level of trainees were lifted. Average score of questions on "Early Warning System," was lower than score of other topics. The project will consider that topics for next year trainings and capacity development activities
- As a result of questionnaire, "Designing/Constructing Structural Measures for Flood" in the field of Flood Management was raised as important issues. And "Operation & Maintenance of River" in the field of Water Resources Management was raised as important issues.
- Many participants are interested in "AR technology for river water level observation". The project already had confirmed positive intention of PUPR executives on the AR. Therefore, AR can be one of the OJT topic at field practice sites.
-

END

Summary of Pre Test and Post Test at Training on "Flood Management" in Manado, May 2016

1. Individual Score Ranking

- Highest Score of Pre Test

Ranking	Score	Name	Organization
1	88	Rahayu Mahanani W, ST., MT	BBWS Bengawan Solo
2	72	Beta Ratnasari, ST	BBWS Mesuji Sekampung
3	71	A. Fitrianingsi, ST	Dinas PSDA Kab. Luwu

- Highest Score of Post Test

Ranking	Score	Name	Organization
1	91	Rahayu Mahanani W, ST., MT	BBWS Bengawan Solo
2	85	Tommy Afrialdy, ST	BWS Sumatra IV
3	79	Hendra H, ST	Dinas PSDA Kab. Luwu

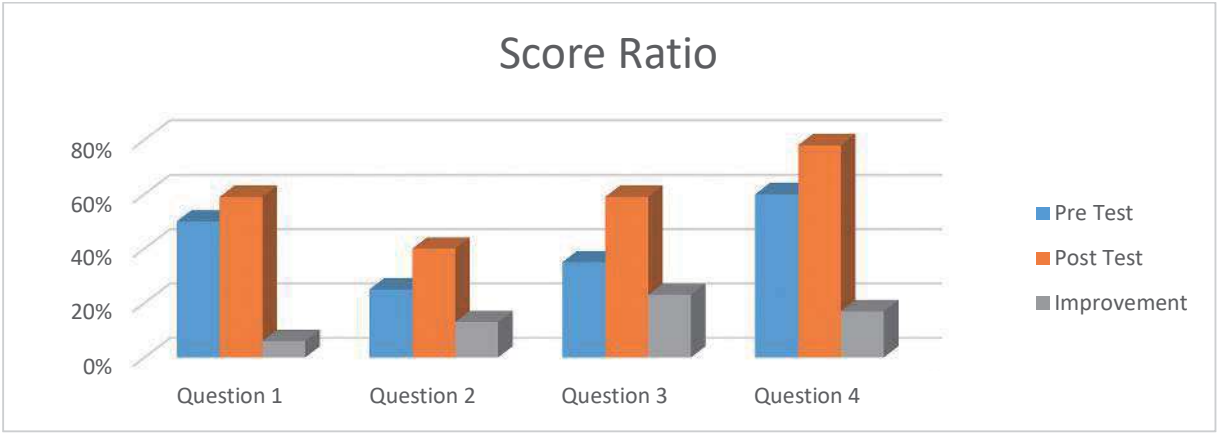
- Highest Score of Improvement

Ranking	Score	Name	Organization
1	41	Rahayu Mahanani W, ST., MT	BBWS Bengawan Solo
2	38	Tommy Afrialdy, ST	BWS Sumatra IV
3	38	Teguh Rudianto, ST	BBWS Brantas

2. Field that was improved and is necessary to improve

Table: Score Rate of Each Field (Question)

No.	Field	Pre Test	Post Test	Improvement
Question 1	Legal Base of Flood Management	50 %	59 %	6 %
Question 2	Early Warning System	25 %	40 %	13 %
Question 3	Structural and non-Structural Measures	35 %	59 %	23 %
Question 4	Disaster Management Plan	60 %	78 %	17 %



ANNEX 6-1

Report No.011

Report of River Maintenance Training, in Jakarta on August 2016

Report of River Maintenance Training

Date:	9 August 2016 to 12 August 2016	
Place:	Jakarta Training Center	
Short Term Expert:	Mr. Kunihiro Moriyasu	
Participants:	33 Participants from All RBOs	
Schedule:	9th & 10th	Classroom Lecture
	11th	Field Trip
	12th	Classroom Lecture

1. 1st Day of Training

1) Opening Ceremony

Attendees: Dr. Suprapto, Head of Water Resources Training Center, HRDA
Mr. Yaya Rukiana, Head of Jakarta Training Center
Mr. Kazushi Suzuki, Project Coordinator

Agenda: Welcome Remarks: Mr. Suzuki
Opening Remarks: Dr. Suprapto

2) Pre Test

33 participants took a Pre Test. Mr. MIURA explained purpose of the Pre-test before the test which are;

-Evaluating participants' knowledge level not for measuring
-Evaluating quality of the training

3) Lecture No.1 "Legal Aspect and Current Status of Maintenance Works for River Facility"

Lecturer: Mr. Hendra Ahyadi, ST, MT, Head of Sub-dit of Operation & Maintenance Planning, Directorate of Operation & Maintenance

4) Lecture No.2 "Database of River Facility"

Lecturer: Dr. Ismail Widadi, ST, M.Sc, Head of Subdit of Water Resources Data and Information System, Directorate of Water Resources Network Development

Question 1: Are there any overwrapping between PDSDA and SISDA?
Answer 1: There is no overwrapping. SISDA is for public, PDSDA is for us, water resources managers.

Question 2: Operation and Management of 2 database will be done by consultant?

Answer 2: No. PUPR, B(B)WS have to collect/input/update data and manage database. Responsibility of consultant is analysis when we need.

Question 3: How to manage database. Are there any concrete / adequate method of management data/database?

Answer 3: There are some guidelines/manual, but we need more trainings. For example, other centuries in south-east Asia have such database. We Indonesia start from now managing database.

5) Lecture No.3 "Inventory of River Facility for Maintenance"

Lecturer: Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

Question 1: All B(B)WS already has a unit of SISDA. But SISDA has not been worked well. But this application can be used as an inventory for maintenance.

Answer 1: SISDA was created by consultant. This application has to be improved more. Therefore it is necessary demand/request from users, B(B)WS.

Question 2: This application is now official one? And Directorate of OP has GIS database. What relationship between this application and GIS database?

Answer 2: This has not been official one yet. And GIS and database is different.

Question 3: Necessary data for real maintenance works at the sites should be detailed. Data and information in the application is a little general.

Answer 3: We have discussed with Directorate OP. Existing excel sheet for database is a little complicated, we have to input so much data… therefore we started creating this application, and we proposed the application to Subdit of OP Planning, but no reply so far. Anyway we still have been improving it.

Question 4: Does the application include hydrology data? And, how about situ (small dam)? Then, purpose of data in the application is for database or asset data?

Answer 4: The application does not include hydrology data, but sedimentation data is included. Data for water allocation can be included into the application.

About information on situ, it is included into this application for Ciliwung Cisadane. This application is for maintenance, so it means for asset. Participants should understand there are two (2) kinds of asset, 1) Asset of citizen; created by nature, 2) National Asset; created by manpower as property.

Question 5: This inventory is very useful for maintenance works. We would like to invite our office Mr. Sarwono. How to invite?

Answer 5: Thank you. It is better to invite through OP Directorate and JICA Project.

Opening Ceremony

Pre-test

Lecture No.1 by Mr. Hendra

Lecture No.2 by Dr. Ismail

2. 2nd Day of Training

1) Lecture No.4 "Maintenance Works of River and Facility in Japan" and Lecture No.5 "River Facility Inventory for maintenance works"

Lecturer: Mr. Kunihiro Moriyasu, JICA Short Term Expert, from MLIT Japan)

Question 1: Breaches of levee was made by lack of maintenance?

Answer 1: River development in Japan has not completed yet. Return period of rivers in Tokyo area is still 50 years. Breached of levee sometimes occur with enough maintenance. But if maintenance is good, duration until breach can be longer. Then we will be able to have longer time for evacuation.

Question 2: How about frequency of Tsunami?

Answer 2: Scale of the Tsunami in 2011 was once/1,000years. We changed concept on disaster management. Level 1 disaster: prevented by structures, Level 2 disaster: human life prevented by non-structural measures

Question 3: How about Budget for river patrol / inspection?

Answer 3: B(B)WS in Japan has a budget for OP. We allocate cost for river patrol / inspection from the OP budget. OP budget is about 23% of total budget for river management.

Question 4: In Liau, Sumatera, length of river is over 300km or 400km, it is very long. And in some section, there is not any residents. Therefore, river patrol/inspection is very difficult.

Answer 4: We conduct patrol/inspection necessary section of rivers only. We categorize sections of river into importance levels. Patrol/inspection are conducted at 1st level (most important) and 2nd level (important) section only.

Question 5: How to categorize A level and B level river from all rivers in Japan?

Answer 5: According to River Law, A rivers are 1) run through Mega City, 2) run through over two (2) provinces. A rivers are usually over 100km. But, finally it is decided by discussion between Minister of MLIT and Governor.

2) Lecture No.6 "Practical Maintenance Works (1) focusing on Weir"

Lecturer: Ms. Suzanti, Head of Division OP, BBWS Ciliwung Cisadane

Question 1: How to make a recommendation on permission/dis-permission for river area management? For example in Bekasi River.

Answer 1: Most difficult thing is relocation of houses in river area. In Bekasi River, residential development is just beside of river area, it is inside of river conservation area. But permission already distributed to developer even

developer understands it is in river conservation area.

Question 2: We heard Gate No.6, 7 have been repairing now. Therefore, are there any difficulty for OP?

Answer 2: We divided river into several sections where are operated/maintained by BBWS, Province and Kota/Kabupatan. But responsibility of each is not so clear now. For example, one mayor indicated closing gates to operator of weir, but it is impossible by regulation.

3) Lecture No.7 "Practical Maintenance Works (2) focusing on Flood Way and Revetment"

Lecturer: Ms. Suzanti, Head of Division OP, BBWS Ciliwung Cisadane

Question 1: I am from Banten. Who can/should make a permission of water use? For example, one water user received permission from governor. It sometimes make confusion/difficulty.

Answer 1: It should be from PUPR. For example in BBWS Cil Cis, Several water user applications were refused. One case, one area was previously agriculture field, but it was developed as industrial area. Industrial manager applied a water use of previous irrigation water to industrial water. But BBWS refused it, because previous irrigation system was constructed by national budget, not by private sector.

Question 2: Upstream of Bekasi River is Kota Bogor. How to manage and coordinate?

Answer 2: In 2014, Mr. Hassan, Director General of Water Resources, tried to issue a decree on water resources management coordination between upstream and downstream. But it was not able to issue…

4) Lecture No.8 "Briefing on Field Study"

Lecturer: Mr. MIURA Hirohisa, ME, JICA Project Technical Expert,
Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project
Mr. from PSDA Jawa Barat

- The route and schedule of the field study was confirmed
- Mr. MIURA explained general information / situation of river facilities
- Mr. Sarwono explained Ciliwung river system for flood and water supply management
- Mr. from PSDA Jawa Barat explained on Bendung Latulampa

Lecture No.4 and 5 by Mr. Moriyasu

Question from participant to Mr. Moriyasu

Lecture No.6 and 7 by Ms. Suzanti

Lecture No.8, explanation by Mr. Sarwono

3. 3rd Day of Training

1) Lecture No.9 "Field Study at Katulampa Weir, upstream area"

Lecturer: Mr. from PSDA Jawa Barat, and operators

- Coordination between BBWS and Dinas has been started from 1981.
- Dinas manages 32km of Ciliwung River
- Staff of Bendung Katulampa is 8 persons
- There is no facility list (Database / Inventory), but there are maintenance check lists that are submitted to BBWS Ciliwung Cisadane
- Patrol/inspection of gates has been conducted every week

2) Lecture No.10 "Field Study at Manggarai Weir and East Flood Way, downstream"

Instructor: Staff from BBWS Ciliwung Cisadane and Operators

- For Manggarai Weir, construction work by BBWS Ciliwung Cisadane, Maintenance work by DKI Jakarta

- Coordination between BBWS and DKI for maintenance work has been started two (2) years ago
- Maintenance work budget is prepared by DKI themselves

Field Study at Bendung Katulampa

Field Study at Manggarai Weir

4. 4th Day of Training

1) Post Test

30 participants took Pre-Test.

2) Lecture No.11 "Feedback of Field Study, Group Presentation"

Coordinator: Mr. MIURA, JICA Project Technical Expert
Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

Comments:

- If you can see the sedimentation, do not think directly "Excavation (pick up sediment) is necessary" without any consideration. You should think "are there any influences to function of facility, intake water, flood control and others on social impact. If there are any influences, you can start analysis of sedimentation.
- We should accept residents' right to access the river. But if you consider flood control, open door of parapet on revetment should be operated by cooperation of residents
- Maintenance lists are submitted to BBWS Ciliwung Cisadane from Katulampa and Manggarai. Participant's office also usually receive maintenance list from site offices. Therefore, you should check the contents of maintenance result and keep them for future planning of facility

3) Closing Ceremony

Attendees: Mr. Yaya, Head of Balai DIKLAT III
Mr. Ade, Head of implementation division, Balai DIKLAT III

Agenda: Announcement on evaluation result of lectures / lecturers and result of Pre/Post test
Closing Massage by Mr. MIURA, JICA Project Technical Expert
Closing Remarks by Mr. Yaya, Head of Balai DIKLAT III

Post Test

Group Presentation

Questions & Discussion

Closing Ceremony

5. Summary

- The participants are quite active in discussion.
- Some of the participants were busy with their mobile phone and not seem to be concentrating
- As a result of Pre/Post Test, proficiency level of trainees were lifted. However, Score of posttest is still not enough, the project will consider on bellows topics for next trainings and capacity development activities (Legal Aspect, Database/Inventory, Practical Maintenance work)
- As a result of questionnaire, "Database & Inventory of Facility" in the field of Flood Management was raised as important issues.
- Participants usually prepare their presentation at night of 3rd day. So, we do not need to put one lecture "Feedback of field study, group discussion". We can start group presentation from beginning of morning 4th day
- Announcement on result of Pre/Posttest at closing ceremony is necessary. At the next training, we will announce result of test and give high scorers presents

END

ANNEX 6-1

Report No.012

Report of Training on Maintenance for Water Resources Infrastructures, in Bandung on August 2016

Report of Training on

Maintenance for Water Resources Infrastructures

Date:	30th August 2016 to 2nd September 2016m for 4 days	
Place:	Bandung Training Center	
Participants:	30 Participants (5 from PUPR, 25 from B(B)WS)	
Schedule:	30th and 31st	Classroom Lecture
	1st	Field Study
	2nd	Group Presentation, Closing ceremony

1. 1st Day of Training

1) Opening Ceremony

Attendees: Dr. Suprapto, Head of Water Resources Training Center, HRDA
Mr. Belanto, Head of Bandung Training Center
Mr. Kazushi Suzuki, Project Coordinator

Agenda: Welcome Remarks: Mr. Suzuki
Opening Remarks: Dr. Suprapto

2) Pre Test

29 participants took a Pre Test. Mr. MIURA explained purpose of the Pre-test before the test which are;

-Evaluating participants' knowledge level not for measuring
-Evaluating quality of the training

3) Lecture No.2 "Database of Water Resources Infrastructures" and Lecture No.3 "Inventory of Water Resources Infrastructures for Maintenance"

Lecturer: Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project
(Dr. Ismail Widadi, ST, M.Sc, Head of Subdit of Water Resources Data and Information System, he was not be available for emergency requirement, so Mr. Sarwono gave the lecture No.2)

Question 1: Does the inventory system include "damage parameter"? And the inventory can be used on line or offline? And when do we start using the inventory?

Answer 1: The parameter is included. And the inventory can be used offline. And we can use it anytime, but it is not official one now. Mr. Sarwono created the inventory with

SDA PUPR several years ago. However official decision for the inventory had not been came yet….

Question 2: Is the inventory applicable to river construction works? And who has a copyright?

Answer 2: It is not applicable to construction work partially, but it is based on latest regulations. However it can be modified for use's demands. Because it is operated on platform of Microsoft Access. Mr. Sarwono has Copyright.

4) Lecture No.4 "Asset Management of Water Resources Infrastructures"

Lecturer: Mr. MIURA Hirohisa, ME, JICA RBO Project Technical Expert

(Ir. Muhammad Asdin Thalib, MT, Head of Sub-dit of Operation & Maintenance Planning, Directorate of Operation & Maintenance, lecturer for lecture No.1, he was not available on 30th Aug. So, schedule was switched between lecture No.1 and No.4)

*There was no question from participants. So, comments from lecturer are as bellows;

Comment 1: Long term plan of facility maintenance is based on conditions of the facility. Information of facility, 1) History of failure / accident, 2) Record of check / inspection, and so on, is indispensable for planning. Therefore, these data should be stocked.

Comment 2: Information of history of failure/accident, Record of check/inspection should be convert to soft data. Because hard data, like paper, is easily damaged and lost….

Opening Ceremony

Group Photo

Pre Test

Lecture No.2 by Mr. Sarwono

Lecture No.3 by Mr. Sarwono

PLecture No.4 by Mr. MIURA

2. 2nd Day of Training

1) Lecture No.5 "Maintenance Works of Dam in Japan"

Lecturer: Mr. MIURA Hirohisa, ME, JICA RBO Project Technical Expert

Question 1: Are there any standard of maximum value on seepage for dam body safety?

Answer 1: There is no standard about it. But we use experienced data during test impounding. After construction, we impound reservoir water until surcharge water level (Maximum high water level) as test impounding to check dam body condition (seepage, deformation, leakage from foundation and so on). Value of seepage at surcharge water level is used as upper limited for dam body stable.

2) Lecture No.2 "Legal Aspect and Current Status of Maintenance Works for Water Resources Infrastructure"

Lecturer: Mr. Sudarsono, ATP, CES, Functional Officers of Water Resources Management, Directorate of Operation & Maintenance

(Ir. Muhammad Asdin Thalib, MT, Head of Sub-dit of Operation & Maintenance Planning,

Directorate of Operation & Maintenance, he was not be available for emergency requirement, so Mr. Sudarsono gave the lecture No.2)

3) Lecture No.8 "Briefing on Field Study"

Lecturer: Mr. MIURA Hirohisa, ME, JICA Project Technical Expert,
Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

- The route and schedule of the field study was confirmed
- Mr. MIURA explained general information / situation of Bendungan Cileunca / Cipanunjang
- Mr. Sarwono explained Citarum river system for flood and water supply management

4) Lecture No.6 "Practical Maintenance Works (1) focusing on small scale dam"

Lecturer: Mr. M Ruchimat, Staff of Functional Group, BBWS Citarum
Mr. ALIMIN, Indonesia Power

5) Lecture No.7 "Practical Maintenance Works (2) focusing on Hydrology Network"

Lecturer: Drs. Petrus Syariman MT, Hydrological Engineering Researcher, PUSAIR

Lecture No.5 Mr. MIURA

Lecture No.2 by Mr. Sudarsono

Lecture No.8 Briefing on Field Study

Lecture No.6 by Mr. Ruchimat

Lecture No.6 by Mr. ALIMIN

Lecture No.7 by Mr. Petrus

3. 3rd Day of Training

1) Lecture No.9 "Field Study at Cileunca & Cipanunjang Dam"

Lecturer: Mr. ALIMIN, Indonesia Power
Mr. Deni, Indonesia Power

- Indonesia Power has implemented operation & maintenance of Cileunca & Cipanunjang Dam for hydropower
- Discharge water of hydropower is used for irrigation or drinking water at downstream
- For facility repairing, Bandung city office requested Indonesia Power to provide water resources and, repair facility for drinking water. Indonesia Power actually does not have to have responsibility for drinking water, therefore Indonesia Power is struggled for this situation
- At main dam of Cileunca, Mr. Miura explained method of observation of dam body deformation at control point and target (survey) points
- At palayangan Dam of Cileunca, intake valve had been repaired, but intake gate has not been repaired. Indonesia Power has a plan of repairing. Participants asked about failure factor, repairing method.
- At Cipanunjang Dam, participants asked about instrument and equipment for seepage observation/well for reducing seepage head and so on
- Indonesia Power has several operator at Cileunca & Cipanunjang Dam. But maintenance works is difficult for them to implement adequately. Because of lack of human resources (engineers)
- Participants visited Cikalong Hydropower Station

2) Lecture No.10 "Field Study at Lab. Hydroloty Ciparay"

Instructor: Staff from Lab. Hydrology Ciparay, PUSAIR

- Instructor explained mechanical system/maintenance works for hydro-meteorological observation instruments
- Instructor explained and demonstrated calibration of flow meter at laboratory

Field Study at Cileunca Dam

Field Study at Palayangan Dam of Cileunca

Field Study at Cipanunjang dam

Field Study at Cikaoing Hydropower Station

Field Study on Meteorological instrument

Laboratory for calibration of flow meter

4. 4th Day of Training

1) Post Test

30 participants took Pre-Test.

Post Test

2) Lecture No.11 "Feedback of Field Study, Group Presentation"

Coordinator: Mr. MIURA, JICA Project Technical Expert
Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

Main Contents of Presentation by Each Group

Group 1: Hydrological Data Observation

Group 2: Catchment Are Conservation for Sedimentation

Group 3: Facility Maintenance

Group 4: Institution system for maintenance

Group 5: Dam Body Maintenance

Comments from participants

- BBWS also should lead for maintenance for sedimentation. Action and countermeasure by operator (Indonesia Power) is limited
- Lack of number of staff at Cileunca & Cipanunjang for adequate maintenance works
- At palayangan dam of Cileunce, fence at reservoir side of gate tower should be installed for safety

Comments from instructor

- B(B)WS including participants of this training should lead for water resources management including sedimentation as regulator.
- Increasing number of staff is usually difficult, because we have to consider cost (Budget). Therefore, participants should consider and conduct knowledge development of staff at the site (operator) and institutional support for adequate maintenance
- Before field study, we decided topics for each group. It was effective to observe at the field and discuss with group member. This is why instructor felt group presentations of this training is best of training so far


Group Presentation


Discussion on group presentation

3) Closing Ceremony

Attendees: Mr. Belanto, Head of Balai DIKLAT IV
Mr. Eman, Head of implementation division, Balai DIKLAT IV

Agenda: Announcement on evaluation result of lectures / lecturers and result of Pre/Post test
Announcement and award of top three (3) excellent participants
Closing Massage by Mr. MIURA, JICA Project Technical Expert
Closing Remarks by Mr. Belanto, Head of Balai DIKLAT IV


Closing Ceremony


Award to top three excellent participants

5. Summary

- The participants are quite active in discussion.
- Some of the participants were busy with their mobile phone and not seem to be concentrating
- Deciding topics for group discussion/presentation in advance makes deep discussion /presentation. We should decide topics for each group at lecture "Briefing on Field Study"
- As a result of Pre/Post Test, proficiency level of trainees were lifted. However, Score of posttest is still not enough, the project will consider on bellows topics for next trainings and capacity development activities (Legal Aspect, Database/Inventory, Asset Management)
- As a result of questionnaire, "Database & Inventory of Facility" in the field of Water Resources Infrastructure Maintenance was raised as important issues.

- Bandung Training Center evaluated participants' performance by score of pre/post-test, attitude during lectures and others. It is effective for improvement of participants' motivation for not only tests but also lectures

END

ANNEX 6-1

Report No.013

Report of Training on Water Quality Management in Urban Rivers, in Jakarta on September 2016

Report of Training on

Water Quality Management in Urban Rivers

Date:	27th September 2016 to 30th September 2016	
Place:	Jakarta Training Center	
Participants:	23 trainees (18 from B(B)WS, 3 from kota, 2 from PJT II)	
Schedule:	27th & 28th	Classroom Lecture
	29th	Field Trip
	30th	Classroom Lecture

1. 1st Day of Training

1) Opening Ceremony

Attendees: Mr. Yaya Rukiana, Head of Jakarta Training Center
Mr. Kazushi Suzuki, Project Coordinator

Agenda: Welcome Remarks: Mr. Suzuki
Opening Remarks: Mr. Yaya Rukiana

2) Pre Test

19 participants took a Pre Test. Mr. Miura explained purpose of the Pre-test before the test which are;

-Evaluating participants' knowledge level not for measuring
-Evaluating quality of the training

3) Lecture No.1 "Water Pollution Control Policy in Indonesia"

Lecturer: Ir. SPM Budisusanti, Msc., Director of Water Pollution Control, Ministry of Environment and Forestry

Question 1: Responsibility of BBWS/BWS for water quality management is only observation/monitoring. If BBWS/BWS find source of pollution, what we should do?

Answer 1: When you find pollution, contact environmental agency of Province or city/kabupatan. Therefore, 1) Patrol, 2) Online report through (ex; HP application (under development)), 3) CCTV, 4) Reporting from local – BLH – conference – action.

Question 2: When an industrial factory makes pollution to river water, which has responsibility, are we able to warn them? In case of Citarum River, BBWS Citarum is usually criticized as responsible agency for environmental conservation in case of occurring pollution.

Answer 2: PPLH (Agency of environment) has responsibility to make cautions / warning / penalty to a person that makes pollution. But certification/license as inspector is necessary. Therefore, BBWS Citarum should attend a meeting on water pollution countermeasures. There was an occasion that anyone from BBWS Citarum did not attend, Minster of Environment and Forestry was angry.

4) Lecture No.2 "Water Quality Monitoring and Management by River Administrator"

Lecturer: Dr. Eka Nugraha Abdi, ST, MPPM, PDS, Head of Subdit of Hydrology & Environmental Water Resources, Directorate of Water Resources Management

Question 1: How do we get RECOM-TECH (Permission of waste water drainage)?

Answer 1: We can get it from BAPEDAL (Environmental Impact Management Agency).

Question 2: I would like to know how to stop illegal waste water drainage? I think there is no related regulation.

Answer 2: If you find such problem, you should inform to Head of BBWS/BWS. We can issue a warning notice. Permission of waste water drainage can be cancelled if it is not solved within 3rd warning notice.

5) Lecture No.3 "Effluent control and Wastewater Treatment in Jakarta"

Lecturer: Mr. Eko, Dinas Tata Air, Provinsi DKI Jakarta

Opening Ceremony

Pre-test

Lecture No.1 by Ms. Ati

Lecture No.2 by Dr. Eka

2. 2nd Day of Training

1) Lecture No.4 "Water Pollution Control Policy and Management in Japan"

Lecturer: Mr. Shu NISHI, JICA Expert in CIPTA KARYA, PUPR

Question 1: How do you decide standard of parameters on water quality?

Answer 1: We have "health items" and "living environment items". We use those items to make standard of water quality for each items

Question 2: How about trash management in Japan?

Answer 2: Trash management is basically done by local government. For river, BBWS and BWS have responsibility for monitoring it. We can say there is no trash in river area.

Question 3: Jatiluful dam has a problem of water quality by fish net. How about dam reservoir water quality in Japan?

Answer 3: There is no fish net at dam reservoir which are managed by MLIT or JWA. In Japan, Fisherman Association has responsibility for fishery management. They do not use fish net in dam reservoir. Everyone understands fish net has bad influence to water quality and also influences to other kinds of fish in reservoir.

2) Lecture No.5 "River Water Quality Management Policy in Japan"

Lecturer: Mr. HAYAKAWA Jun, JICA Expert on IWRM, PUPR

Question 1: Why sedimentation at bottom of river influences to water quality? (Dinas PU Tenggaran Kabupatan)

Answer 1: Sedimentation includes microorganism which consumes oxygen. Lack of oxygen causes to decrease water quality.

Question 2: Cisadane River has much sedimentation. When flood occurs, flash of sedimentation causes death of fish. How to solve this situation?

Answer 2: Flash of sedimentation distributes microorganism to entire river flow. It makes lack of oxygen. Therefore, sedimentation should be picked up by river administrator.

Question 3: How do we do for water quality improvement in Ciliwung River?

Answer 3: We should make common goal and open the situation to public with stakeholders. It usually makes strong ownership for river by stakeholders.

Question 4: How to install river purification project? (BBWS Brantas)

Answer 4: You should talk with environmental Agency. But if you make a plan of the project, mechanic facility should be considered for operation and maintenance.

Question 5: How about water quality improvement facility for dam reservoir? (PJT I)

Answer 5: We usually install 1) Selective intake, 2) Air Circulator, 3) Check dam at upstream and so on.

3) Lecture No.6 "Water quality monitoring and response against water quality problem "

Lecturer: Ms. Reni Mayasari, ST., M. Si, Head of Water and Electric Resources Management Division

4) Lecture No.7 "Water quality management at Cilliwung River"

Lecturer: Ms. Amrina, S. Si, BBWS Ciliwung Cisadane

(Ms. Gemala Suzanti, SP., MMA, Head of OP Division, BBWS Ciliwung Cisadane, she was not available because of emergency works)

5) Lecture No.8 "Briefing on Field Study"

Lecturer: Mr. Miura Hirohisa, ME, JICA Project Technical Expert,
Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

- The route and schedule of the field study were confirmed
- Mr. Miura explained general information / situation of Waduk Setia Budi and Waduk Melati
- Mr. Sarwono explained drainage system in Jakarta Area, and Ciliwung river system for flood

Lecture No.4 by Mr. NISHI

Lecture No.5 by Mr. HAYAKAWA

Lecture No.6 by Ms. Reni

Lecture No.9 by Ms. Amrina

3. 3rd Day of Training

1) Lecture No.9 "Field Study at Water treatments, Waduk Setia Budi and Waduk Kebun Melati"

Lecturer: Mr. Subekti, President Director, PD PAL Jaya

Lecturer: Mr. Eko, Dinas Tata Air, Provinsi DKI Jakarta

-Wadul Setia Bud-

- Standard of draining water quality to river has not been set? PD PAL Jaya expects new standard to be issued
- PD PAL Jaya can collect fee of waste water treatment from business sector.
- According to the result of financial audit, PD PAL Jaya's performance and output are not matched with its sufficient income. PD PAL Jaya are strongly suggested to improve its performance. For example, operation time of water circulators should be longer and all three (3) circulators should always be operated.
- According to water quality analysis by PD PAL Jaya, value of Escherichia coli is too high in waste water from business buildings. It makes difficult for PD PAL Jaya to treat the waste water to match with their standard of drainage water quality to river
- At Waduk Setia Budi, only one (1) circulator was operating.

-Waduk Kabum Melati-

- Waduk is managed by DIK Jakarta
- Several operators are working for pump and sewage treatment
- Sewage treatment facility is installed
- Standard of BOD to come to Waduk is less than 50mg/l

Mr. Subekti, President of PD PAL Jaya

Explanation at Office of PD PAL Jaya

Questions from Participants

Mr. Matsumoto, JICA Expert participates as commentator

Field Study at Waduk Setia Budi

Sewage treatment facility at Waduk Melati

4. 4th Day of Training

1) Post Test

23 participants took Post-Test.

2) Lecture No.10 "Feedback of Field Study, Group Presentation"

Coordinator: Mr. Miura, JICA Project Technical Expert
Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

Comments:

- Performance of PD PAY Jaya was not actually so good, however it can be used as an example to avoid same situation in participants work
- It seems there is no any set standard of drainage water quality, waste water quality to rivers. Participants should consider and make an action on making the standard for their river basin
- Participants as staff of B(B)WS should create good coordination mechanism with environmental agency, local governments and community. It makes prompt and adequate response for river water quality incidents

3) Closing Ceremony

Attendees: Mr. Yaya, Head of Balai DIKLAT III Jakarta
Mr. Ade, Head of implementation division, Balai DIKLAT III Jakarta

Agenda: Announcement on evaluation result of lectures / lecturers and result of Pre/Post test
Closing Massage by Mr. Miura, JICA Project Technical Expert
Closing Remarks by Mr. Yaya, Head of Balai DIKLAT III Jakarta


Pre Test


Group Presentation


Discussion during group presentation


Closing Ceremony

5. Summary

- Information arrived at participants just one (1) day before the staring of the training. This is why some participants could not come at first day. We need more coordinate and monitoring with employment section, secretary of DG SDA.
- Participants were quite active in discussion.
- Some of the participants were busy with their mobile phone and not seem to be concentrating on the training.
- At Waduk Setia Budi (PD PAL Jaya) where we visited for field study, performance of PD PAL Jaya was not so good by the result of audit. Participants of the training were disappointed. The participants suggested that field study site should be as a good example for their duties.
- As a result of Pre/Post Test, proficiency level of trainees were lifted. According to the result, the project should consider on "Legal Aspect" for next trainings and capacity development activities
- As a result of questionnaire, "Monitoring River Water Quality" in the field of Water Quality Management was raised as important issues
- Our target level of the training is "young engineers". Some of participants were middle class and veteran staff of B(B)WS. We heard they were disappointed because they thought "JICA" training is usually including advanced/high level technology introductions… we should consult with the employment section to choose suitable participants from B(B)WS

END

ANNEX 6-1

Report No.014

Report of Training on Operation & Maintenance for Irrigation, in Surabaya on October 2016

Report of Training on

Operation & Maintenance for Irrigation

Date:	18th October 2016 to 21st October 2016m for 4 days	
Place:	Surabaya Training Center	
Participants:	28 Participants (21 from B(B)WS, 2 from Dinas, 2 from PJT I)	
Schedule:	18th & 19th	Classroom Lecture
	20th	Field Trip
	21st	Classroom Lecture

1. 1st Day of Training

1) Opening Ceremony

Attendees: Dr. Suprapto, Head of Water Resources Training Center, HRDA
Mr. Ahmad, Head of Surabaya Training Center
Mr. MIURA Hirohisa, Project Technical Expert

Agenda: Welcome Remarks: Mr. MIURA
Opening Remarks: Dr. Suprapto

2) Pre Test

24 participants took a Pre Test. Mr. MIURA explained purpose of the Pre-test before the test which are;

-Evaluating participants' knowledge level not for measuring
-Evaluating quality of the training

3) Lecture No.1 "Legal Aspect and Current Status of Operation and Maintenance of Irrigation"

Lecturer: Mr. Dadang, Head of Section, Sub-dit of Operation & Maintenance of Irrigation and Swamp, Directorate of Operation & Maintenance, SDA, PUPR

Question 1: In case of Padang, one irrigation area has an area less than 1,000ha. But additional irrigation area is developed in same irrigation area. As a result, area is over 1,000ha. In this case, how to transfer the responsibility to province?

Answer 1: We have a regulation about criteria. Please flow the regulation.

Question 2: How to classify responsibility for irrigation area management?

Answer 2: According to the regulation, over 3,000 ha irrigation area goes to national government, 1,000 ha to 3,000 ha province, less than 1,000 ha kota/kabupaten.

4) Lecture No.2 "Water Distribution Planning and Operation for Agriculture Products"

Lecturer: Mr. Dadang, Head of Section, Sub-dit of Operation & Maintenance of Irrigation and Swamp, Directorate of Operation & Maintenance, SDA, PUPR

Question 1: Regarding water intake for water distribution, who should has a responsibility of operation & maintenance of intake facility (weir)?

Answer 1: If benefit irrigation area is less than 1,000 ha, kota/kabupaten have to have a responsibility.

Question 2: Are there any influences by groundwater using for irrigation?

Answer 2: I think that much groundwater using influences to progress of land subsidence.

Question 3: Who should operate & maintain comprehensive weir? It means the weir is for intake to 1) 3,000 ha irrigation area by national, 2) 1,500 ha by province and 3) 500 ha by kabupaten.

Answer 3: Three (3) parties should discuss and coordinate this issue with leadership of B(B)WS.

Question 4: Regarding UU No.23/2014, when we transfer some assets to other agency, for example from national to province, do we have to issue the official document of minister?

Answer 4: I think necessary at least official letter from somewhere.

5) Lecture No.3 "Operation and Maintenance of Irrigation in Japan"

Lecturer: Mr. MIURA Hirohisa, ME, JICA RBO Project Technical Expert

Question 1: Are there any area where is changed from agriculture field to residential or industrial area in Japan?

Answer 1: Yes, this is one of the reasons we have a project "Rationalization Project of Agriculture Water Use". Domestic water demand is increased, so we reduced volume of water use right of irrigation with renovation of irrigation facilities. Then water use right of domestic can be increased.

Question 2: Why Japanese regulation classifies 3,000ha of paddy field and 1,000ha of agriculture (non-paddy) field as national project?

Answer 2: My understanding that non-paddy field usually needs additional facility such as a pipeline for sprinkler, it is more costly than paddy field facility. This is one reasons even 1,000ha of non-paddy field is managed by national.

Question 3: Do you have any problem of sedimentation at canals?

Answer 3: Yes, but it is not so much. We remove sedimentation about once in three (3) to five (5) year. In this case, we have to stop the water in the canal to make dry for sediment remove works. However it is very difficult to get understanding from water users. So, we currently install “double section canal” or parallel canal (pipeline) by canal renovation project. We can use one section for water supply, another section can be dry for removing sedimentation.

Question 4: Regarding amount of water use, is it changed frequently?

Answer 4: Yes, especially in a season of starting rice cropping. We use much water nearly maximum water use right. So, we operate intake gate and check gate every day with checking / calculating daily water demand.

Question 5: Do you have any research institute for irrigation?

Answer 5: Yes, we have an “Institute for Rural Engineering”. The institute conducts many research about irrigation system.

Question 6: What responsibility of national government for Irrigation O/M?

Answer 6: National government usually transfers responsibility of O/M to province or LID (Land Improvement District, it is similar with T3A in Indonesia) after finishing construction project by national government. But Ministry of Agriculture, fishery and Forestry has several regional offices. The offices support legal and engineering matter to province and LID.

Question 7: How about stakeholder coordination for irrigation O/M?

Answer 7: For example of Tone Canal Management Office, Japan Water Agency, they established “Council Tone Canal Management”. The member is consist of representatives from stakeholders, National/Province/City government, LID, Water users and local communities.

Opening Ceremony

Pre-test

Lecture No.1 by Mr. Dadang

Lecture No.3 by Mr. Miura

2. 2nd Day of Training

1) Lecture No.4 "Operation & Maintenance of Irrigation Dam"

Lecturer: Mr. Herri Ari Panuntun, Staff of Sub-dit Dam and Lakes OP, Directorate of OP

Question 1: How to control legally mining activity near reservoirs?

Answer 1: I think there are some related regulations for environmental conservation. We should follow the regulation and coordinate with related agencies.

Question 2: What is the control water level?

Answer 2: It is limited water level before start flood.

Question 3: Regarding new application for Dam O/M, when can it start? Is it opened to public?

