KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL SUMBER DAYA AIR
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INDONESIA:

DAM OPERATIONAL IMPROVEMENT AND SAFETY PROJECT – ADDITIONAL FINANCING (DOISP AF)

ENVIRONMENTAL MANAGEMENT PLAN (EMP) OF YEAR 1 WORKS (2017)

December 2016

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DEFINITIONS

Terms	Meaning
Government	The Government of the Republic of Indonesia
Project	Dam Operational and Safety Improvement Project Additional Financing (DOISP AF)
Provincial government	The *provinsi* government, headed by a governor or *gubernur*
Local government	Municipal *(kota)* government (headed by a mayor or *walikota)* or district or regency *(kabupaten)* government (headed by a district head/regent or *bupati*)
Sub-project	Project component implemented at the central, provincial and/or *kabupaten/kota* level

ACRONYMS

B(B)WS	River Basin Unit (of the MPWH)
BDSF	Basic Dam Safety Facility
BLH	Local-Government Environmental Office (at Provincial or *Kabupaten/Kota* Level)
BPN	Land Administration Agency
CPIU	Central Project Implementation Unit
CPMU	Central Project Management Unit
DGWR	Directorate General Water Resources
DSU	Dam Safety Unit (*Balai Bendungan*)
EMP	Environmental Management Plan
ESMF	Environmental and Social Management Framework
GOI	Government of Indonesia
ICOLD	International Commission on Large Dams
INACOLD	Indonesian Commission on Large Dams (a Chapter of ICOLD)
MPWH	Ministry of Public Works and Housing
PIU	Project Implementation Unit
O&M	Operational and Maintenance
PIP	Project Implementation Plan
SF	Safety Factor
SID	Surveys, Investigations and Designs (SID)
TA	Technical Assistance
TD	Tender Document
UKL-UPL	*Upaya Pengelolaan dan Pemantauan Lingkungan* (Environmental Management and Monitoring Effort)
WBOJ	World Bank Office in Jakarta

1. Introduction

The Government of Indonesia with the World Bank has an agreement to finance Dam Operational and Safety Improvement Project (DOISP). The DOISP is a long-term project to substantially improve Indonesia's dam operation, dam structures and other dam related infrastructure in order to ensure continued water supply for beneficial local community use.

DOISP1 was implemented from 2009-2016 with Development Objectives to: (i) increase the safety and the functionality with respect to bulk water supply of 34 large MPWH-owned reservoirs; and (ii) strengthen the safety and operational management policies, regulations and administrative capacity of MPWH.

DOISP2 is a continuation of DOISP with additional financing and restructuring, hereafter named as DOISP AF and planned to be implemented from 2017-2022. The Development Objectives of DOISP AF are to (i) increase the safety and the functionality with respect to bulk water supply of large Ministry of Public Works-owned reservoirs; and (ii) strengthen the safety and operational management policies, regulations and administrative capacity of Ministry of Public Works and Housing.

This Environmental Management Plan (EMP) covers DOISP AF first year works namely Ubrug Spillway, Ketro Dam, Penjalin Dam, Greneng Dam, Tempuran Dam, Mrancang Dam.

1.1 Purpose of EMP

The purpose of this Environmental Management Plan (EMP) is to ensure that DOISP AF first year works are carried out in sustainable way by managing the environmental safeguards aspect. The social safeguard aspect will be managed according to ESMF. EMP contains plan for mitigation and monitoring of significant environmental impacts potentially generated from rehabilitation works of the DOISP AF during first year sub-projects implementation. This EMP also includes standard processes of monitoring, reporting and reviewing of EMP to simplify and unify the processes in sub-projects' PIU. The EMP is developed based on draft UKL-UPL for year 1 works. The Draft UKL-UPL is not yet submitted to the GOI Env Agency and not yet being disclosed and/or consulted with the affected people.

1.2 DOISP AF Components

The components of the DOISP AF are divided into 5 components:

Component 1: Dam Operational Improvement and Safety Works and Studies. The original objective under DOISP was to restore dam performance and safety by providing for: (i) design and construction of *minor* and localized rehabilitation and remedial works on each of about 34 prioritized large dam/reservoir sites ("sub-projects") to restore operational performance and/or safety (including spillway equipment repair and/or minor upgrading); (ii) four sub-projects for implementation in the first year; (iii) Surveys, Investigations and Designs (SID) – including social and environmental management plans – for *medium to major* works (sub-projects) to restore and/or improve operational performance and safety for approximately 22 dams/reservoirs to be implemented in the

successor project, including the second-phase additional works on about 14 dams/reservoirs that were subject of first improvement in DOISP; (iv) Basic Dam Safety Facility (BDSF) repair and/or upgrading to improve safety monitoring, and preparedness systems for spillway emergency discharge for about 34 dams; (v) establishing a river inflow and sediment monitoring system to improve the operational hydrology for about 63 dams, and review flood flow data, estimated flood discharge frequency, and PMF or "Flood Envelope Curves" related to watershed area; and (vi) assessment of spillway capacity and downstream flooding risks for approximately 34 dams (including surveys, models and feasibility studies regarding downstream effects to determine the viability of any spillway modification or operational change, to be undertaken in the successor project).

The additional financing of DOISP AF will finance the physical rehabilitation of major dams to restore dam performance and safety in accordance with the original design criteria. This includes 23 major dams prioritized and prepared under DOISP, along with priority investments from the remaining 111 major dams in the portfolio that are to be prioritized based on the objective criteria for identification and assessment. Support would include: (i) specialized studies, Surveys, Investigations and Designs (SIDs), supervision and quality control of rehabilitation works; (ii) rehabilitation works, including civil and hydro-mechanical works; (iii) installation, rehabilitation or upgrading of Basic Dam Safety Facilities (BDSF) to improve safety monitoring, flood forecasting and preparedness systems; (iv) installation, rehabilitation or upgrading of instrumentation for operational hydro-meteorological monitoring; and, (v) hydrological assessments to review flood flow data, estimate flood discharge frequency and review spillway capacity and downstream flooding risks. The project will not finance any new dam construction and is focused on the rehabilitation of existing dams and their associated structures, along with improved safety measures. These activities are not intended to exceed the original schemes, change their nature, or so alter or expand the scope and extent as to make them appear as new or different schemes.

Component 2: Operations and Maintenance Improvement and Capacity Building. The original objective under DOISP was to support improved operations and maintenance and to strengthen capacity building of the dam agency through: (i) preparation of O&M plans, Standard Operation Procedures (including rule curves and reservoir water balance) and manuals and undertaking needs based budgeting and O&M activities for about 34 dams and reservoirs, and for 29 dam sites to be rehabilitated under the successor project; (ii) preparation of dam and reservoir management plans and emergency spillway operation plans for about 34 dams; (iii) O&M staff training for dam safety monitoring, maintenance and operations, (iv) participatory programs on reservoir and dam management with local communities living near the reservoir, in approximately 20 reservoirs; and (v) provision of incremental operating costs for O&M of dams and reservoirs (borne by GOI).

The additional financing of DOISP AF will finance improvements in the operational elements required for securing dam safety and improved utilization. This would include: (i) strategic studies (sedimentation, catchment hydrology); (ii) asset management systems and needs based budgeting for operation and maintenance; (iii) Operation and Maintenance Plans; (iv) Instrumentation Plans and service standards; (v) Emergency Preparedness Plans, including dam break analyses, downstream flood mapping and

benchmarking; (vi) piloting of management contracts; and, (vii) basin-wide dam development and reservoir management plans.

Component 3: Reservoir Sedimentation Mitigation. The original objective under DOISP was to provide for measures to mitigate the risk of sedimentation of selected reservoirs and for sustained performance and safety through: (i) bathymetric surveys to determine the available total storage and water level-area-volume relations of approximately 30 of the 63 reservoirs known to be affected by accelerated sedimentation; (ii) feasibility studies, designs and any necessary safeguards plans for "within-reservoir" activities and interventions to be taken in the medium-term (e.g., dredging, hydro-suction, etc.) that can be funded in DOISP or the successor project; (iii) preparation for a sample study for decommissioning of a severely silted reservoir to be financed under the successor project; and (iv) piloting of institutional models and plans for treatment of upstream rivers and (sub-)catchments with construction of sediment retaining and river bank protection structures, mostly through community participation and incentive programs.

The additional financing of DOISP AF will support the scale-up of a comprehensive Sedimentation Management Program. This will include: (A) Corrective Measures, such as (i) dredging; (ii) flushing and diversion works; (iii) check dams; etc. and, (B) Preventative Measures, such as (i) piloting watershed management program by formulating a Watershed Management Plan for selected dams. This includes developing a hydrological model to predict the impact of mitigation strategies on flood runoff and sediment yield, preparing a local regulation for dam watershed conservation, implementing a watershed conservation program, and setting up a sediment load sampling station; and (ii) conduct community participation program in watershed management, that may include carrying out watershed community educational program and piloting of market based mechanisms, such as Payment for Environmental Services.

Component 4: Dam Safety Assurance Institutional Improvement. The original objective under DOISP was to further strengthen and consolidate the regulatory framework and national dam safety institution and strengthen MPWH's capacity for portfolio management and regulation in order to sustain rehabilitation works and reservoir life. This was achieved through: (i) the preparation of the Government and Ministerial regulatory documents and Concept/Academic Papers, including the consultations; (ii) a public awareness campaign about dams and reservoirs, and dissemination to all public and private dam owners of the regulations and guidelines regarding dams and reservoirs; (iii) strengthening and development of the DSU better fulfill its regulatory roles for about 63 dams under MPWH's program, and of other public and mines tailings dams through staff recruitment and training (with outsourcing of work to consultants and RCWR); (iv) provision of a fully furnished and equipped DSU office capable of housing about 30 engineers; (v) preparation of new or updated DSC Guidelines; (vi) establishing and supporting a National Dam Safety Panel to review site investigations and designs; (vii) establishing a dam engineer and technician training and certification system in cooperation with INACOLD; and (viii) incremental costs of the structural CDMU in DGWR to operate as the focal point for dam safety monitoring, review and archiving

The additional financing of DOISP AF will continue to support Government's

institutional evolution and further innovations in building water resources institutions in Indonesia. The institutional activities aim at: (i) strengthening the capacity of MPWH to manage its dam portfolio better and regulate large dams in the country, and (ii) improving the sustainability of the rehabilitation works and the reservoir life. This will include support for the following: (i) institutional assessments, benchmarking and enhanced coordination mechanism among line agencies; (ii) regulatory support and instruments, standards and guidelines, including national dam policy on registration, inspection, safety compliance and penalties; (iii) a National Dam Safety Management System; and (iv) human resource development and capacity building.

Component 5: Project Management. The original objective of this component under DOISP1 was to provide for overall Project Management including provision of: (i) the principal Project Management TA Consultant; (ii) the incremental operating costs of the Central Project Management Unit's (CPMU) and Project Implementation Units (PIUs) activities for coordinating all project interventions; and (iii) all TA support to prepare for the successor project.

The additional financing of DOISP AF will support continued implementation and the overall project management through: (i) the Central Project Management Unit (CPMU) within Ministry to provide the necessary support services for timely and effective project implementation, including monitoring & evaluation, procurement, financial management, safeguard monitoring, etc.; (ii) Technical Assistance for the Dam Safety Unit to ensure oversight and effective implementation; (iii) Technical Assistance for the river basin organizations to ensure timely and effective implementation; (iv) Environmental and Social Service Provider/s; (v) an international Dam Safety Panel of Experts; (vi) a National Dam Safety Review Panel; and, (vii) the incremental operating costs of the Central Project Management Unit's (CPMU) and the Project Implementation Units (PIUs) for activities related to project implementation.

1.3 Year 1 Works Description

For the first year of works (year 2017) there are 6 dams/reservoirs, which will undergo rehabilitation/remedial works. The initial sub-projects were screened based on the screening process and risk assessment detailed above, as well as dam safety assessment/special study. The sub-projects are:

1. Ubrug (spillway radial gate) located on Jatiluhur Sub-District, Purwakarta District, West Java Province. Ubrug Spillway in BBWS Citarum is one of three saddle dams at Jatiluhur. The Special Study found that a fully control gate in the exiting auxiliary spillway is needed to reduce risk of overspill in the morning glory. It is actually in accordance with the original design of the dam. At the time of construction four outlets in the auxiliary spillway were blocked with solid concrete arches. These would be breached through blasting with dynamite during a high flood event. To improve operational capacity, it is now proposed to go back to the original design to replace the concrete arches with two radial gates.
2. Ketro located on Tanon Sub-District, Sragen District, Central Java Province. Ketro Dam in BBWS Bengawan Solo is a 15m high, earthfill dam with a central clay core built in 1984. The Special Study found that piping in the downstream slope need permanent solution. The section of main dike in 0+180 also found to be unsafe with

safety factor (SF) below minimum of 1.2 and 1.3 with and without earthquake. Based on the findings of the Special Study, the scope of work under the additional financing includes rehabilitation of main dike, minor replacement of hydro-mechanical and dredging of sediment.

3. Penjalin located on Bumiayu Sub-District, Brebes District, Central Java Province. Penjalin Dam in BBWS Pemali Juana is a 23m high, homogenous earthfill dam built in 1934. The Special Study found that the safety main dike to the earthquake is below minimum level, piping in the downstream slope is also observed. Based on the findings of the Special Study, the scope of work under the additional financing includes rehabilitation of the main dike, using diaphragm wall, minor replacement of hydro-mechanical and dredging of sediment.
4. Greneng located on Blora Sub-District, Blora District, Central Java Province. Greneng Dam in BBWS Pemali Juana is a 13m high, homogenous earthfill dam built in 1918. The Special Study found similar case like in Penjalin dam. Based on the findings of the Special Study, the scope of work under the additional financing includes replacement of material along the dike, improved compaction and stability along with dredging of sediment.
5. Tempuran located on Blora Sub-District, Blora District, Central Java Province. Tempuran Dam in BBWS Pemali Juana is an 18m high, homogenous earthfill dam built in 1916. The Special Study found frequent piping in a spot where a big tree was removed. Sliding and crack in the crest level also happened. Based on the findings of the Special Study, the scope of work under the additional financing includes replacement of material along the dike, improved compaction and stability along with dredging of sediment.
6. Mrancang located on Gunung Tabur Sub-District, Berau District, East Kalimantan Province. Mrancang Dam in BWS Kalimantan III is a 08m high, homogenous earthfill dam built in 1995. The Special Study found that due to consolidation and crack the existing crest level is about 1.8 meter below design level. The existing spillway might not be enough to cope with flood, the dam is not safe. Based on the findings of the Special Study, the scope of work under the additional financing includes and leveling of undulating main dike, and repair spillway, minor replacement of hydro-mechanical and dredging of sediment.

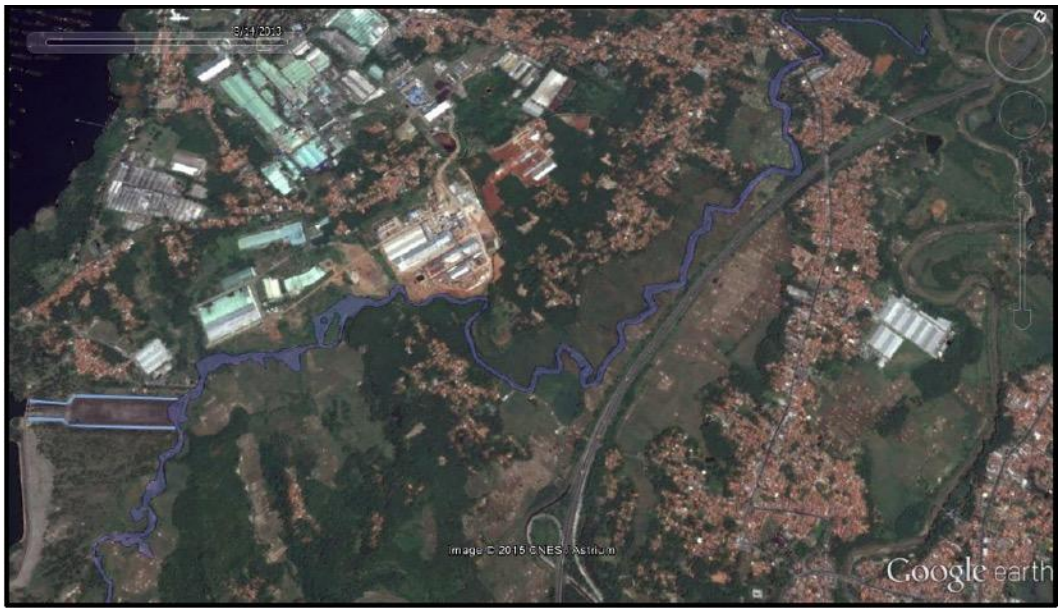
2. Sub-project Scope of Activities

2.1 Ubrug Spillway, Jatiluhur Dam, Jatiluhur Sub-District, Purwakarta District, West Java Province;

Jatiluhur dam is a multi-purpose water reservoir that located about 80 km south-east of Jakarta on Citarum River. It is the largest and most important dam in Indonesia and was commissioned in 1967. It is owned by the Government of Indonesia through the Ministry of Public Works and is operated by Perum Jasa Tirta II (PJT II), a state owned company.