Answer 3: It has not finalized yet. It will not be opened to public.

Question 4: How many years of useful life of dam? If the useful life is exceeded, do we have to stop operation and break or renovate dam?

Answer 4: "Useful life" is just an indication. We can use dam even useful life is exceeded, if conditions of dam body and facility is fair. Therefore, O/M is important.

Question 5: We have a regulation on dam O/M that is set in 2006. But new regulation on O/M is set in this year. Do we have to update/revise current procedure of dam O/M?

Answer 5: If current procedure of dam O/M is much different from new regulation, we should update/revise the procedure.

Question 6: If sedimentation is much in dam reservoir, it impacts to operation of dam?

Answer 6: Yes. If sedimentation occupy a part of effective storage capacity, if inlet point in the reservoir is covered by sedimentation, and other cases, we should reconsider some countermeasure for sedimentation and revision of operation procedure.

Question 7: During dry season, small volume of inflow to reservoir makes water quality deterioration.

Answer 7: Water quality deterioration is caused by not only lack of inflow but also environmental condition of watershed. We should study factors of water quality deterioration.

Question 8: When do we have to make a procedure of dam O/M?

Answer 8: We should make the procedure at a stage of dam construction planning.

2) Lecture No.5 "Operation & Maintenance Works of Irrigation as Regulator"

Lecturer: Ms. Tami Adininhtyas, Division of OP, BBWS Brantas

Question 1: How about coordination for dam O/M?

Answer 1: O/M of Dams is conducted by PJT I in Brantas River Basin. Therefore, PJT I coordinates O/M works, BBWS Brantas monitors it.

Question 2: How to calibrate (inspect) dam? And how often?

Answer 2: We conduct inspection of dam one in five (5) years.

Question 3: Regarding water use, there are water users of not only irrigation but also industry and drinking. Does BBWS Brantas monitor water allocation for all?

Answer 3: We have regulation on water use right. Water users have to get permission. Responsibility of BBWS is monitoring of the water use right for all users.

Question 4: Do water users of industry have self-monitoring report on water intake?

Answer 4: They have a self-monitoring report on water intake, but it is not periodical. Therefore, BBWS usually compares our data and PJT I's data for checking.

Question 5: How to keep a quality of collecting data?

Answer 5: It is difficult. Our observers sometimes forget to collect data. BBWS requests adequate observation, but they complain about low salary…

Question 6: BBWS and Dinas Province have data on irrigation. How to coordinate management of data. I think two (2) offices has each data, it make confusion.

Answer 6: BBWS's data is for agriculture planning, province's data is for planting planning. Purposes are different.

Question 7: How to coordinate for maintenance works?

Answer 7: In Brantas River Basin, there are mainly three (3) organizations for maintenance of irrigation. BBWS, PJT I and Province/Kabupaten support each other for adequate maintenance works for irrigation, especially emergency case.

Question 8: How about making schedule of RAT (Annual Stakeholders Meeting)?

Answer 8: In Brantas River Basin, we make the schedule annually. The schedule can be used without permission of minister.

Question 9: Do you have a procedure of water allocation planning?

Answer 9: First we should calculate water balance. For the stakeholder coordination, we have a meeting for negotiation to decide water allocation for each water user. Everyone wants to decide water allocation as everyone likes…

Question 10: If there is a mining or construction activity near bridge, how do we do?

Answer 10: If the activity is inside of river area, we have to order to stop the activity. It is one of the important duty of B(B)WS.

Question 11: How to do calibration?

Answer 11: Regarding calibration of sedimentation, first we prepare a budget for a survey of sedimentation. We should conduct the survey to confirm/set initial condition of sedimentation in two (2) year after finishing construction.

3) Lecture No.6 "Water User Coordination on Water Allocation"

Lecturer: Ms. Astria Nugrahany, Head of division of environment, PJT I

Question 1: If PJT I finds illegal action of water use, how to control and supervise? Giving penalty and other action is came from TKPSDA?

Answer 1: Duty of PJT I is mainly monitoring, and report to BBWS. BBWS has a duty of control and supervise against the illegal action.
TKPSDA meeting is usually held four (4) times in a year. Usual topic is water use. Regarding legal control, TKPSDA recommends this matter to PUPR.

Question 2: How to coordinate for conversion of agriculture field?

Answer 2: In case of Delta Brantas, it is responsibility of Province.

Question 3: Does PJT I have standard on priority of water user for water allocation?

Answer 3: PJT I has a procedure of water allocation. The procedure mentions about it.

Question 4: In case of climate change, how about RAAT?

Answer 4: If severe drought occurs, PJT I re-calculate it. Sometimes PJT I considers a countermeasure, for example artificial rainfall etc…

Question 5: How about human resources development in PJT I?

Answer 5: So far so good. But there is on issue about staff regeneration. Number of young engineers is small.

Question 6: How about human resources development in PJT I?

Answer 6: So far so good. But there is one issue about staff regeneration. Number of young engineers is small.

Question 7: Are there any recommendation on best method of operation?

Answer 7: We should consider condition of water resources and water use in each river basin. PJT I uses "Dry and Wet Pattern".

Question 8: Are there any recommendation on best method of operation?

Answer 8: We should consider condition of water resources and water use in each river basin. PJT I now applies "Dry and Wet Pattern".

Question 9: How about monitoring intake water at each weir?

Answer 9: PJT I does not monitor all weir, because PJT I is not involved into planning of planting. But BBWS conducts a study on water balance at outside of PJT I management area. The data will be merged into one, and we hope all weir is monitored.

4) Lecture No.7 "Briefing on Field Study"

Lecturer: Mr. MIURA Hirohisa, ME, JICA Project Technical Expert,
Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

- The route and schedule of the field study was confirmed
- Mr. MIURA explained general information / situation of Bendung Lengkong Baru and Delta Brantas Irrigation Canal
- Mr. Sarwono explained system of Brantas River Basin and water allocation scheme in Brantas River Basin

Lecture No.4 by Mr. Herri

Lecture No.5 by Mr. Tami

Lecture No.6 by Ms. Astria

Lecture No.8 Briefing on Field Study

3. 3rd Day of Training

1) Lecture No.8 "Field Study at Bendung Lengkong Baru and Delta Brantas Irrigation Area"

Lecturer: Mr. Indra, Head of Lengkong Baru Weir Office, PJT I

Lecturer: Mr. Juwanto, Officer of Dinas PU Province

- Before leave from Training Center, participants leader confirmed with participants about objective of the field study and topics of each group to study in the field study
- Surabaya Training Center recorded situation of the field study for their activity introduction movie by outsourcing
- At Bendung Lengkong Baru, we received explanation of operation and maintenance works
- Participants visited operation room of Bendung Lengkog Baru to check facility and instrument for operation
- At diversion gates and irrigation canal for Delta Brantas, participants observed condition of facilities and operation and maintenance work at the site by Dinas Pu Kabupaten

Participants leader confirmed objectives of the field study

At office of Bendung Lengkong Baru (PJT I)

Group Photo at Office of PJT I

At Diversion Gates

At Irrigation Canal for Delta Brantas

Group Photo at weir by drone

4. 4th Day of Training

1) Post Test

23 participants took Pre-Test.

2) Lecture No.10 "Feedback of Field Study, Group Presentation"

Coordinator: Mr. MIURA, JICA Project Technical Expert
Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

Group 1: Instrument Maintenance

- Generator for gate operation

[Comments]

- Definition of instrument is mentioned, but the list is not match with the definition…
- Concrete exampled on "dynamic" and "stable" status of weir and dam
- Current status of instrument: all instrument condition is fair by good maintenance work by PJT I

Group 2: Operation Procedure

- 8 staff for Bendung Lengkong Baru
- Record of maintenance/operation
- Name Card of staff and organization charts with photo / name
- Water level observation at diversion gates
- Information on irrigation water allocation board

[Comments]

- Sedimentation: procedure of operation must be and include sediment management
- In case of power down: there is SOP, but there is no manual
- Evaluation of operation: method of evaluation on irrigation operation

Group 3: Maintenance

- SOP
- Routine works for maintenance

[Comments]

- Emergency response system
- Painting gate doors
- Operation and maintenance for canals: there should be a schedule of OP including sediment excavation

Group 4: Flood Management

- Upstream, there is no retention area in irrigation area
- Prong Canal is closed during flood to prevent inundation in along prong canal

[Comments]

- Flood Hazard Map:
- Flood volume at Maximum and Minimum: Minimum is 17.90m3/s, maximum is about 17,000m3/s in 2007 flood
- Response at before during after of flood
- Coordination for flood response: information sharing with related institution and coordination with BPBD

Group 5: Organization

- Damages of structure
- Organization for Operation
- Lack of staff

[Comments]

- Stakeholder Coordination: There is a matrix of indicator for coordination. And they hold a meeting to solve the problems. But it is still difficult because of mind set of stakeholders
- Conflicts: TKPSDA is functioned to solve
- Detail of analysis for necessary human resources

Comments:

- Emergency response in case of power down, we need “emergency generator” as structural measure, and also we should make a manual on method of switch to emergency generator and training for operators
- Regarding flood management for irrigation canal system, we should consider installing “spillway” and “sideway” to avoid making overflow from canal

3) Closing Ceremony

Attendees: Mr. Ahmad, Head of Surabaya Training Center
Mr. MIURA Hirohisa, Project Technical Expert

Agenda: Announcement on participants of Top 3 score of Pre/Post test
Closing Massage by Mr. MIURA, JICA Project Technical Expert
Closing Remarks by Mr. Ahmad, Head of Surabaya Training Center

Pre Test

Group Presentation

Discussion during group presentation

Closing Ceremony

5. Summary

- Information arrived at participants about one (1) week before the staring of the training. Therefore, almost expected number of participants could come.
- As a result of Pre/Post Test, proficiency level of trainees were lifted. According to the result, the project should consider on "Canal System" for next trainings and capacity development activities
- As a result of questionnaire, "Water Allocation Planning" in the field of OP for Irrigation was raised as important issues.
- Our target level of the training is "young engineers". Some of participants were middle class and veteran staff of B(B)WS. We should surely share the information on participant requirement with B(B)WS through employment section.
- The participants are quite active in discussion and punctual.
- Field study at Bendung Lengkong Baru that is managed by PJT I. It was good example for maintenance of instruments, equipment and facility. The project should continue to cooperate with PJT I for capacity development activity for B(B)WS, such as trainings and OJT.

END

ANNEX 6-1

Report No.015

Report of Training on River Rehabilitation, in Jakarta on November 2016

Report of Training on River Rehabilitation

Date:	15 November 2016 to 18 November 2016	
Place:	Jakarta Training Center	
Participants:	23 Participants (21 from B(B)WS, 1 from Dinas, 1 from PJT I)	
Schedule:	15th & 16th	Classroom Lecture
	17th	Field Trip
	18th	Classroom Lecture

1. 1st Day of Training

1) Opening Ceremony

Attendees: Mr. Hasanudin, Head of Secretariat, Human Resources Development
Mr. Yaya Rukiana, Head of Jakarta Training Center
Mr. Kazushi Suzuki, Project Coordinator

Agenda: Welcome Remarks: Mr. Suzuki
Opening Remarks: Mr. Hasanudin

2) Pre Test

23 participants took a Pre Test. Mr. Miura explained purpose of the Pre-test before the test which are;

-Evaluating participants' knowledge level not for measuring
-Evaluating quality of the training

3) Lecture No.1 "Natural Disasters and National Disaster Management Policy in Indonesia"

Lecturer: Mr. Mohd. Robi Amri, ST, Head of Disaster Risk Research Section, Directorate of Disaster Risk Reduction, BNPB

Question 1: Which organization manages a "Command Post" (Emergency Rescue Team)?
Answer 1: Command Post is consist of several organizations, Army, Fire defense and police. BNPB has responsibility of coordination whole of the activity.

Question 2: How about other disaster, such as drought?
Answer 2: Drought disaster is managed by BNPB. And also, sediment disaster and Tsunami are managed by BNPB.
Question 3: Does hazard map include evacuation route?
Answer 3: No. Scale of the map is about 1/50,000. In urban area, it is 1/25,000. We will

upgrade them to be able to include evacuation route.

Question 4: Can you explain more on “Sekolar Sungai” (River School) and word of “Penggal Sungai” (Scraps of River: literal translation)

Answer 4: “Sekolar Sungai” is one of BNPB activity with community on river environment improvement and awareness raising on flood, and so on. “Penggal Sungai” means that river is classified into several section based on each community, it is to make smooth activity by each community. But BBWS also has classification of river into several section, we should coordinate for the activity.

Question 5: Regarding information sharing, who should announce disaster information? And how about flood warning by river water level?

Answer 5: BMKG and other agencies has a role of announcement on disaster information, however BNPB should announce all kind of disaster information to avoid confusion of the information. Regarding flood warning by river water level, it has not set yet. We has to coordinate with each B(B)WS.

Question 6: Regarding flood hazard map, there are some hazard map in several river basins or areas. But accuracy of the map is not so good. Who should update the map?

Answer 6: Hazard maps that are made by BNPB is based on information and data from related agency and organization. BNPB opens the hazard maps on 1) Website (PDF file), 2) SNS, 3) SDG. At provincial level ,BPBD has a responsibility for hazard map. And there is a plan that hazard map will be opened for all kapupaten until 2018.

4) Lecture No.2 “Operations as Disaster Risk Reduction by B(B)WS in Japan”

Lecturer: Mr. SHINYA Takafumi, JICA Expert on Disaster Management, BNPB

Question 1: Regarding “Super Levee”, residences has to return to the land of Super Levee? Or can move to other place?

Answer 1: Residences can choose as they like. Some of residences move to somewhere on this opportunity.

Question 2: B(B)WS hold an event for awareness raising of residences. But one facility was broken during the event. Do you have any suggestion about other method of event?

Answer 2: I do not know reason, but we should pay attention on safety for residences (visitors) and facility/equipment.

Comments from Participants

There is a difference of culture between Indonesia and Japan. In Indonesia, our awareness of Operation & Maintenance is not high. For examples, residents usually plant trees on the river bank even there is a sign board that mentions "Do not plant trees here". Staff of B(B)WS understands importance of Operation & Maintenance, but they do not take any actions. Therefore, raising motivation of B(B)WS's staff on Operation & Maintenance has to be raised by not only trainings but also themselves.

5) Lecture No.3 "Emergency response policy to water destructive power during disaster"

Lecturer: Mr. Situmeang, Section Chief, Sub-dit of O/M Planning

Question1: Are there any differences on meaning of "Disaster" between PUPR and BNPB?

Answer1: I think there is a difference. In BNPB, if damage of human or facility happened, it becomes "Disaster". But in PUPR, if river bank is collapse but there is no influence to human and economic activity, it is not "Disaster".

Question2: B(B)WS has equipment and machine for emergency response, but they usually do not work…

Answer2: It is caused by lack of maintenance. And also B(B)WS should not lent any equipment and machines to other agencies. Emergency case will sometimes come suddenly. B(B)WS always has to keep them for emergency.

Pre Test

Lecture No.1 by Mr. Robi from BNPB

Lecture No.2 by Mr. Shinya

Question from Participant

2. 2nd Day of Training

1) Lecture No.4 "River information Management and Early Warning System"

Lecturer: Ms. Brriant, section chief, Sub-dit of Water Quality & Environment

Question 1: Regarding data transfer, if radio signal and SNS are not available, how to do?

Answer 1: PUPR are installing automatic telemetry system.

Question 2: Regarding early warning system, we need more concrete countermeasures for adequate implementation.

Answer 2: I would like to introduce KOICA pilot project as an example

Question 3: Can you introduce any countermeasures for "Water Hyacinth"?

Answer 3: We usually take them out of the reservoir.

Question4: Regarding Early Warning System, there are some broken AWLRs in our river basin. Can we replace them?

Answer4: I think they are "TECH4WATER". You should communicate with PUSAIR. But I heard PUSAIR has one tele-communication staff only…

2) Lecture No.5 "Legal system for Rehabilitation of Disaster-Stricken Public Facilities, and Engineering restoration work method for "Build Back Better", in Japan"

Lecturer: Mr. Ozawa, JICA Short Term Expert (Deputy Director of Disaster Management Division, Water and Disaster Management Bureau, Ministry of Land, Infrastructure, Transport and Tourism JAPAN)

Question 1: Who is a leader (decision maker)? Are there any agency similar to BNPB?

Answer 1: Leader is Prime Minister. But just after disaster happen, Minister of MLIT is

tentative leader. Cabinet office is similar to BNPB.

Question 2: Can you introduce any countermeasures for TSUNAMI?

Answer 2: We, Japanese government, combine structural and non-structural measures for TUNAMI. And also we consider preparation in 2 (two) stages. 1st one is protection by structural measures against "once in a century" disaster. 2nd one is protection by both structural and non-structural measures against "once in a millennium" disaster.

Question 3: Budget of reconstruction and rehabilitation for disaster is provided from National budget. Are there any other budget resources?

Answer 3: One of the other resources is "Donation Money" to local government.

3) Lecture No.6 "Practical operations as emergency response to water destructive power during and after disaster"

Lecturer: Ms. Lina, BBWS Ciliwung Cisadane

Question1: Are there any format for facility inspection?

Answer1: We have started facility inspection. After finish construction, we conduce the inspection to accept starting operation or not. After start operation, we conduct "Walk Through" yearly.

Question2: How about human resources for river operation & maintenance in BBWS Ciliwung Cisadane?

Answer2: There is 6 (six) staff in Operation & Maintenance Division. But there is no expert for river patrol.

Question3: Does BBWS Ciliwung Cisadane have any data of flood in 2013? And how to manage relocation of residences in river area?

Answer3: We have some data on flood. Regarding relocation, local government has the responsibility. Therefore, B(B)WS's responsibility is to set adequate river area, but border line of river area is not so clear.

Question4: Why did BBWS implement "build back better" for Situ Gintung Disaster?

Answer4: It made over 100 casualties. We should not make same incident. This is why we rehabilitated as rock fill type dam with enough spillway (with gates). And also, sedimentation in the reservoir was severe. This is why we installed underground outlet.

Question5: How about management of Bekasi River?

Answer5: There are some difficulties for operation & maintenance. BBWS should update a POLA. BBWS collaborate with PJT II to make operation procedure, but it has not finished yet.

Comments:

- Patrol not only river and also observation stations
- Try to coordinate among 6 Ci Rivers for Integrated flood/water utilization management
- Registration of river area with BMN (in PUPR, section for land property registration)
- In NTT, there are about 5,000 empung (Small pond). BWS has not registered them yet. If problem is name of "empung", BWS can change name from "empung" to "situ"
- BBWS usually has flood hazard maps. But BBWS should update periodically about flood water arrival time, because of river normalization

4) Lecture No.7 "Technical points for investigation to determine the cause of collapse and for selection of rehabilitation works (design and construction)"

(The lecture was canceled because of lecturer was not available suddenly)

5) Lecture No.8 "Briefing on Field Study"

Lecturer: Mr. Miura Hirohisa, ME, JICA Project Technical Expert,
Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

- The route and schedule of the field study were confirmed
- Mr. Miura explained general information / situation of River Improvement at Kampung Pulo, Ciliwung River and Dam body collapse incident of Situ Gintung in 2009
- Mr. Sarwono explained detail of Ciliwung river system for flood, River Improvement Project at Kampung Pulo and Dam body Collapse disaster of Situ Gintung in 2009

Topics of each group for field study

Group 1: River Management
Group 2: Preparation for Disaster
Group 3: Management of River Area
Group 4: River Walk through (River Patrol)
Group 5: Dam (Situ) Management

Lecture No.4 by Mr. Brriant

Lecture No.5 by Mr. Ozawa, JICA Short Term Expert

Lecture No.6 by Ms. Lina, from BBWS Cili Cis

Briefing on Field Study

3. 3rd Day of Training

1) Lecture No.9 "Field Study of River Channel Improvement Project at Kampung Pulo, Ciliwung River"

Lecturer: Staff from BBWS Ciliwung Cisadane

- Inspection road at right side river bank is tentatively opened for residents
- Parapet has been installed tentatively against overflow. After finish construction of Dams in upstream and connection tunnel to KBT, parapet can be removed
- Construction works at left side of river is still on going, they are installing sheet piles. However, it seemed piles could not be installed straightly into land
- There is still high risk of flood, especially internal flood, in protected inland. Therefore, "Super Levee" in Japan is introduced as example to reduce risk of flood

2) Lecture No.10 "Field Study of Dam Rehabilitation at Situ Gintung, South Tangerang"

Lecturer: Staff from BBWS Ciliwung Cisadane

- Era of Netherland colony: developed for tourism
  1993: Constructed dam body as Situ
  2007: O/M by Banten Province
  2008: Small Repairing of spillway
  2009: 27th March 05:40 collapse of dam body
- Factor of collapse was that lack of capacity of spillway, and high reservoir water level (+99.0m)
- Rehabilitation like "Build Back Better" is mainly upgrade of spillway with installing gates
- Current problem for O/M is too many fish nets
- There is no plan of any countermeasures for sedimentation
- Water quality sampling and analysis has been conducted twice in a year

River Improvement works at Kampung Pule

Explanation on kampong Pulo by BBWS Cil Cis

Explanation on Situ Gintung at Situ Center

Dam body and Spillway of Situ Gintung

4. 4th Day of Training

1) Post Test

22 participants took Post-Test.

2) Lecture No.11 "Feedback of Field Study, Group Presentation"

Coordinator: Mr. Miura, JICA Project Technical Expert
Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

Group 1: River Management

- In case of Ciliwung River, operation of gates and pump
- Periodical patrol for river and facility

[Comments]

- Relocation is necessary, but one of solutions is "Super Levee" as example
- Resident's awareness of flood should be raised continuously
- Improvement of construction quality, especially sheet piles

Group 2: Preparation for Disaster

- Level raising of levee is still needed, if we consider current flood control system in Ciliwung River
- Necessary of trash collecting
- Continue to expropriation of land at left side river bank

[Comments]

- Awareness raising of residents on flood is also necessary
- BBWS Ciliwung Cisadane should conduct public awareness campaign activity with TKPSDA and related institutions for community
- If there is no evacuation plan, BBWS Ciliwung Cisadane should support for making the plan for BPBD and community
- BBWS should promotes resident's understanding on flood warning Levels

Group 3: Management of River Area

- Making residents' understanding on river area and flood risk
- River Improvement with green belt
- Cooperation with related institutions for integrated flood management

[Comments]

- Collecting trash is necessary, if possible once in a day
- Even inspection road is opened to public, but shops on the road should not allowed
- According to regulation, river area boundary is until 3m from edge of levee. The situation in Kampung Pulo seems difficult for relocation of all residents to outside of river are. There is still a lot of houses…
- Sometimes person in high position is included in residents in river area. We have to

pay attention in this case…

Group 4: River Walkthrough (River Patrol)

- Inspection / maintenance of Situ Gintung should be followed by SOP
- There is a crack on parapet at Kampung Pulo
- Height of position of drainage pile (Sluice) is low. If river water is high, water cannot be drained to river

[Comments]

- Result of walkthrough should be shared with contractor

Group 5: Dam (Situ) Management

- There are over 150 fish nets. It is difficult for BBWS to remove/control
- Dam body deformation; 10cm sink at crest of dam body from finish construction

[Comments]

- Difficulty on fish nets is caused by permission from Provincial office to fish nets owners
- Coordination with local government essential to solve the problem of fish nets
- For maintenance of facility, there is no manual, and lack of budget. BBWS should make plan of maintenance, such as annual/long term for budgeting

3) Closing Ceremony

Attendees: Mr. Ade, Head of implementation division, Balai DIKLAT III Jakarta
Mr. Ozawa, JICA Short Term Expert

Agenda: Announcement on evaluation result of lectures / lecturers and result of Pre/Post test
Closing Massage by Mr. Ozawa, JICA Short Term Expert
Closing Remarks by Mr. Ade, Head of Implementation division, Balai DIKLAT III Jakarta

Pre Test

Group Presentation

Discussion during group presentation

Closing Ceremony

5. Summary

- Participants were quite active in lectures and discussion
- As a result of Pre/Post Test, proficiency level of trainees were lifted. However, Score of posttest is still not enough, the project will consider on bellows topics for next trainings and capacity development activities (Legal Aspect)
- As a result of questionnaire, "Emergency Response" and "Rehabilitation Works" in the field of River Rehabilitation were raised as important issues.

END

ANNEX 6-1

Report No.016

Report of Training on Benchmarking, in Solo on March 2017

Report of Training on Benchmarking

Date:	13th March 2017 to 17th March 2017, for 5 days	
Place:	CRBOM in Solo city	
Participants:	39 Participants	
Schedule:	13th	Opening Ceremony and 1st day (Classroom Lecture)
	14th & 15th	2nd & 3rd day (Classroom Lecture)
	16th	4th day (Exercise at BBWS Bengawan Solo)
	17th	5th day (Field Study), Classroom Lecture

1. 1st Day of Training

1) Opening Ceremony

Attendees: Mr. Herman, Head of Yogyakarta Training Center
Mr. Suzuki Kazushi, Project Coordinator

Agenda: Welcome Remarks: Mr. Suzuki
Opening Remarks: Mr. Herman

2) Pre Test

39 participants took a Pre Test.

3) Lecture No.1 "Introduction on NARBO and Strengthen RBO"

Lecturer: Dr. Herman Idrus, Former President Director of Jasa Tirta II

Contents: Definition of "Benchmarking" and "IWRM"
Challenges and Strategy of IWRM
Outline of NARBO
Activities of NARBO

4) Lecture No.2 "Introduction on Activity of RBO and RBO Index"

Lecturer: Dr. Herman Idrus, Former President Director of Jasa Tirta II

Contents: Introduction on RBO Benchmarking
Benchmarking Indicators
Procedure of Implementation of Benchmarking

Question 1: Leader of Benchmarking should have a competences. If person who does not have any competences conduct Benchmarking as a leader, it is difficult to

coordinate… (BWS Sulawesi I)

Answer 1: Yes. Head of B(B)WS should assign officially leader of benchmarking

Comment 2: For Question No.1, one division / section should have an official responsibility of benchmarking. (Comment)

Question 3: Can quality of RBO works be controlled by ISO?

Answer 3: It can be said possible, but benchmarking is a tool to measure a work performance.

Some of B(B)WSs already have ISO on hydrological works. But it is quality control for our works. It mentions necessary works / duty to keep good quality of works. But benchmarking is a tool to measure current performance, set a target and action planning.

Photo-1 Remarks by Mr. Suzuki at Opening Ceremony

Photo-2 General Information from Head of Training Center

Photo-3 Lecture No.1 by Dr. Herman

Photo-4 Lecture No.2 by Ms. Nur

2. 2nd Day of Training

1) Lecture No.3 "Explanation on Guideline of performance assessment of RBO"

Lecturer: Ir. Darismanto

Contents: Outline of RBOs in Indonesia
15 indicators
Criteria Performance Area

Question 1: Reports and documents can be retained by soft data?

Answer 1: Yes. Keeping as soft data is better.

Question 2: There are fifteen (15) main works as RBO. On the material, star marks are put on several of 15 works. Are there any differences between works with star mark and without?

Question 3: Guideline mentions some reports and documents as an evidence for scoring. But sometimes available evidences are different by office by office. Can we revise name/kinds of evidence?

Answer 3: It is understandable, but the guideline has already been authorized. Therefore, you can discuss during SA and Peer Review, what report/document can be applied to which evidence on the guideline.

2) Lecture No.4 "Implementation of RBO Management in Japan"

Lecturer: Mr. Miura Hirohisa, JICA Project expert

Contents: Definition, purpose of Benchmarking
Introduction on IWRM
Introduction on IWRM guideline by UNESCO
Case Study in IWRM in Japan

3) Lecture No.5 "Introduction on Performance Benchmarking "

Lecturer: Ir. Isunugroho, Executive Director of CRBOM

Contents: Implementation of IWRM
Mind set for IWRM (from Project oriented to Service oriented)
Difficulty of conducting benchmarking
Criteria Performance Area
15 Indicator and Indicator value
How to evaluate RBO performance

Photo-5 Lecture No.4 by Mr. Miura

Photo-6 Lecture No.5 by Dr. Isunugroho

3. 3rd Day of Training

1) Lecture No.6 "Example of Performance Benchmarking at BBWS Bengawan Solo"

Lecturer: Ms. Nova, Head of OP Division, BBWS Bengawan Solo

Contents: Organization of BBWS Bengawan Solo
Self-Assessment and Peer Review at BBWS Bengawan Solo
Gaps of scores between Self-Assessment and Peer Review

Question 1: Why BBWS Bengawan Solo made 1.0 score for Indicator 14 on Budget recovery?

Answer 1: B(B)WS cannot collect any charge from water users, this is why score was 1.0 as self-assessment

Question 2: Why was there gas of scores between self-assessment and peer review?

Answer 2: Regarding Indicator 14, Self-assessment 1.0, peer review 2.5. We can compare with other B(B)WSs through peer review. We could understand performance at BBWS Bengawan Solo on Budget Recovery was average.

Question 3: Regarding budget, function and roles of BBWS and PJT is different. But BBWS has responsibility of SIPA.

Answer 3: For collecting charge from water users, SIPA is essential. But BBWS cannot collect water user charge with PJT, because river basin is overlap. We cannot receive charge from same user twice.

2) Lecture No.7 "Exercise 1: Self-Assessment"

Lecturer: Mr. Bambang Trihariono, Project staff
Ms. Hendarti
Mr. Darismanto

Contents: Ministerial Regulaton No.20/2016
Category/type of B(B)WSs and organizational institution
Examples of assessments

Basic concept of action plan

3) Lecture No.8 "Exercise 1: Presentation on Self-Assessment from each group"

Lecturer: Mr. Bambang Trihariono, Project staff
Ms. Hendarti
Mr. Darismanto

Contents: Representative from each group made a presentation on existing Self-assessment of his/her office (RBO)
Group 1: Indicator 1, 2, 3, 4, 5 in case of BWS NT1
Group 2: Indicator 6, 7, 8, 9, 10 in case of BWS
Group 3: Indicator 11, 12, 13, 14, 15 in case of BWS Pemali Juana

Comment:

4) Lecture No.9 "Explanation on Peer Review"

Lecturer: Mr. Bambang Trihariono, Project staff
Ms. Hendarti
Mr. Darismanto

Contents: Explanation on Purpose/Procedure of Peer Review by Dr. Darismanto

5) Lecture No.10 "Exercise 2: Peer Review"

Lecturer: Mr. Bambang Trihariono, Project staff
Ms. Hendarti
Mr. Darismanto

Contents: Practice of peer review on Self-assessment
PR team - SA team
Group 1 – Group 2
Group 2 – Group 3
Group 3 – Group 1

6) Lecture No.11 "Exercise 2: Presentation on Peer Review from each group"

Lecturer: Mr. Bambang Trihariono, Project staff
Ms. Hendarti
Mr. Darismanto

Contents: Presentations on peer review of self-assessment by each group

7) Post Test

39 participants took a post test

8) Briefing on Field Study

Lecturer: Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

- The route and schedule of the field study was confirmed
- Mr. Sarwono explained Schedule, route of field study, system of Kali Pepe as drainage river

Lecture No.6 by Ms. Nova

Lecture No.7 Exercise of SA

Lecture No.8 Group Presentation on SA

Lecture No.8 Question from participants

Post Test

Briefing on Field Study by Mr. Sarwono

4. 4th Day of Training

1) Lecture No.12 "Greeting on Purpose of this visit" and Lecture No.13 "Greeting from Head of BBWS Bengawan Solo

Lecturer: Ms. Nova, Head of Division of OP, BBWS Bengawan Solo

2) Lecture No.14 "Exercise of SA and PR at BBWS Bengawan Solo and Document survey", Lecture No.15 "Confirmation of Stakeholder Status by Interview"

Lecturer: Mr. Nova, Head of Division of OP, BBWS Bengawan Solo

Lecturer: Ir. Darismanto

Lecturer: Ms. Hendarti

Lecturer: Ms. Salmi, Section Chief, Sub-dit of Water Resources Institution

Lecturer: Mr. Ketut Artana, Provincial WR & Spatial Planning, Central Jawa, Semarang

Lecturer: Mr. Sutrisno, from Water User Association (P3A)

[To BBWS Bengawan Solo]

Question 1: What is most difficulty for Self-assessment?

Answer 1: There is no big problem. But one think that should be improved is procedure of commitment for SA.

[To BBWS Bengawan Solo]

Question 2: How about number of member of SA team and criteria of selection of member?

Answer 2: Eight (8) people from OP and other divisions. Head of BBWS finally decide member.

[To BBWS Bengawan Solo]

Question 3: In BBWS Bengawan Solo, mainly member from OP. But in our BWS, mainly member from program division. Why does it occurred such difference?

Answer 3: It is depended on decision of Head of B(B)WS.

[To BBWS Bengawan Solo]

Question 4: Do you frequently direct about document safekeeping and organizing in BBWS Bengawan Solo?

Answer 4: Yes. I think it is better that other B(B)WSs.

[To PDAM]

Question 5: How often do you have a meeting with BBWS?

Answer 5: Once in three (3) months. It is a coordination meeting with BBWS and PJT. We discuss on water shortage countermeasures and water allocation. As an example in Coro Weir, we supply water on Wednesday only in case of water shortage. We have a MOU and rule about it.

[To Waterworks department as water user]

Question 6: Have you received any feedback from BBWS?

Answer 6: We usually receive some feedbacks from PJT through BBWS. In emergency case, we received some information from PJT directly.
Until 2009, there were some conflicts with PJT, however our relationship has been improved now. Coordination among three (3) parties (User, BBWS and PJT) is satisfactory through GP3T.

3) Lecture No.16 "Preparation for Group Presentation", Lecture No.17 "Group Presentation to BBWS Bengawan Solo"

Lecturer: Mr. Nova, Head of Division of OP, BBWS Bengawan Solo
Lecturer: Mr. Darismanto
Lecturer: Ms. Hendarti
Lecturer: Ms. Salmi, Section Chief, Sub-dit of Water Resources Institution
Lecturer: Mr. Ketut Artana, Provincial WR & Spatial Planning, Central Jawa, Semarang

From Group 1: Presentation on Indicator 1 – 5
From Group 2: Presentation on Indicator 6 – 9
From Group 3: Presentation on Indicator 10 - 15

[Comments from Ms. Nova BBWS Bengawan Solo]

- Indicator 1
- LAKIP 2016 has not been made yet
- Indicator 2
- A report has not been updated by new Ministerial Regulation No.20/2016 about function and role of B(B)WS
- Documents and reports have been converted to soft data
- Indicator 3
- TKPSDA usually makes some recommendations only
- Some of recommendations is confidential
- Indicator 4

- BBWS Bengawan Solo has conducted questionnaires survey to water users
- However BBWS has not analyzed result of questionnaires

- Indicator 5

- BBWS Bengawan Solo cannot give any penalties to violators, therefore BBWS usually cooperate with related agencies.
- BBWS basically makes a report to related agencies about illegal activities

- Indicator 6

- BBWS Bengawan Solo has some reports as evident, however BBWS has not conducted any follow up activities. Because it is responsibility of policy

- Indicator 7

- It is no change from SA

- Indicator 8

- BBWS Bengawan Solo usually has applied adequate method, BBWS rarely has applied new/advanced technology
- As an example, BBWS uses a website for hydrology and flood management

- Indicator 9

- BBWS Bengawan Solo has conducted feedback
- BBWS has some reports of Rekomtek

- Indicator 10

- BBWS Bengawan Solo cannot conduct follow up for all proposals from stakeholders
- Some of proposals is out of BBWS's responsibility area

- Indicator 11

- For water allocation, BBWS Bengawan Solo has cooperated with PJT
- Rekomtek from BBWS, technical calculation by PJT

- Indicator 12

- There is a SOP on flood management
- For rivers that are managed by Provinsi or Kabupaten, BBWS has coordinated with provinsi/kabupaten to solve issues on water resources management
- Some houses/structures on levee has not been controlled, BBWS and Provinsi should control it

- Indicator 13

- Some of data/information is confidential

- Indicator 14

- It should be clear about responsibility of BBWS and PJT to avoid overlapping

- Indicator 15

- Budget execution at BBWS Bengwan Solo is satisfactory. If there is remaining budget, BBWS surely return

Lecture No. 13 by Ms. Nova

Lecture No.14 checking document at BBWS

Lecture No.15 Questions to Water Users

Lecture No. 17 Group Presentation to BBWS

5. 4th Day of Training

1) Field Study

Instructors:	Mr. Untoro, BBWS Bengawan Solo
	Mr. Vega, BBWS Bengawan Solo
	Mr. Untadi, Consultant
	Mr. Totok, Constructor
Route:	Bendung Karet Trtonadi (under rehabilitation)
	Kali Pepe near Pasar Legi
	Kali Pepe near Pasar Gede
	Pintu Air Demangan

At Bendung Karet Trtonadi

At Bendung Karet Tirtonadi

At Pump Station at Demangan

At Pintu Air Demangan

2) Closing Ceremony

Attendees: Mr. Herman, Head of Yogyakarta Training Center
Ms. Sri Martini Rahayu, PUSDIKLAT SDA dan Konstruksi
Mr. Isnugroho, Executive Director of CRBOM
Mr. MIURA Hirohisa, Project Technical Expert

Agenda: Announcement on participants of Top 3 score
Closing Remarks by Mr. Ahmad, Head of Surabaya Training Center

Closing Ceremony

Giving Prizes to Top 3 Score Participants

END

ANNEX 6-1

Report No.017

Report of Training on Sediment Management for Dam, in Yogyakarta on April 2017

Report of Training on Sediment Management for Dam

Date:	17th April 2017 to 21st April 2017, for 5 days	
Place:	Yogyakarta Training Center	
Participants:	24 Participants	
Schedule:	17th	Opening Ceremony and 1st day (Classroom Lecture)
	18th	2nd day (Classroom Lecture)
	19th & 20th	3rd & 4th day (Field Trip)
	21st	5th day (Group Presentation), Closing Ceremony

1. 1st Day of Training

1) Opening Ceremony

Attendees: Mr. Herman, Head of Yogyakarta Training Center
Mr. Suzuki Kazushi, Project Coordinator

Agenda: Welcome Remarks: Mr. Suzuki
Opening Remarks: Mr. Herman

2) Pre Test

23 participants took a Pre Test.

3) Lecture No.1 "Law, Regulation and Technical Guidelines for Dam & Sediment Management"

Lecturer: Mr. Adek Rizaldi, ST. MT, Head of Sub-dit of Operation & Maintenance Dam and Lakes

Contents:

1) Laws and regulations on dam

-Law No.11 1974 on Water Resource

-Law No.26 2007 on Spatial Planning

2) Current issues on dam O/M

-45% of dams are damaged, need rehabilitation

-Current issues of dams are 1) ageing, 2) Climate change and 3) transferred agriculture field to commercial area and increasing population

3) Outline of sediment management for dam

-Main countermeasures can be classified into countermeasures at upstream and at reservoir

-Propose of countermeasures at upstream is control/decrease sediment volume

-Countermeasures at reservoir area check dam, flushing, sluicing, diversion canal and so on

4) Lecture No.2 "Sedimentation of Dam and Countermeasures in Japan"

Lecturer: Mr. MIURA Hirohisa, ME, JICA Project Technical Expert

Contents:

1) Dam sediment capacity planning
2) Countermeasures for dam sediment

Question 1: How to calculate sediment capacity of dam?

Answer 1: We usually refer existing data of sedimentation of dams where are located near new dam location

Question 1: If there is no existing data near new dam site, how to calculate dam sediment capacity?

Answer 2: We conduct topography, geography and river cross section survey and sediment analysis. Then we can calculate predicted sediment discharge with refer to average data of existing dams where are located even different river basin

Question 3: In Indonesia, we have stage of inspection before start O/M officially. How about it in Japan?

Answer 3: Yes, we also have the stage. After finish dam body construction, we have test impound stage until reservoir water level reaches surcharge water level and down to normal water level. We check not only condition of dam body but also sedimentation, slope condition at reservoir. If big landslide and slope failure occurs, we stop impounding and make countermeasures.

Question 4: How about countermeasures for landslide at upstream

Answer 4: When we make outline plan of dam, we conduct survey at upstream about topographic and geographic. Then risk of landslide and slope failure is identified. If volume of sedimentation at a location is small, we do not implement any countermeasure, but if sediment volume is big and it will influence to reservoir capacity, we conduct countermeasures.

5) Lecture No.3 "Planning & Design of Structural Measures for Sediment & Landslide at Upstream of Dam"

Lecturer: Mr. Chandra Hasan, Senior of Sabo Center

Contents:

1) Planning sabo works

- We should consider sedimentation of dam from planning stage
- Deforestation is progressive, especially Gorontaro. Usually legal framework for environmental conservation is not set in new province

2) Design of Sabo dams

- Check dam is one of the sabo works
- Regarding maintenance of Sabo dam, we should involve residents and explain purpose and function of sabo dam to resident is.
- Maintenance work, patrol, should conduct once a month at least

Question 1: Design standard of grand sill between main dam and sub dam can be applied to another grand sill?

Answer 1: Partially yes.

Photo-1 Opening Ceremony

Photo-2 Lecture No.2 by Mr. Adek

Photo-3 Lecture No.2 by Mr. Miura

Photo-4 Lecture No.3 by Mr. Chandora

2. 2nd Day of Training

1) Lecture No.4 "Mechanism of Sediment transport in Dam Reservoir and Bathymetric Survey"

Lecturer: Mr. Ayhar Mustafa, Researcher of sabo center, PUSAIR

Contents: Mechanism of dam sedimentation

Bathymetric survey

Survey of dam sedimentation

Apply the survey result to planning/implementing sediment countermeasures

Question 1: Two method of surveys are introduced. Which is most applicable? Because survey result has some differences due to method of survey.

Answer 1: Each method has each features. We should choose suitable method. Problem is that there is no regulation on method of dam sediment survey.

2) Lecture No.5 "Planning & Design of Water Intake Facility and Spillway / Gates with Considering on Sedimentation"

Lecturer: Mr. Dwi, Head of Sabo Center, PUSAIR

Contents: General consideration for design
Design and seismic resistance value of outlet
Operation of gate, wall and other equipment/facilities
Specific items of design for special cases

Question 1: Please explain details of intake structure design

Answer 1: design is depended on site condition.

Comment: It is necessary for dam design to consider several aspects, hydrology, topography, geography and so on. Moreover, we should consider not only technical aspect and also political aspect. Sometime politician request dam construction project suddenly. It is big problem for us…

3) Lecture No.6 "Practical Sabo Works in BBWS Serayu-Opak "

Lecturer: Ir. Imam Mardjiant, senior of PUPR

Contents: Definition of "Sabo" and "Sabo Works"
Necessity of Sabo works in Indonesia
Outline of Sabo works
Practical Sabo works in Merapi Mount.

4) Lecture No.7 "Practical Sediment Management for Dam in Bengawan Solo (Wonogiri Dam)"

Lecturer: Mr. Yoga, Manager of Wonogiri Rehabilitation Project

Contents: Outline of Wonogiri Rehabilitation Project
Outline and function of Closure dike
Dredging works

Question 1: Why sediment from Keduang river is much?

Answer 1: Main factor is deforestation. Therefore, we have a project on resident empowerment for environment conservation, especially for forestation as a package 8.

Question 2: Regarding dredging works, have you calculated Benefit/Cost?

Answer 2: We calculated unit cost of dredging. But we have not calculated B/C.

Question 3: How do you simulate future sediment volume? Because it will be changed by land use.

Answer 3: For future sediment volume, we use experienced data to calculate it.

Question 4: How about countermeasures at other area of upstream?

Answer 4: We continue to conduct social empowerment on forestation.

5) Lecture No.8 "Briefing on Field Study"

Lecturer: Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

Contents: Sabo Works in Gendol and Putih River and other examples

Outline of Wonogiri dam and Bendung Colo

Photo-5 Lecture No.4 by Mr. Ayhar

Photo-6 Lecture No.5 by Mr. Dwi

Photo-7 Lecture No.6 by Mr. Imam Mardjiant

Photo-8 Lecture No.8 by Mr. Sarwonoi

3. 3rd Day of Training

1) Lecture No.9 "Field Study at Putih River and Gendol River on Sabo"

Visited Site: Sabo Dam at Gendol River
Diversion Channel for Sabo at Putih River

[Gendol River]

- At Gendol river, there are 22 existing Sabo dams. This Gadingan Sabo Dam is at middle stream of Gendol
- The Sabo dam is slit type (Open type). The dam can discharge fine grain soil and sand
- Capacity of sediment storage is 225m3
- Concrete strength is 350 kgf/cm2 (= 35 N/mm). Sabo dam usually is constructed with 250 kgf/cm2 concrete
- Irrigation intake is also installed by residents request as new intake
- Excavation is permitted to residents. But no machine and at center of river only
- Position of the sabo dam is 20km from top of Mount. Merapi. Velocity of "lahal" is usually 5km/h. But case of 2010 eruption was 20km/h
- Return period of design is 100 years. Sediment run off calculation has been conducted every 10 years and by FS

[Putih River]

- Elevation is 400m, river bed gradient is about 1/50
- This area was covered by sediment by 2010 eruption
- Sediment class at Putih river is mainly fine grain soil and sand
- Construction work is smooth, issue is socialization. Excavation by residents is unofficially permitted.

Photo-9 at Gadingan Sabo dam at Gendol river

Photo-10 at diversion channel at Putih river

4. 4th Day of Training

1) Lecture No.10 "Field Study at Wonogiri Dam on Sediment Management for Dam"

Visited Site: Wonogiri Dam
Colo weir

[Wonogiri dam]

- Wonogiri dam rehabilitation project has eight (8) packages
- Dredging is ongoing, but the project has not decided location of sediment haulage. Sediment is not stocked at sediment pond
- The project has not distributed sediment to residents, because soil analysis has not been finished.
- As a watershed management, the project implements forestation, environment conservation and greenbelt activity with residents and local government
- 13 check dam has been constructed at Keduang river by JICA loan since 2007

[Colo weir]

- Sedimentation at upstream side is progressed
- When wonogiri dam starts new operation for sediment flush discharge, colo weir receive much sedimentation.
- According to JICA study in 2007, sedimentation from wonogiri dam can be discharged to downstream from colo weir by spillway
- However, PJT I, operator of colo weir, will continue excavation.

Photo-11 at Wonogiri dam

Photo-12 at Colo weir

5. 5th Day of Training

1) Post test

24 participates took posttest.

2) Group Presentation

Group 2: Sediment countermeasure at Wonogiri Dam

- Difficulty of dredging, volume of dredging is not enough and location of sediment haulage is not decided

Question 1: How about operation rule?

Question 2: Progress rate of closure dike construction works

Question 3: How much sedimentation remained after dredging?

Group 1: Effective countermeasure for lahal at Putih river

- Socialization should be more implemented, such as resident meetings

Question 1: What is purpose of access road to river at diversion channel?

Answer 1: There are 4 access roads. It can be used for maintenance work and evacuation

Question 2: Is cross section area enough for safety lahal discharge to downstream?

Answer 2: Width is 70m. It is considered design volume of sediment (lahal)

Question 3: How about return period for design?

Answer 3: it is 100 years

Group 3: Operation / Maintenance for sedimentation at Wonogiri dam

- To reduce sediment volume, forestation and conservation with resident is necessary

Question 1: What is concrete activity with resident?

Answer 1: Promotion of forestation by residents. For dam sedimentation, both structural and non-structural measures are necessary. As one of the non-structural measures, this activity should be conducted

Question 2: What is a purpose of Closure dike?

Answer 2: We should think about whole system of sediment management. Closure dike is for stop sediment flow to left side of dam, to avoid closure of hydropower intake

Question 3: Regarding water allocation, how about coordination with water user for emergency? And how about priority for water users in case of drought?

Answer 3: BBWS Bengawan Solo often coordinates with PJT I for water users coordination on water allocation

Group 4: Sediment management at Gendol river

- As recommendations, 1) Increasing of reservoir capacity, 2) increasing sand pockets, 3) rehabilitation upstream infrastructures, 4) dike raising, 5) Operation/Maintenance, 6) Residents participation and 7) flood warning

Question 1: How to reduce cost of O/M?

Answer 1: Cooperation with residents is indispensable. And also clear classification of responsibility between BBWS and local government

Question 2: How about condition of sediment?

Answer 2: Mainly coarse grain.

Question 3: How to manage excavation by residents?

Answer 3: it is permitted with no using machine, excavate only at center of river

3) Closing Ceremony

Attendees: Mr. Herman, Head of Yogyakarta Training Center
Mr. MIURA Hirohisa, Project Technical Expert

Agenda: Announcement on result and evaluation of the training
Closing Remarks by Mr. Ahmad, Head of Surabaya Training Center

Photo-13 Posttest

Photo-14 Group Presentation

Photo-15 Question to presentation

Photo-16 Closing Ceremony

6. Summary

- Number of participants was twenty-four (24). It was less than expected number by Balai DIKLAT. Invitations were sent to thirty-six (36) including local government officials. This issues is appeared every time
- There was no absent of lecturers. It is made by some lecturers from senior as one of the reason

- Participants seems they would like to know more practical countermeasures that can be applied their field directly and soon. However it is not possible for the training for all B(B)WS. It can be by workshop or seminar at the B(B)WS and site
- As a result, nine (9) participants could not pass the post test. According to PUPR regulation, 70% is necessary for passing. Even nine (9) participant were gave an opportunity of posttest again, however no one passed. It can be considered that it was caused from miss-matching participants with our qualification of expected participants.

END

ANNEX 6-1

Report No.018

Report of Training on Calculation of Water Balance, in Yogyakarta on August 2017

Report of Training on Calculation of Water Balance

Date:	22nd August 2017 to 25th August 2017, for 4 days	
Place:	Yogyakarta Training Center	
Participants:	44 Participants	
Schedule:	22nd	Opening Ceremony and 1st day (Classroom Lecture)
	23rd	2nd day (Classroom Lecture)
	24th	3rd day (Field Trip)
	25th	4th day (Group Presentation), Closing Ceremony

1. 1st Day of Training

1) Opening Ceremony

Attendees: Mr. Herman, Head of Yogyakarta Training Center
Mr. Miura Hirohisa, JICA Project Technical Expert

Agenda: Welcome Remarks: Mr. Miura
Opening Remarks: Mr. Herman

2) Pre-Test

39 participants took a Pre-Test at 10:30 of 22nd Aug. 5 participants arrived at venue of the training lately. They had the test just after their arrival. Total participants are 44.

3) Lecture No.1 "Law, Regulation and Technical Guidelines for Water Balance Calculation and Water Allocation"

Lecturer: Sudarsono, CES

Contents:
1) Policy and strategy of water allocation
2) Technical standard
3) Basic knowledge on water availability and water demand
4) Annual Water Allocation Planning
5) Detail Water Allocation Planning
6) Monitoring and Evaluation
7) Environment Conservation by Water Allocation

Question 1: According the report of annual water allocation, 70% of outflow of river was not used in Sematera area. Is there any special reason?

Answer 1: The situation like that is popular in Sematera. The 70% flows to sea, because

water demand in Sematera is not so much compare with the demand in Jawa.

Question 2: I think specification of each river basin is different. Therefore, is method of calculation of water balance also different?

Answer 2: Basically, same in all river basin in Indonesia. However, it seems that run-off coefficient is different. Research and analysis of run-off is needed.

Question 3: How about procedure of Operation of water allocation after annual plan is finalized?
And are there specified system/procedure in each river basin?

Answer 3: The procedure is described on Ministerial Regulation No. 6/2015. Actually, B(B)WS should cooperate with TKPSDA for coordination for water users.
I think there is no specified one. The procedure is common for all river basin

4) Lecture No.2 "Basic Knowledge and Preparation for Water Balance and Water Allocation"

Lecturer: Prof. Dr. Waluyo Hatmoko M.Sc.

Contents: 1) Basic knowledge on Water Balance and Water Allocation
2) Preparation for Water Balance Calculation and Water Allocation Operation

Question 1: For annual water allocation plan in BWS Sulawesi I, the plan includes 14 months for annual water allocation. Do you know why 14 months are considered?

Answer 1: It is not correct, annual plan must consider 12 months only. I think it happens by some mistaking.

Question 1: Water Allocation plan should reflect to infrastructure planning?

Answer 2: I think so, but coordination between water allocation sector and infrastructure sector should be implemented. Participants from Operation and Maintenance section should communicate with Programing section in your B(B)WS.

5) Lecture No.3 "Water Balance Calculation"

Lecturer: Mr. Pradah, Head of Section, Sub-dit of Hydrology and Environment, Directorate of Water Resources Management (Ir. Sigid Santoso, MM, Head of Sub-dit of Hydrology and Environment)

Contents: 1) Water resources management policy/strategy
2) Outline of Water Balance
3) Schematization for water management

4) Water Availability and Water demand

5) Formulation for calculation of water balance

Question 1: For water demand calculation, how to consider about poultry and groundwater intake?

Answer 1: There is no formulation / consideration of poultry for water demand currently. Groundwater also can be ignored in this condition, but in the future, we should consider it if groundwater intake volume is dramatically increased.

Question 2: How to consider water pollution for water availability/demand calculation?

Answer 2: We cannot consider polluted water for the calculation. If water pollution occurs, water intake must stop.

Question 3: Method of water availability calculation is different from statistical calculation method that I learned in University.

Answer 3: There is a lot of formulation/method of statistics.

Question 4: Water balance calculation for kota/kabupaten should consider by each area (DAS).

Answer 4: No. Even water balance for water allocation at kota/kabupaten should be considered in one river basin.

Photo-1 Opening Ceremony

Photo-2 Lecture No.1 by Mr. Sudarsono

Photo-3 Lecture No.2 by Prof. Waluyo

Photo-4 Question from Participant at Lecture No.2

2. 2nd Day of Training

1) **Lecture No.4 "Exercise of Analysis / Calculation of Water Availability and Water Demand"**
Lecturer: Ir. Widyarti Sumawinata

Contents: 1) Explanation on method, formulation and format for the calculation
2) Exercise on water balance calculation by each participant

- At the beginning, participants feel that the exercise is too difficult for them. Therefore, lecturer has changed level of exercise to lower for participants. Therefore, participants could understand basic procedure, formulation and format of the calculation.

2) Lecture No.5 "Example of Water Allocation Planning from Water Balance Calculation in Semarang City Area"

Lecturer: V. Untoro Kurniawan, ST., MM., Chief of O&M Division, BBWS Pemali-Juana

Contents: 1) Outline of Water Allocation for Semarang city area
2)Water Availability and Water Demand in Semarang city area
3)Operation plan 2018 at Jatibarang Dam and Simon a weir for Water Allocation

Question 1: Water allocation for drinking water (PDAM) is biggest among water use. During drought season, dose water availability fulfill water demand?

Answer 1: For drinking water, water supplying comes from Jatibarang Dam. We do not use natural flow for it. And, we have water balance and water allocation plan.

Question 2: Do you have an operation procedure for flood management at Jatibarang dam?

Answer 2: Yes, we have the POLA and operation rule.

Question 3: How much difference of water availability between dry and flood seasons?

Answer 3: Please see a graph at lecture material P15.

3) Lecture No.6 "Briefing on Field Study"

Lecturer: Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

Contents: 1) Schedule of Field Study

2) Outline of Jatibarang Dam, Simongan Weir and PDAM Kota Semarang

3) Topic of each group presentation

- Each group decided tentative topic for group presentation;
  Group 1: Water Allocation for PDAM
  Group 2: System of flood management at Jatibarang Dam
  Group 3: River Maintenance Flow
  Group 4: Water Quality by PDAM
  Group 5: Water Allocation at Simongan Weir
- These topics are still not so clear; therefore, each group will discuss more to decide clear topic until Field Study

Photo-5 Lecture No.4 by Ms. Widiarti

Photo-6 Lecture No.4 exercise on water balance calculation

Photo-7 Lecture No.5 by Mr. Untoro

Photo-8 Lecture No.6 discussing on topics for group presentation at Briefing on Field Study

3. 3rd Day of Training

1) Lecture No.7 "Field Study at Dam, Weir, Intake for domestic water and Irrigation"

Visited Site: Jatibarang Dam
Simongan Weir
IPA Kali Garang, PDAM Kota Semarang

[Jatibarang Dam]

- There is an operation rule that was made by consultant. But official SOP have not been certificated.
- Annual reservoir water level plan is still draft one. It was made by consultant of JICA Loan Project
- Power generation have not been started. It now processes a public offering for enterprises of operation
- Jatibarang dam supplies PDAM, river maintenance flow. Water supply for irrigation is not included

[Simongan Weir]

- Simongan weir provides water for maintenance/flushing for kali Semanarag at right side of the weir, drainage channel at left side
- For PDAM, water allocates 1,300 L/s. Intake is at upstream from the weir
- Intake for industrial water is under construction at Simongan Weir
- The Simongan weir had provided irrigation water until decades ago. But it has not provided, because irrigation area has been converted to residential and industrial area

[PDAM Kota Semarang]

- Service area of PDAM is divided into 4 areas, North, west south and east of Semarang City
- PDAM is constructing a new water treatment plant (IPA), it is for only west Semarang area
- PDAM have a plan on new service area. But the service has not been started yet

Question 1: How about water distribution management during dry season?

Answer 1: PDAM has 8 wells (natural springs). If water availability is lower than water demand, PDAM uses 8 wells. And, PDAM has SIPPA, 1,300 L/s at Kali Garang. But PDAM uses usually only 1,200 L/s. 100 L/s is for emergency case.

Question 2: If water supply from Jatibarang dam is decreased, how to manage?

Answer 2: PDAM does not have a plan of the case. Because 1,300 L/s at Kali Garang is guaranteed for 50 years.

Question 3: Do you tell us any factors on 39% water leakage?

Answer 3: Percentage at 2010 was 26 %. There are some technical and non-technical factors. One of the non-technical factor, we cooperate with customers for monitoring and preventing water stealing. One of the technical factors, meter for water consume is usually in trouble.

Photo-9 Gallery Room at Jatibarang Dam

Photo-10 at Simongan Weir

Photo-11 General explanation at PDAM office

Photo-12 Intake facility at IPA Kali Garng II, PDAM

4. 4th Day of Training

1) Post test

43 participates took posttest.

2) Group Presentation

Group 5: Non-Revenue Water (NRW)of PDAM kota Semarang

Question 1: 36.5% in Semarang, 25% of ADB Survey in the world, which is fair as a result?

Question 2: Are there SOP for operation during dry season?

Question 3: At PDAM office yesterday, PDAM manager explained NRW is 39%. What is difference between 39% and 36.5%?

Question 4: Calculation of NRW is based on water demand data?

Group 2: Water Allocation from Jatibarang Dam

Question 1: Are there any countermeasures for sedimentation?

Comment 3: Title of presentation is water allocation, but contents of presentation is water balance…

Comment 4: I think water allocation should be consider river basin or each branch river area, only dam is not enough for water allocation

Question 5: Is water allocation plan data in the presentation predicted or actual one?

Answer 1: These are some check dam at upstream

Answer 5: It is a predicted one.

Group 3: Contribution of Jatibarang Dam Operation for Water Allocation

Question 1: How about consideration on sedimentation?

Question 2: Does Jatibarang Dam have a POLA OP?

Question 4: Does POLA OP include maintenance works?

Question 5: Does POLA OP include operation rule of gates?

Answer 1: Jatibarang Dam already have some check dams at upstream

Answer 2: It has not yet been formulated. Jatibarang dam uses OP manual which was made by consultant

Group 4: Strategy of water balance at Kali Garang river area

Question 1: How to maximize water use?

Question 2: For the water balance calculation, why did you include Kreo river?

Comment 3: Water allocation in your presentation is until planning. Stakeholders coordination and operation are also important for water allocation

Comment 5: You should make clearer about bases for calculation such as factors and parameters

Answer 1: We should try to maximize it. If PDAM fulfill water demands by intake from river, we can stop groundwater intake

Answer 2: We just use data from Kali Garang area for this presentation. If we make an official plan, we should consider river basin, including Kali Kreo

Group 1: Water Allocation at Simongan Weir for PDAM

Comment 2: PDAM service is OK, but PDAM should improver leakage water (NRW)

Comment 3: You should consider river maintenance flow when you calculate maximization of water use from Jatibarang Dam

Comment 4: PDAM should minimize groundwater use.

Comment 5: When you consider maximization of water use, you should consider various factors

3) Closing Ceremony

Attendees: Mr. Herman, Head of Yogyakarta Training Center
Mr. MIURA Hirohisa, Project Technical Expert

Agenda: Announcement on result and evaluation of the training
Closing greeting by Mr. MIURA Hirohisa, Project Technical Expert
Closing Remarks by Mr. Ahmad, Head of Surabaya Training Center

Photo-13 Posttest

Photo-14 Group Presentation

Photo-15 Question to presentation

Photo-16 Closing Ceremony

5. Summary

- Regarding participants, number of participants was 44. It was the most number in project's training so far. "Water Balance Calculation" can be thought as interesting and important topic that B(B)WS faces on water resources management

- During exercise lecture (Lecture No.4), we found that most of participants have not experienced calculation of water balance so far. It was different from our requirement for participants. Therefore, we should put clearly requirement of participants not only on the curriculum, but also on the letter to B(B)WS
- Regarding venue, meeting room for classroom lectures was a bit small. Because Balai DIKLAT reserved for only 35 participants as a prediction. Balai DIKLAT could not confirmed exact number of participants before the training even Balai DIKLAT had tried contact
- Regarding Field Study, information of field study did not reach to Jatibarang Dam office. And staff from BBWS Pemali Juana misunderstood a schedule of Field Study. Therefore, JICA Project should ask Balai DIKLAT to contact by not only a letter but also telephone. And Balai DIKLAT should confirm with BBWS Pemail Juana one day before
- As a result, all participants passed a qualify of the training and got a certification. But participants received a homework on exercise of water balance calculation. After submission of the homework, Balai DIKLAT send the certification to participants (JICA Project team should monitor…)
-

END

ANNEX 6-1

Report No.019

Report of Training on Design of River Facility Structures, in Padang on September 2017

Report of Training on Design of River Facility Structures

Date:	12th September 2017 to 15th September 2017, for 4 days	
Place:	Padang	
Participants:	34 Participants	
Schedule:	12th	Opening Ceremony and 1st day (Classroom Lecture)
	13th	2nd day (Classroom Lecture)
	14th	3rd day (Field Trip)
	15th	4th day (Group Presentation), Closing Ceremony

1. 1st Day of Training

1) Opening Ceremony

Attendees: Mr. Adam, Head of Medan Training Center
Mr. Febry Donal, Head of Administrative sub-department, BWS Sumatera V
Mr. Miura Hirohisa, JICA Project Technical Expert

Agenda: Welcome Remarks: Mr. Miura
Opening Remarks: Mr. Adam

2) Pre-Test

30 participants took a Pre-Test at 10:00 of 12th Sep. 4 participants arrived at venue of the training lately. They had the test just after their arrival. Total participants are 34.

3) Lecture No.1 "Law, Regulation and Technical Guidelines for River Facility Structures"

Lecturer: Ir. Indira Aisyah Wetenripada, MT, Chief of Technical Assistance Section for Western Regional, Directorate of River & Coastal

Contents:

1) Laws and Technical Standards on river
2) Example of river facility planning

4) Lecture No.2 "Hydraulics in River Channel of Flood Time for Planning & Design of River Facility Structures"

Lecturer: Dr. Eng. Adi Prieto, ST., M .Eng., Researcher/ Acting Chief of Research and Development Section, Experimental Station for Hydraulic Structures and Geotechnical, PUSAIR

Contents:

1) Definitions of rivers, river area, river basin and others

2) Type of rivers
3) Hydraulics on flows, steady/unsteady/uniform/varied/liner/turbulent flow
4) General principals on river facility planning/design, about foundation,
5) sedimentation and others
6) Basic knowledge on planning/design of Spur dike, Levee, Sabo dam
7) Numerical model (UHM)

Comment 1: I (from BWS) also experienced that data and design quality from consultants was not good.
= You can get acceptable data if you come to PUSAIR in Bandung. You can use data from website, but it usually is not fair for your works. Because these data is not for Indonesia. It is difficult for Indonesia to use.

Question 1: I forget name of river where condition is difficult for river improvement works.
Answer 1: At Pantur PKPT

Comment 2: Regarding Sabo, illegal sand excavation is big problem in our rivers. Decreasing river bed is progressing rapidly. 10m is already decreased.
= It is difficult for B(B)WS to control such people (illegal sand miner), we should coordinate with stakeholders

Question 2: In Sumatera, some rivers have much sedimentation, debris at river. I think we do not need to prohibit sand excavation at river.
Answer 2: I am from PUSAIR, you should discuss with SDA. But we should usually consider whole of river basin. For examples, even one part of river has much sedimentation, perhaps downstream need more sediment discharge.

5) Lecture No.3 "Practical Planning & Design of Levee and Revetment"

Lecturer: Ir. Bambang Warsito, Dipl.HE.

Contents:

1) Technical standard on Levee design
2) Example of levee collapse and analysis
3) Technical standard on Revetment design
4) Example of revetment construction

Photo-1 Opening Ceremony

Photo-2 Pre-test

Photo-3 Lecture No.2 by Dr. Adi from PUSAIR

Photo-4 Lecture No.3 by Mr. Bambang Warsito

2. 2nd Day of Training

1) **Lecture No.4 "Practical Planning & Design of Weir and Groundsill"**

Lecturer: Ir. Supriyana, Dipl.HE.

Contents:

1) Stable analysis and hydraulics analysis for weir planning/design
2) Examples of weir design and structures
3) Stable analysis and hydraulics analysis for groundsill design
4) Examples of groundsill design and structures

2) Lecture No.5 "Landscape Design (Environment-friendly) for River Facility and Infrastructure"

Lecturer: Ir. Budi Santoso, Dipl.HE.

Contents:

1) Principles of infrastructures planning
2) Expected functions and effectiveness of infrastructures
3) Examples of river facility, considering landscape design
4) Examples of river facility, considering environment-friendly

3) Lecture No.6 "Historical and Advanced River Facility Structures in Japan"

Lecturer: Mr. Jun Hayakawa, JICA expert on Integrated Water Resources Management

Contents:

1) Outline of rivers in Japan
2) Compound cross section rivers
3) Planning/design of Fish-way at weir

Question 1: I would like to know materials of fishway structure and countermeasures against flood flow.

Answer 1: Material of fishway structure is usually concrete. The structure is basically strong against flood. But we sometimes use woods for simple/tentative fishway. Simple/tentative one should be repair after flood. And movable one should be removed before flood and reinstalled after flood.

4) Lecture No.7 "Exercise of Planning & Design of River Facility"

Lecturer: Mr. MIURA Hirohisa, ME, JICA Project Technical Expert,
Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

Contents:

1) Discussion on failure examples of river facility collapse/design-mistake
   - Levee collapse by circular slip
   - Revetment design mistake (footing depth was shorter than standards)
   - Groundsill design mistake (Sealing works was not implemented)
2) Experiences of river facility structure collapse and countermeasures

5) Lecture No.8 "Briefing on Field Study"

Lecturer: Ir. Sarwono Sukardi, Dipl. HE, JICA RBO Project

Contents:

1) Schedule of Field Study
2) Outline of Diversion gate at Batang Arau, Kanal Banjir, Sabo Project at Batang Kuranji, River Improvement Project at Batang Anai, Coastal Protection at Pantai Padang
3) Topic of each group presentation

- Each group decided tentative topic for group presentation;
  Group 1: Flood Management for Padang City

Group 2: Revetment for river bank protection

Group 3: Flood Management at Batang Arau

Group 4: Groundsill and River Bed Management at Batang Arau

Group 5: Sediment Management at Batang Kuranji

- These topics are still not so clear; therefore, each group will discuss more to decide clear topic until Field Study

Photo-5 Lecture No.5 by Mr. Budi Santoso

Photo-6 Lecture No.6 by Mr. Hayakawa Jun

Photo-7 Question from participants

Photo-7 Lecture No.6 on exercise of river facility planning/design

3. 3rd Day of Training

1) Lecture No.9 "Field Study on River Facility"

Visited Site: Diversion Gate at Batanag Arau

Kanal Banjir for Flood in Padang

Sabo Works at Batang Kuranji

River Improvement at Batang Anai

Jetty (Coastal Protection Works) at Pantai Padang

[Diversion Gate at Batanag Arau]

- At this site, topics were structures of weir and groundsill
- During flood, if water level reached 3.0m, gates should be opened

- Operator is only one person
- There is no operation manual/rule.
- Gates may be changed, because width of gate door and guide is different
- Participants made many questions to operator about operation procedure

[Kanal Banjir]

- At this site, topic were structures of revetment and drop structure
- There is a sluice gate (drainage) at just downstream side of drop structure
- Participants check the drop structure including side wall, revetment (concrete facing with small stones)

[Sabo Works at Batang Kuranji]

- At the side, topics were structure of Sabo dam (check dam), river wall and drop structure
- The project constructs series of check dam, 5 dams
- Residents usually excavates sand/rock from river, in the plan, reservoir of 2nd check dam from downstream is permitted excavation of sand/rock for residents with slope road to river that is not included on the drawings
- Participants is interested in planning of series check dams for effective catch debris
- River side wall is collapsed. The wall had not been finished construction all section, sue to coordination with residents

[River improvement at Batang Anai]

- At the site, topic was a compound cross section for river channel improvement
- The project has done by JICA Loan project
- Participants understood river regime, conditions are different between Batang Anai and Batang Kuranji. For the downstream of Batang Anai, river improvement with the compound river cross section is fair.

[Jetty for coastal protection at Pantai Padang]

- At the side, topics is coastal protection structure
- The jetty was constructed by West Sumatera Province
- Shape and structure was referred by River mouth of Batang Arau
- Previously, both side coast of river mouth was eroded, but after construction of jetty, left (northern) side coast was progressed beach nourishment. After construction of groins at right (southern) side coast, coastal erosion was stopped
- Engineers from Dinas SDA Province explained outline, structure of jetty and success points to training participants

Photo-9 at Diversion Gates at Batang Arau

Photo-10 at Kanal Banjir

Photo-11 Sabo works at Batang Kuranji

Photo-12 at Jetty, Coastal Protection

4. 4th Day of Training

1) Post test

34 participates took posttest.

2) Group Presentation

Group 4: Groundsill and River Bed Management at Batang Arau

Question 1: What is functions of groundsill?

= Protection for facility there, such as drop structure, Check dam and revetment

Question 2: At Kuranji, why concrete structure (revetment, river wall) was broken?

= Before construction of groundsill, it was broken because all part of revetment/river wall could not finish due to stakeholder coordination

Question 3: Please tell differences between groundsills at 3 rivers condition, Batang Arau, Kuranji and Anai.

=There are many differences, Batang kuranji is special for debris flow. But Batang Arau and Anai are special for sedimentation and flood

Question 4: What is condition to need to construct groundsill?

= Straight River Line, Steep Slope and sediment/rock flow

Group 5: Sediment Management at Batang Kuraji

Question 1: Why is construction of Sabo Dam needed at downstream firstly?
How about sediment supply to coast from river?
=We have some residents who should be protected at downstream.
Type of check dam is slit type. Sediment can be supply to downstream and coast.

Question 2: According to information from Sabo Project Team, annual discharge of sediment is around 2,000,000 m3. Are these check and Sabo dams enough?
= These dams cannot catch all discharge of sediment. Propose of dams is reduce sediment and debris flow, not catch all sediment.

Question 3: How about influences from land use to check dam construction
= There is not so much influences.

Question 4: How about integrated management or countermeasures? Countermeasures without check dams is not functional?
= Discharge of sediment is too big for countermeasures without dams. Therefore, check dams are applied

Group 3: Improvement of Flood Management (Diversion Gate Operation)

Question 1: How about master plan on flood management?
= There is a plan of drainage, but construction has not been implemented yet.

Question 2: Operator is by only one person; therefore, a manual is necessary.
Whose responsibility is river environment, especially trashes in river?
= For operation, we should increase number of staff at the site and BWS should create an official manual on operation.
For trashes in river, it should mainly be conducted by local government.

Question 4: What are merit and demerit of recommendations?
= We put 4 recommendations for improvement of operation, 1) increase number of operators, 2) Making the manual, 3) Automaton of operation, 4) Warning System (Flood)

Question 5: There is no manual, who should make the manual? And how many staff is fair for good operation?
= We think at least 2 staff is necessary. BWS should create the manual

Group 1: Revetment for river bank protection

Question 2: What is an improvement sediment flow by the design?
= Revetment at Batang Kuranji will make sediment smooth flow to downstream and protect river bank against debris/sediment flow.

Question 3: What is countermeasure for resident coordination on illegal sand excavation?
= Permission to residents at reservoir of 4th check dam, but required condition is that machine cannot use.

Question 4: What kind of conditions we should consider for design of revetment
= We should consider river bet elevation, low and high water level and soil pressure to revetment

Question 5: What points are effective/efficient by sheet piles and concrete lining/blocks?
= If foundation is not so strong, we should apply sheet piles. But it is very expensive and quality control of construction is sometimes difficult.

Group 2: Flood Management by Diversion Channel for Padang City
Drainage, trash management

Question 1: What is recommendation? The presentation does not include it.
= In the center of Padang city, it usually receives internal flood (inundation). Therefore, improvement of drainage system is recommended.

Question 3: Batang Anai, how to analyze flood flow prediction?
= There are some hydrological stations at up and downstream. We can calculate it with data from stations

Question 4: There is drift-wood at check dam on the photo in your presentation. How about countermeasures for it?
= We should install Sabo dams at upstream area.

Question 5: Flood from river has rarely been happened, How about inundation?
= Yes. At Batang Arau, we have Kanal Banjir. It rarely occurred. Therefore, Padang city should focus on improvement/construction of drainage system now.

3) Closing Ceremony

Attendees: Mr. Mahlan Siregar, Head of Administrative sub-department, Balai DIKLAT Medan
Mr. MIURA Hirohisa, Project Technical Expert

Agenda: Announcement on result and evaluation of the training
Closing greeting by Mr. MIURA Hirohisa
Closing Remarks by Mr. Mahlan Siregar

Photo-13 Posttest

Photo-14 Group Presentation

Photo-15 Question to presentation

Photo-16 Closing Ceremony

5. Summary

- Regarding participants, total number of participants was 34. Participants from PUPR was 10.
- Regarding venue, meeting room for classroom lectures was good, enough capacity for 34 participants, staff from Balai DIKLAT and JICA Team.
- As a result of pre/posttest, score of questions on "Legal Aspect" and "River Channel Improvement" was lower than other topics. Therefore, two topics above can be candidate for training topic for future
- As a result of questionnaire, "Hydrological Analysis for River Facility Planning" is chosen as a most important topic in river facility structure design. "Flood Management", "River Area Management" and "River Operation & Maintenance" are chosen as a most important topic in water resources management. Those topics can be candidates for training topics for future
- Evaluation of and certification to participants, Balai DIKLAT could not finish all evaluation until closing ceremony. Balai DIKLAT will announce it later

END

ANNEX 6-1

Report No.020

Report of Training on RBO Performance Benchmarking for BBWS and BWS in West Region, in Palembang on April 2018

Report of Training on RBO Performance Benchmarking for BBWS and BWS in West Region

Date:	9th April 2018 to 13th April 2018, for 5 nights	
Place:	Palembang Training Center	
Participants:	28 trainees	
Schedule:	9th	Opening Ceremony and 1st day (Classroom Lecture)
	10th & 11th	2nd & 3rd day (Classroom Lecture)
	12th	4th day (Exercise at BWS Sumatra VIII)
	13th	5th day (Classroom Lecture), Closing Ceremony

1. 1st Day of Training

1) Opening Ceremony

Attendees: Mr. Teuku Faisal Riza, Head of Palembang Training Center
Mr. Suparji, Head of BWS Sumatera VIII
Mr. Ariyan, Section head, BWS Sumatera VIII
Mr. Suzuki Kazushi, Project Coordinator

Agenda: Welcome Remarks: Mr. Teuku Faisal Riza and Mr. Suzuki
Opening Remarks: Mr. Suparji

2) Pre Test

25 participants took a Pre Test.

3) Lecture No.1 "Outline of RBO Performance Benchmarking"

Lecturer: Ms. Diah, section head, sub-dit of Water Resources Institution

Contents: Background and purpose of Benchmarking
Status of performance benchmarking at B(B)WS
Understanding RBO Performance Benchmarking in more deeply for better implementation of self-assessment and peer review activity

Question 1: This RBO PB guidance should be conducted at each B(B)WS. But the understanding of RBO PB still need to be strengthened. What is the next program should be done?