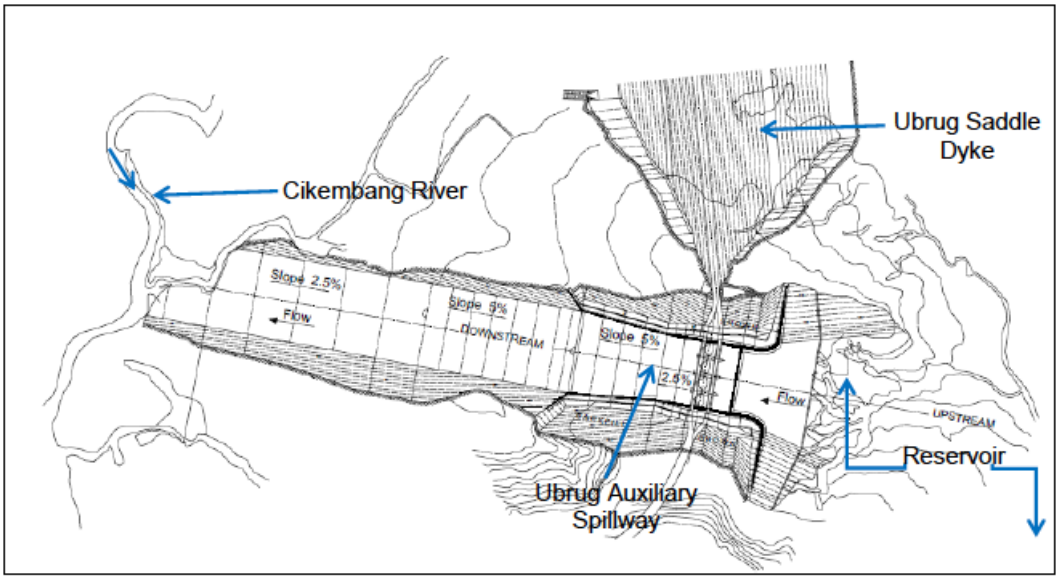
Ubrug spillway is situated at about 14 km from Jatiluhur Main Dam and is accessible by road. The road alignment is winding and traverses through countryside. Ubrug dike is 24m high, 550m long earthfill dam. It has the crest elevation of 114.5.0m. The spillway is

located at left side of this dike (**Figure 2**). It has four bays separated by three piers.



Source: Ubrug Spillway UKL-UPL Report, 2014

Figure 1: *Location Map of Business Plan and/or Activity of Ubrug Auxiliary Spillway*



Source: Technical Report on Ubrug Auxiliary Spillway, 2015

Figure 2*: Ubrug Auxiliary Spillway Plan*

Based on current needs to improve the dam operation and safety aspect, Ubrug Spillway will undergo some physical rehabilitation works in 1st year of the project. Based on the overall planned activities, activities with potential significant impact to the environment are identified for each of 3 (three) construction activities, they are:

a) Pre-Construction

- Planning and Socialization
- Installation of project activities boundary sign

b) Construction

- Construction Workers Recruitments
- Mobilization of Heavy Equipments and Materials
- Dismantling of Ubrug Spillway Concrete Walls
- Installation of Ubrug Spillway Radial Gates

c) Operation/Post Construction

- Recruitment of workers for operation

2.2 Ketro, Tanon Sub-District, Sragen District, Central Java Province;

Ketro Dam, with the length of 1.200 meters and catchment area of 50 km^2, could reserve ± 2,7 millions m^3 water from Ketro River. Ketro Dam is located on Ketro Village, Tanon Sub-District, Sragen District, Central Java. The function of Ketro Dam is to reserve water during the rainy season, to be later utilized for irrigation, raw water supply, fisheries, and tourism purposes. Irrigation area of Ketro Dam covers 862 Ha of agricultural land in surrounding area.

Source: Ketro Dam Special Study Report, 2012

***Figure 3**: Location Map of Business Plan and/or Activity of Ketro Dam*

Based on current needs to improve the dam operation and safety aspect, Ketro Dam will undergo some physical rehabilitation works in 1st year of the project. Based on the overall planned activities, activities that has potential significant impact to the environment are identified for each of 3 (three) construction activities, they are :

a) Pre-Construction

- Detailed Survey, Measurement, and Planning
- Project Socialization, Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

b) Construction

- Rehabilitation Works of Upstream Slope of Dam (Riprap)
- Rehabilitation Works of Downstream Slope of Dam (Riprap)
- Drainage Works And Installation of Geotextiles
- Grass Planting Works
- Rehabilitation of Dam Instrumentation And Related Equipments
- Dredging of Sediment And Garbage
- Mobilization of Construction Equipment and Materials
- Mobilization/Recruitment of Human Resources
- Management of Loss Area, Site Office, Warehouse, and Base Camp
- Land Clearing and Transport of Soil

c) Operation/Post Construction

- Operation and Maintenance
- Dam Function after Rehabilitation
- Change of Activities in the Surrounding Communities
- Improvement of Social and Economic Conditions in the Surrounding Communities

2.3 Penjalin, Bumiayu Sub-District, Brebes District, Central Java Province;

Penjalin Dam is located in the administrative area of Paguyungan Village, Bumiayu Sub-District, Brebes District, Central Java. Penjalin Dam is a homogenous earthfill dam built in 1930-1934, with maximum height of 22,64 meters, length of 842 meters, and catchment area of 4,40 km^2 with storage capacity of 8,992 million m^3.

Penjalin Dam water source is the Penjalin River and its tributaries. Penjalin dam serves as a water reservoir in the rainy season and technical irrigation for 29,000 Ha of paddy fields, as well as raw water supply for the surrounding community. By 2008, total length of the diaphragm wall installed on Penjalin Dam is 650 meters, while length of the dam is 842 meters. Penjalin watershed, which includes 4,219 km^2 (421,9 Ha) area, has an annual sediment rate of 347,84 ton/Ha/year. This rate indicates a critical land erosion in the

watershed. For that, measures must be taken to conserve land and control the sediment transport in Penjalin waterssed. This data is obtained from bathymetry and tachimetri result in 2010 and 2013

Source: Penjalin Dam Special Study Report, 2012

***Figure 4**: Location Map of Business Plan and/or Activity of Penjalin Dam*

Based on current needs to improve the dam operation and safety aspect, Penjalin Dam will undergo some physical rehabilitation works in 1st year of the project. Based on the overall planned activities, activities that has potential significant impact to the environment are identified for each of 3 (three) construction activities, they are:

a) Pre-Construction

- Detailed Survey, Site Identification, and Benchmarking
- Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

b) Construction

- Construction of Diaphragm Wall (length = 136 meters, depth = ± 30 – 40 meters)
- Dredging of Sediment (Volume = ± 1.000 m3)
- Enhancement of Dam Crest Height and Asphalting
- Readjustment of Land Use in Dam/Benchmark Surrounding
- Moving of Berthment Pier
- Spillway Rehabilitation Works
- Dam Drainage Works and V Notch

- Construction of Clean Water Storage
- Mobilization of Construction Equipment and Materials
- Mobilization of Human Resources
- Management of Borrow Area, Quarry, Loss Area, Directiekeet (Site Office), Warehouse, and Base Camp

c) Operation/Post Construction

- Land Use Management with Legal Measures
- Change of Activities in the Surrounding Communities
- Improvement of Social and Economic Conditions in the Surrounding Communities

2.4 Greneng, Blora Sub-District, Blora District, Central Java Province

Built in 1919, Greneng Dam is a homogenous earthfill dam with maximum height of about 11,70 meters. Greneng Dam has length of 240 meters, catchment area of 4.99 km^2, and storage capacity under normal conditions of ± 2.3 million m^3. The dam store water from Gowak River and tributaries of Rante River. Greneng Dam serves as water reservoir during rainy season to be later used for technical irrigation of 251 Ha agricultural area and raw water supply for the surrounding community.