Answer 1: The program for strengthening the understanding on RBO PB is to conduct socialization, evaluation and training in every year if possible.

Question 2: Is there any sanction/penalty if the B(B)WS did not conducted RBO PB properly in accordance with the mechanism?

Answer 2: This is dealing with the loyalty and discipline of the civil servant, this task must be conducted. The result of self-assessment will dealing with the process of budgeting for the next year, means no report there will be no budget.

4) Lecture No.2 "Explanation on guideline of RBO performance assessment"

Lecturer: Ms. Diah, section head, sub-dit of Water Resources Institution

Contents: Introduction on the Guideline book
Procedure of Implementation of Benchmarking
Introduction fifteen (15) indicators

Question 1: The Guideline book is consider as a new thing for B(B)WS and it is not easy to apply it properly so that B(B)WS need intensive guidance Directorate of WR Management through Sub-dir. of WR Institutional. Is it possible and how is the implementation.

Answer 1: Actually that was not a new thing, the Guideline already distribute to all B(B)WS. The problem is how the Head of each B(B)WS conduct the socialization. Sub-dir. of WR Institutional will try to arrange better socialization in a possible time.

5) Lecture No.3 "Explanation on NARBO and RBO-PB"

Lecturer: Mr. Herman Idrus, Individual Expert

Contents: Introduction of NARBO for the implementation of IWRM
Some examples of B(B)WS in Asia

Question 1: What is the relation between NARBO and B(B)WS in Indonesia?

Answer 1: We can see it on the aim of NARBO, it is to help achieve the IWRM for river basin organization in Asia including B(B)WS in Indonesia .

Question 2: What is the exact goal of NARBO?

Answer 2: The goal is to strengthen the capacity of NARBO in promoting IWRM, to develop water management through training and exchange of information and experience among the B(B)WS and water sector institution. Also provide suggestion for RBOs across Asia.

2. 2nd Day of Training

1) Lecture No.4 "Explanation on NARBO and RBO Performance Benchmarking"

Lecturer: Mr. Herman Idrus, Individual Expert

Contents: Introduction of NARBO for the implementation of IWRM

Some examples of B(B)WS in Asia

Question 1: What is the relation between NARBO and B(B)WS in Indonesia?

Answer 1: We can see it on the aim of NARBO, it is to help achieve the IWRM for river basin organization in Asia including B(B)WS in Indonesia .

Question 2: What is the exact goal of NARBO?

Answer 2: The goal is to strengthen the capacity of NARBO in promoting IWRM, to develop water management through training and exchange of information and experience among the B(B)WS and water sector institution. Also provide suggestion for RBOs across Asia.

2) Lecture No.5 "Implementation of RBO Management in Japan"

Lecturer: Mr. Miura Hirohisa, JICA Project expert

Contents: Definition, purpose of Benchmarking
Introduction on IWRM
Introduction on IWRM guideline by UNESCO
Case Study in IWRM Tone River System in Japan

Question 1: How about Ego-sectual for coordination on water resources management in Japan? Especially each Ministry want to follow own regulations, they do not care about regulation of other ministry.

Answer 1: All stakeholders and citizen must follow laws and regulations. I think contents of laws and regulations is reasonable. But if one ministry enlarges their rights more than regulation contents, we have to make their understand correctly with reasonable and scientifically evident. Coordination system in Indonesia is better than system in Japan. Because there is TKPSDA.

Question 2: How about water quality pollution control in Japan?

Answer 2: Against industrial drainage, we set a regulation about it. Then we make sudden inspection in factories. If a factory does not follow the regulation, we open the company name to public. It affects company value down. Then almost all factory and company will follow the regulation.
Against garbage at river, we should educate children. Education to adult is very difficult. Therefore, we expect that children educate their parents and we wait the children grows and changing next generations

3) Lecture No.6&7 "Introduction on RBO-PB Instrument, 15 Indicators and Action Plan"

Lecturer: Mr. Isnugroho, Director of CRBOM

Contents: Introduction on RBO PB Instrument, detail explanation about 15 indicators and action plan

Question 1: Where were the NARBO applied other than in Indonesia? What is the role of NARBO in the implementation of RBO in Indonesia?

Answer 1: NARBO were applied across Asian countries. The role of NARBO is quite essential for RBO in Indonesia, because NARBO is the cooperation network among RBO institution in Asia including in Indonesia. The aim is to achieve IWRM among the member of NARBO.

Question 2: How is the condition of RBO in Indonesia in general? Is it need to be improved through the training?

Answer 2: Off course still need to be improved, because RBO time by time will also dynamically change adjusting to the latest condition. Hopefully it can be improved through the training.

4) Lecture No.8 "RBO-PB Document Management (Filing System)"

Lecturer: Mr. Bambang Trihariono, JICA RBO Local Expert

Contents: Understanding filing system

Implementation proper filing system

Question 1: Is all self-assessment report must be documented?

Answer 1: Yes, it's a must because for several reason, that are:

a. Ensure that all documents used in the implementation of daily tasks is a legit/ valid document.
b. Ensure that the document is traceable, can be recognized and easy to read.
c. Facilitate the distribution of document to the user internally or externally.
d. Avoid the usage of invalid document.

Question 2: Do all RBO have to apply the filing system?

Answer 2: Yes, it does. RBO gradually prepare necessary documentation equipment.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3. 3rd Day of Training

1) Lecture No.9&10 "Practice on Self-Assessment and Presentation"

Lecturer: Ms. Hendarti and Mr. Herman Idrus, Individual Expert

Contents: Practice the implementation of self-assessment

2) Lecture No.11 "Peer Review in Practice"

Lecturer: Mr. Isnugroho, Director of CRBOM

Contents: Explanation on Peer Review and its practice
(Self-assessment result evaluate by the peer to assess the objectivity level. Peer review team established to evaluate the SA result of a RBO)

Question 1: Is peer review same with an audit of ISO 9001?

Answer 1: Not the same but similar, the difference are:

a. Peer review conducted by peer who certified as a peer reviewer. Audit conducted by an external team accredited by BSN (National Standard Board).
b. Peer review is intended for continues improvement. Audit is intended to look for incompatibilities of product and its process to get certificate.

3) Lecture No. 13 "Practice on Peer Review and Presentation"

Lecturer: Herman Idrus, Individual Expert

Contents: Practice the implementation of peer review. Participant are divided into several groups and role as a peer reviewer.

4) Lecture No.14 "Implementation of RBO PB in BBWS Sumatera VIII"

Lecturer: Mr. Suparji, Head of BWS Sumatera VIII

Contents: Introduction on BBWS Sumatera VIII
RBO PB result of BBW Sumatera VIII

Question 1: Is there any socialization activity for stakeholder?

Answer 1: There is but not in regular basis.

Question 2: Is there any CD system for BBWS's employee?

Answer 2: CD for the employee are following the framework established by DGWR and HRDA of Ministry of Public Works and Housing.

Question 3: Has BBWS Sumatera VIII certified with ISO 9001?

Answer 3: From the time being is just Hydrology Division.



4. 4th Day of Training

1) Lecture No.15, 16 &17 "Field Trip for SA and PR Practice in BBWS Sumatera VIII and Presentation"

Lecturer: Ms. Hendarti, Mr. Isnugroho and Mr. Herman Idrus, Individual Expert

Contents: Practice the implementation of self-assessment and peer review in BBWS Sumatera VIII

Question 1: How to manage water service fee?

Answer 1: The service fee will be utilized for water management and return to tax office.

Question 2: Is there any community cooperated with BBWS Sumatera VIII and what is its role?

Answer 2: There is a community called South Sumatera River Lovers Community. The activity are reforestation and educating community about waste management. Also rewarding community who had managed the river in proper way.

5. Post Test

6. Closing Ceremony

7. Summary

- Palembang Training Center have been provided adequate training facility (classroom and dormitory)
- BBWS Sumatera VIII have been provided full support especially for Field Trip activity
- Need improvement in term of punctuality by the participant

END

ANNEX 6-1

Report No.021

Report of Training on RBO Performance Benchmarking for BBWS and BWS in East Region, in Mataram on April 2018

Report of Training on RBO Performance Benchmarking for BBWS and BWS in East Region

Date:	16th April 2018 to 20th April 2018, for 5 nights	
Place:	Lombok Astoria Hotel	
Participants:	25 trainees	
Schedule:	16th	Opening Ceremony and 1st day (Classroom Lecture)
	17th & 18th	2nd & 3rd day (Classroom Lecture)
	19th	4th day (Exercise at BWS Nusa Tenggara I)
	20th	5th day (Classroom Lecture), Closing Ceremony

1. 1st Day of Training

1) Opening Ceremony

Attendees: Mr. Kholidi, Head of Surabaya Training Center
Mr. Rahman, Chief of Implementation Division
Mr. Mukhlis, Person in Charge for RBO PB, BWS Nusa Tenggara I
Mr. Suzuki Kazushi, Project Coordinator

Agenda: Welcome and Opening Remarks: Mr. Teuku Faisal Riza and Mr. Suzuki

2) Pre Test

3) Lecture No.1&2 "Outline of RBO Performance Benchmarking"

Lecturer: Mr Tulus, Head of sub-dit of Water Resources Institution

Contents: Background and purpose of Benchmarking
Status of performance benchmarking at B(B)WS
Understanding RBO Performance Benchmarking in more deeply for better implementation of self-assessment and peer review activity

Question 1: How to establish SA Team?

Answer 1: SA Team establish by the Decree Letter of Head of BWS, member of team consists of all working unit from O&M, Planning, General Affair and Project Working Unit (Satker).

Question 2: In the function of UPT, according to the explanation of the lecturer that there is one function that not yet included as an indicator. Can you describe it?

Answer 2: Urban drainage as the entrance point of wastewater to the river, so that the issue become essential recently. The issue will be considered to be included as an indicator in the future.

4) Lecture No.3&4 "Explanation on NARBO and RBO-PB"

Lecturer: Mr. Herman Idrus, Individual Expert

Contents: Introduction of NARBO for the implementation of IWRM

Some examples of B(B)WS in Asia

Question 1: Is there any sanction/penalty if RBO PB does not properly conducted?

Answer 1: The Directorate of Water Resources Management should an action to make some countermeasure program for strengthening the BWS and provide guidance in conducting RBO PB. Training is one of the solution.

Question 2: Did RBO in Indonesia already implementing the NARBO mechanism?

Answer 2: Yes, they did. Although it still need to be improved.

2. 2nd Day of Training

1) Lecture No.5 "Implementation of RBO Management in Japan"

Lecturer: Mr. Miura Hirohisa, JICA Project expert

Contents: Definition, purpose of Benchmarking
Introduction on IWRM
Introduction on IWRM guideline by UNESCO
Case Study in IWRM Tone River System in Japan

Question 1: What kind of stakeholders are in river basin?

Answer 1: RBO itself, such as BWS, Water Users such as irrigation, industry, hydropower (PLTA), PDAM, Another local government or no government which used the water and the environment which become water management and water user.

Question 2: How do you solve this problem?

Answer 2: Water diversion based on each of stakeholder demand, or divided in proportional way.

2) Lecture No.6 "Introduction on RBO-PB Instrument, 15 Indicators and Action Plan"

Lecturer: Mr. Isnugroho, Director of CRBOM

Contents: Introduction on RBO PB Instrument, detail explanation about 15 indicators and action plan

Question 1: Do the action plan make in 5 years or every years arrange another action plan for next 5 years?

Answer 1: Each year the action plan remains to review, whether it has been implemented or not, if it has been implemented, then we have implemented, if it is not, we will evaluate why it not implemented. So, these 5 years, each year we check what it remains to do. So we allocate to the suddenly task, because as a public institution worker, we often get a sudden task, so we still allocate a few percent of it. So from the action plan we still allocate some activities, activities that available for sudden task. For example Bali Peninda, the sudden task is for saving the beach, it is a sudden task, although it is not in the action plan, but still we still enter, the main program still monitored. The monitor for the action plan conduct yearly, for example, you wants to make a house, the first year you have a program to buy land, in the second year your program is to make foundation, third year continue, etc. Then every year you remains evaluate. the first program of your plan is to buy the land, whether it has been purchased or not, if not, you

must be evaluated why, moreover, you can find the weaknesses , so we still use the action plan for five years and keep our check per year.

Question 2: In this handbook, the year is from 2016 to 2020, if it is in 2018, are we make action plan for 2022 or still use action plan at 2016-2020?

Answer 2: We are still using the initial action plan, and then we see if sometimes we get additional tasks. So the initial framework are not separated from the action plan.

3) Lecture No.7 "RBO-PB Document Management (Filing System)"

Lecturer: Mr. Bambang Trihariono, JICA RBO Local Expert

Contents: Understanding filing system
Implementation proper filing system

Question 1: In line with the innovation of documents, there are recent government regulations about archival governance, where there is a schedule of archives. I want to link if the document we need, let say if we need the document, it is a little difficult and the person who can ask for the document is the head of the BWS. In addition, in the archives, there are rules of governing about destruction of the document, if it is in the institution we mean, then there is a public information disclosure protest that we can ask and be banned for us in the this RBO step. As well as the RBO or RBO PB at the level of the policy level echelon, it should be in control of the field of execution, but in office completion, there are reviewers of information, information managers and sometimes unmatched. And this is what causes the RBO in each BWS of course different from the 15 criteria earlier. So, we give a response to them, why not the archive input into an indicator?

Answer 1: I think it would be great if the archives and filing rules becomes an Indicator. Because in there, we can see where the archive is, the year of the archive. But, can be adjusted in progress, I think will be better, as long as it is in line and not deviant from the national archive regulation. What I mention here is also does not deviate from the national archive, but it may be incomplete. For example, when a document must be destroyed, and it is set in the national archive. My suggestion is that we slowly follow what is set out in the RBO.

Comment1: If there is an archive we can also see or track the steps we take and can see what documents are not valid. Related to the search of the criteria achievement process.

Comment 2: if we are talking about search, there is other name that is able to search. If one

day the result of self-assessment were done and it has been documented, and if there will be a question, we don't know where the question from is, we should able to search the history of that document. So, it means that all kind of document should be documented in order to make other able to search and obviously can search.

Question 2: Assessment of the RBO index that we did in 2017, there was an assessment report that which written in 2017 is the report written in 2017 for the 2017 RBO assessment is done in 2018, or the RBO assessment done in 2018 for its previous performance appraisal RBO? And what is the relationship with LAKIP?

Answer 2: In the TKPSDA meeting, I propose, what should we do with the function?, then how about LAKIP? Are we do nothing? If the LAKIP is done, we send it to Jakarta, and finish. Then, what is the function of LAKIP? So, I proposed that LAKIP should be functioned because it is very valuable because contain with data and information. Documentation is also for the first time add the similar activities with this. I insist to put it in this activity, this is the second time before Palembang. If you make a LAKIP, look at the self-assessment report, is that reported on 2018? So, what time is the self-assessment? In 2017. Because, in this year 2018, self-assessment is not yet happened. So, that is 2017 report or last two years which also has no report.

Comment 1: I'm recently know about RBO PB , last year maybe the participant from BWS Maluku Utara are follow the similar program, but, maybe they were only attend and did not report what they got. My comment is, like what you said before, there is exact document ant etc, is it important if the document is only made for RBO? As I know, documentation is really important.

Comment 2: every officer who attend this activity should transfer their knowledge but, mostly they keep it for their own. Document is not finish in one day, our hope is it used for the future. If we have to arrange the document management and it need times.

3. 3rd Day of Training

1) Lecture No.8&9 "Practice on Self-Assessment and Presentation"

Lecturer: Ms. Hendarti and Mr. Herman Idrus, Individual Expert

Contents: Practice the implementation of self-assessment

Question 1: Can we get the example of how to decide the score related to the criteria?

Answer 1: You may look at the Guideline Book (RBO performance measurement) Appendix II. You will see the relation between the indicator, score and the criteria. So you have to keep that Guideline Book as your refference when you are assessing the performance.

Question 2: Can we use this Practice I result as reference in implementing SA in our BWS?

Answer 2: Principly yes but it should be ajusted with the recent condition in your BWS as. This SA Prctice I result is an example or guidence how to implement SA method.

2) Lecture No.10 "Peer Review in Practice"

Lecturer: Mr. Isnugroho, Director of CRBOM

Contents: Explanation on Peer Review and its practice
(Self-assessment result evaluate by the peer to assess the objectivity level. Peer review team established to evaluate the SA result of a RBO)

Question 1: Is peer review same with an audit of ISO 9001?

Answer 1: Not the same but similar, the difference are:

a. Peer review conducted by peer who certified as a peer reviewer. Audit conducted by an external team accredited by BSN (National Standard Board).
b. Peer review is intended for continues improvement. Audit is intended to look for incompatibilities of product and its process to improve it then to get certificate.

3) Lecture No. 11&12 "Practice on Peer Review and Presentation"

Lecturer: Herman Idrus, Individual Expert

Contents: Practice the implementation of peer review. Participant are divided into several groups and role as a peer reviewer.

Question 1: What is the expected goal to be achieved with the Peer Review on the SA result?

Answer 1: To validate reliable information on BWS performance described on the SA report.

Question 2: What kind of evidence to be presented to Peer Review Team?

Answer 2: The evidence are:

a. Detail description of performance (achievement).
b. Defined criteria have to be able to support/describing the score that are chosen.
c. Appropriate supporting document.
d. Work evidence.

Question 3: Who can be assigned as Peer Reviewer and what is the requirement?

Answer 3: Peer Review conducted by a team established by the Decree Letter of DGWR which the member consists of certified reviewer (graduates of RBO PB Training)

4) Lecture No.13 "Implementation of RBO PB in BWS Nusa Tenggara I"

Lecturer: Mr. Mukhlis, Person in Charge for RBO PB, BWS Nusa Tenggara I

Contents: Introduction on BBWS Sumatera VIII
RBO PB result of BBW Sumatera VIII

Question 1: Is there any system for HR CD in BWS Nusa Tenggara I?

Answer 1: CD for the employee are following the framework established by DGWR and HRDA of Ministry of Public Works and Housing. In case there is a problem Balai will coordinate and ask guidence to Directorate of Water Resources Management

Question 2: Is there any community cooperated with BWS Nusa Tenggara I and what is its role?

Answer 2: There are several River Communities work together with BWS NT I who intensively manage the river together. The main task is to assist BWS NT I to keep the river at the original function using appropriate technology based on the applicable regulation.

4. 4th Day of Training

1) Lecture No.14, 15 & 16 "Field Trip for SA and PR Practice in BWS Nusa Tenggara I and Presentation"

Lecturer: Ms. Hendarti, Mr. Isnugroho and Mr. Herman Idrus, Individual Expert

Contents: Practice the implementation of self-assessment and peer review in BBWS Sumatera VIII

5. Post Test

6. Closing Ceremony

7. Summary

- Surabaya Training Center have been provided adequate training facility
- BWS Nusa Tenggara I have been provided full support especially for Field Trip activity
- Need improvement in term of punctuality by the participant

END

ANNEX 6-2

Manual No.001

Manual on High Water Flow Measurement at Tikala, Sario and Malalayang at BWS Sulawesi 1

A6-2-No.001-3

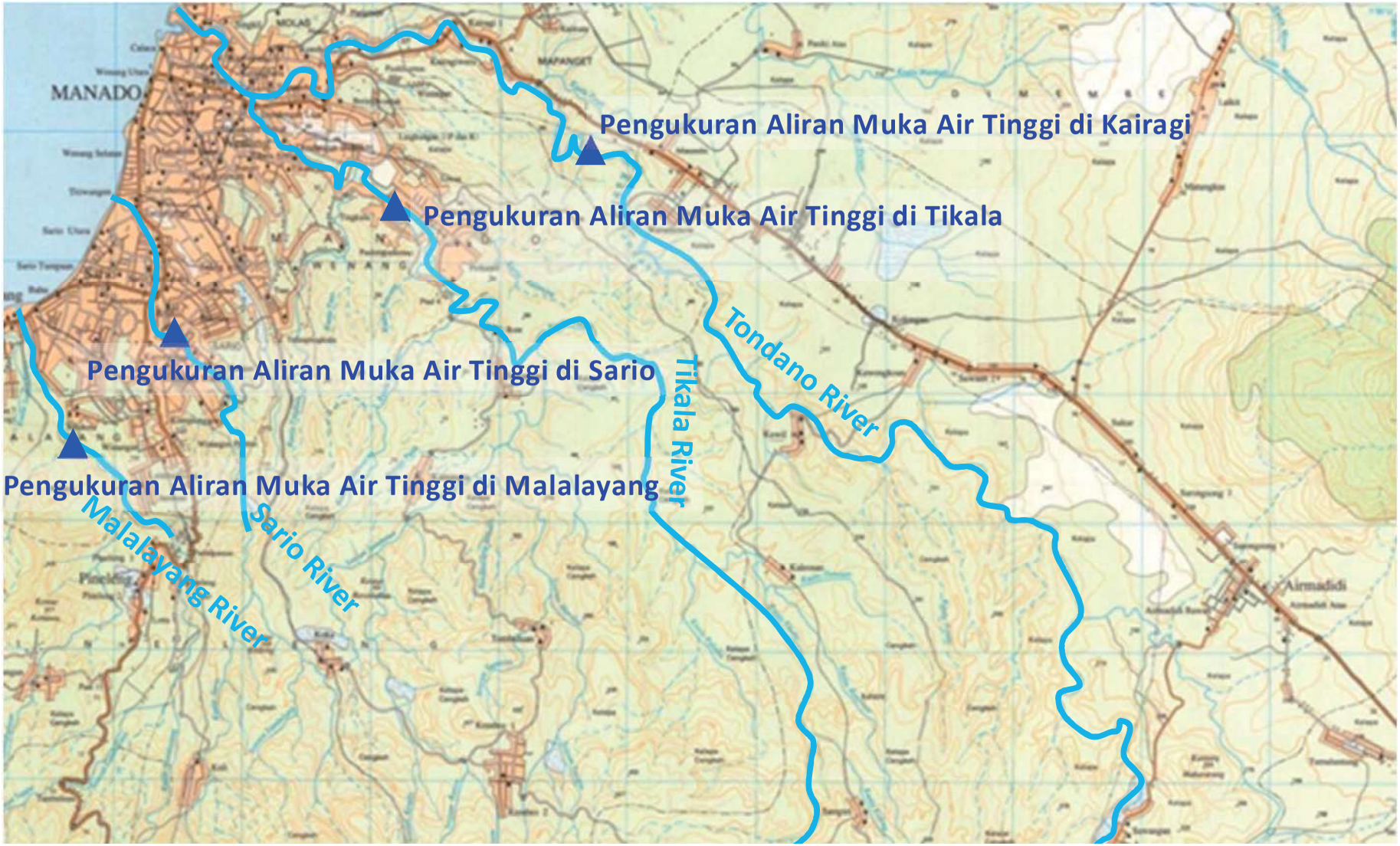
Manual
Pengukuran Aliran Muka Air Tinggi

Januari 2018

Unit Hydrologi , BWS Sulawesi 1

A6-2-No.001-4

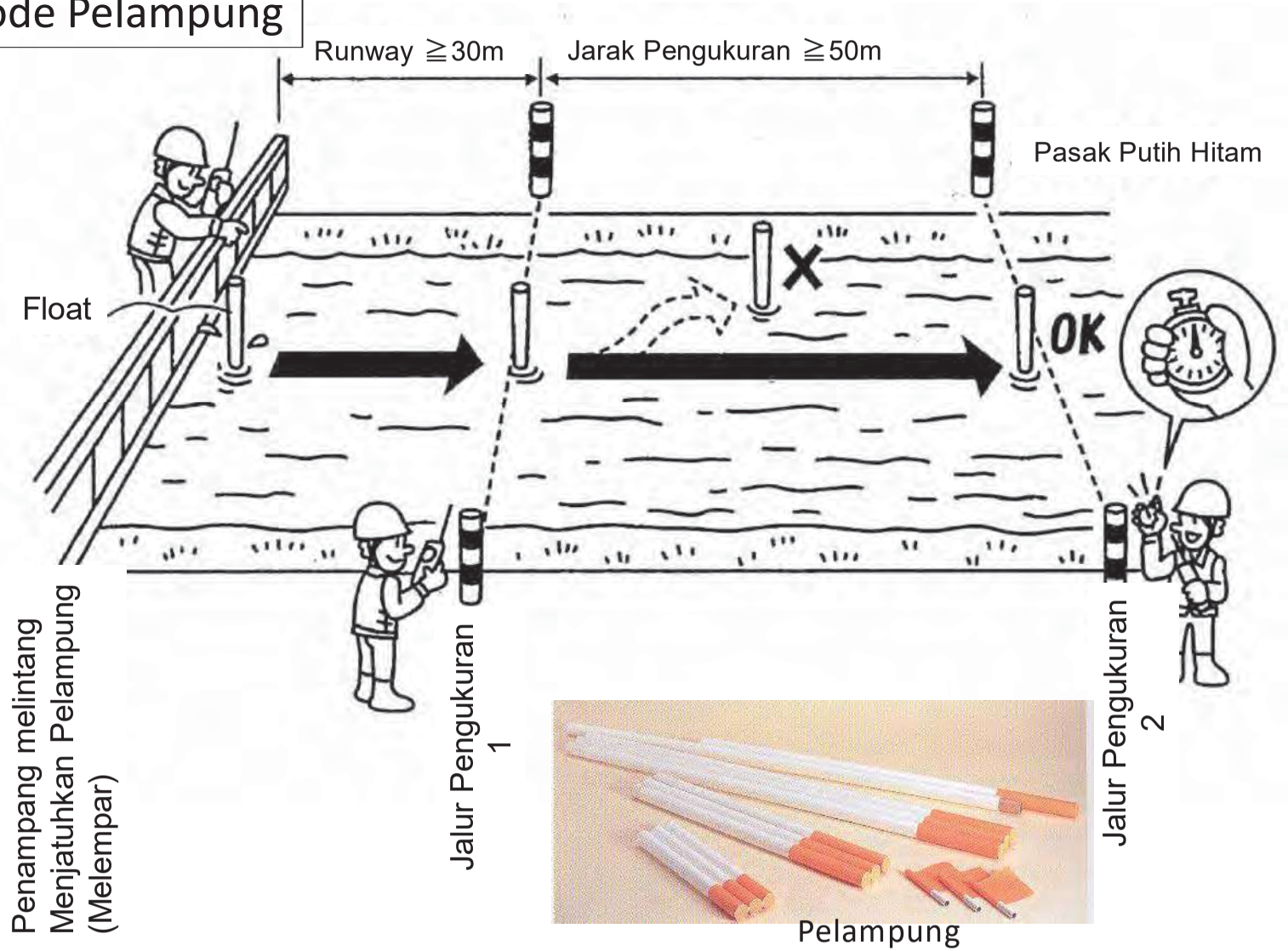
Peta Lokasi



Latar Belakang dan Kegunaan

- Dalam melakukan perencanaan, pengelolaan, operasi debit aliran besar (banjir) dan debit aliran kecil (debit andalan), data debit pengamatan (observasi) lebih dipilih atau lebih akurat dibanding data debit sintetis (rekayasa) yang di bangkitkan dari curah hujan dan parameter DAS (daerah aliran sungai).
- Pengukuran banjir/muka air tinggi sangat diperlukan untuk membuat lengkung debit (H-Q) lebih akurat terutama pada bagian debit aliran tinggi.
- Keempat lokasi yang akan dilakukan pengukuran banjir/muka air tinggi adalah sungai yang melintasi kota manado dan dipersiapkan untuk menjadi acuan dalam melakukan peringatan dini banjir.
- Metode pengukuran aliran dengan pelampung mempunyai pedoman yaitu SNI 8066:2015 “Tata cara pengukuran debit aliran sungai dan saluran terbuka menggunakan alat ukur arus dan pelampung”

Metode Pelampung



Pelampung

Metode Pelampung

Prosedur

Tahap Persiapan

- Tentukan tepatnya dimana ; “lokasi pelampung yang akan di jatuhkan”, “lokasi penampang kontrol pertama”, “lokasi penampang kontrol kedua”.
- Lakukan pengukuran penampang melintang sungai pada titik penampang “kontrol pertama” dan “kedua” serta pada titik “pengamatan muka air”.
- Siapkan alat dan bahan yang akan digunakan.
- Menyiapkan personil di lapangan paling kurang 3 (tiga) orang di satu lokasi pengukuran.

Metode Pelampung

Prosedur

Tahap Pelaksanaan

- Jatuhkan pelampung pada lokasi yang sudah ditentukan terlebih dahulu ≤ 5-20 m dari penampang control 1 untuk menstabilkan pelampung.
- Ukurlah waktu tempuh saat pelampung mencapai penampang control pertama sampai pada penampang control kedua dengan memakai stopwatch.
- Kalikan kecepatan waktu tempuh pelampung dengan koefisien pelampung.

Metode Pelampung

Standard dan Aturan

Standard lebar sungai berbanding dengan jarak pelampung yang akan dijatuhkan

Lebar Sungai	Kurang dari 20 m	20 ~ 100 m	100 ~ 200 m	Lebih dari 200 m
Jarak pelampung yang akan dijatuhkan	5	10	15	20

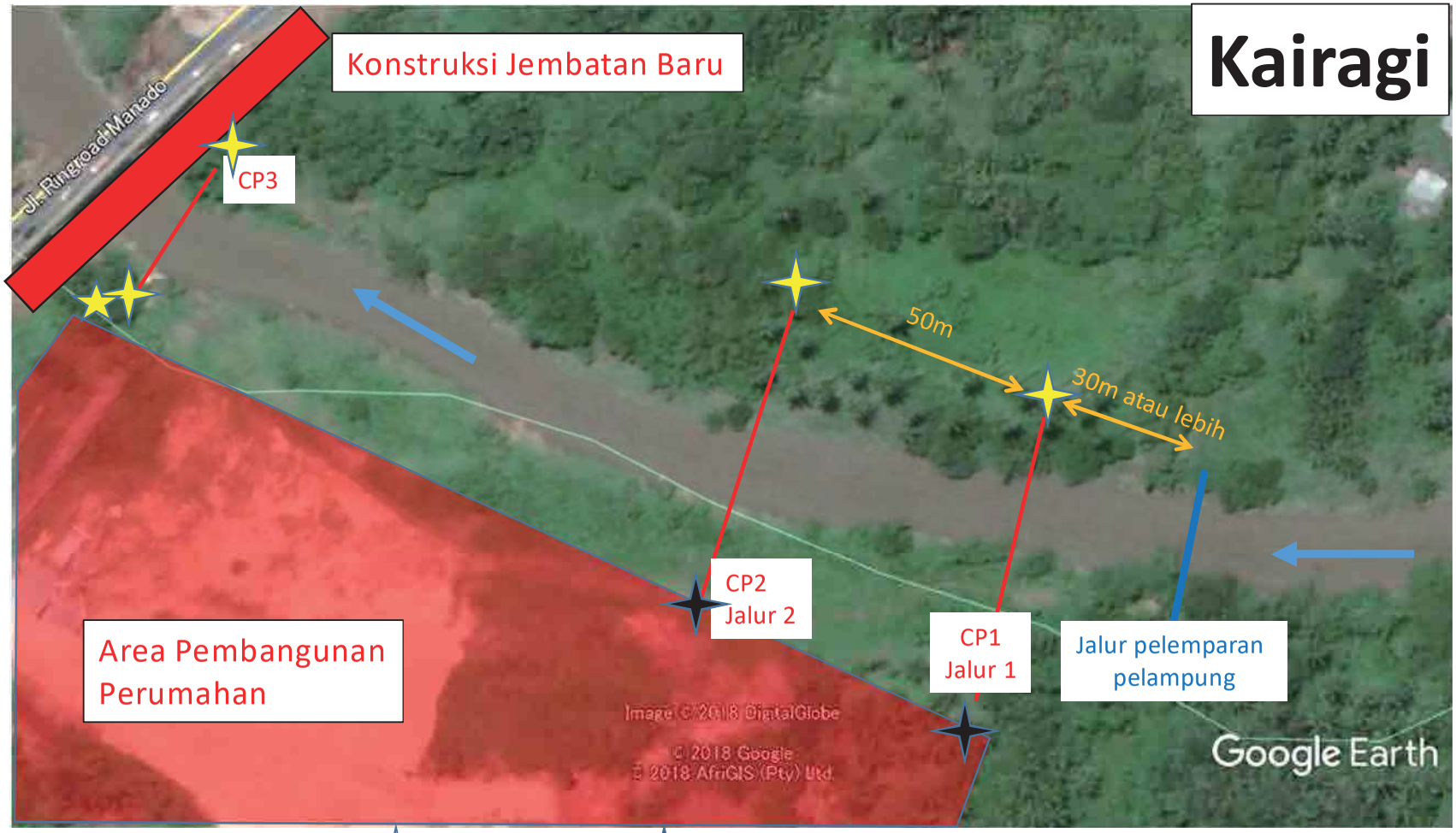
Kasus Mendesak

Lebar Sungai	Kurang dari 50 m	50 ~ 100 m	100 ~ 200 m	200 ~ 400 m	400 ~ 800 m	Lebih dari 800 m
Jarak pelampung yang akan dijatuhkan	3	4	5	6	7	8

Tipe-Tipe Pelampung

Tipe Pelampung	1	2	3	4	5
Kedalaman air	Kurang dari 0.7 m	0.7 ~ 1.3 m	1.3 ~ 2.6 m	2.6 ~ 5.2 m	Lebih dari 5.2 m
Kedalaman pelampung dalam air	Pelampung permukaan	0.5 m	1.0 m	2.0 m	4.0 m
Koefisien pelampung	0.85	0.88	0.91	0.91	0.96

A6-2-No.001-9



Patok Kontrol :Masih ada :Hilang oleh Pekerjaan Pengembangan

BM : Masih ada

Kairagi

A6-2-No.001-11

Situasi Pos AWLR Kairagi pada 13 Desember 2018

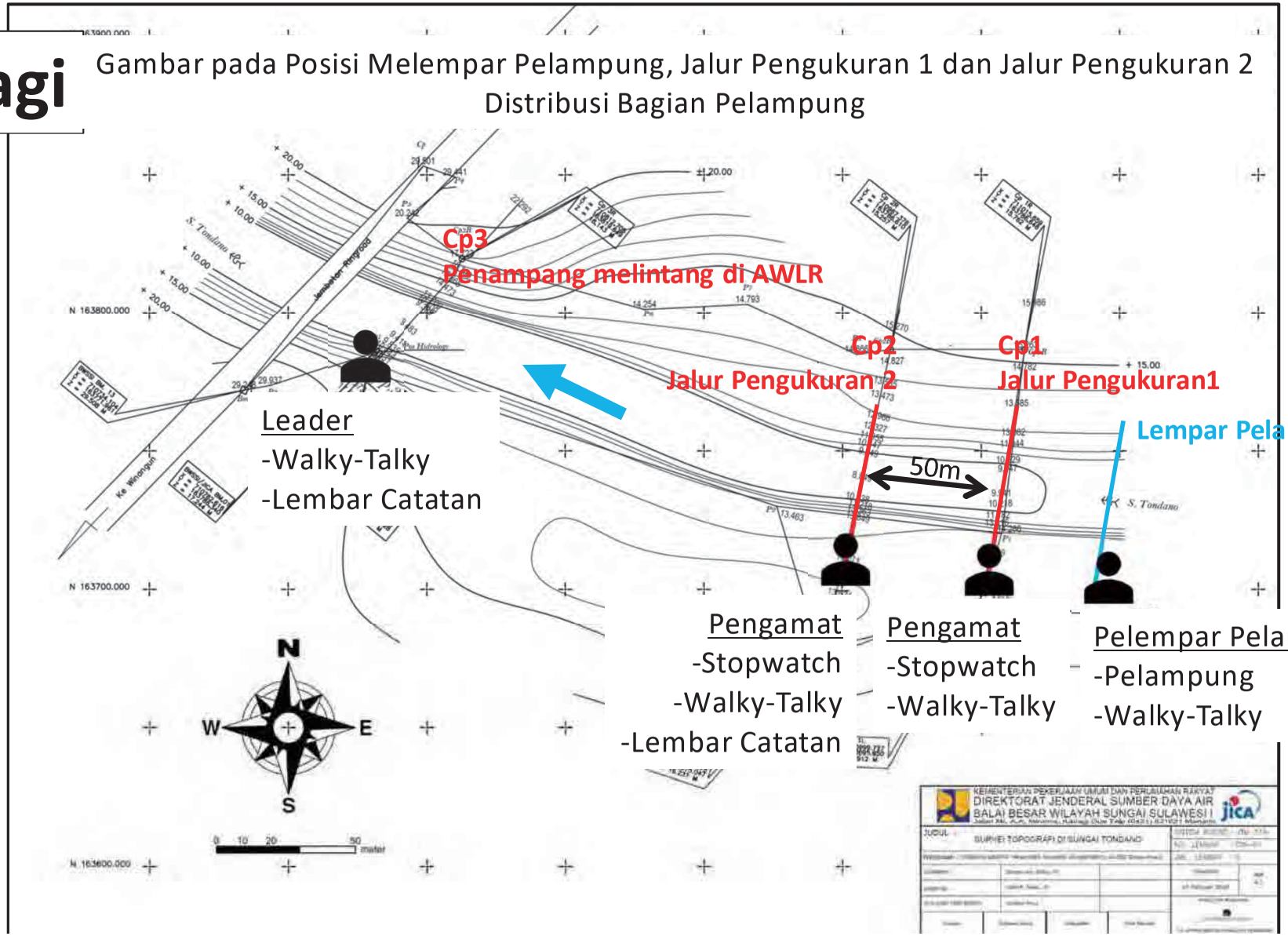
"Periksa kondisi untuk Pengukuran Aliran Muka Air Tinggi setelah pembangunan perumahan dan pekerjaan konstruksi jembatan. Jika memungkinkan, lakukan pengukuran Penampang Melintang Sungai! "

Kairagi

Gambar pada Posisi Melempar Pelampung, Jalur Pengukuran 1 dan Jalur Pengukuran 2 Distribusi Bagian Pelampung

Kairagi

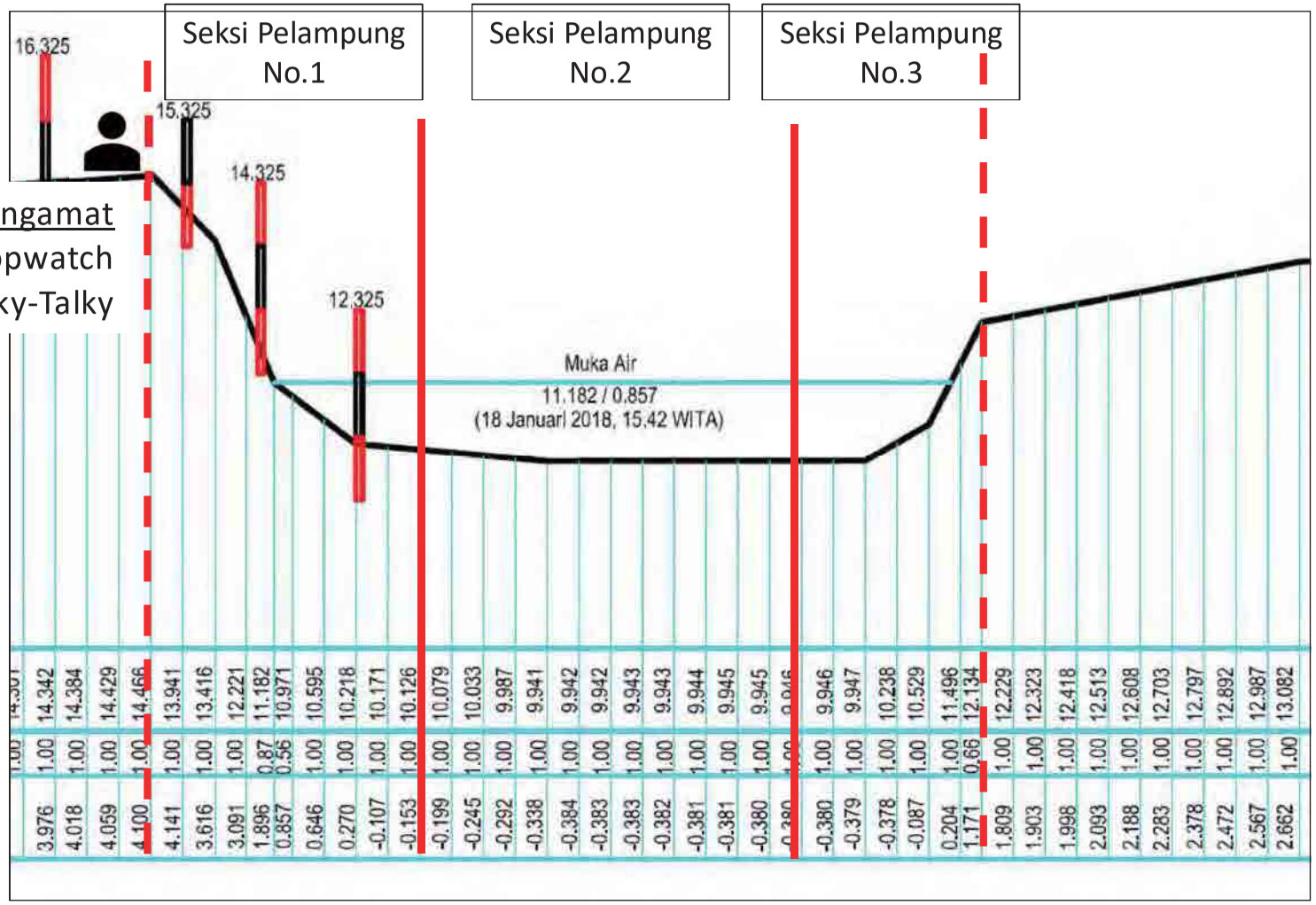
Gambar pada Posisi Melempar Pelampung, Jalur Pengukuran 1 dan Jalur Pengukuran 2
Distribusi Bagian Pelampung



A6-2-No.001-13

Kairagi

Cp1: Jalur Pengukuran1

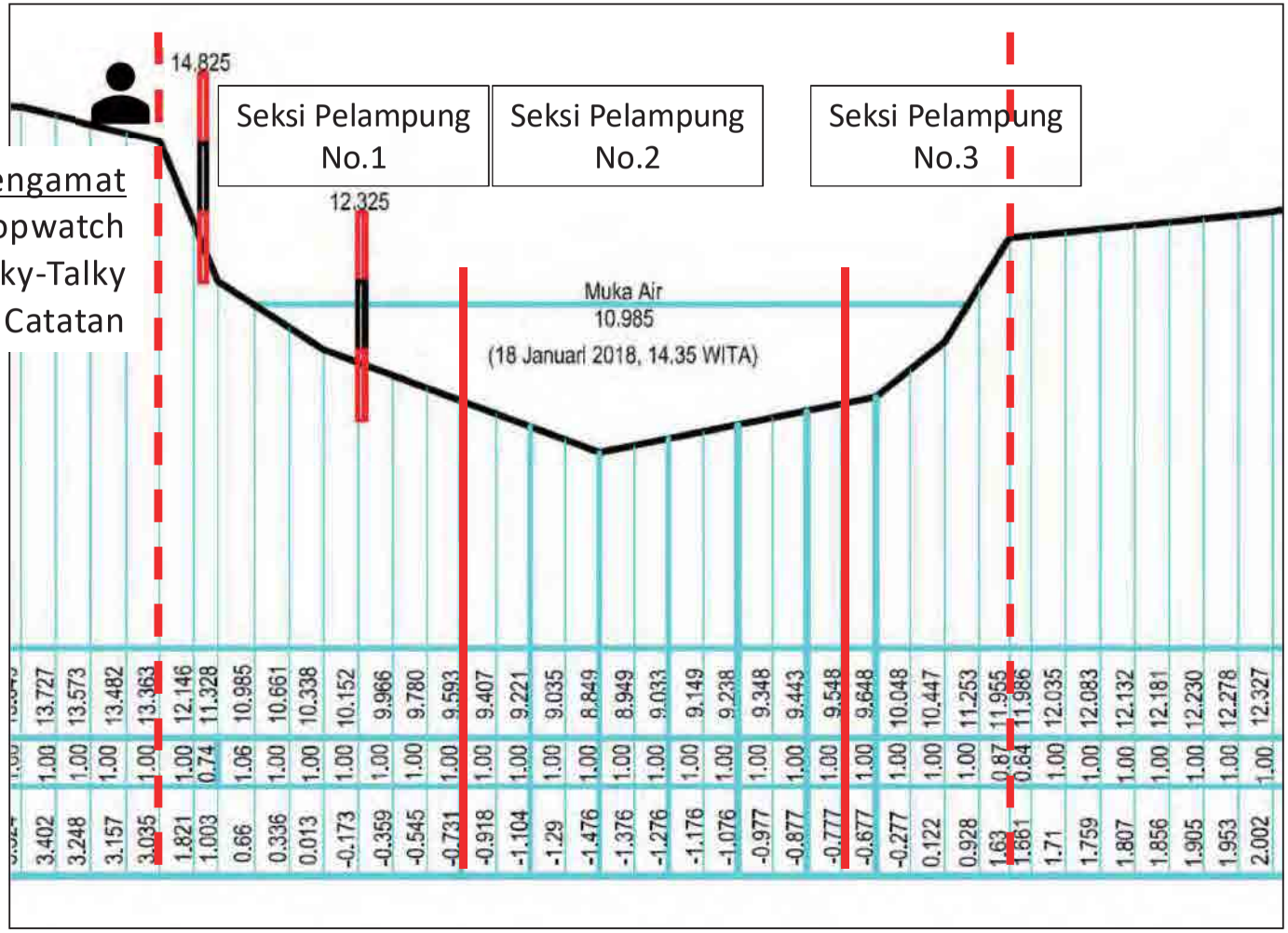


Pengamat
-Stopwatch
-Walky-Talky

A6-2-No.001-14

Kairagi

Cp2: Jalur Pengukuran 2

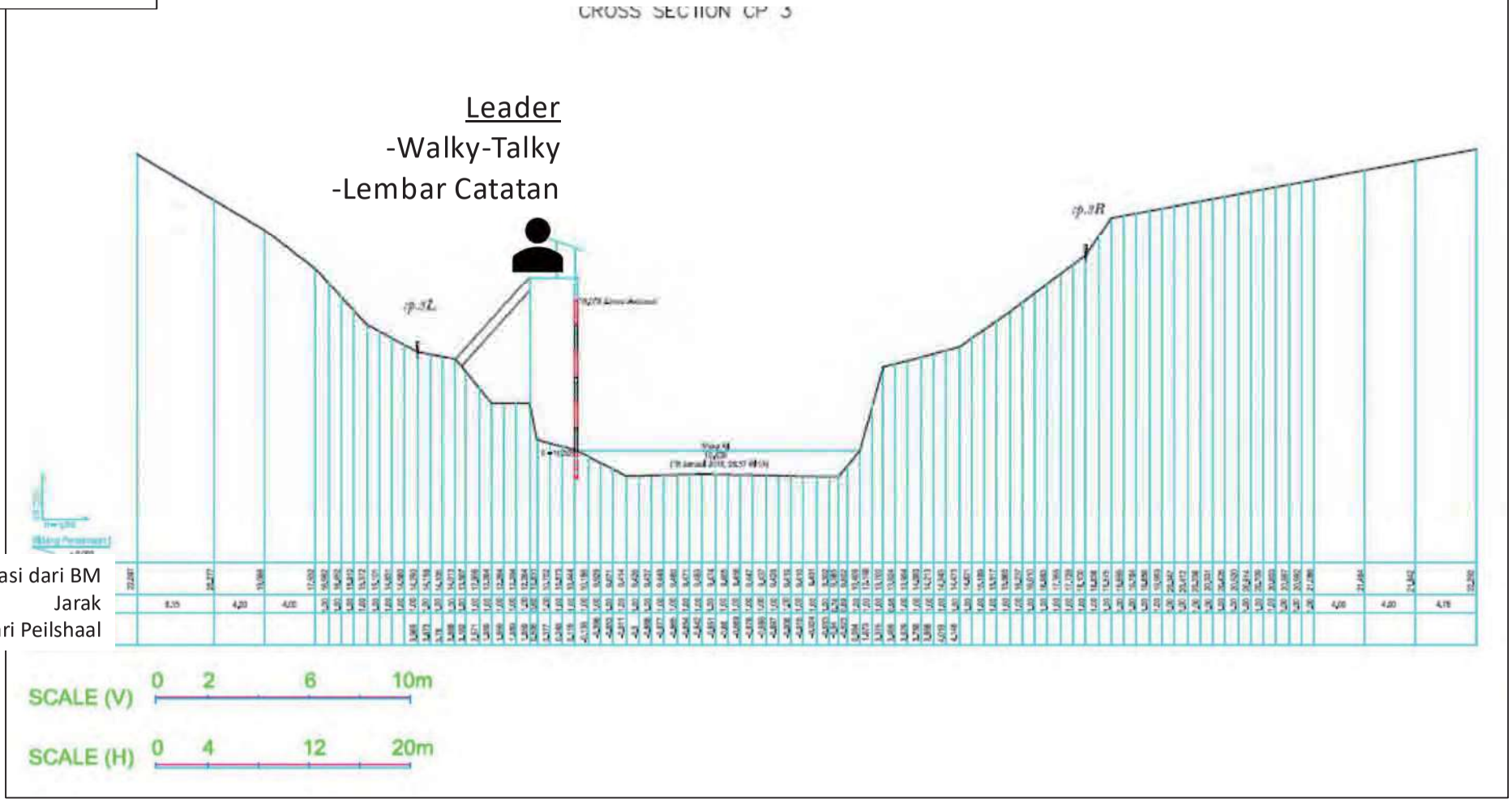


A6-2-No.001-15

Kairagi

Cp3: Penampang Melintang di AWLR

A6-2-No.001-16



Tikala


CP3
Jalur 2
50m
30m or more
CP1
Lempar
Pelampung
Pekerjaan Perkuatan Tebing Sungai
CP2
Jalur 1
Pasak Kontrol :Masih Ada
:Hilang oleh Pekerjaan Tebing Sungai
BM : Masih Ada
Peilschaal
Google Earth

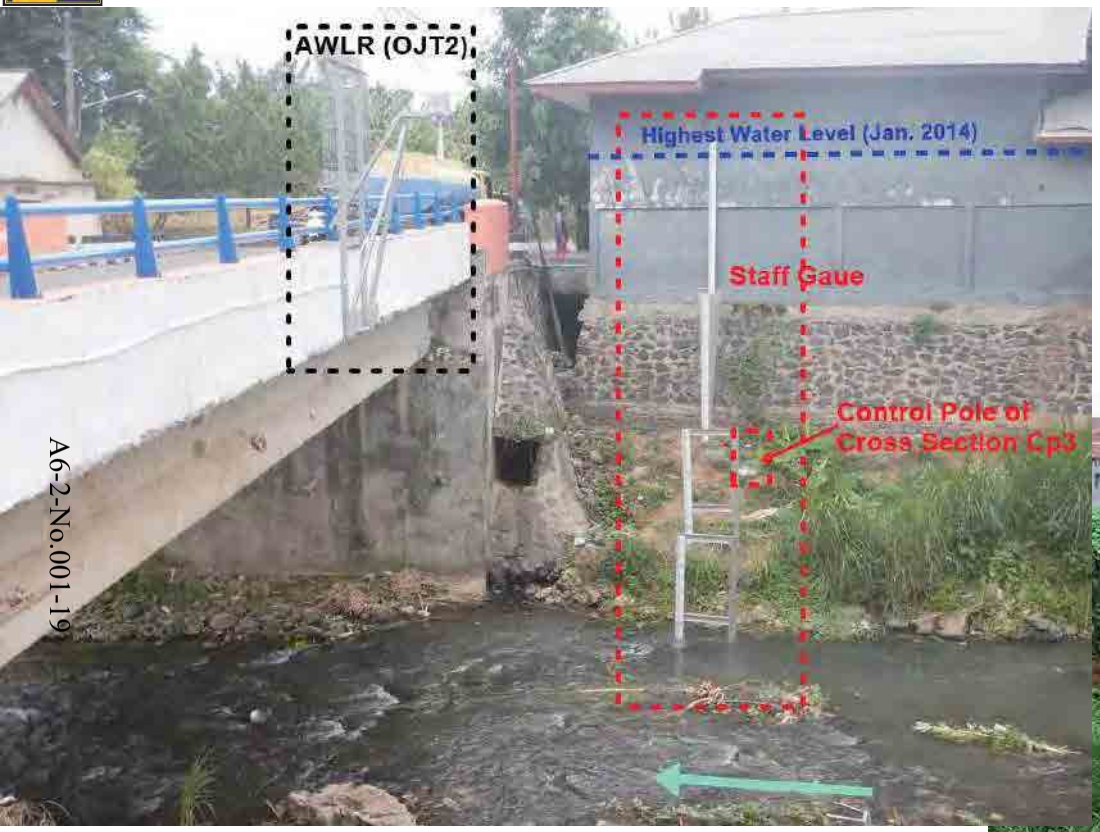
Tikala

← Pada 13 Desember 2018

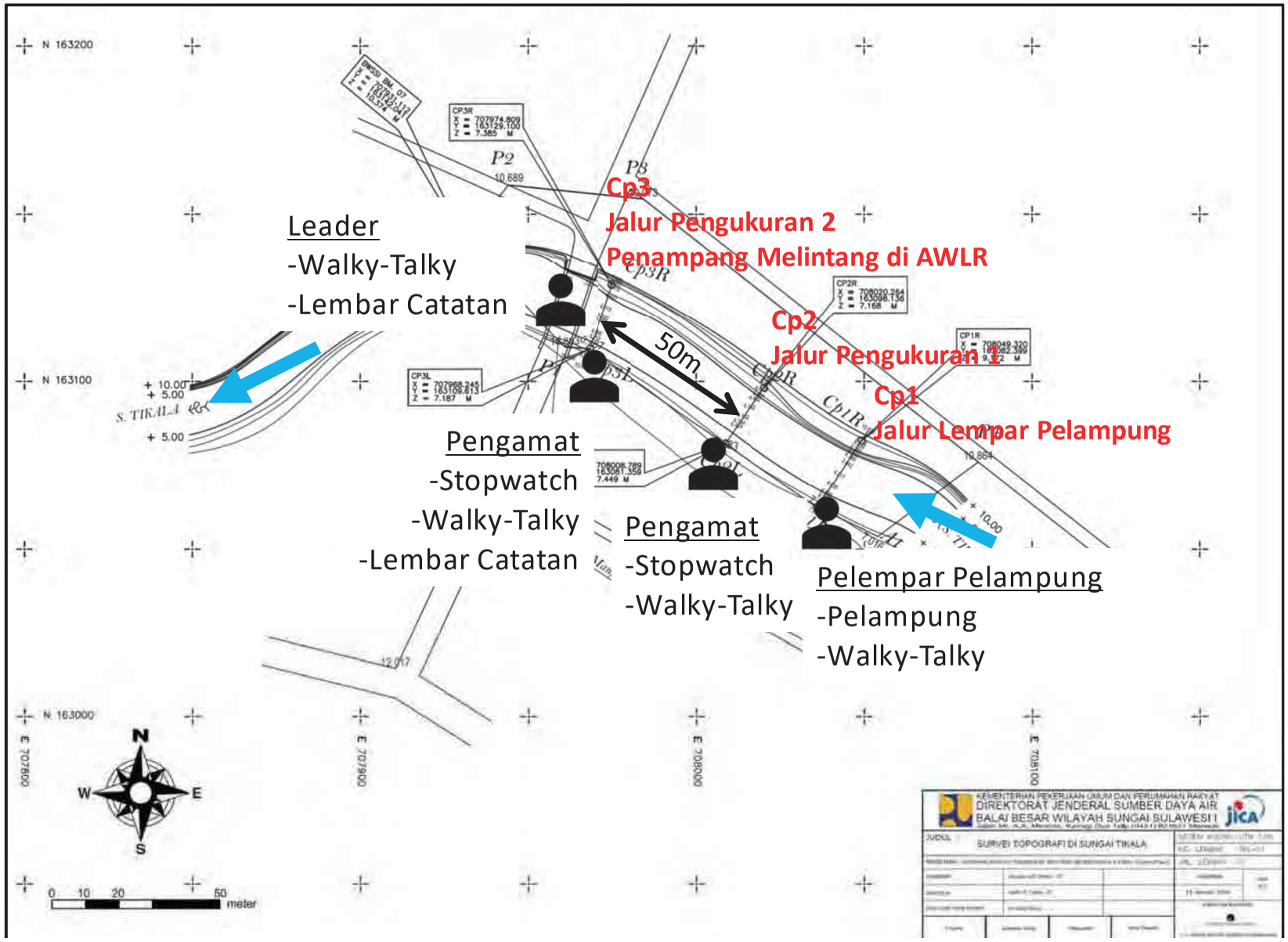
"Lakukan survei Penampang Melintang Sungai di Cp3 setelah Perkuatan Tebing selesai!"

Pada 6 Maret 2018 →

Tikala



A6-2-No.001-19


Leader
-Walky-Talky
-Lembar Catatan
Cp3
Jalur Pengukuran 2
Penampang Melintang di AWLR
Cp2
Jalur Pengukuran
Cp1
Jalur Lempar Pelampung
50m
Pengamat
-Stopwatch
-Walky-Talky
-Lembar Catatan
Pengamat
-Stopwatch
-Walky-Talky
Pelempar Pelampung
-Pelampung
-Walky-Talky
N 163200
N 163100
N 163000
E 707800
E 707900
E 708000
E 708100
S. TIKALA
P2
P8
CP3R
CP2R
CP1R
CP3L
N
S
W
E
0 10 20 50 meter
KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
SURVEI TOPOGRAFI DI SUNGAI TIKALA

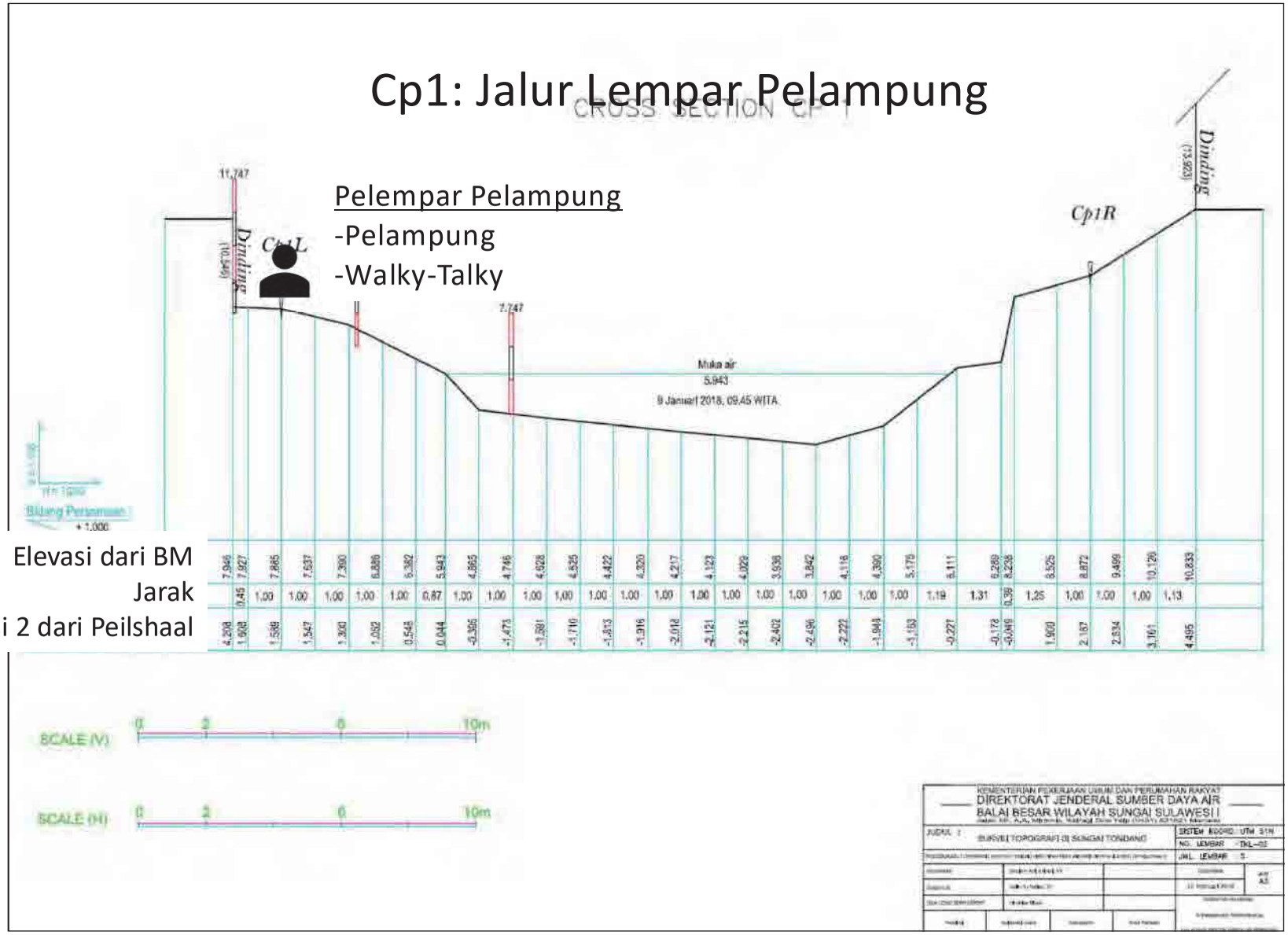
Rute Menuju Cp1 (Titik Lempar Pelampung)

A6-2-No.001-21

Rute Menuju Cp2 (Jalur Pengukuran 1)

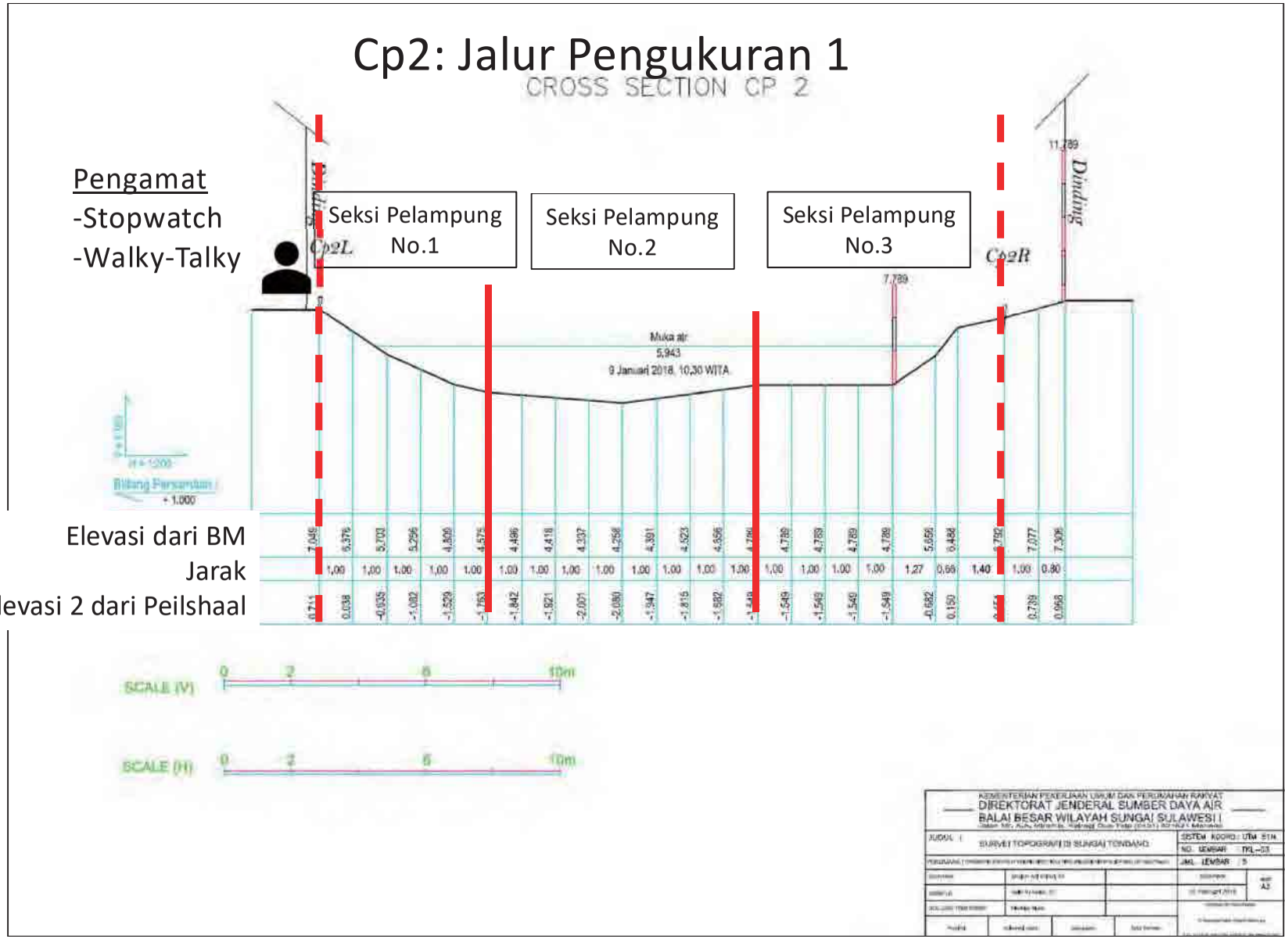
A6-2-No.001-22

Cp1: Jalur Lempar Pelampung



A6-2-No.001-23

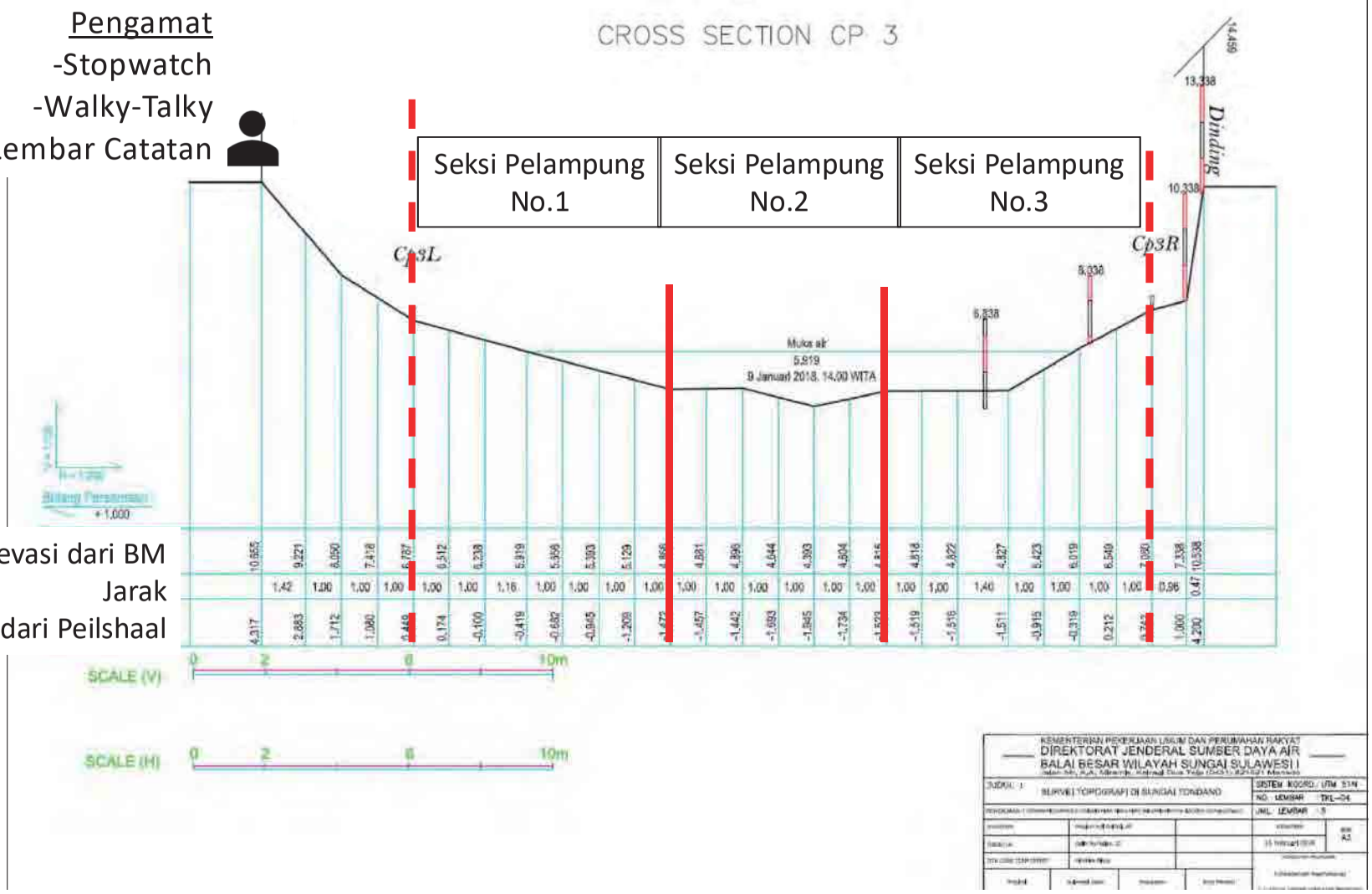
Cp2: Jalur Pengukuran 1



A6-2-No.001-24

Cp3: Jalur Pengukuran 2, Penampang Melintang di AWLR

Pengamat
-Stopwatch
-Walky-Talky
-Lembar Catatan



A6-2-No.001-25

Sario


50m
30m atau lebih
CP3
Jalur 2
CP2
Jalur 1
CP1
Jalur Lempar
Pelampung
Pasak Kontrol :Masih Ada :Ditandai Cat
BM : Masih Ada
Peilschaal
Google Earth

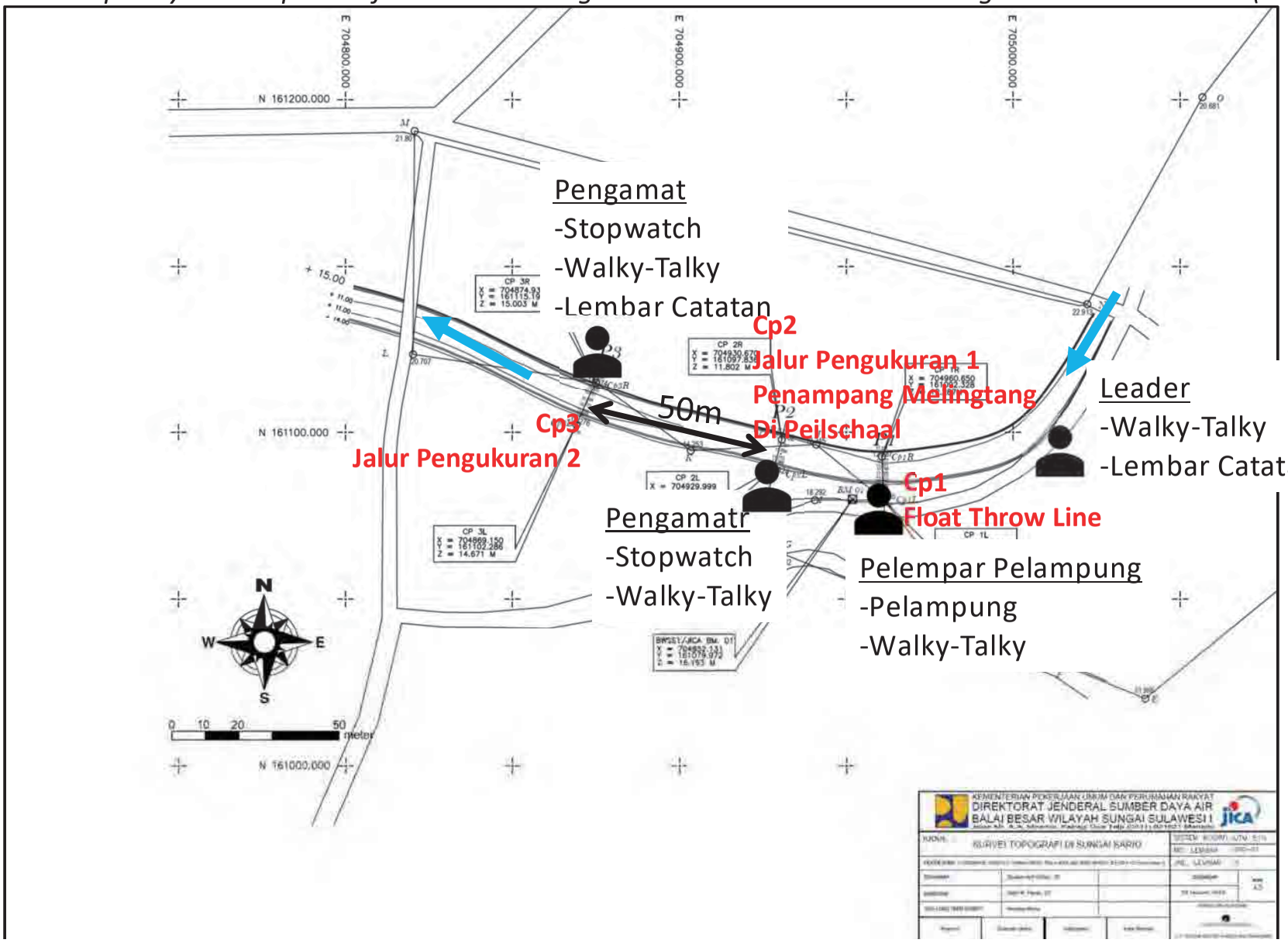
Sario

A6-2-No.001-27

Sario

Sario Cp2 Jalur Pengukuran 1

Sario Cp3
Jalur Pengukuran 2


Pengamat
-Stopwatch
-Walky-Talky
-Lembar Catatan
Cp2
Jalur Pengukuran 1
Penampang Melingtang
Di Peilschaal
50m
Cp3
Jalur Pengukuran 2
Leader
-Walky-Talky
-Lembar Catatan
Cp1
Float Throw Line
Pengamat
-Stopwatch
-Walky-Talky
Pelempar Pelampung
-Pelampung
-Walky-Talky
N
W
E
S
0 10 20 50 meter
N 161200.000
N 161100.000
N 161000.000
E 704800.000
E 704900.000
E 705000.000
KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
SURVEI TOPOGRAFI DI SUNGAI KARIO

Rute Menuju Cp1 (Titik Lempar Pelampung)

A6-2-No 001-30

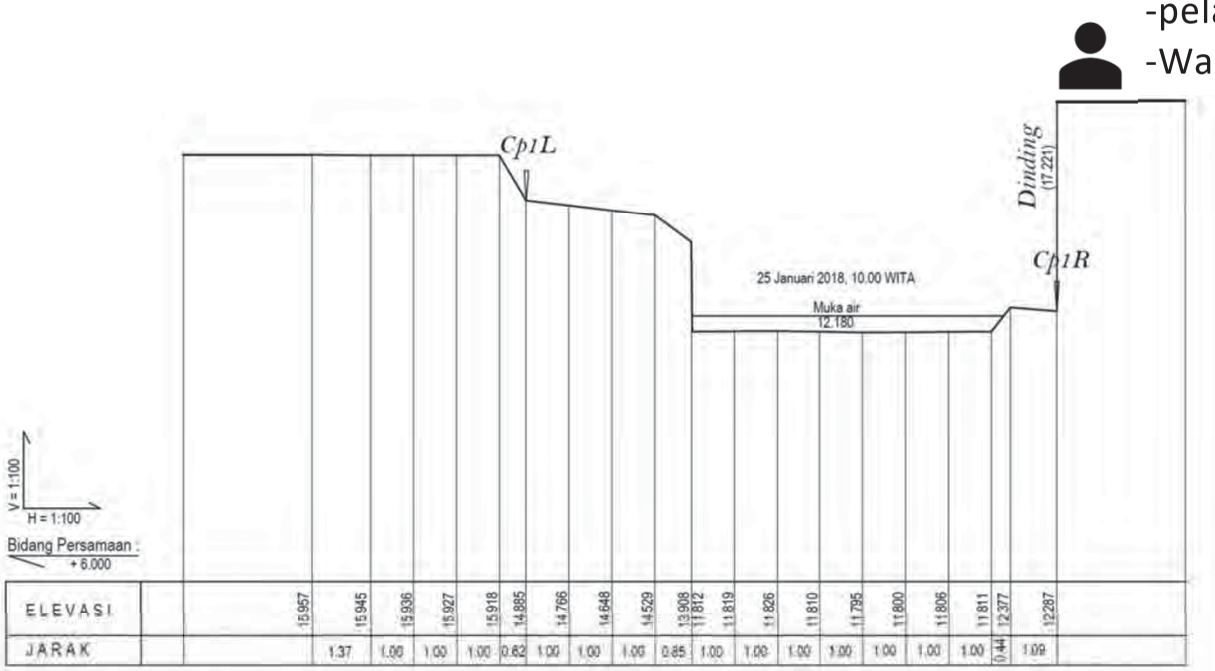
Rute Menuju Cp2 (Jalur Pengukuran 1)