Areas located on the downstream are areas that will benefit from the existence of the dam, they are: 5 (five) villages in the Tunjungan Sub-District including Tunjungan Village, Sambungrejo Village, Kalangan Village, Tambahrejo Village, and Adirejo Village and 2 (two) villages in the Banjarejo Sub-District including Plosorejo Village and Buluroto Village. Total area of the villages mentioned is around 60.33 km^2, with widest village area is Tunjungan Village (29.70 km^2) and smallest area is Plosorejo Village (1.80 km^2).

Source: Greneng Dam Special Study Report, 2012

***Figure 5**: Location Map of Business Plan and/or Activity of Greneng Dam*

Based on current needs to improve the dam operation and safety aspect, Greneng Dam will undergo some physical rehabilitation works in 1st year of the project. Based on the overall planned activities, activities that has potential significant impact to the environment are identified for each of 3 (three) construction activities, they are:

a) Pre-Construction

- Detailed Survey, Measurement, and Planning
- Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

b) Construction

- Construction of Cofferdam (Coffering and Dewatering)
- Rehabilitation of Main Dam on the Left and Right Side
- Connecting Hill Works
- Rehabilitation of Dam Slope/Riprap and Geotextiles
- Spillway Rehabilitation Works
- Rehabilitation of Instrumentations and its related Equipments
- Dredging of Sediment and Garbage
- Mobilization of Construction Equipment and Materials
- Mobilization of Human Resources
- Socialization, Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

c) Operation/Post Construction

- Operation and Maintenance
- Dam Function after Rehabilitation
- Change of Activities in the Surrounding Communities
- Improvement of Social and Economic Conditions in the Surrounding Communities

2.5 Tempuran, Blora Sub-District, Blora District, Central Java Province

Tempuran Dam, with a storage capacity of 2.143 million m^3, currently functions as raw water sources for Blora Sub-District water supply and irrigation of 923 Ha agricultural land. Previously, a bathymetry measurement in Tempuran Dam was carried out by PT. Indra Karya Region III JV and PT. Yodya Karya Utama Semarang Branch in 2012. Based on the result, current Tempuran Dam's storage capacity is 0.46 million m^3. The dam has lost > 50% of its design storage capacity due to high rate of sedimentation.

Source: Tempuran Dam Special Study Report, 2012

***Figure 6**: Location Map of Business Plan and/or Activity of Tempuran Dam*

Based on current needs to improve the dam operation and safety aspect, Tempuran Dam will undergo some physical rehabilitation works in 1st year of the project. Based on the overall planned activities, activities that has potential significant impact to the environment are identified for each of 3 (three) construction activities, they are:

a) Pre-Construction

- Detailed Survey, Measurement, and Planning
- Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

b) Construction

- Construction of Cofferdam (Coffering and Dewatering)
- Rehabilitation of Main Dam on the Left and Right Side
- Connecting Hill Works
- Rehabilitation of Dam Slope/Riprap and Geotextiles
- Spillway Rehabilitation Works
- Rehabilitation of Instrumentations and its related Equipments
- Dredging of Sediment and Garbage
- Mobilization of Construction Equipment and Materials
- Mobilization of Human Resources
- Socialization, Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

c) Operation/Post Construction

- Operation and Maintenance
- Dam Function after Rehabilitation
- Change of Activities in the Surrounding Communities
- Improvement of Social and Economic Conditions in the Surrounding Communities

2.6 Mrancang, Gunung Tabur Sub-District, Berau District, East Kalimantan Province

Mrancang Dam is located Merancang Village, Gunung Tabur Sub-District, Berau District, East Kalimantan. Merancang Dam, which is a homogeneous earthfill dam, was built in 1992. The dam has maximum height of approximately 5.5 meters, total length of 1,152 meters, and catchment area of 14.4 km^2, and storage capacity of approximately 13,04 million m^3. The dam receives water from Selubuk River.

Mrancang Dam serves as a water reservoir in the rainy season to be later used for irrigation of 1,200 Ha agricultural area and raw water supply for the surrounding community. The dam is operated and managed under the authorities of BWS (River Basin Organization) Kalimantan III, Ministry of Public Works and Housing.

Source: Merancang ; Laporan SS Bendungan Mrancang, 2012

***Figure 7**: Location Map of Business Plan and/or Activity of Mrancang Dam*

Currently, Merancang Dam, which has normal storage capacity of 9.78 million m^3 normal, mainly functions as raw water supply for people in Gunung Tabur Sub-District and water irrigation sources for 1200 Ha agricultural land. A bathymetry measurement has been carried out in Mrancang Dam under an SS (Special Study) by PT. Indra Karya (Persero) in 2012. The result showed that current reservoir capacity is 9.0 million m^3.

There are needs to improve the operation and safety aspect of Tempuran Dam, therefore will undergo some physical rehabilitation works in 1st year of the additional financing. Based on the overall planned activities, activities that has potential significant impact to the environment are identified for each of 3 (three) construction activities, they are:

a) Pre-Construction

- Detailed Survey, Measurement, and Planning
- Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

b) Construction

- Construction of Access Road
- Construction of Cofferdam (Coffering and Dewatering)
- Rehabilitation of Main and Secondary Dam
- Rehabilitation of Upstream Toe of Main Dam Slope and Toe Drain Filter
- Rehabilitation of Dam Crest and Spillway
- Hydromechanical Works (Rehabilitation of Sluice Gate, and Trashrack)
- Rehabilitation of Instrumentations and its related Equipments

- Dredging of Sediment and Garbage
- Mobilization of Construction Equipment and Materials
- Mobilization of Human Resources
- Management of Loss Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

c) Operation/Post Construction

- Operation and Maintenance
- Dam Function after Rehabilitation
- Change of Activities in the Surrounding Communities
- Improvement of Social and Economic Conditions in the Surrounding Communities

3. Impacts Identification

3.1 Typical Impacts

In general, DOISP AF first year sub-project activities will have low risk impacts for:

1. Air pollution associated with vehicle and mechanical equipment use;
2. Domestic and construction waste generation associated with construction activities;
3. Natural resource depletion associated with fuel for vehicles and mechanical equipment, materials use for construction such as cement, masonry and asphalt;
4. Noise pollution directly associated with the activities;
5. Soil and water pollution associated with spills from mechanical equipment, especially if working adjacent to water bodies;
6. Disruption or change of water release schedule;
7. No land acquisition;
8. No impact on Indigenous Peoples.

It can be determined that the indirect and direct environmental and social impacts both upstream and downstream associated with the activities can be considered minimal. Detailed impact identification is described below.

3.2 Ubrug Impacts

It has been envisaged that construction activities of the Ubrug Spillway may have environmental impacts. The potential impacts have been identified through identification matrix as shown in table below.

Table 1: *Environmental Impact Identification Matrix of Ubrug Spillway*

No	Activities / Environmental Components	Pre-Construction			Construction					Post-Construction	
		1	2	3	1	2	3	4		1	2
A.	***Geophysics - Chemical***										
1.	Air Quality					V					
2.	Noise					V					
3.	Traffic Congestion					V					
4.	Surface Water Quality						V	V			
B.	***Biology***										
1.	Wildlife Habitat										
C.	***Social, Economic, Culture, and Public Health***										
1.	Land Ownership			V							
2.	Agriculture Production			V							
3.	Job Opportunity				V					V	
4.	Business Opportunity				V						
5.	Income				V					V	
6.	Social Perception	V	V	V	V						V
7.	Sanitation										
8.	Prevalence of Disease					V					

Note:

Pre-Construction:
(1) Planning and Socialization
(2) Installation of Project Activities Sign

Construction:
(1) Construction Workers Recruitments
(2) Mobilization of Heavy Equipments and Materials
(3) Dismantling of Ubrug Spillway Concrete Walls
(4) Installation of Ubrug Spillway Radial Gates

Post-Construction
(1) Recruitment of workers for operation

3.3 Ketro Impacts

Physical rehabilitation activities planned in Ketro Dam has potential impact to the environment around the work site. Study on those environmental impacts is expected to support an effective and environmentally sound project implementation. Downstream area of the dam mainly consists of agricultural areas and technical irrigation areas which is very fertile. Agriculture is the primary source of income for people surrounding the dam. Benificiaries of the dams includes 6 (six) Villages in Tanon Sub-District, they are Tanon Village, Ketro Village, Slogi Village, Karangasem Village, Gabugan Village, and Bonagung Village. Total area of the villages mentioned is around 19.48 km^2, with widest village area is Tanon Village (3.49 km^2) and smallest area is Gabungan Village (2.89 km^2).