Rute Menuju Cp3 (Jalur Pengamatan 2)

A6-2 No.001-31

Cp1: Jalur Lempar Pelampung

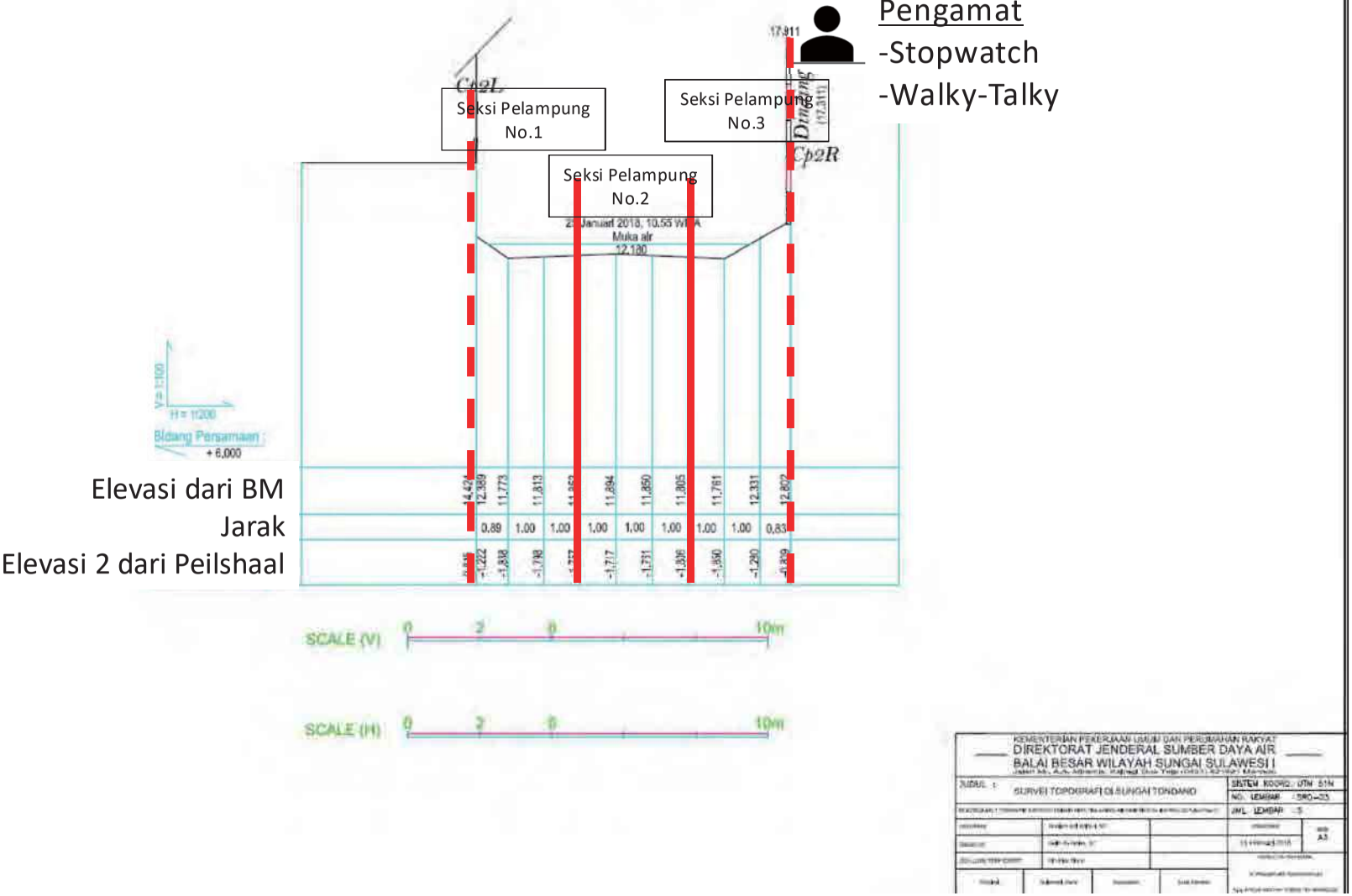
Pelempar pelampung
-pelampung
-Walky-Talky



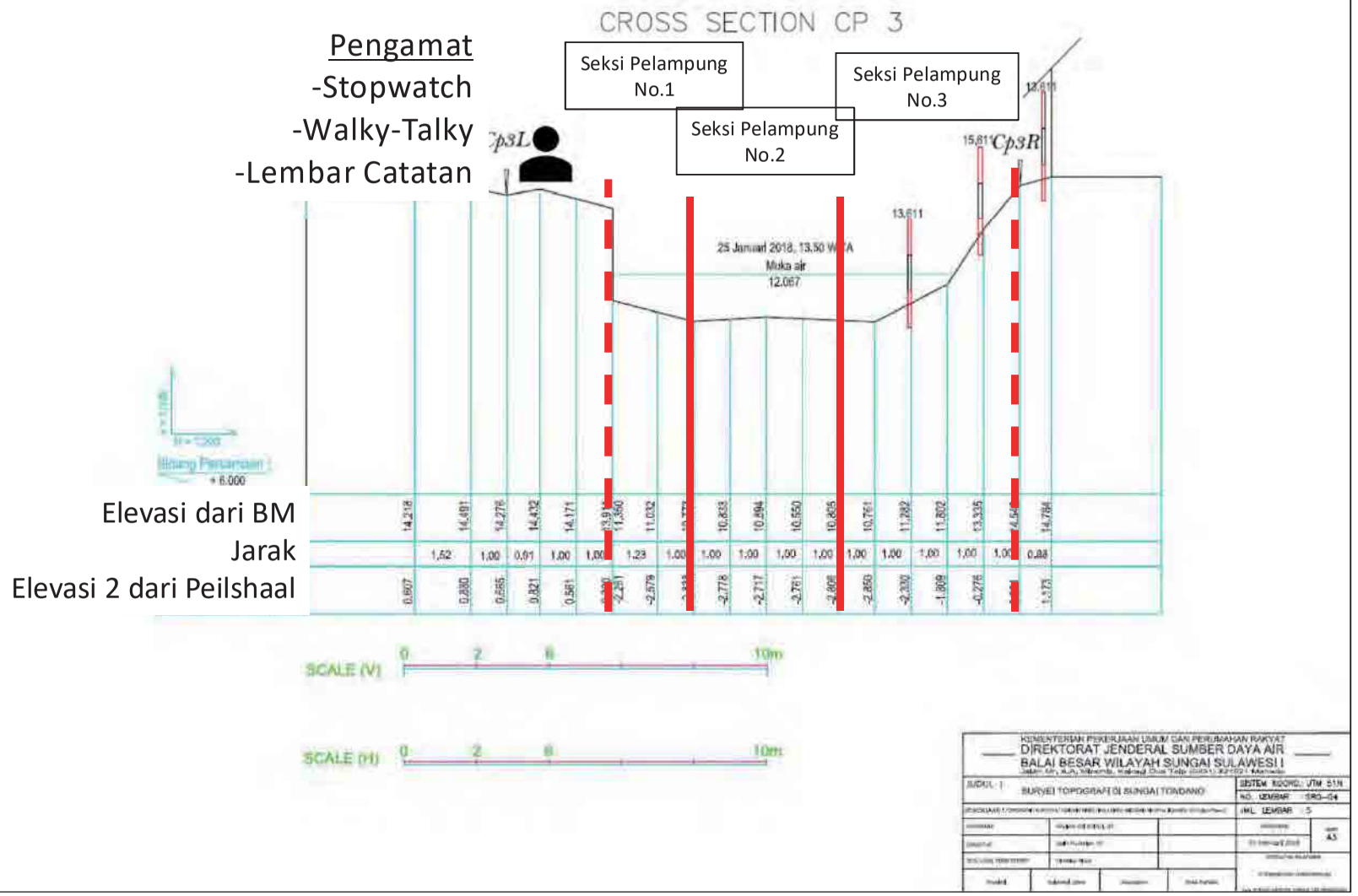
A6-2-No.001-32

Cp2: Jalur Pengukuran 1

Pengamat
-Stopwatch
-Walky-Talky



Cp3: Jalur Pengukuran 2



Malalayang

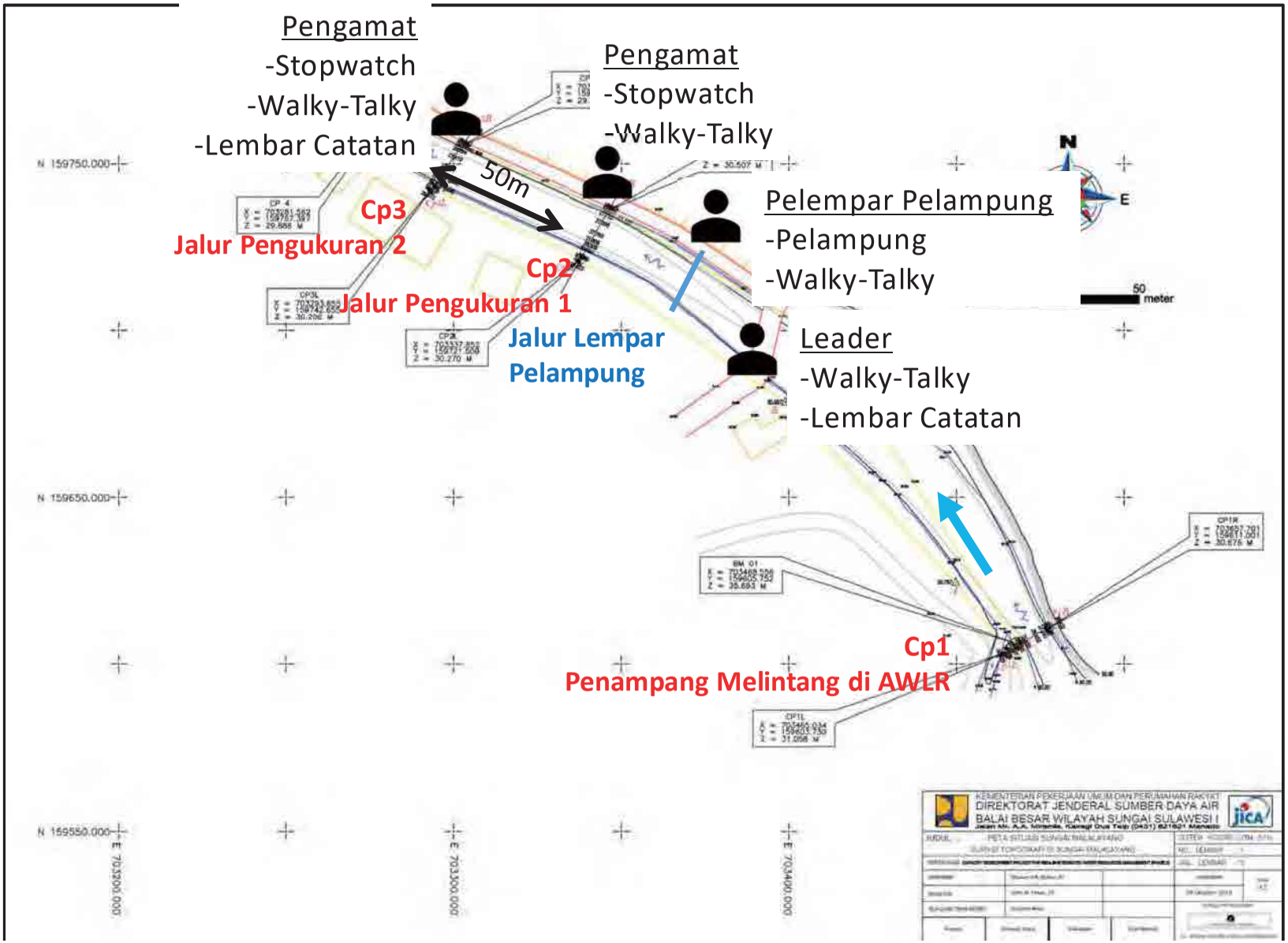

CP3
Jalur 2
CP2
Jalur 1
Lempar
Pelampung
CP1
Posisi AWLR
Pasak Kontrol :Masih Ada :Ditandai Cat
BM : Masih Ada
Peilschaal
AfriGIS (Pty) Ltd.
2018 DigitalGlobe
2018 Google
Google Earth


Malalayang
Cp3: Jalur Pengukuran 2
Cp2: Jalur Pengukura 1
No.1
No.2
No.3
Seksi Pelampung
Jalur Lempar Pelampung

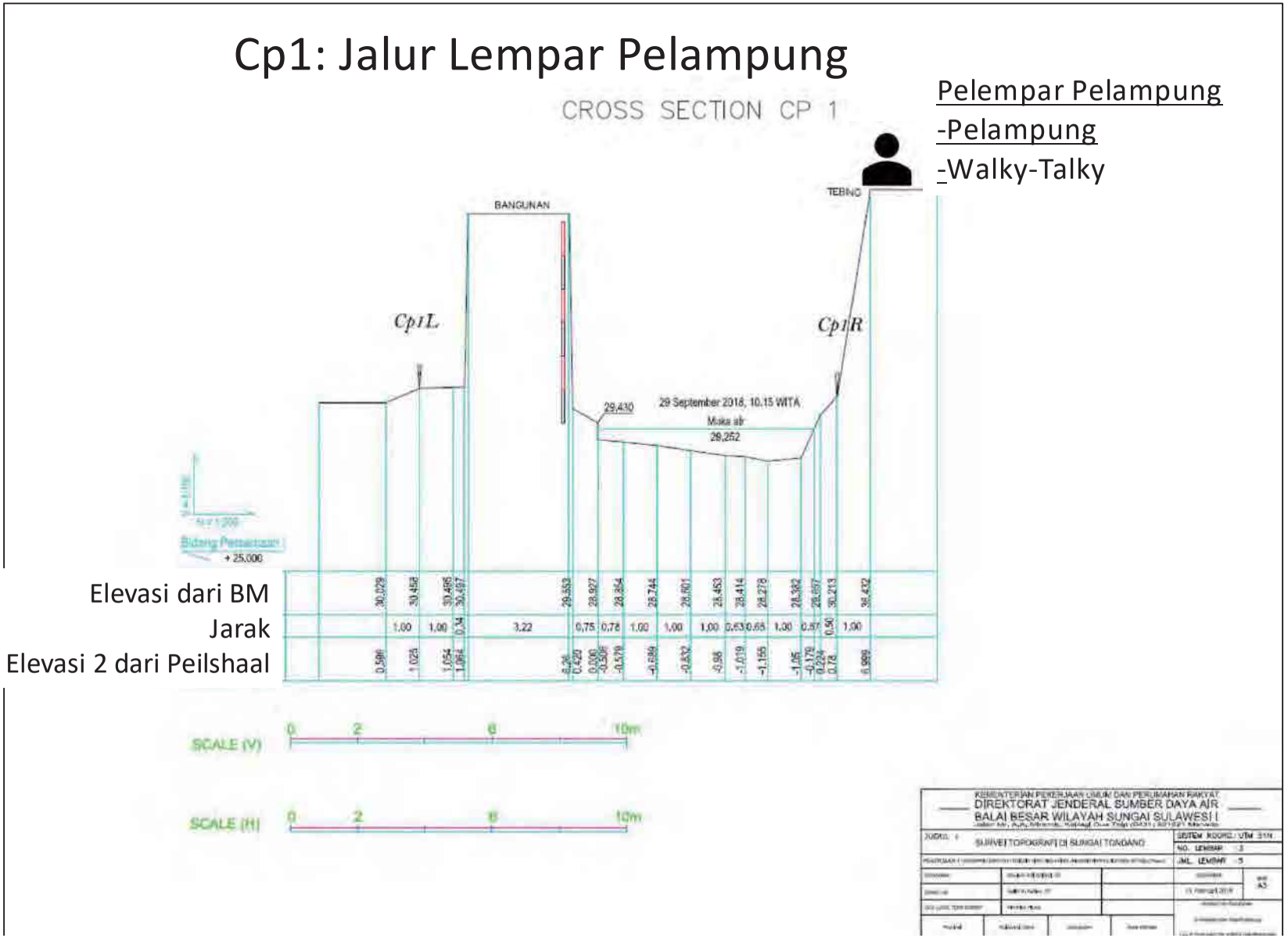
Malalayang

Malalayang Cp2
Jalur Pengukuran 1

Malalayang Cp3
Jalur Pengukuran 2


Pengamat
-Stopwatch
-Walky-Talky
-Lembar Catatan
Pengamat
-Stopwatch
-Walky-Talky
50m
Cp3
Jalur Pengukuran 2
Cp2
Jalur Pengukuran 1
Jalur Lempar
Pelampung
Pelempar Pelampung
-Pelampung
-Walky-Talky
Leader
-Walky-Talky
-Lembar Catatan
Cp1
Penampang Melintang di AWLR
N
E
50
meter
N 159750.000
N 159650.000
N 159550.000
E 703300.000
E 703400.000
KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I

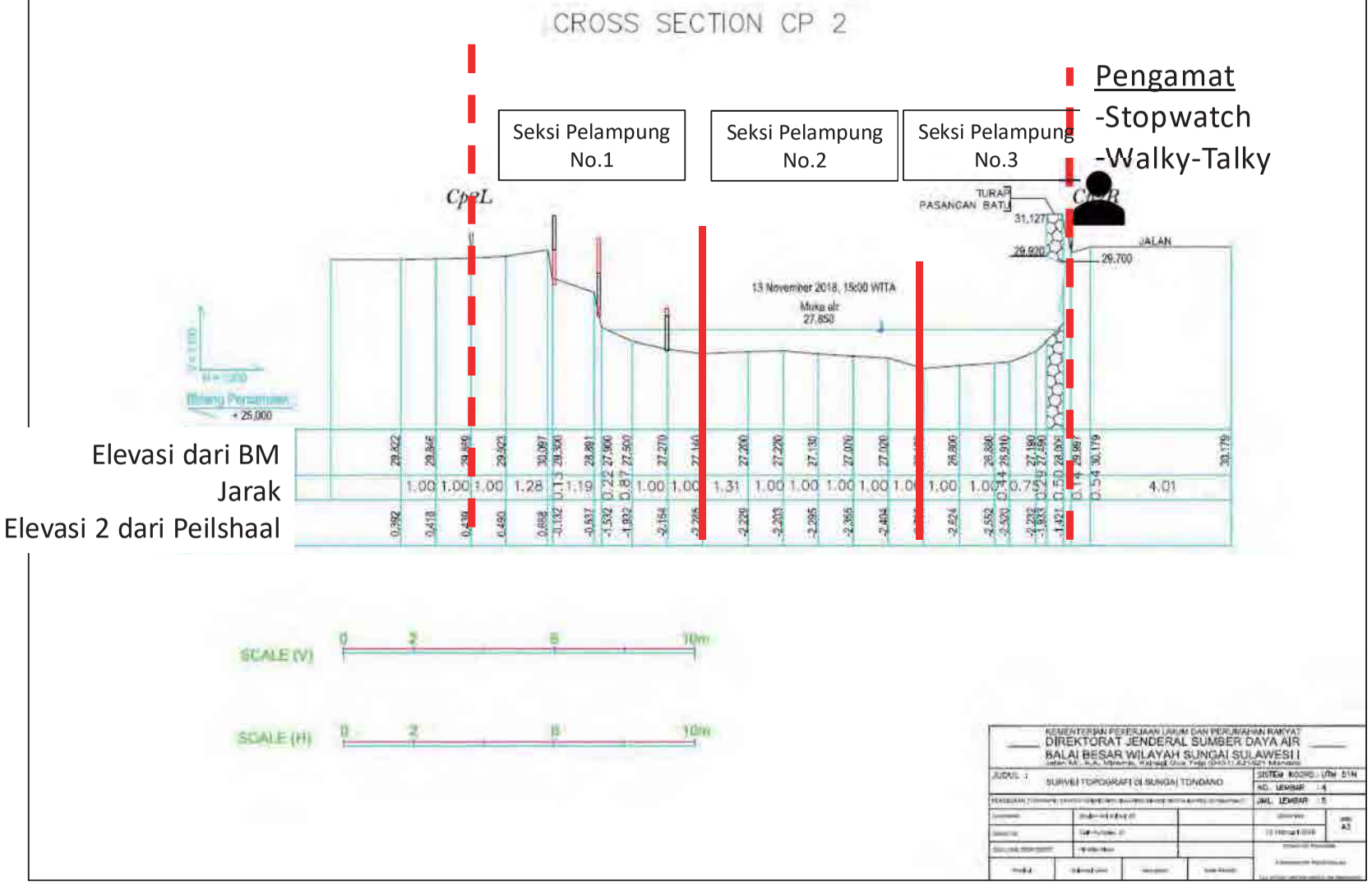
Cp1: Jalur Lempar Pelampung



Pelempar Pelampung
-Pelampung
-Walky-Talky

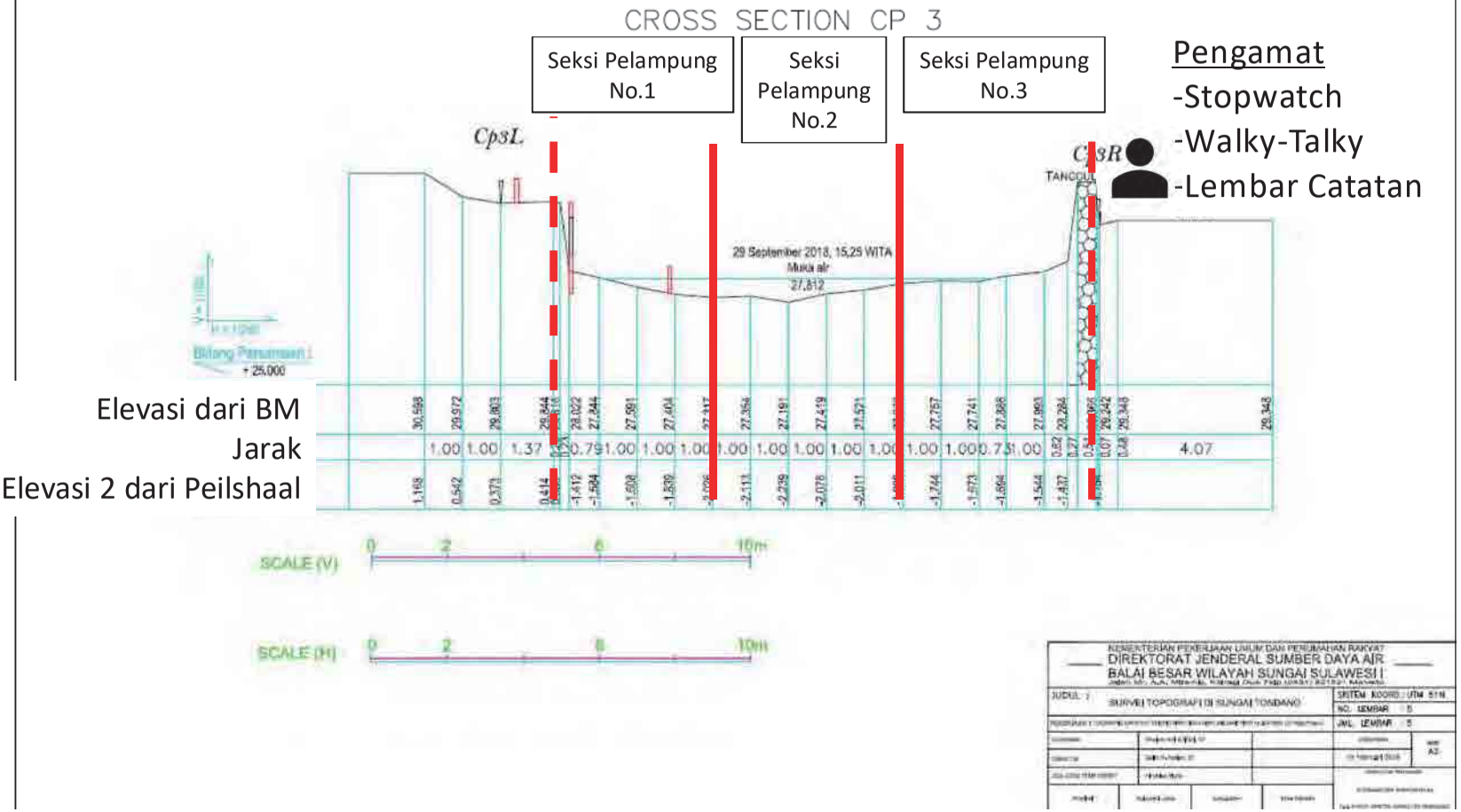
A6-2-No.001-39

Cp2: Jalur Pengukuran 1



A6-2-No.001-40

Cp3: Jalur Pengukuran 2



Pengamat
-Stopwatch
-Walky-Talky
-Lembar Catatan

A6-2-No.001-41

Lembar Catatan

Lembar 1-1
Halaman Muka Lembar Catatan
(Contoh Kasus Malalayang)

A6-2-No.001-42

Lembar 1-1

Lembar Catatan Pengukuran Arus di Lapangan

(Versi Metode Pelampung)

Pos	Nama	Malalayang		
	Tipe	Pelampung	Kode	
	DAS	Malalayang	Sungai	Malalayang
	Alamat	Batu Kota Bawah	Jarak dari Muara Sungai	
	Institusi	BWS Sulawesi I		
Durasi Pengukuran	Mulai	19-Jan-96		
	Selesai	/ /		

Lembar Catatan

Lembar 1-2
Tabel Pengamatan
(Daftar Pengukuran Muka Air Tinggi dan Rendah)
(Contoh Kasus Malalayang)

A6-2-No.001-43

Lembar 1-2

Tabel Pengamatan

No.	Waktu, Tanggal/Bulan/Tahun	Muka Air (m)	Catatan
1	14 : 30 , 13 / Nov / 2018	1.1	Metode Pelampung, untuk Air Tinggi (Banjir)
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		
	: , / /		

Lembar Catatan

Lembar 2-1
Data Pengukuran untuk Setiap Pengamatan
(Contok Kasus Malalayang)

A6-2-No.001-44

Lembar 2-1

Pos	Tipe	Kode
Malalayang		

Tanggal/Bulan/Tahun	13-Nov-18				Cuaca	Mendung, Setelah Hujan	
Frekuensi Pengamatan	1				Angin	tidak ada	
Nama		Boy	Rifanto/Selfi	Riki/Fanny	Waktu Pengamatan (jam:menit)	Mulai	15:06
	Leader	Pelampung	1st Line	2nd Line		Selesai	15:26

Section No.	Pelampung No.	Kedalaman Pelampung (m)	Waktu Melempar (jam:menit)	Durasi Aliran (menit:detik)	Lintasan Pelampung
1	2	0.5	15:06	42.14	Tersangkut/tidak dipakai
1	2	0.5	15:07	59.03	Sesuai Jalur
		.	:	.	
2	2	0.5	15:12	57.2	Sesuai Jalur
		.	:	.	
3	2	0.5	15:19	57.9	Keluar Jalur
3	2	0.5	15:26	57.73	Sesuai Jalur
		.	:	.	
		.	:	.	
		.	:	.	
		.	:	.	
		.	:	.	
		.	:	.	
		.	:	.	

All measured data should be entered, including measurement which float was out of route (float section)

Lembar Catatan

Lembar 2-2
Situasi Muka Air Sungai selama pengukuran
(Contok Kasus Malalayang)

A6-2-No.001-45

Lembar 2-2

Muka Air

	Titik Referensi				Jalur Pengamatan 1				Jalur Pengamatan 2			
	Waktu (Jam:menit)	Muka Air (m)			Waktu (jam:menit)	Muka Air (m)			Waktu (jam:menit)	Muka Air (m)		
		Tertinggi	Terendah	Rata-rata		Tertinggi	Terendah	Rata-rata		Tertinggi	Terendah	Rata-rata
Mulai	15:06	.	.	1.1	:	.	.	-1.36	:	.	.	-1.86
Selesai	:	.	.	1.1	:	.	.	-1.36	:	.	.	-1.86
Rata-rata	:	.	.	1.1	:	.	.	-1.36	:	.	.	-1.86

Catatan

1. Hasil pengamatan di jalur Pengamatan 1 (CP2) adalah 0.64, atau setara dengan -1.36 dari titik referensi
2. Hasil pengamatan di jalur Pengamatan 2 (CP3) adalah 1.14, atau setara dengan -1.86 dari titik referensi

Lembar Catatan

Lembar 3-1
Lembar Perhitungan Aliran (Vesri Metode Pelampung untuk Kecepatan Aliran dan Rata-rata Aliran)
(Contok Kasus Malalayang)

A6-2-No.001-46

Lembar 3-1

Tipe	Kode

Lembar Perhitungan Aliran (Metode Pelampung)

DAS	Malalayang	Sungai	Malalayang	Pos				
Frekuensi Pengamatan			Jumlah Tahunan					
Pengamatan Tanggal/bulan	13-Nov	Waktu Pengamatan	Mulai	:	Cuaca	Arah Angin	Kecepatan Angin	
			Selesai	:				
			Rata-rata	:				

Muka Air (Titik Referensi) (m)	Volume Total Aliran (m3/s)	Jumlah Jalur Pengukuran Kecepatan	Lebar Sungai Rata-rata (m)	Luas Penampang Melintang (m2) (m2)	Gradien Permukaan Air	Kecepatan Rata-rata (m/s)	Jarak Lemparan (m)
.	.	3	.	.	1/	.	50

Muka Air (m)	Titik Referensi (m)	Jalur Pengamatan 1 (m)	Jalur Pengamatan 2 (m)	Peilschaal (m)	Beda Muka Air (m)	Jarak (m)	Gradien Permukaan Air
Mulai	.	.	.	.			
Selesai	.	.	.	.			
Rata-rata	.	.	.	.	.	50	

Penampang Melintang No.	Tipe Pelampung		Waktu Lempar (jam:menit)	Durasi Aliran (S)	Kecepatan Aliran Pelampung (m/s)	Koefisien	Kalibrasi Kecepatan (m/s)	Luas Penampang Melintang			Debit per seksi (m3/s)
	Tipe	edalama						Penampang 1 (m2)	Penampang 2 (m2)	Rata-rata (m2)	
1	2	0.5	15:06	59.03	0.85	0.88	0.75	1.26	2.11	1.69	1.27
2	2	0.5	15:12	57.2	0.87	0.88	0.77	5.02	3.73	4.37	3.36
3	2	0.5	15:26	57.73	0.87	0.88	0.77	3.81	1.49	2.65	2.04

These data come from Sheet 2-1 and enter successful measurement data only

50 m ÷ Duration of Flow (S)

The coefficient comes from a Table of Float Type on page No.7

The data comes from Sheet 3-2 and 3-3 and calculate an average

Kondisi Aliran	Total	6.67

Accumulation of Flow Rate (m3/s)
It is used for H-Q curve

Calibrated Velocity (m/s)
×
Average of Cross Section Area (m2)

Lembar Catatan

Lembar 3-2
Perhitungan Area Penampang Melintang, lembar No. 1
(Contok Kasus Malalayang)

Lembar 3-2

Tipe	Kode

Lembar Perhitungan Luas Penampang Melintang (No.1)

DAS	Malalayang	Sungai	Malalayang	Pos	Malalayang	rvei Penampang Melinta	29-Sep. 2018
Tanggal Pengamatan	13/Nov./2-18	Frekuensi Pengamatan	1st	Jumlah Pengamatan	No.1	Beda Luas Penampang Melintang (m2)	
						Sebelum Banjir	
						Setelah Banjir	

Jalur Pengamatan 1

Luas Penampang Melintang (m2)		
Muka Air	Mulai (m)	.
Muka Air	Selesai (m)	.
Muka Air	Rata-rata (m)	.
Muka Air	Titik Referensi (m)	.
	Beda Antara Titik Referensi (m)	.

No.	Jarak (m)	Muka Air (m)	Muka Air Rata-rata (m)	Lebar Rata-rata (m)	Luas (m2)	Luas Penampang (m2)
1	0.00	0.00	0.00	0.13	0.00	1.26
	0.13	0.00	0.00	1.19	0.00	
	1.32	0.00	0.00	0.22	0.00	
	1.54	0.00	0.18	0.87	0.15	
	2.41	0.35	0.47	1.00	0.47	
	3.41	0.58	0.65	1.00	0.65	
	4.41	0.71	.	.	.	Luas Penampang Titik Referensi (m2)
			Lebar Total :		1.26	.
2	4.41	0.71	0.68	1.31	0.89	5.02
	5.72	0.65	0.64	1.00	0.64	
	6.72	0.64	0.68	1.00	0.68	
	7.72	0.72	0.75	1.00	0.75	
	8.72	0.78	0.81	1.00	0.81	
	9.72	0.83	1.26	1.00	1.26	
	10.72	1.68	.	.	.	Luas Penampang Titik Referensi (m2)
	.	.	.	.	.	.
	.	.	Lebar Total :		6.28	.

Jalur Pengamatan 2

Luas Penampang Melintang (m2)		
Muka Air	Mulai (m)	.
Muka Air	Selesai (m)	.
Muka Air	Rata-rata (m)	.
Muka Air	Titik Referensi (m)	.
	Beda Antara Titik Referensi (m)	.

No.	Jarak (m)	Muka Air (m)	Muka Air Rata-rata (m)	Lebar Rata-rata (m)	Luas (m2)	Luas Penampang (m2)
	0.00	0.00	0.00	0.23	0.00	2.11
	0.23	0.00	0.17	0.79	0.13	
	1.02	0.34	0.47	1.00	0.47	
	2.02	0.59	0.69	1.00	0.69	
	3.02	0.78	0.82	1.00	0.82	
	4.02	0.86	.	.	.	Luas Penampang Titik Referensi (m2)
	.	.	.	.	.	.
	.	.	Lebar Total :		2.11	.
	4.02	0.86	0.80	1.00	0.80	3.73
	5.02	0.73	0.81	1.00	0.81	
	6.02	0.89	0.83	1.00	0.83	
	7.02	0.76	0.71	1.00	0.71	
	8.02	0.66	0.58	1.00	0.58	
	9.02	0.50	.	.	.	Luas Penampang Titik Referensi (m2)
	.	.	.	.	.	.
	.	.	Lebar Total :		5.84	.

Distance from beginning Point

Water depth until river bed at each point

Average water depth

Distance until next point

Average Water Depth (m) × Distance until next point (m)

Make an accumulation of Area And goes to sheet 3-1

Lembar Catatan

Lembar 3-3
Perhitungan Penampang Melintang,
Lembar No. 1
(Contok Kasus Malalayang)

A6-2-No.001-48

Lembar 3-3

Tipe	Kode

Lembar Perhitungan Luas Penampang Melintang (No.2)

Tanggal Pengamatan	13/Nov./2018	Frekuensi Pengamatan	1st	Jumlah Pengamatan	No.1	Pos	Malalayang

Jalur Pengamatan 1

No.	Jarak (m)	Muka Air (m)	Muka Air Rata-rata (m)	Lebar Rata-rata (m)	Luas (m2)	Luas Penampang (m2)
	10.72	1.68				
	11.72	1.05	1.37	1.00	1.37	
	12.72	0.97	1.01	1.00	1.01	
	13.16	0.94	0.96	0.44	0.42	3.81
	13.91	0.66	0.80	0.75	0.60	
	14.70	0.36	0.51	0.79	0.40	
	.	.	.	.	.	Luas Penampang Titik Referensi (m2)
	.	.	.	.	.	
	.	.	.	.	.	.
			Lebar Total :		**10.08**	.
	.	.				
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	Luas Penampang Titik Referensi (m2)
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	.
			Lebar Total :			.
	.	.				
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	Luas Penampang Titik Referensi (m2)
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	.
			Lebar Total :			.

Jalur Pengamatan 2

No.	Jarak (m)	Muka Air (m)	Muka Air Rata-rata (m)	Lebar Rata-rata (m)	Luas (m2)	Luas Penampang (m2)
	9.02	0.50				
	10.02	0.42	0.46	1.00	0.46	
	11.02	0.45	0.44	1.00	0.44	
	11.75	0.30	0.38	0.73	0.28	1.49
	12.75	0.19	0.25	1.00	0.25	
	13.37	0.00	0.10	0.62	0.06	
	13.64	0.00	0.00	0.27	0.00	Luas Penampang Titik Referensi (m2)
	.	.	.	.	.	
	.	.	.	.	.	.
			Lebar Total :		**7.33**	.
	.	.				
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	Luas Penampang Titik Referensi (m2)
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	.
			Lebar Total :			.
	.	.				
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	Luas Penampang Titik Referensi (m2)
	.	.	.	.	.	
	.	.	.	.	.	
	.	.	.	.	.	.
			Lebar Total :			.