Potential environmental impacts arising from physical rehabilitation of the dam is analysed in an Impact Identification Matrix by looking at the interaction between the activities of the project (pre-construction, construction and post-construction stage) and the environment components. After overall potential impact of the activitiy is identified, then Significant Impacts Prediction is analysed, then followed by Significant Impacts Evaluation.

Impact Identification Matrix through the checklist method will present information on which environmental components are affected (both positive and negative impact) by the project activities. The matrix is presented on the following table.

Table 2: *Environmental Impact Identification Matrix of Ketro Dam*

No	Activities / Environmental Components	Pre Construc-tion		Construction											Post-Construction			
		1	2	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
A.	***Geophysics - Chemical***																	
1.	Topography	V																
2.	Land Use	V				V										V		
3.	Water Quality			V	V	V		V	V	V	V			V				
4.	Air Quality			V	V	V	V	V	V	V	V	V						
5.	Noise			V	V	V	V	V				V						
B.	***Biology***																	
1.	Flora					V												
2.	Fauna																	
C.	***Socio-Economic-Culture***																	
1.	Mobility			V	V		V	V		V	V	V	V	V				
2.	Livelihood			V				V		V	V	V	V	V				
3.	Land Ownership					V									V	V		
4.	Health			V	V	V	V	V	V	V	V	V	V	V				
5.	Infrastructure and Transportation			V	V	V	V	V	V	V	V	V		V				
6.	Community Standard of Living							V					V					V
7.	Community Activities							V	V				V		V		V	

Note:

Pre-Construction:
(1) Detailed Survey, Measurement, and Planning
(2) Project Socialization, Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

Construction:
(1) Rehabilitation Works of Upstream Slope of Dam (Riprap)
(2) Rehabilitation Works of Downstream Slope of Dam (Riprap)
(3) Drainage Works and Installation of Geotextiles

Post-Construction
(1) Operation and Maintenance
(2) Dam Function after Rehabilitation
(3) Change of Activities in the Surrounding Communities
(4) Improvement of Social and Economic Conditions in the Surrounding Communities

(4) Grass Planting Works
(5) Rehabilitation of Dam Instrumentation and Related Equipments
(6) Dredging of Sediment and Garbage
(7) Mobilization of Construction Equipment and Materials
(8) Mobilization/Recruitment of Human Resources
(9) Management of Loss Area, Site Office, Warehouse, and Base Camp
(10) Land Clearing and Transport of Soil

3.4 Penjalin Impacts

Physical rehabilitation activities planned in Ketro Dam has potential impact to the environment around the work site. Downstream area of the dam mainly consists of agricultural areas and technical irrigation areas which is fairly fertile. Agriculture is the primary source of income for people surrounding the dam. Benificiaries of the dams includes 5 (five) Villages in Paguyangan Sub-District, 7 (seven) villages in Bumiayu Sub-District, and 9 (nine) Villages in Bantarkawung Sub-District. Total area of the villages mentioned is around 213,99 km^2, with widest village area is Kalsimusu Village (26.04 km^2) and smallest area is Kaliwadas Village (0.85 km^2).

Study on environmental impacts of physical rehabilitation activities in Penjalin Dam is expected to support an effective and environmentally sound project implementation. In order to give a sense of security to the communities of potential adverse impact of the project, it is necessary to identify which environmental components are affected (both positive and negative impact) by the project. Significant impacts identified during this study shall be an integral part of the project design and implementation plan itself, as a consideration to the environment and society.

Potential environmental impacts arising from physical rehabilitation of the dam is analysed in an Impact Identification Matrix by looking at the interaction between the activities of the project (pre-construction, construction and post-construction stage) and the environment components. After overall potential impact of the activitiy is identified, then Significant Impacts Prediction is analysed, then followed by Significant Impacts Evaluation.

Impact Identification Matrix through the checklist method will present information on which environmental components are affected (both positive and negative impact) by the project activities. The matrix is presented on the following table.

Table 3: *Environmental Impact Identification Matrix of Penjalin Dam*

No	Activities / Environmental Components	Pre Construc-tion		Construction											Post Construction			
		1	2	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
A.	***Geophysics - Chemical***																	
1.	Topography	V																
2.	Land Use	V				V										V		
3.	Water Quality			V	V	V		V	V	V	V			V				
4.	Air Quality			V	V	V	V	V	V	V	V	V						
5.	Noise			V	V	V	V	V				V						
B.	***Biology***																	
1.	Flora					V												
2.	Fauna																	
C.	***Socio-Economic-Culture***																	
1.	Mobility			V	V		V	V		V	V	V	V	V				
2.	Livelihood			V				V		V	V	V	V	V				
3.	Land Ownership					V									V	V		
4.	Health			V	V	V	V	V	V	V	V	V	V	V				
5.	Infrastructure and Transportation			V	V	V	V	V	V	V	V	V		V				
6.	Community Standard of Living							V					V					V
7.	Community Activities							V	V				V		V		V	

Note:

Pre-Construction:
(1) Detailed Survey, Measurement, and Planning
(2) Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

Construction:
(1) Construction of Diaphragm Wall (length = 136 meters, depth = ± 30 – 40 meters)
(2) Dredging of Sediment (Volume = ± 1.000 m3)
(3) Enhancement of Dam Crest Height and Asphalting
(4) Readjustment of Land Use in Dam/Benchmark Surrounding
(5) Moving of Berthment Pier
(6) Spillway Rehabilitation Works
(7) Dam Drainage Works and V Notch
(8) Construction of Clean Water Storage
(9) Mobilization of Construction Equipment and Materials
(10) Mobilization of Human Resources
(11) Management of Borrow Area, Quarry, Loss Area, Directiekeet (Site Office), Warehouse, and Base Camp

Post-Construction
(1) Operation and Maintenance
(2) Dam Function after Rehabilitation
(3) Change of Activities in the Surrounding Communities
(4) Improvement of Social and Economic Conditions in the Surrounding Communities

3.5 Greneng Impacts

Physical rehabilitation activities planned in Greneng Dam has potential impact to the environment around the work site. Study on those environmental impacts is expected to support an effective and environmentally sound project implementation. Downstream area of the dam mainly consists of agricultural areas and technical irrigation areas which is fairly fertile. Agriculture is the primary source of income for people surrounding the dam.

Potential environmental impacts arising from physical rehabilitation of the dam is analysed in an Impact Identification Matrix by looking at the interaction between the activities of the project (pre-construction, construction and post-construction stage) and the environment components. After overall potential impact of the activitiy is identified, then Significant Impacts Prediction is analysed, then followed by Significant Impacts Evaluation.

Impact Identification Matrix through the checklist method will present information on which environmental components are affected (both positive and negative impact) by the project activities. The matrix is presented on the following table.