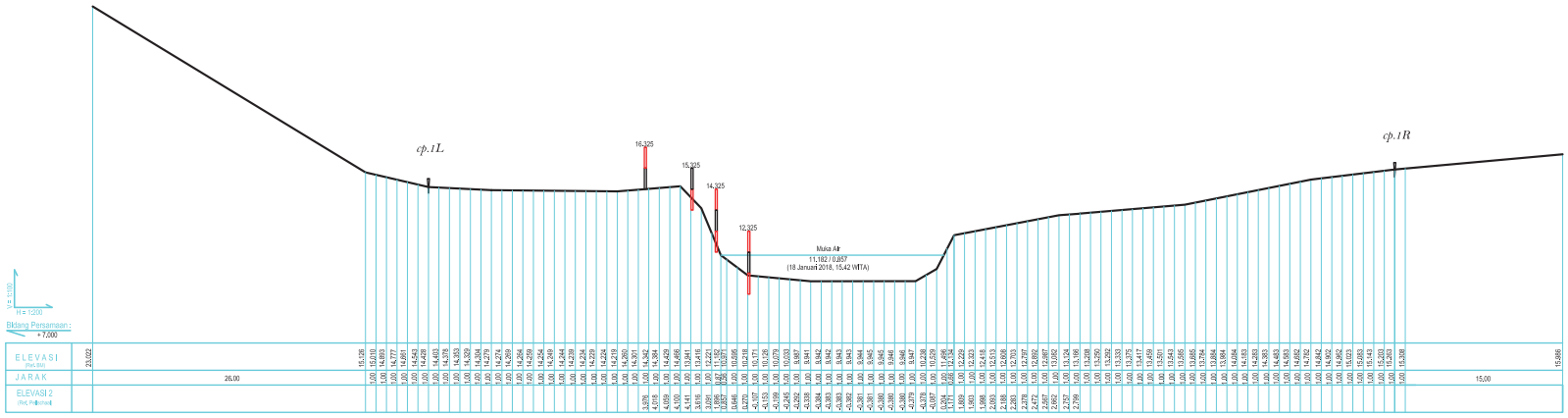
Same as sheet 3-2

Lampiran

Gambar Penampang Melintang

A6-2-No.001-50

CROSS SECTION CP 1



SCALE (V) 0 2 6 10m

SCALE (H) 0 4 12 20m

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : TDN–02
PEKERJAAN : TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER For JICA RBO's CD Project (Phase 2)			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatlan, ST		15 Februari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten: Kota Manado		D: \Pekerjaan\JICA Project\Atrium.jpg
			C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

A6-2-No.001-51

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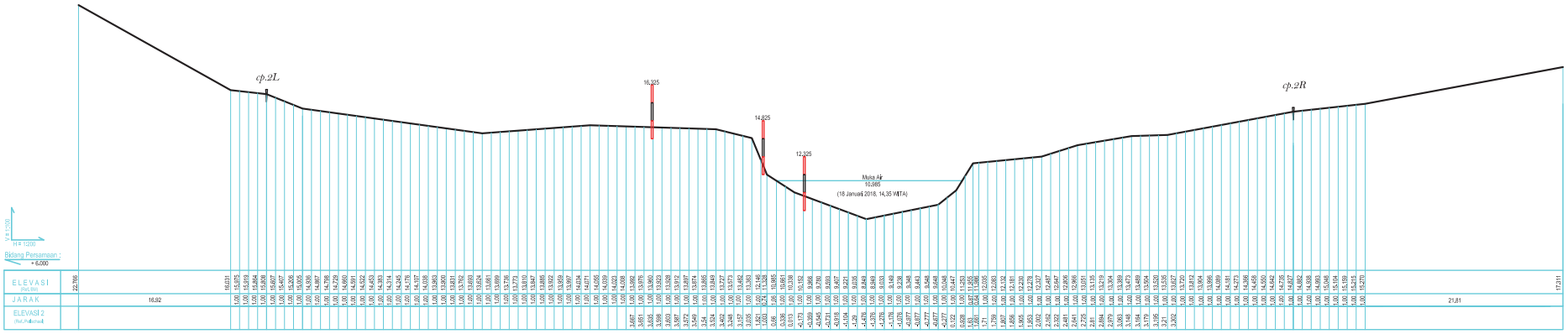


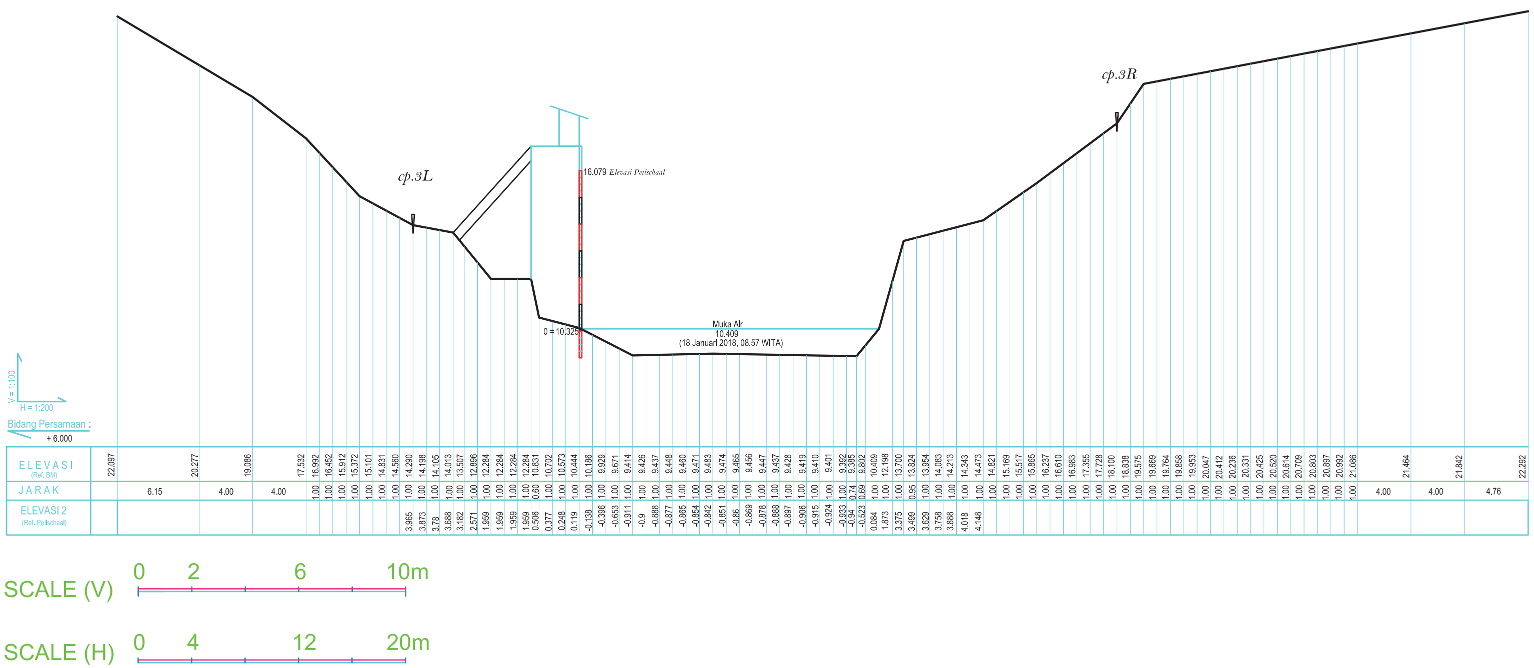
SCALE (V) 0 2 6 10m

SCALE (H) 0 4 12 20m

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO		SISTEM KOORD.: UTM 51N
		NO. LEMBAR : TDN–03
PEKERJAAN : TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER For JICA RBO's CD Project (Phase 2)		JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST	DIGAMBAR 15 Februari 2018
DIREKTUR	Galih M. Fatlan, ST	SIZE A3
JICA LONG TERM EXPERT	Hirohisa Miura	KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten: Kota Manado	D: \Pekerjaan\JICA Project\Atrium.jpg C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

CROSS SECTION CP 3



KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO

SISTEM KOORD.: UTM 51N
NO. LEMBAR : TDN–04
JML. LEMBAR : 5

PEKERJAAN : TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER For JICA RBO's CD Project (Phase 2)

DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR
DIREKTUR	Galih M. Fatian, ST		15 Februari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi	Sulawesi Utara	Kabupaten	Kota Manado

SIZE A3

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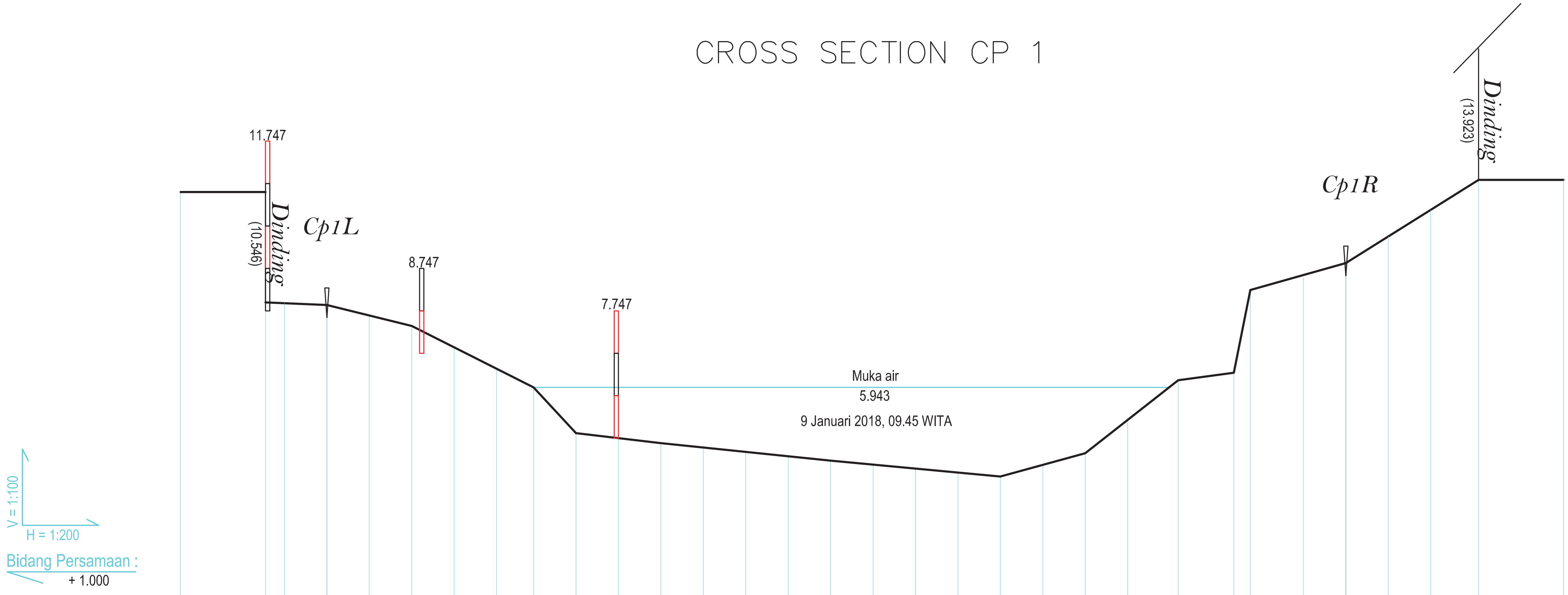
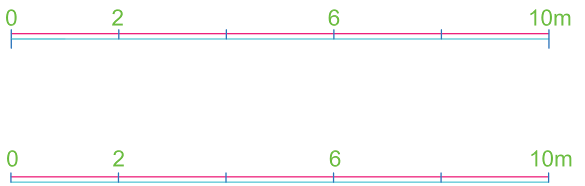
CROSS SECTION CP 1



Bidang Persamaan : + 1.000

ELEVASI (Ref. BM)	JARAK	ELEVASI 2 (Ref. Peilschaal)
7.946	0.45	4.208
7.927	1.00	1.608
7.885	1.00	1.589
7.637	1.00	1.547
7.390	1.00	1.300
6.886	1.00	1.052
6.382	1.00	0.548
5.943	0.87	0.044
4.865	1.00	-0.395
4.746	1.00	-1.473
4.628	1.00	-1.591
4.525	1.00	-1.710
4.422	1.00	-1.813
4.320	1.00	-1.916
4.217	1.00	-2.018
4.123	1.00	-2.121
4.029	1.00	-2.215
3.936	1.00	-2.402
3.842	1.00	-2.496
4.116	1.00	-2.222
4.390	1.00	-1.948
5.175	1.19	-1.163
6.111	1.31	-0.227
6.289	0.39	-0.178
8.238	1.25	-0.049
8.525	1.00	1.900
8.872	1.00	2.187
9.499	1.00	2.534
10.126	1.13	3.161
10.833		4.495

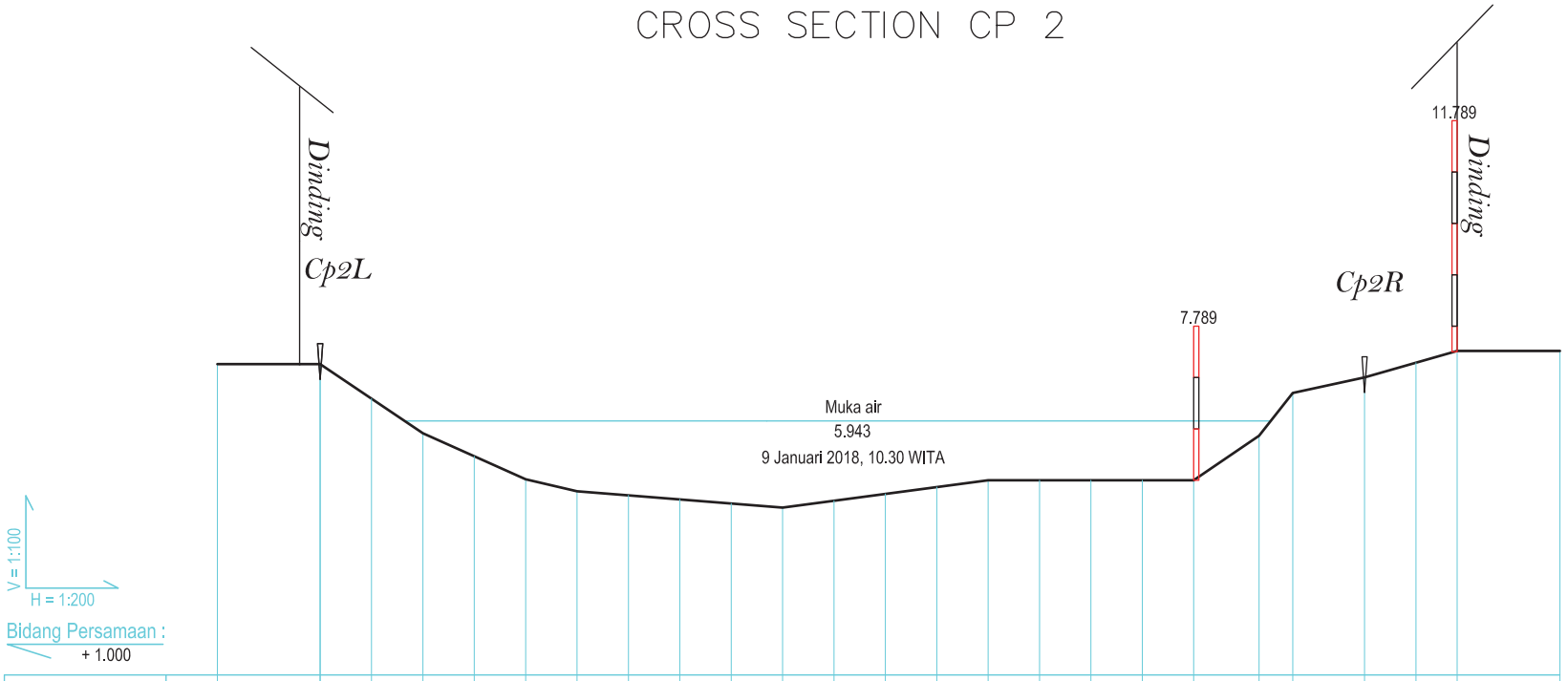


KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : TKL–02
PEKERJAAN : TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER For JICA RBO's CD Project (Phase 2)			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR — SIZE A3
DIREKTUR	Galih M. Fatian, ST		15 Februari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi	Sulawesi Utara	Kabupaten	Kota Manado
			C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

A6-2-No.001-54

CROSS SECTION CP 2



ELEVASI (Ref. BM)		7.049	6.376	5.703	5.256	4.809	4.575	4.496	4.416	4.337	4.258	4.391	4.523	4.656	4.789	4.789	4.789	4.789	4.789	5.656	6.488	6.792	7.077	7.306		
JARAK			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.27	0.66	1.40	1.00	0.80		
ELEVASI 2 (Ref. Peilschaal)		0.711	0.038	-0.635	-1.082	-1.529	-1.763	-1.842	-1.921	-2.001	-2.080	-1.947	-1.815	-1.682	-1.549	-1.549	-1.549	-1.549	-1.549	-0.682	0.150	0.454	0.739	0.968		

SCALE (V) 0 2 6 10m

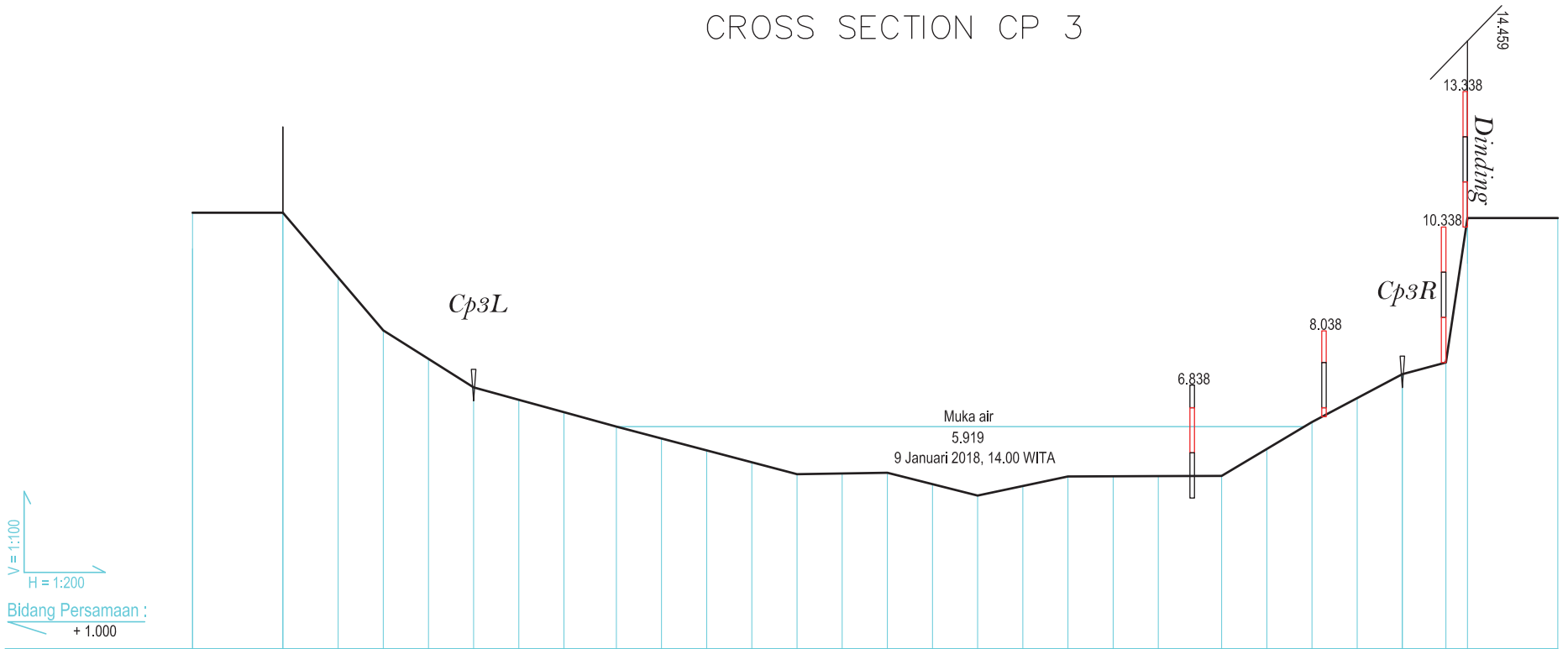
SCALE (H) 0 2 6 10m

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : TKL–03
PEKERJAAN : TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER For JICA RBO's CD Project (Phase 2)			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatlan, ST		15 Februari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten: Kota Manado		D: \Pekerjaan\JICA Project\Atrium.jpg
			C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

A6-2-No.001-55

CROSS SECTION CP 3



ELEVASI (Ref. BM)	10.655	9.221	8.050	7.418	6.787	6.512	6.238	5.919	5.656	5.393	5.129	4.866	4.881	4.896	4.644	4.393	4.604	4.815	4.818	4.822	4.827	5.423	6.019	6.549	7.080	7.338	10.538			
JARAK		1.42	1.00	1.00	1.00	1.00	1.00	1.16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.40	1.00	1.00	1.00	1.00	0.96	0.47			
ELEVASI 2 (Ref. Peilschaal)	4.317	2.883	1.712	1.080	0.449	0.174	-0.100	-0.419	-0.682	-0.945	-1.209	-1.472	-1.457	-1.442	-1.693	-1.945	-1.734	-1.523	-1.519	-1.516	-1.511	-0.915	-0.319	0.212	0.742	1.000	4.200			

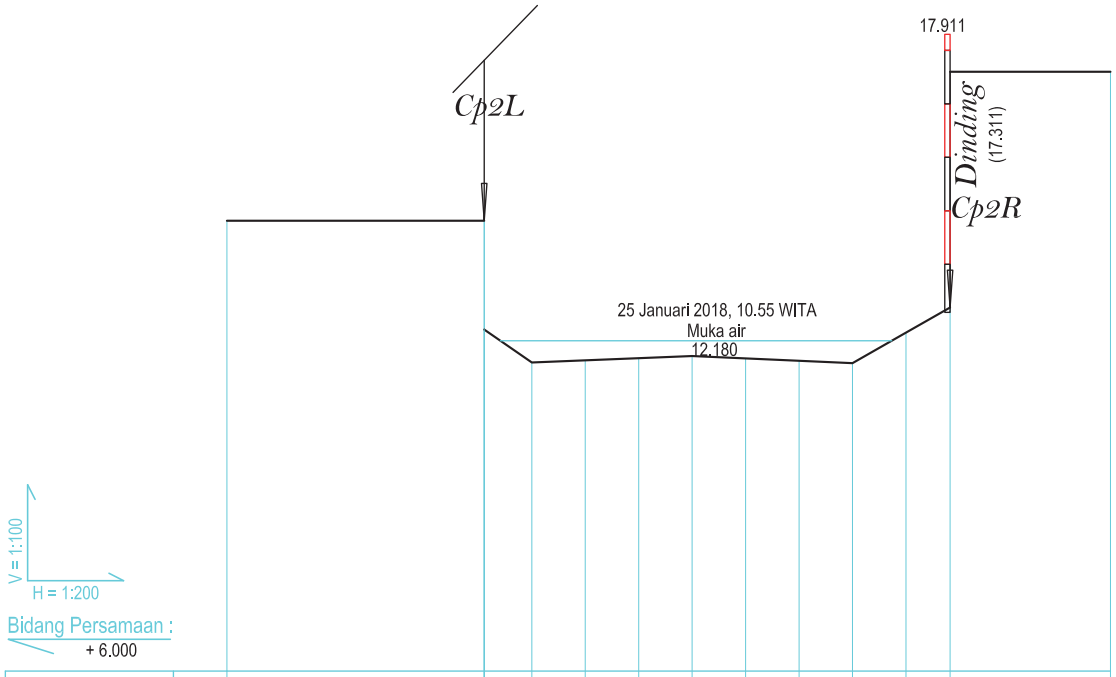
SCALE (V) 0 2 6 10m

SCALE (H) 0 2 6 10m

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : TKL–04
PEKERJAAN : TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER For JICA RBO's CD Project (Phase 2)			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatlan, ST		15 Februari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten:	Kota Manado	D: \Pekerjaan\JICA Project\Atrium.jpg
			C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

CROSS SECTION CP 2



ELEVASI (Ref. BM)	14.424	12.389	11.773	11.813	11.853	11.894	11.850	11.805	11.761	12.331	12.802
JARAK		0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.83
ELEVASI 2 (Ref. Peilschaal)	0.815	-1.222	-1.838	-1.798	-1.757	-1.717	-1.761	-1.806	-1.850	-1.280	-0.809

SCALE (V) 0 2 6 10m

SCALE (H) 0 2 6 10m

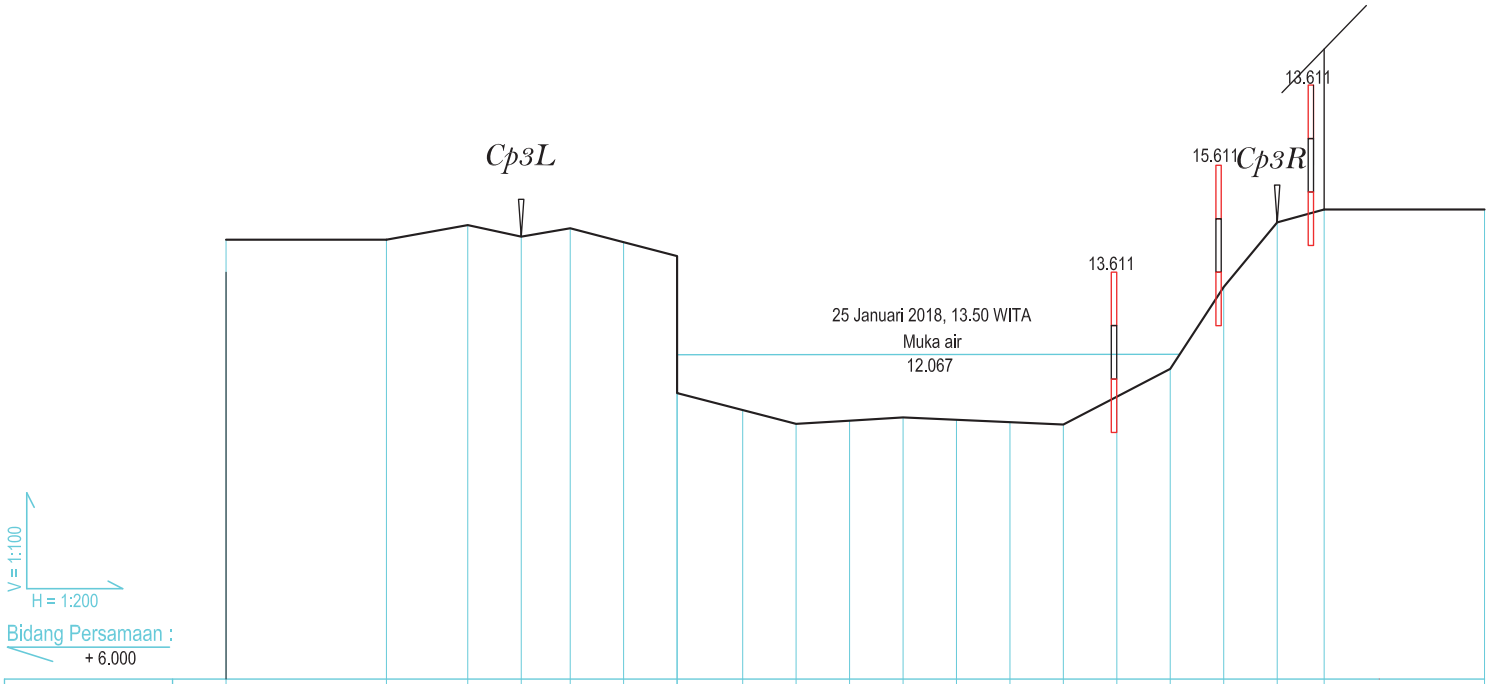
KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : SRO–03
PEKERJAAN : TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER For JICA RBO's CD Project (Phase 2)			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR 15 Februari 2018
DIREKTUR	Galih M. Fatlan, ST		SIZE A3
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten	Kota Manado	D: \Pekerjaan\JICA Project\Atrium.jpg
			C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

A6-2-No.001-56

A6-2-No.001-57

CROSS SECTION CP 3



ELEVASI (Ref. BM)		14.218	14.491	14.276	14.432	14.171	13.911	11.350	11.032	10.773	10.833	10.894	10.550	10.805	10.761	11.282	11.802	13.335	14.542	14.784
JARAK			1.52	1.00	0.91	1.00	1.00	1.23	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	
ELEVASI 2 (Ref. Peilschaal)		0.607	0.880	0.665	0.821	0.561	0.300	-2.261	-2.579	-2.838	-2.778	-2.717	-2.761	-2.806	-2.850	-2.330	-1.809	-0.276	0.931	1.173

SCALE (V) 0 2 6 10m

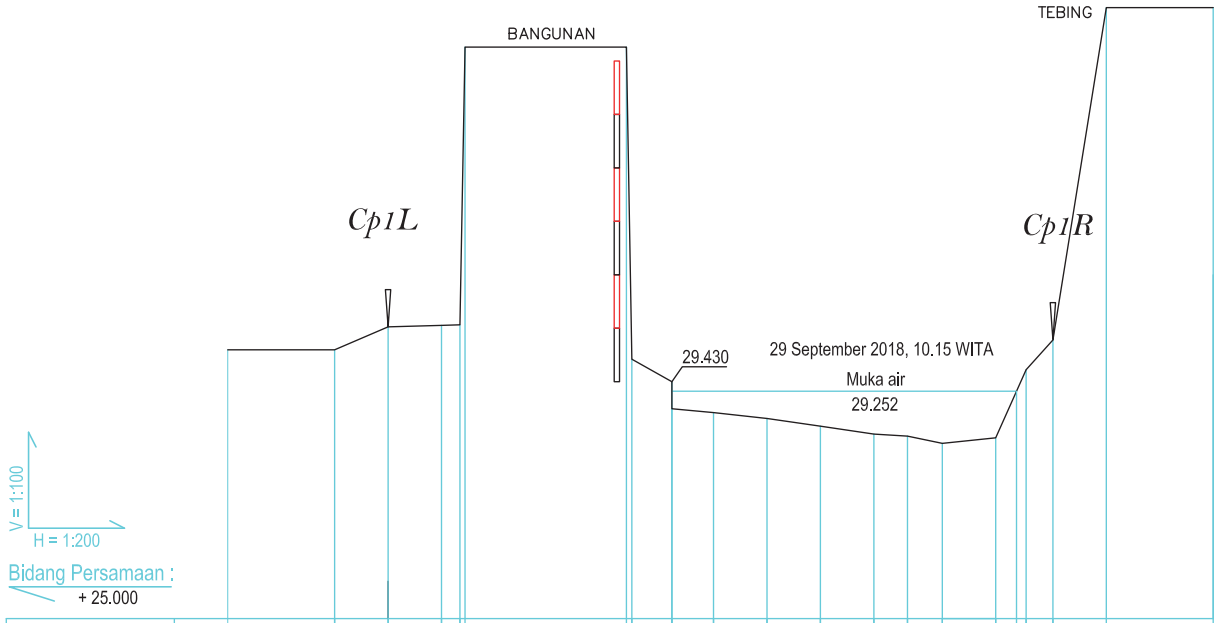
SCALE (H) 0 2 6 10m

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : SRO–04
PEKERJAAN : TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER For JICA RBO's CD Project (Phase 2)			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatlan, ST		15 Februari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten:	Kota Manado	D: \Pekerjaan\JICA Project\Atrium.jpg
			C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

A6-2-No.001-58

CROSS SECTION CP 1



ELEVASI (Ref. BM)		30.029	30.458	30.495	30.497		29.553	28.927	28.854	28.744	28.601	28.453	28.414	28.278	28.382	29.657	30.213	36.432					
JARAK			1.00	1.00	0.34	3.22		0.75	0.78	1.00	1.00	1.00	0.63	0.65	1.00	0.57	0.50	1.00					
ELEVASI 2 (Ref. Peilschaal)		0.596	1.025	1.054	1.064		6.26	0.420	0.000	-0.506	-0.579	-0.689	-0.832	-0.98	-1.019	-1.155	-1.05	-0.179	0.224	0.78	6.999		

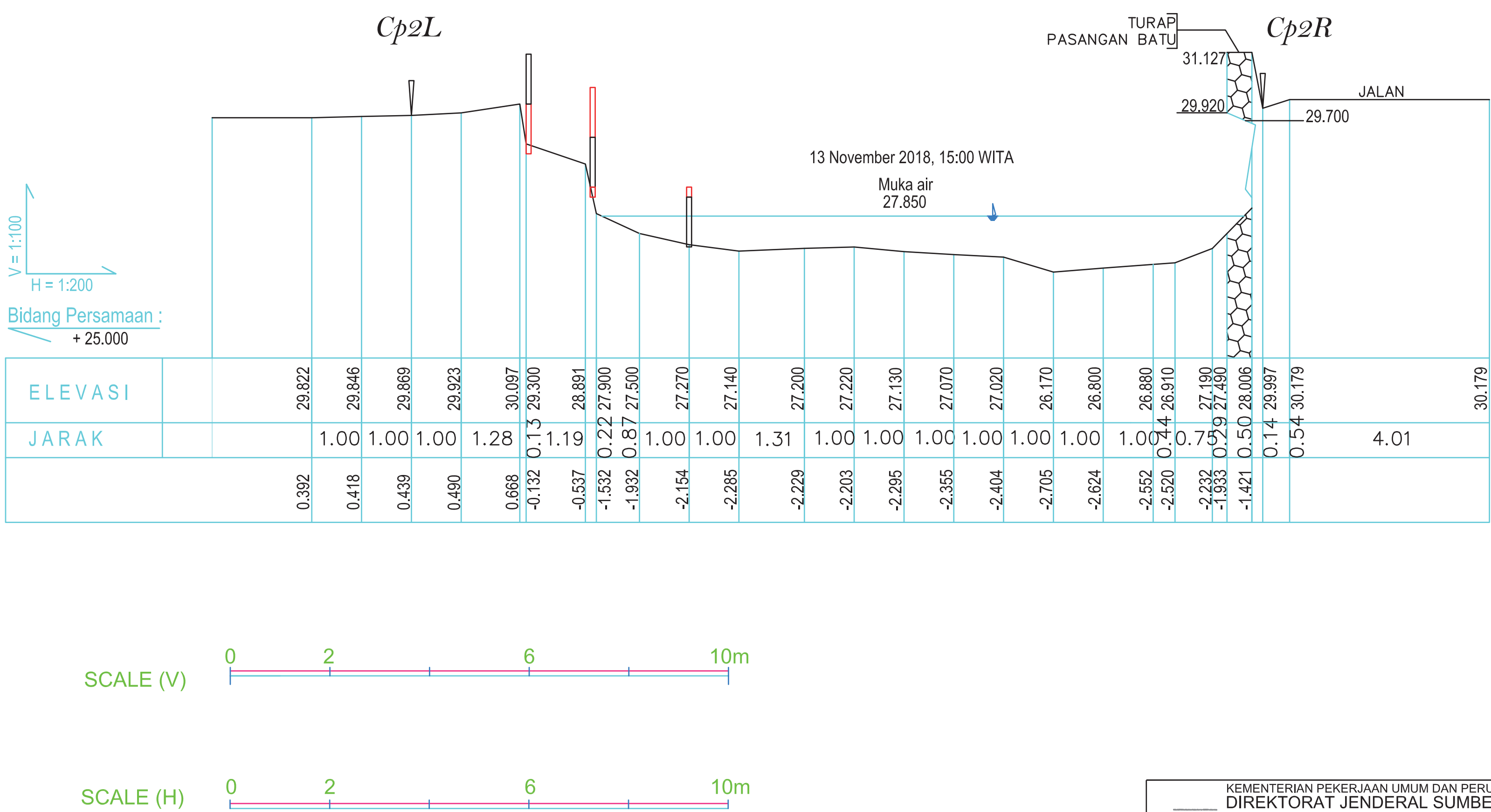
SCALE (V) 0 2 6 10m

SCALE (H) 0 2 6 10m

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO			SISTEM KOORD.: UTM 51N
			NO. LEMBAR : 3
PEKERJAAN : TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER For JICA RBO's CD Project (Phase 2)			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatlan, ST		15 Februari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi: Sulawesi Utara	Kabupaten	Kota Manado	D: \Pekerjaan\JICA Project\Atrium.jpg
			C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

CROSS SECTION CP 2



KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Miramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL : SURVEI TOPOGRAFI DI SUNGAI TONDANO

SISTEM KOORD.: UTM 51N
NO. LEMBAR : 4
JML. LEMBAR : 5

PEKERJAAN : TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER For JICA RBO's CD Project (Phase 2)

DIGAMBAR	Ghulam Arfi Ghifari, ST	DIGAMBAR	SIZE A3
DIREKTUR	Galih M. Fatian, ST	15 Februari 2018	
JICA LONG TERM EXPERT	Hirohisa Miura	KONSULTAN PELAKSANA	

Propinsi	Sulawesi Utara	Kabupaten	Kota Manado

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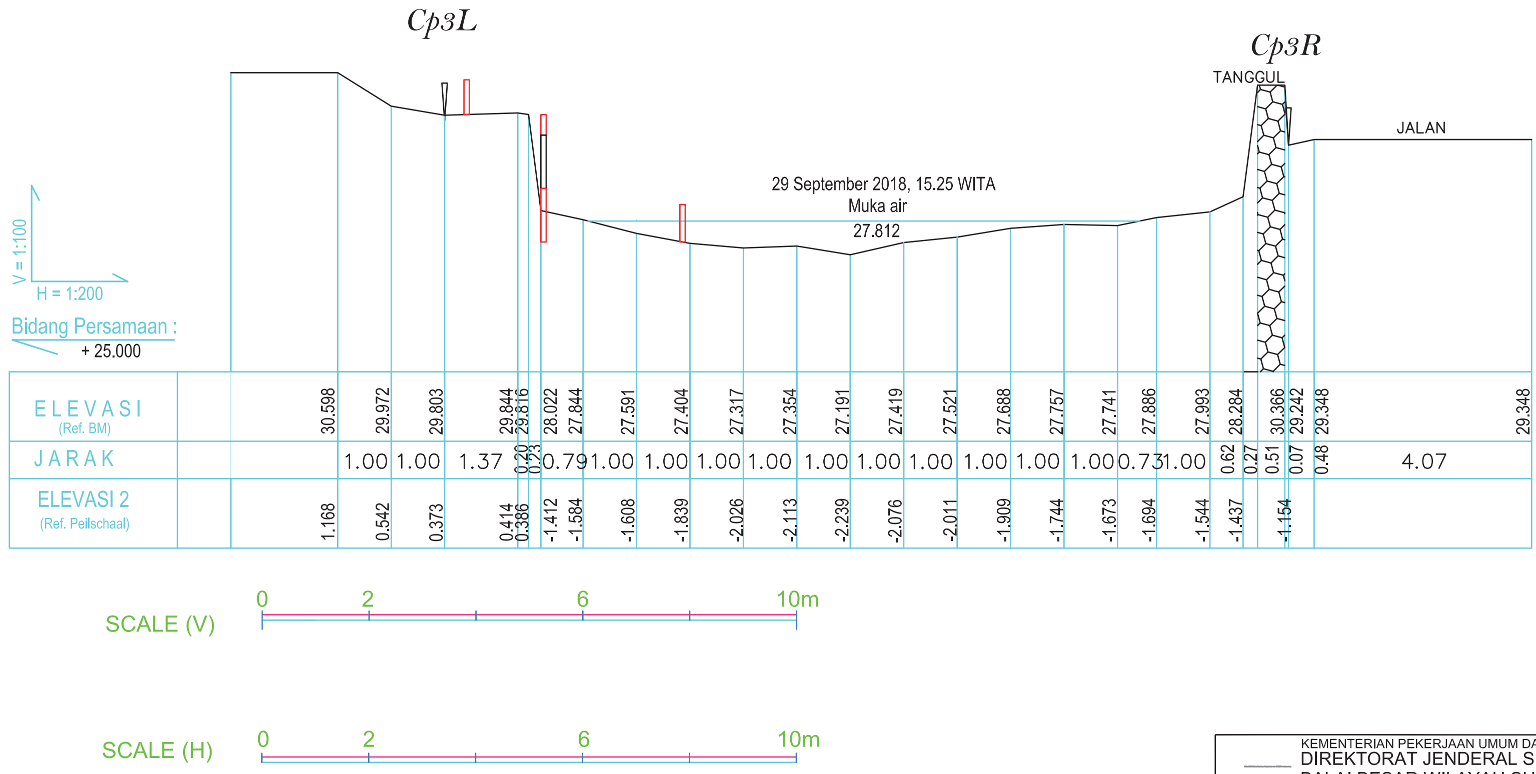
C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