Table 4: *Environmental Impact Identification Matrix of Greneng Dam*

No	Activities / Environmental Components	Pre Construc-tion		Construction											Post Construction			
		1	2	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
A.	***Geophysics – Chemical***																	
1.	Topography	V																
2.	Land Use	V	V							V			V	V		V		
3.	Water Quality			V	V	V		V	V	V	V			V			V	
4.	Air Quality			V	V	V	V	V		V	V			V			V	
5.	Noise			V	V	V	V	V		V	V			V			V	
B.	***Biology***																	
1.	Flora									V				V				
2.	Fauna			V						V				V			V	
C.	***Socio-Economic-Culture***																	
1.	Mobility			V	V					V	V	V					V	
2.	Livelihood			V						V	V	V		V			V	
3.	Land Ownership														V	V		
4.	Health			V	V	V	V	V	V	V	V	V	V	V			V	
5.	Infrastructure and Transportation			V	V	V	V	V	V		V			V				
6.	Community Standard							V		V		V						V

No	Activities / Environmental Components	Pre Construc-tion		Construction											Post Construction			
		1	2	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
	of Living																	
7.	Community Activities							V	V	V			V	V	V		V	

Note:

Pre-Construction:
(1) Detailed Survey, Measurement, and Planning
(2) Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

Construction:
(1) Construction of Cofferdam (Coffering and Dewatering)
(2) Rehabilitation of Main Dam on the Left and Right Side
(3) Connecting Hill Works
(4) Rehabilitation of Dam Slope/Riprap and Geotextiles
(5) Spillway Rehabilitation Works
(6) Rehabilitation of Instrumentations and its related Equipments
(7) Dredging of Sediment and Garbage
(8) Mobilization of Construction Equipment and Materials
(9) Mobilization of Human Resources
(10) Socialization, Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

Post-Construction
(1) Operation and Maintenance
(2) Dam Function after Rehabilitation
(3) Change of Activities in the Surrounding Communities
(4) Improvement of Social and Economic Conditions in the Surrounding Communities

3.6 Tempuran Impacts

Physical rehabilitation activities planned in Tempuran Dam has potential impact to the environment around the work site. Study on those environmental impacts is expected to support an effective and environmentally sound project implementation.

Tempuran Dam has catchment areas of 4.3 km^2 and storage capacity under normal condition of 4.72 Ha which water flowing from Kedung Pudon River, Jurang River, and tributaries of Jumok River. Downstream area of the dam mainly consists of agricultural areas and technical irrigation areas which is fairly fertile. Agriculture is the primary source of income for people surrounding the dam. Benificiaries of the dams includes 7 (seven) Villages in Blora Sub-District, they are Tempuran Village, Sendangharjo Village, Ngadipurwo Village, Purwosari Village, Patalan Village, Tempurejo Village, and Karangjati Village. Total area of the villages mentioned is around 23.19 km^2, with widest village area is Sendangharjo Village (8,31 km^2) and smallest area is Ngadipurwo Village (0.27 km^2).

Environmental significant impacts arising from physical rehabilitation of the dam is analysed in an Impact Identification Matrix by looking at the interaction between the activities of the project (pre-construction, construction and post-construction stage) and the environment components. After overall potential impact of the activitiy is identified, then Significant Impacts Prediction is analysed, then followed by Significant Impacts Evaluation.

Impact Identification Matrix through the checklist method will present information on which environmental components are affected (both positive and negative impact) by the project activities. The matrix is presented on the following table.

Table 5: *Environmental Impact Identification Matrix of Tempuran Dam*

No	Activities / Environmental Components	Pre-Construction		Construction											Post-Construction			
		1	2	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
A.	***Geophysics - Chemical***																	
1.	Topography	V																
2.	Land Use	V	V							V			V	V		V		
3.	Water Quality			V	V	V		V	V	V	V			V			V	
4.	Air Quality			V	V	V	V	V		V	V			V			V	
5.	Noise			V	V	V	V	V		V	V			V			V	
B.	***Biology***																	
1.	Flora									V				V				
2.	Fauna			V						V				V			V	
C.	***Socio-Economic-Culture***																	
1.	Mobility			V	V					V	V	V					V	
2.	Livelihood			V						V	V	V		V			V	
3.	Land Ownership														V	V		
4.	Health			V	V	V	V	V	V	V	V	V	V	V			V	
5.	Infrastructure and Transportation			V	V	V	V	V	V		V			V				
6.	Community Standard of Living							V		V		V						V
7.	Community Activities							V	V	V			V	V	V		V	

Note:

Pre-Construction:
(1) Detailed Survey, Measurement, and Planning
(2) Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

Construction:
(1) Construction of Cofferdam (Coffering and Dewatering)
(2) Rehabilitation of Main Dam on the Left and Right Side
(3) Connecting Hill Works
(4) Rehabilitation of Dam Slope/Riprap and Geotextiles
(5) Spillway Rehabilitation Works
(6) Rehabilitation of Instrumentations and its related Equipments
(7) Dredging of Sediment and Garbage
(8) Mobilization of Construction Equipment and Materials
(9) Mobilization of Human Resources
(10) Socialization, Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

Post-Construction
(1) Operation and Maintenance
(2) Dam Function after Rehabilitation
(3) Change of Activities in the Surrounding Communities
(4) Improvement of Social and Economic Conditions in the Surrounding Communities

3.7 Mrancang Impacts

Physical rehabilitation plan in Mrancang Dam is located in Mrancang Village, Gurung Tabur Sub-District, Berau District. Geographic location of the Mrancang Dam I is 2°13'48" NL – 117°40'20" EL, while Mrancang Dam II is 2°13'33" NL – 117°40'58,6" EL. Downstream area of the dam mainly consists of agricultural areas and technical irrigation areas which is fairly fertile. Agriculture is the primary source of income for people surrounding the dam. Benificiaries of the dams includes 3 (three) Villages in Gunung Tabur Sub-District, they are Mrancang Ulu, Mrancang Ilir, and Melati Jaya Village. Total area of the villages mentioned is around 138,53 km^2.

Physical rehabilitation activities planned in Mrancang Dam has potential impact to the environment around the work site. Study on those environmental impacts is expected to support an effective and environmentally sound project implementation. Environmental significant impacts arising from physical rehabilitation of the dam is analysed in an Impact Identification Matrix by looking at the interaction between the activities of the project (pre-construction, construction and post-construction stage) and the environment components. After overall potential impact of the activitiy is identified, then Significant Impacts Prediction is analysed, then followed by Significant Impacts Evaluation.

Impact Identification Matrix through the checklist method will present information on which environmental components are affected (both positive and negative impact) by the project activities. The matrix is presented on the following table.

Table 6: *Environmental Impact Identification Matrix of Mrancang Dam*

No	Activities / Environmental Components	Pre-Construc-tion		Construction											Post-Construction			
		1	2	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
A.	***Geophysics – Chemical***																	
1.	Topography	V																
2.	Land Use	V	V							V			V	V		V		
3.	Water Quality			V	V	V		V	V	V	V			V			V	
4.	Air Quality			V	V	V	V	V		V	V			V			V	
5.	Noise			V	V	V	V	V		V	V			V			V	
B.	***Biology***																	
1.	Flora									V				V				
2.	Fauna			V						V				V			V	
C.	***Socio-Economic-Culture***																	
1.	Mobility			V	V					V	V	V					V	
2.	Livelihood			V						V	V	V		V			V	
3.	Land Ownership														V	V		
4.	Health			V	V	V	V	V	V	V	V	V	V	V			V	

No	Activities / Environmental Components	Pre-Construc-tion		Construction											Post-Construction			
		1	2	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
5.	Infrastructure and Transportation			V	V	V	V	V	V		V			V				
6.	Community Standard of Living							V		V		V						V
7.	Community Activities							V	V	V			V	V	V		V	

Note:

Pre-Construction:
(1) Detailed Survey, Measurement, and Planning
(2) Borrow Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

Construction:
(1) Construction of Access Road
(2) Construction of Cofferdam (Coffering and Dewatering)
(3) Rehabilitation of Main and Secondary Dam
(4) Rehabilitation of Upstream Toe of Main Dam Slope and Toe Drain Filter
(5) Rehabilitation of Dam Crest and Spillway
(6) Hydromechanical Works (Rehabilitation of Sluice Gate, and Trashrack)
(7) Rehabilitation of Instrumentations and its related Equipments
(8) Dredging of Sediment and Garbage
(9) Mobilization of Construction Equipment and Materials
(10) Mobilization of Human Resources
(11) Management of Loss Area, Quarry, Directiekeet (Site Office), Warehouse, and Base Camp

Post-Construction
(1) Operation and Maintenance
(2) Dam Function after Rehabilitation
(3) Change of Activities in the Surrounding Communities
(4) Improvement of Social and Economic Conditions in the Surrounding Communities

4. Mitigation and Monitoring Plan

4.1 General Mitigation Plan

The environmental system is an action to manage the environmental impact that may occur. The environmental impacts as a result of the present project will be prevented by environmental management activity. This is based on the three approaches:

- technological approach
- socio-economic-culture approach and
- institutional approach.

General environmental management measures to be taken during the preparation, construction, and operation of physical rehabilitation of the dams are as follows:

- Public Dissemination, in order to give people in the surrounding area understandings of project activities and benefits, also a sense of security related to potential impacts.
- Road Pavement/Improvement for damaged roads due to the mobilization of vehicles and heavy equipment during the project.

- Perform daily watering, especially during the dry season to minimize flying dust affecting the construction workers also people in the surrounding area.
- Controlling flow of water of the river / dam, especially during the rainy season.
- Soil Compaction, to avoid landslides and puddles on the project site and surrounding areas.
- Adjusting Construction Schedule during the daytime to reduce noise disturbances.
- Replanting of Dam Slope/Riprap, Greenbelts, and Surrounding Area
- Cleaning/Flushing of Mud/Sediment Flow in local drainage ditches, culverts and drains, and irrigation channel.

4.2 General Monitoring Plan

The environmental monitoring effort is the way to evaluate the implementation of the environmental management. Environmental monitoring measures to be taken during the preparation, construction, and operations of physical rehabilitation of the dams are usually conducted every 6 (six) months while the direct measurement usually conducted every month.

4.3 Management and Monitoring Plan Matrix

Environmental Management and Monitoring Plan for each sub-project during 1st year implementation of the additional financing are described in each matrix as follows.

a. Ubrug Environmental Management and Monitoring Plan

Table 7: *Ubrug Spillway Environmental Management and Monitoring Plan Matrix*

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
A.	**PRE-CONSTRUCTION**										
1)	Planning and Socialization	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities	Public explanations/ socialization about the planned activities' specific benefit for the communities	Jakarta, Bunga Kuning, Bunder and Cilegong, especially at locations around the site activity	In the early stages before physical activity (construction) starts	The public perception is monitored by means of direct observation and interviews	Jakarta, Bunga Kuning, Bunder and Cilegong, especially at locations around the site activity	3 months during the construction, to the early stages of construction	Implementation: BBWS CRB Supervision: BLH Purwakarta Report: Regent of Purwakarta
2)	Installation of Project Activities Sign	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities	Installation of project sign involve owner of land as one of local worker The sign to be installed in a strategic place	Jakarta, Bunga Kuning, Bunder and Cilegong, especially at locations around the site activity	In the early stages before physical activity (construction) starts	The public perception is monitored by means of direct observation and interviews	Jakarta, Bunga Kuning, Bunder and Cilegong, especially at locations around the site activity	3 months during the pre-construction, to the early stages of construction	Implementation: BBWS CRB Supervision: BLH Purwakarta, BPN Purwakarta Report: Regent of Purwakarta
B.	**CONSTRUCTION**										
1)	Construction worker recruitments	• Increased employment activities		Persentage of local workers (>70%)	• Socialization needs to be carried out at the surrounding community head • Hirig priority to the community sekitar	Cibinong, kembang kuning, bunder and Cilegong, especially at locations around	In the early stages of construction activities	The employment activities is monitored by means of direct observation and interview	Cibinong, Kembang Kuning, Bunder and Cilegong, especially at locations around	3 months during the construction phase	Implementation: BBWS CRB Supervision: BLH Purwakarta

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					project site	the site activity			the site activity		Report: Regent of Purwakarta
		• Increased business opportunity		Increase of community's business	• Identification and inventory of thetype and amount of effort that developed • Inventory of tha type and amount of labor services needs that can be corporated with the community	Cibinong, kembang kuning, bunder and Cilegong, especially at locations around the site activity	During construction	The business activity is monitored by means of direct observation and interview	Cibinong, kembang kuning, bunder and Cilegong,	3 months during the construction phase	Implementation: BBWS CRB Supervision: BLH Purwakarta, Office of Cooperatives, SMEs, Insdustry and Trade Purwakarta Report: Regent of Purwakarta
		• Increased revenue		Increase of community's income	• Provision of construction labor > MSE Purwakarta • Cooperation meeting the needs of labor and serbices to the community • Training in business management	Cibinong, kembang kuning, bunder and Cilegong, especially at locations around the site activity	During construction	Level of labor income abd business by interview and observation	Cibinong, kembang kuning, bunder and Cilegong,	3 months during the construction phase	Implementation: BBWS CRB Supervision: BLH Purwakarta, Office of Manpower and transmigration Report: Regent of Purwakarta
2)	Mobilization of Heavy Equipments and Materials	• The decline in air quality		Air quality standards in accordance with Government Regulation No. 82 of 2001	Maintenance and cleaning of heavy equipment transport before use Examination and check the physical condition of the transport and	Along mobilization route	Do every day as long as the activities	Ambient air sampling and laboratory analysis	Inundation area	3 months during the construction phase	Implementation: BBWS CRB Supervision: BLH Purwakarta, Office of Transportation Purwakarta

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					materials on a regular basis Covering top of vehicle by tarpaulins Spraying water in mobilization activitie Greening at the project site and surrounding areas						Report: Regent of Purwakarta
		• Noise Pollution		Noise level exceeds the quality standards (BM>55dBA)	Maintenance and cleaning of transportation equipment before use Check physical condition of transport Use K3 and provision of necessaryfirst aid kit Reduce speed when passing residential area	Along the way of mobilization route	Everyday as long as the activity is being carried out	Monitor noise level by direct measurements in the field with a sound level meter	Nearest access road to the settlement Location of heavy equipment and material storage	3 months during construction phase	Implementation: BBWS CRB Supervision: BLH Purwakarta, Office of Transportation Purwakarta Report: Regent of Purwakarta
		• Traffic conflicts on the main access road for project vehicle (either transporting materials or project workers). • Increased traffic volumes around the project site. • Traffic congestion and road user inconvenience.		• Level of damage to roads • Delays and traffic jams • Traffic Count • No. of Accident	• Installation of traffic signs temporarily during construction activities in accordance with the Code of Highways No. 003 / T / BNKT / 1990 and Regulation of the Minister of Transport No. 60 of 2006 • Placement of officers to regulate	Along the way of mobilization route	Everyday as long as the activity is being carried out	Annual average daily traffic, survey daily trafic	Nearest access road to the settlement Location of heavy equipment and material storage	3 months during construction phase	Implementation: BBWS CRB Supervision: BLH Purwakarta, Office of Transportation Purwakarta Report: Regent of Purwakarta

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
		• Damage to the road infrastructure			traffic in main access road of the project vehicle project. • Scheduling of activities to avoid rush hour traffic or night time. • Repair damage to infrastructure (roads) if made. • Limiting the load materials for transportation based onJBI permit. • Coordinating with relevant agencies.						
3)	Dismantling of Ubrug Spillway Concrete Walls	Decrease surface water quality		TSS level	• Collecting demolition debris and placed in the form of certain non-exposed to the flow • Closing demolition debris pile with a tarp • Immedietly transfer demolition debris	Demolition concrete walls of ubrug spillway	Every day during demolition activities	TSS level by taking surface water samples	Upper River Cikalembang, Lower river cikembang	3 months during construction phase	Implementation: BBWS CRB Supervision: BLH Purwakarta, Report: Regent of Purwakarta
4)	Installation of Ubrug Spillway Radial Gates	Decrease surface water quality		TSS level	• Collecting demolition debris and placed in the form of certain non-exposed to the flow • Closing demolition debris pile with a tarp • Immedietly transfer	Demolition concrete walls of ubrug spillway	Every day during demolition activities	TSS level by taking surface water samples	Upper River Cikalembang, Lower river cikembang	3 months during construction phase	Implementation: BBWS CRB Supervision: BLH Purwakarta, Report: Regent of Purwakarta