CROSS SECTION CP 3



KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
BALAI BESAR WILAYAH SUNGAI SULAWESI I
Jalan Mr. A.A. Maramis, Kairagi Dua Telp (0431) 821621 Manado

JUDUL :	SURVEI TOPOGRAFI DI SUNGAI TONDANO		SISTEM KOORD.: UTM 51N
			NO. LEMBAR : 5
PEKERJAAN : TOPOGRAPHIC SURVEYS AT TONDANO RIVER, TIKALA RIVER, AND SARIO RIVER For JICA RBO's CD Project (Phase 2)			JML. LEMBAR : 5
DIGAMBAR	Ghulam Arfi Ghifari, ST		DIGAMBAR / SIZE A3
DIREKTUR	Galih M. Fatlan, ST		15 Februari 2018
JICA LONG TERM EXPERT	Hirohisa Miura		KONSULTAN PELAKSANA
Propinsi	Sulawesi Utara	Kabupaten	Kota Manado

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C.V. ATRIUM ARSITEK KONSULTAN PERANCANG

ANNEX 6-2

Manual No.002

Manual on Periodical Maintenance for AWLR (Microwave Type) at Tikala for BWS Sulawesi 1

The project on Capacity Development for RBOs
in Integrated Water Resources management in Indonesia (Phase 2)

Manual Pekerjaan Pemeliharaan berkala AWLR (Tipe Microwave) di Tikala

A6-2-No.002-3

Unit Hidrologi, BWS Sulawesi 1


AWLR di Tikala
AWLR Sensor
Catatan Muka Air Banjir, Januari 2014
peilschaal
Kabel yang menghubungkan Sensor dan Data Logger

A6-2-No.002-4

AWLR di Tikala

Data Logger and Battery Box

Daftar Periksa Pemeliharaan Berkala Alat AWLR

BWS Sulawesi 1

	Pembimbing	Pemeriksa	Pemeriksa		Pengawas	Pengamat
Daftar Periksa Pemeliharaan Harian Alat AWLR						
Nama Pos:						
Tanggal: / /	Waktu: : ~ :					

Uraian Pemeriksaan		Hasil	Masalah, Situasi Tidak Baik dan Penanggulangan yang kami lakukan
Kotak Data Logger	Kebersihan Di Dalam Kotak (Tidak Ada Serangga, Bagian Yang Kotor)	B / TB	
	Tidak Ada Kabel yang Putus	B / TB	
	Tidak Ada Peringatan pada Lampu Indikator ☐ Hijau Menyala : Terhubung dengan Baterai, Malam Hari ☐ Hijau Berkelip : Terhubung dengan Baterai, Siang Hari ☐ Hijau Mati : Tidak ada Baterai ☐ Merah menyala: Beban rendah / tinggi ☐ Merah Berkelip : Kelebihan Arus ☐ Merah Mati : Beban OK	B / TB	
Modem	Indikator signal dapat setidaknya 1 bar	G or NG	
	Indikator GSM/GPRS menyala warna orange	G or NG	
Panel Surya	Kebersihan Permukaan Panel	B / TB	
	Tidak ada bayangan yang menghalangi panel	B / TB	
	Tidak ada kabel yang terlepas	B / TB	
Kabel	Tidak Ada Kabel Rusak dari Kotak ke Panel Surya	B / TB	
	Tidak Ada Kabel Rusak dari Kotak ke Sensor	B / TB	
Sensor	Sensor masih ada	B / TB	
	Tidak Ada Kesrusakan pada Sensor	B / TB	
	Tidak Ada Kesrusakan pada Pelindung Sensor	B / TB	
	Tidak Ada Kesrusakan pada Tiang penyangga	B / TB	
	Tidak Ada Kerusakan pada Pagar	B / TB	
	Stable of the attachment at Bridge	B / TB	
	Tidak Ada Batu, Sampah dan Kayu di bawah Sensor di Sungai	B / TB	
Peilschall	Peilschall Masih Ada	B / TB	
	Tidak Ada Kerusakan pada Peilscahll	B / TB	
	Tidak Ada Kerusakan pada Pilar Besi	B / TB	
	Tidak ada Sampah dan Kayu pada Peilschall	B / TB	

A6-2-No.002-6

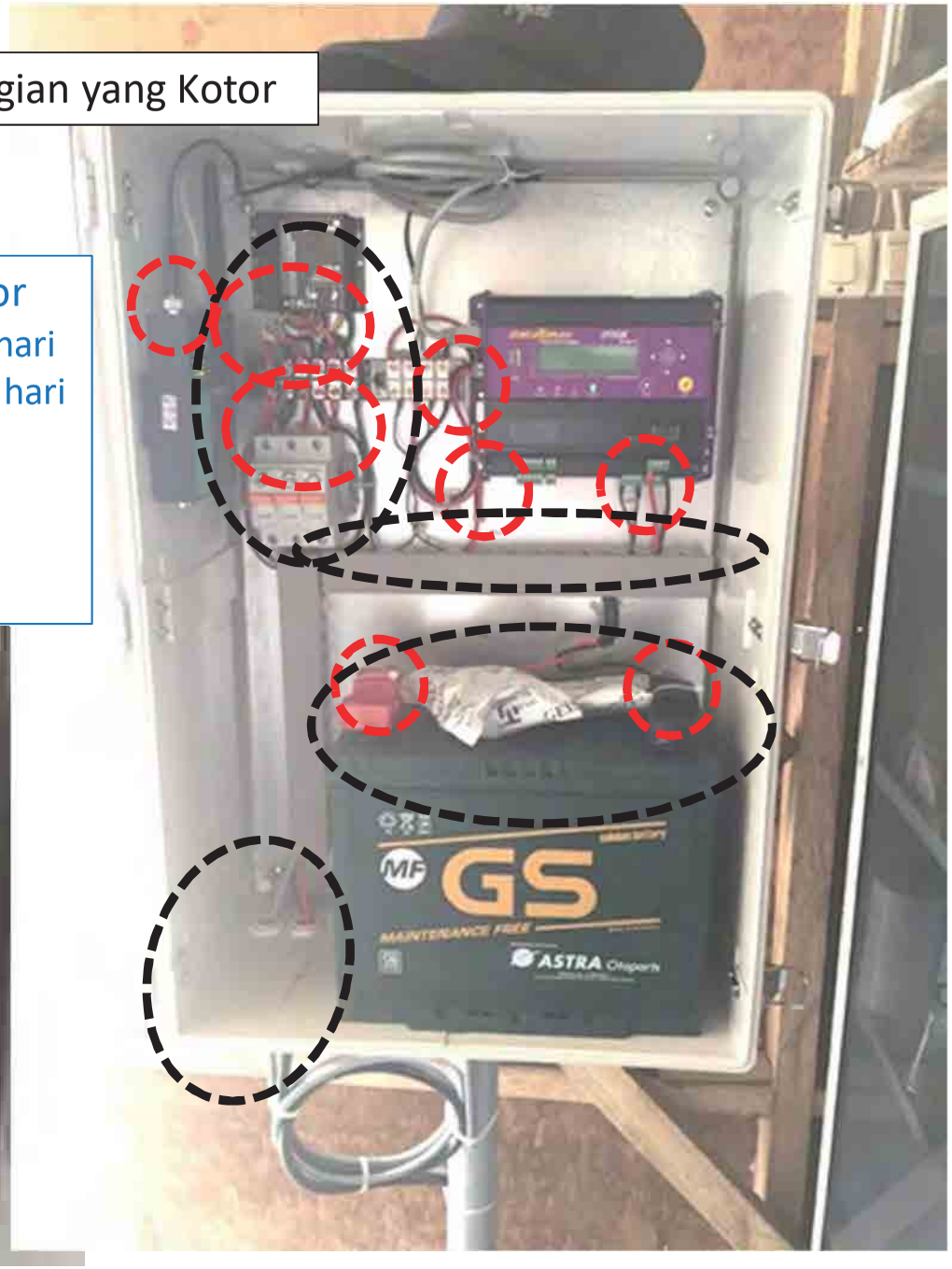
Data Logger

Kebersihan Kotak (Tidak ada Serangga, Bagian yang Kotor

Tidak ada Kabel Putus

Tidak Ada Peringatan Pada Lampu Indikator

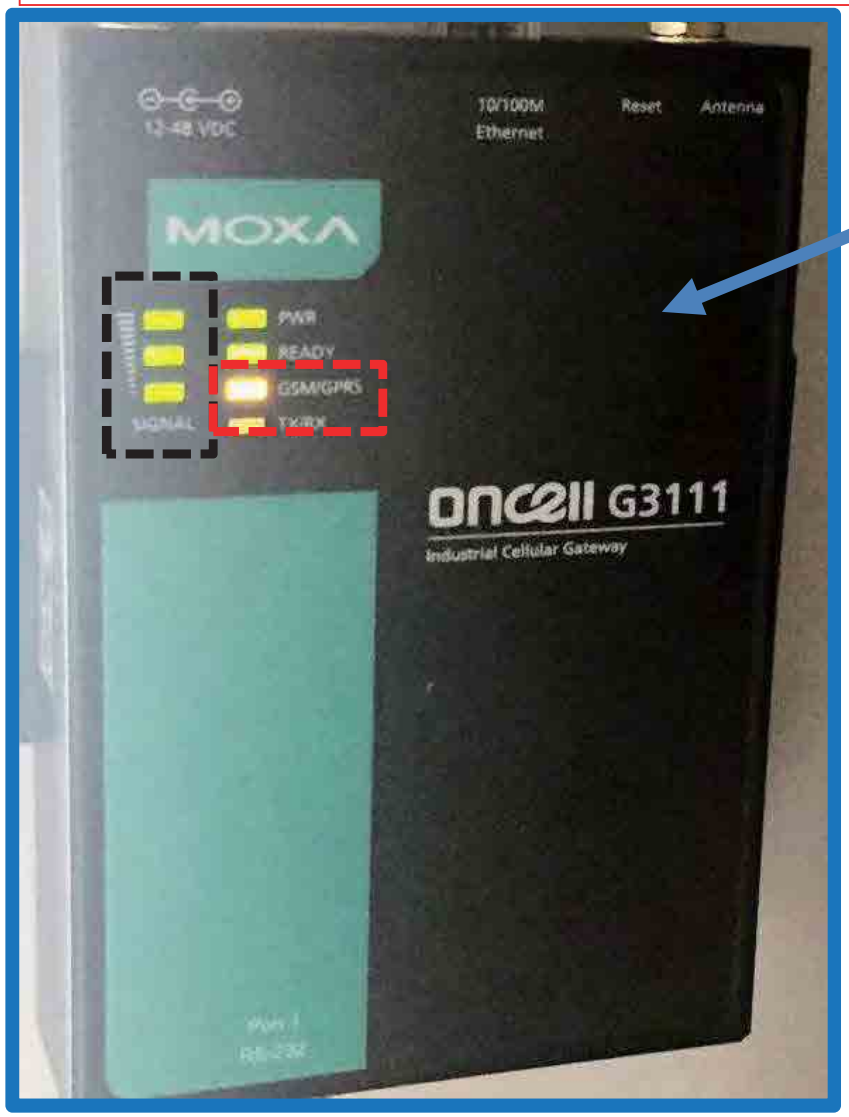
- ☐Hijau on : Terhubung dengan baterai,malam hari
- ☐Hijau flash : Terhubung dengan baterai,Siang hari
- ☐Hijau Off : Tidak ada baterai
- ☐Merah on : Beban rendah/tinggi
- ☐Merah flash : Kelebihan arus
- ☐Merah off : Beban OK



Modem

Indikator signal dapat setidaknya 1 bar

Indikator GSM/GPRS menyala warna orange



Solar Panel

Kebersihan Permukaan Panel

Tidak ada Bayangan pada Panel

Tidak ada Kabel Putus

A6-2-No.002-9

Kabel

Tidak ada Kabel Rusak dari Kotak Ke Solar Panel

Tidak ada Kabel Rusak dari Kotak Ke Sensor

Kotak Sensor

Sensor masih ada

Tidak ada Kerusakan pada sensor

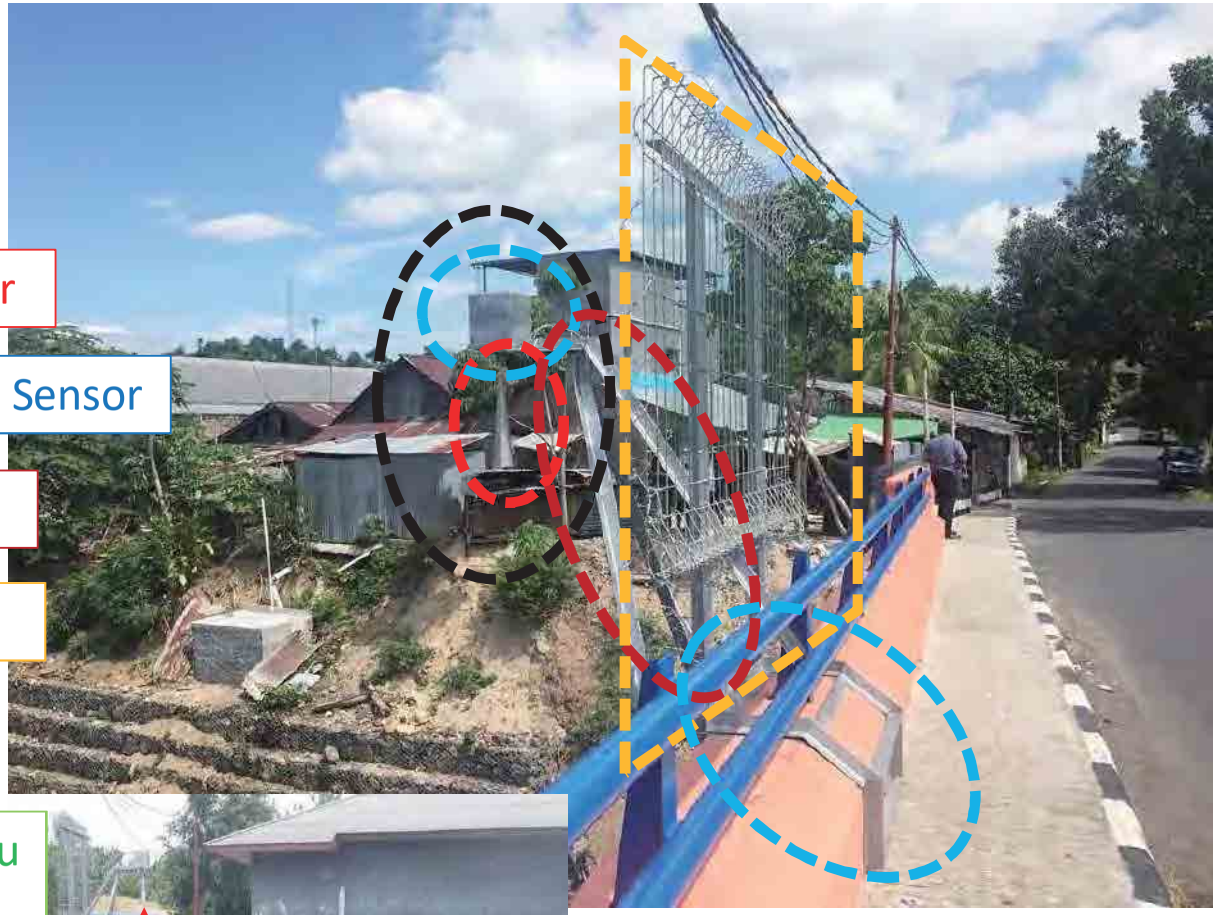
Tidak ada Kerusakan pada Cover Sensor

Tidak ada Kerusakan pada Tiang

Tidak ada Kerusakan pada Pagar

Stabil terpasang di jembatan

Tidak ada batu, sampah dan kayu
Dibawah sensor di sungai



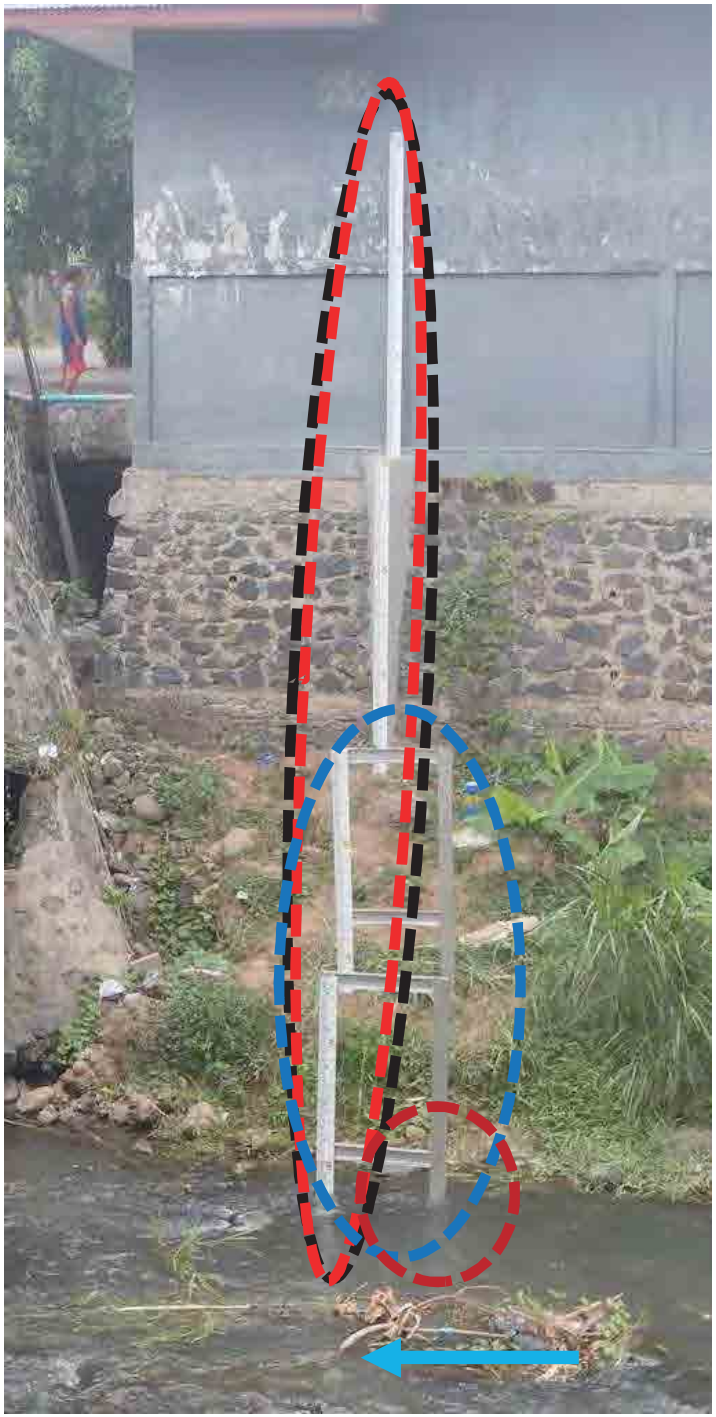
Peilschaal

Peilschaal masih ada

Tidak ada Kerusakan pada Peilschaal

Tidak ada Kerusakan pada Tiang Besi

Tidak ada Sampah dan Kayu pada Peilschaal



A6-2-No.002-12

BWS Sulawesi 1

Pembimbing	Pemeriksa	Pemeriksa	Pengawas	Pengamat

Daftar Periksa Pemeliharaan Harian Alat AWLR

Nama Pos:

Tanggal: / /

Waktu: : ~ :

Uraian Pemeriksaan		Hasil	Masalah, Situasi Tidak Baik dan Penanggulangan yang kami lakukan
Kotak Data Logger	Kebersihan Di Dalam Kotak (Tidak Ada Serangga, Bagian Yang Kotor)	B / TB	
	Tidak Ada Kabel yang Putus	B / TB	
	Tidak Ada Peringatan pada Lampu Indikator ☐ Hijau Menyala : Terhubung dengan Baterai, Malam Hari ☐ Hijau Berkelip : Terhubung dengan Baterai, Siang Hari ☐ Hijau Mati : Tidak ada Baterai ☐ Merah menyala: Beban rendah / tinggi ☐ Merah Berkelip : Kelebihan Arus ☐ Merah Mati : Beban OK	B / TB	
Modem	Indikator signal dapat setidaknya 1 bar	G or NG	
	Indikator GSM/GPRS menyala warna orange	G or NG	
Panel Surya	Kebersihan Permukaan Panel	B / TB	
	Tidak ada bayangan yang menghalangi panel	B / TB	
	Tidak ada kabel yang terlepas	B / TB	
Kabel	Tidak Ada Kabel Rusak dari Kotak ke Panel Surya	B / TB	
	Tidak Ada Kabel Rusak dari Kotak ke Sensor	B / TB	
Sensor	Sensor masih ada	B / TB	
	Tidak Ada Kesrusakan pada Sensor	B / TB	
	Tidak Ada Kesrusakan pada Pelindung Sensor	B / TB	
	Tidak Ada Kesrusakan pada Tiang penyangga	B / TB	
	Tidak Ada Kerusakan pada Pagar	B / TB	
	Stable of the attachment at Bridge	B / TB	
	Tidak Ada Batu, Sampah dan Kayu di bawah Sensor di Sungai	B / TB	
Peilschall	Peilschall Masih Ada	B / TB	
	Tidak Ada Kerusakan pada PeilscahII	B / TB	
	Tidak Ada Kerusakan pada Pilar Besi	B / TB	
	Tidak ada Sampah dan Kayu pada Peilschall	B / TB	

ANNEX 6-2

Manual No.003

Manual on Periodical Maintenance for ARR ‘Tipping Bucket Type) at Kuwil Kaleosan at BWS Sulawesi 1

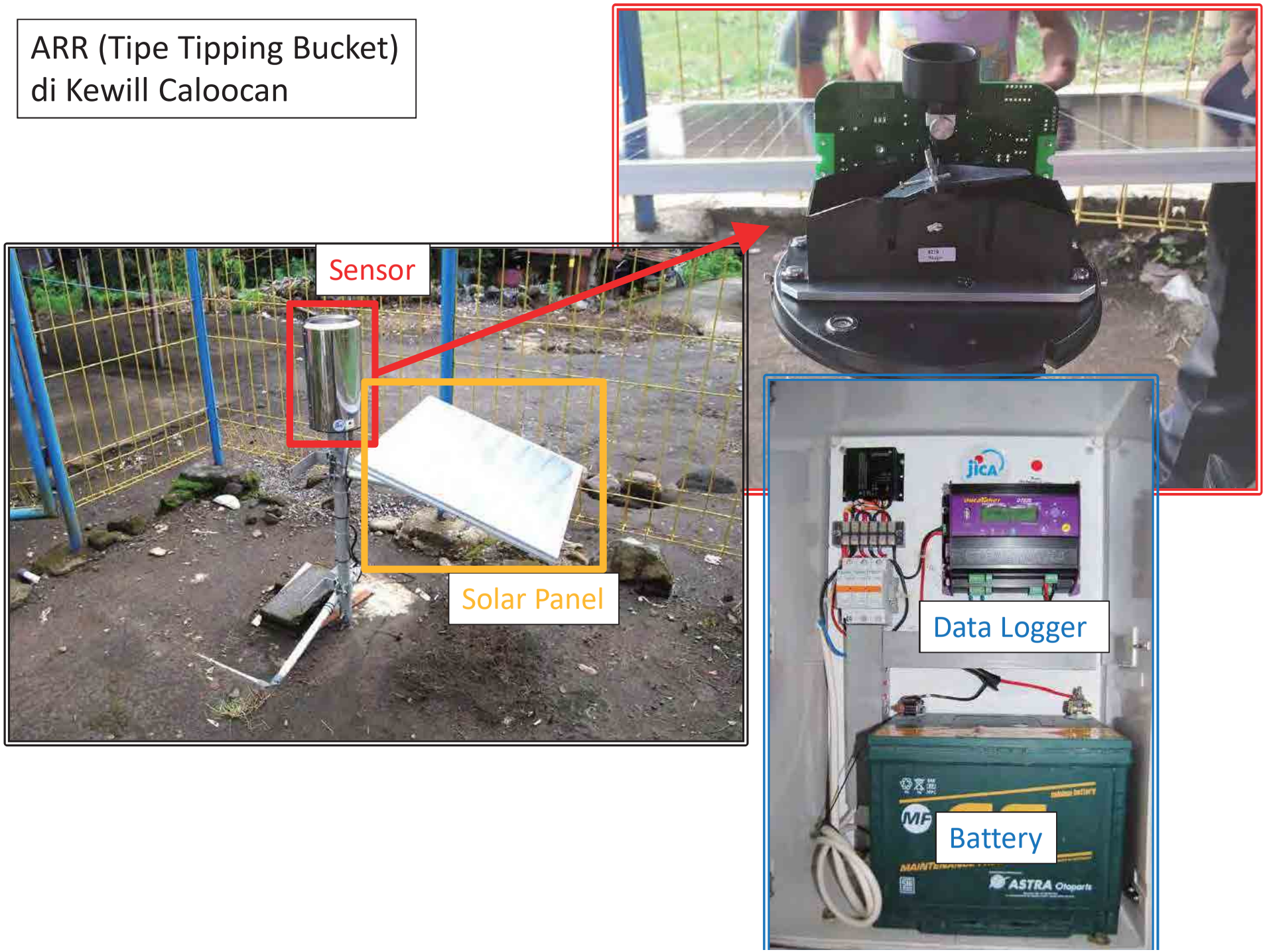
The project on Capacity Development for RBOs
in Integrated Water Resources management in Indonesia (Phase 2)

Manual Pekerjaan Pemeliharaan berkala ARR (Tipe Tipping Bucket) di Kuwill Kaleosan

A6-2-No.003-3

Unit Hidrologi, BWS Sulawesi 1

ARR (Tipe Tipping Bucket)
di Kewill Caloocan



A6-2-No.003-4

Contoh Daftar Pemeriksaan Pemeliharaan Berkala ARR

BWS Sulawesi 1

Pembimbing	Pemeriksa	Pemeriksa	Pengawas	Pengamat

Daftar Periksa Pemeliharaan Harian Alat ARR

Nama Pos:

Tanggal: / /

Waktu: : ~ :

Uraian Pemeriksaan		Hasil	Masalah, Situasi Tidak Baik dan Penanggulangan yang kami lakukan
Kotak Data Logger	Kebersihan Di Dalam Kotak (Tidak Ada Serangga, Bagian Yang Kotor)	B / TB	
	Tidak Ada Kabel yang Putus	B / TB	
	Tidak Ada Peringatan pada Lampu Indikator ☐ Hijau Menyala : Terhubung dengan Baterai, Malam Hari ☐ Hijau Berkelip : Terhubung dengan Baterai, Siang Hari ☐ Hijau Mati : Tidak ada Baterai ☐ Merah menyala: Beban rendah / tinggi ☐ Merah Berkelip : Kelebihan Arus ☐ Merah Mati : Beban OK	B / TB	
Panel Surya	Kebersihan Permukaan Panel	B / TB	
	Tidak ada bayangan yang menghalangi panel	B / TB	
	Tidak ada kabel yang terlepas	B / TB	
Kabel	Tidak Ada Kabel Rusak dari Kotak ke Panel Surya	B / TB	
	Tidak Ada Kabel Rusak dari Kotak ke Sensor	B / TB	
Penakar Hujan	Sensor masih ada	B / TB	
	Tidak Ada Kerusakan Pada Penakar	B / TB	
	Tidak Ada Serangga, Daun dan Sampah di dalam Penakar	B / TB	
	Tidak Ada Kerusakan pada Penyangga	B / TB	
	Tidak Ada Kerusakan pada Pagar Pelindung	B / TB	

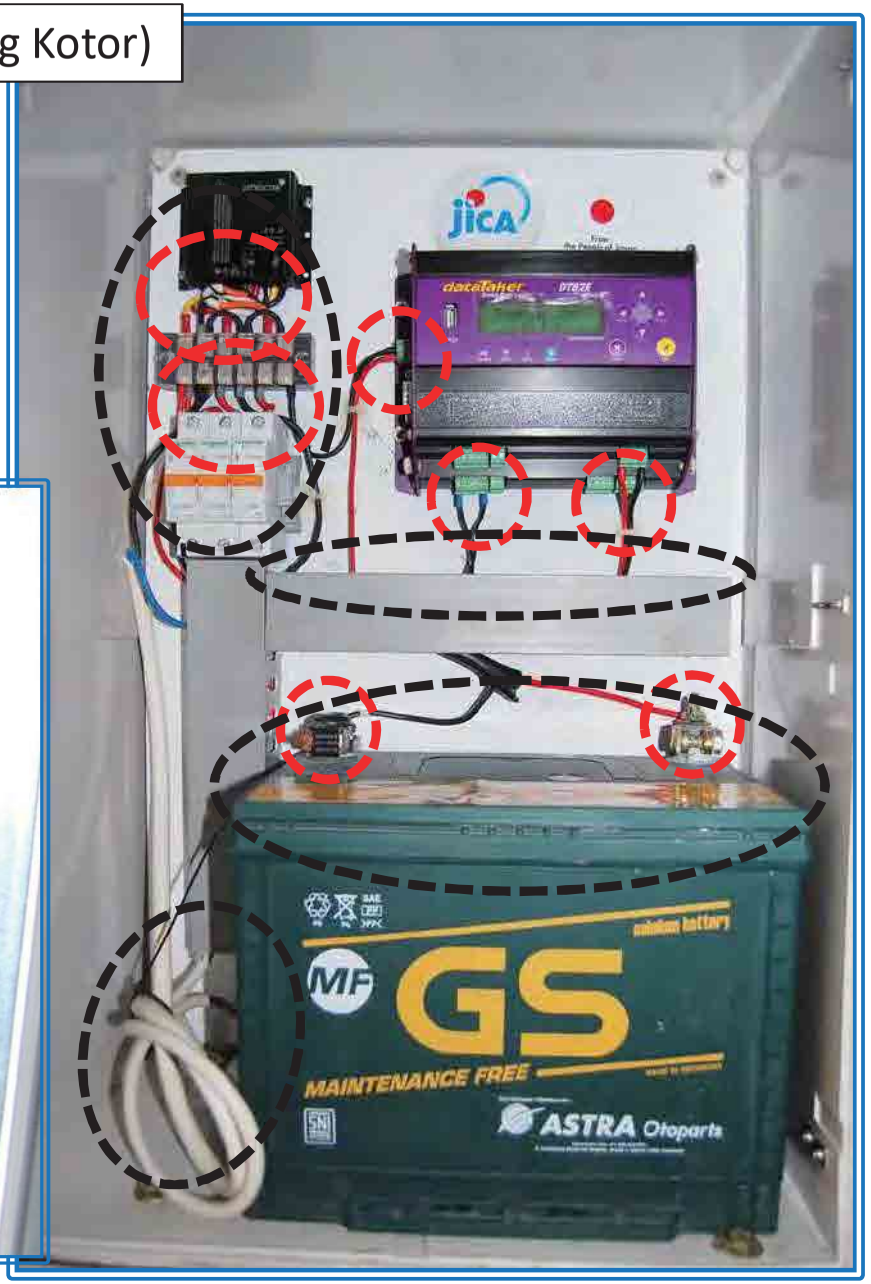
Data Logger

Kebersihan Box (Tidak Ada Serangga, Bagian Yang Kotor)

Tidak Ada Kabel yang Putus

Tidak Ada Peringatan Pada Lampu Indikator

- ☐ Hijau on : Terhubung dengan baterai,malam hari
- ☐ Hijau flash : Terhubung dengan baterai,Siang hari
- ☐ Hijau Off : Tidak ada baterai
- ☐ Merah on : Beban rendah/tinggi
- ☐ Merah flash : Kelebihan arus
- ☐ Merah off : Beban OK

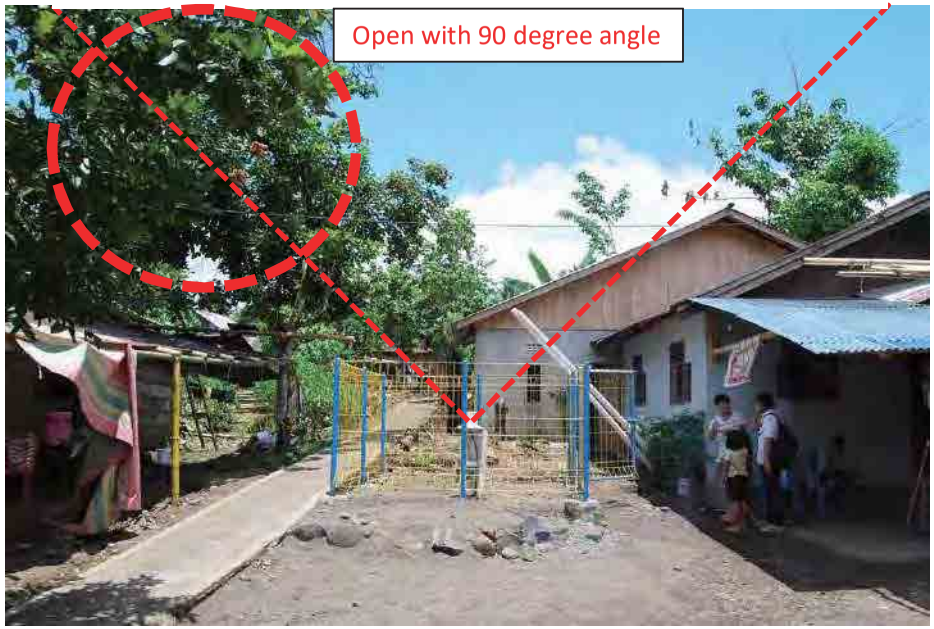


Solar Panel

Kebersihan Permukaan Panel

Tidak ada Bayangan pada Panel

Tidak ada Kabel Putus

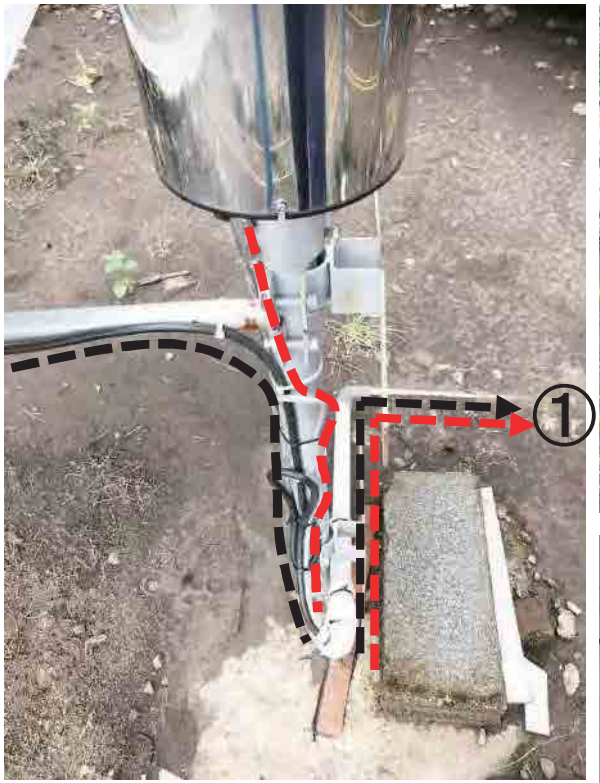


A6-2-No.003-7

Kabel

Tidak Ada Kabel Rusak dari Kotak ke Panel Surya

Tidak Ada Kabel Rusak dari Kotak ke Sensor



Penakar pada Sensor

Sensor masih ada

Tidak ada Kerusakan pada Penakar

Tidak ada Serangga, Daun dan Sampah pada Penakar

Tidak ada Kerusakan pada Tiang

Tidak ada Kerusakan pada Pagar

BWS Sulawesi 1

Leader	Inspector	Inspector

Supervisor	Observer

Daily Maintenance Check List of ARR

Station:

Date: / /

Time: : ~ :

Check Point		Result	Problems, Not Good Situation and Countermeasure that we done
Data Logger Box	Cleanness Inside (No Insects, Dirty Part)	G or NG	
	No Cable Disconnecting	G or NG	
	No Alart on Indicator Lamp ☐ Green on: Connect with battery, night ☐ Green flash: Connect with battery, daytime ☐ Green Off: There is no battery ☐ Red on: Low / high load ☐ Red flash: Over current ☐ Red off: Load OK	G or NG	
Solar Panel	Cleanness Panel Surface	G or NG	
	No Shadow on the Panel	G or NG	
	No Cable Disconnecting	G or NG	
Cable	No Damage Cable from the Box to Solar Panel	G or NG	
	No Damage Cable from the Box to Sensor	G or NG	
Basket of Sensor	Sensor still remains	G or NG	
	No Damage on the Basket	G or NG	
	No Insects, Leaves and any Gabbage in the Kasket	G or NG	
	No Damage on Beams	G or NG	
	No Damage on the Fence	G or NG	


JICA