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					demolition debris						
C.	**POST CONSTRUCTION**										
1)	Recruitment of workers for operation	Increased employment activities		Persentage of local workers (>70%)	• Socialization needs to be carried out at the surrounding community head • Hirig priority to the community sekitar project site	Cibinong, kembang kuning, bunder and Cilegong, especially at locations around the site activity	In the early stages of construction activities	The employment activities is monitored by means of direct observation and interview	Cibinong, Kembang Kuning, Bunder and Cilegong, especially at locations around the site activity	3 months during the construction phase	Implementation: BBWS CRB Supervision: BLH Purwakarta Report: Regent of Purwakarta

b. Ketro Environmental Management and Monitoring Plan

Table 8: *Ketro Dam Environmental Management and Monitoring Plan Matrix*

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
A.	**PRE-CONSTRUCTION**										
1)	• Survey, Indentification • Technical Planning for Dam Rehabilitation	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities / rehabilitation of Ketro Dam	Public explanations/ socialization about the planned activities' specific benefit for the communities	Ketro village, especially at locations around the site activity	Once during the pre-construction activities	The public perception is monitored by means of direct observation and interviews	Ketro village, especially at locations around the site activity	Once during the pre-construction activities	Implementation: BBWS Bengawan Solo Supervision: BLH Sragen Report: Regent of Sragen
B.	**CONSTRUCTION**										
2)	Mobilization of equipment and material • Rehabilitation Works • Mobilization of equipment and materia	The decline in air quality and increase in noise distrubances		Ambient air quality standards according to SK Gub Java No. 8 of 2001 and Kep-48 / MENLH / 11/1996 on the	• Usage of vehicles (trucks) and heavy equipment with good condition. • Maintenance machinery vehicles (trucks) and heavy	Vehicle (trucks) transport tools and materials	During construction phase	Sampling and laboratory analysis	Project site, and the settlements around the project site	6 months during the construction phase	Implementation: BBWS Bengawan Solo Supervision: BLH Sragen Report: Regent of Sragen

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				standard noise level for settlements	equipment on a regular basis. • Installation of fence/barrier around the location						
3)	Physical Rehabilitation Works of Ketro Dam	The decline in water quality		Water quality standards in accordance with Government Regulation No. 82 of 2001	Land clearing in areas that really needed / necessary. Greening at the project site and surrounding areas	Dam site and surrounding area	During construction activities	Samples of water, sampled using a water sampler. Once sampled, then analyzed in the laboratory	Inundation area	6 months during the construction phase	Implementation: BBWS Bengawan Solo Supervision: BLH Sragen Report: Regent of Sragen
4)	• Mobilization of vehicle. • Mobilization heavy equipment • Transport of equipment, materials and workers	• Traffic conflicts on the main access road for project vehicle (either transporting materials or project workers). • Increased traffic volumes around the project site. • Traffic congestion and road user inconvenience. • Damage to the road infrastructure		• Level of damage to roads • Delays and traffic jams • Traffic Count • No. of Accident	• Installation of traffic signs temporarily during construction activities in accordance with the Code of Highways No. 003 / T / BNKT / 1990 and Regulation of the Minister of Transport No. 60 of 2006 • Placement of officers to regulate traffic in main access road of the project vehicle	Roads around Ketro Dam and Project Site	During construction activities	Implementation of MKJI Method 1997 dan Pavement Condition Indeks (PCI)	Roads around Ketro Dam and Project Site	6 months during the construction phase	Implementation: BBWS Bengawan Solo Supervision: • Public Works Agency of Kabupaten Sragen • Dishubkominfo Kabupaten Sragen • Environmental Agency of Kabupaten Sragen Report: Regent of Sragen

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					project. • Scheduling of activities to avoid rush hour traffic or night time. • Repair damage to infrastructure (roads) if made. • Limiting the load materials for transportation based on JBI permit. • Coordinating with relevant agencies.						
5)	Labor recruitment	Employment and business opportunity		• The intensity of the complaint, demands of society related to employment opportunities or remuneration. • Amount of local labor hired	• Requirement for hiring of local labor as much as possible, in accordance with the needs and areas of expertise. • Provide opportunities for informal sector growth during construction phase in surrounding area • Cooperating with local government (village) in the	Ketro village, especially at locations around the site activity	During construction activities	Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	Ketro village, especially at locations around the site activity	6 months during the construction phase •	Implementation: BBWS Bengawan Solo Supervision: • Dinsosnakertran Kab. Sragen • Dinas Perhubungan Kab. Sragen • BLH Kab. Sragen Report: Regent of Sragen

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					local labor recruitment						
6)	Labor recruitment	Employment and business opportunity		• The intensity of the complaint, demands of society related to employment opportunities or remuneratio n. • Amount of local labor hired	• Requirement for hiring of local labor as much as possible, in accordance with the needs and areas of expertise. • Provide opportunities for informal sector growth during construction phase in surrounding area • Cooperating with local government (village) in the local labor recruitment	Ketro village, especially at locations around the site activity	During construction activities	Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	Ketro village, especially at locations around the site activity	6 months during the construction phase	Implementation: BBWS Bengawan Solo Supervision: • Dinsosnakertran Kab. Sragen • Dinas Perhubungan Kab. Sragen • BLH Kab. Sragen Report: Regent of Sragen
7)	Construction Activities	Decrease of Public Convenence		The intensity of the complaints and protests from people who realized in the form of obstacles / barriers of society to	• Conducting appropriate standard operating procedure (SOP) • Watering regularly (dry season) • Limitations on working hours so	Ketro village, especially at locations around the site activity	During construction activities underway	Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	• Project site • Surrounding Area (Ketro Village)	6 months during the construction phase	Implementation: BBWS Bengawan Solo Supervision: • Dinas Perhubungan Kab. Sragen • BLH Kab. Sragen

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				construction activities	as not to interfere with the comfort of the surrounding community. • Traffic control equipment and material • Transportation of materials dredged less than 24 hours each day						Report: Regent of Sragen
8)	Construction Activities	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities / rehabilitation of Ketro Dam	• Give explanation to the public about the construction activities related to the benefits that can be earned by society • Give an explanation to the public aboutcomplaints mechanismsand their compensation, in the event of disruption or pollution due to construction activity	Ketro village, especially at locations around the site activity	During construction activities	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Ketro village, especially the project site and surrounding areas	6 months during the construction phase	Implementation: BBWS Bengawan Solo Supervision: • Dinas Transportasi Kab. Sragen • BLH Kab. Sragen Report: Regent of Sragen

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					• Conducting appropriate standard operating procedure (SOP)						
C.	**POST CONSTRUCTION**										
9)	Mobilization of equipment and material and project workers during operational phase	The decline in air quality and increase in noise distrubances		Ambient air quality standards according to SK Gub Java No. 8 of 2001 and Kep-48 / MENLH / 11/1996 on the standard noise level for settlements	• Usage of vehicles (trucks) and heavy equipment with good condition. • Maintenance machinery vehicles (trucks) and heavy equipment on a regular basis. • Installation of fence/barrier around the location	Vehicle (trucks) transport tools and materials	During construction phase	Sampling and laboratory analysis	Project site, and the settlements around the project site	6 months during the construction phase	Implementation: BBWS Bengawan Solo Supervision: BLH Sragen Report: Regent of Sragen
10)	Domestic acivities and operation and maintenance of Ketro Dam	The decline in water quality		Water quality standards in accordance with Government Regulation No. 82 of 2001	Land clearing in areas that really needed / necessary. Greening at the project site and surrounding areas	Dam site and surrounding area	During construction activities	Samples of water, sampled using a water sampler. Once sampled, then analyzed in the laboratory	Inundation area	6 months during the construction phase	Implementation: BBWS Bengawan Solo Supervision: BLH Sragen Report: Regent of Sragen
11)	Mobilization of operational vehicle.	• Traffic conflicts on the main access road for project vehicle		• Level of damage to roads • Delays and	• Installation of traffic signs temporarily during	Roads around Ketro Dam and Project Site	During construction activities	Implementation of MKJI Method 1997 dan	Roads around Ketro Dam and Project Site	6 months during the construction phase	Implementation: BBWS Bengawan Solo

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
		(either transporting materials or project workers). • Increased traffic volumes around the project site. • Traffic congestion and road user inconvenience. • Damage to the road infrastructure		traffic jams • Traffic Count • No. of Accident	construction activities in accordance with the Code of Highways No. 003 / T / BNKT / 1990 and Regulation of the Minister of Transport No. 60 of 2006 • Placement of officers to regulate traffic in main access road of the project vehicle project. • Scheduling of activities to avoid rush hour traffic or night time. • Repair damage to infrastructure (roads) if made. • Limiting the load materials for transportation based onJBI permit. • Coordinating with relevant agencies.			Pavement Condition Indeks (PCI)			Supervision: • Public Works Agency of Kabupaten Sragen • Dishubkominfo Kabupaten Sragen • Environmental Agency of Kabupaten Sragen Report: Regent of Sragen

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
12)	Water Utilization	Productivity of agricultural land		The area of agricultural land that can be served by the irrigation dam Ketro	The setting of raw water services for irrigation service area Greening at the project site and surrounding areas Catchment area conservation	Irrigation area	During operations and maintenance	Observation and Interviews	Irrigation area	6 months during the construction phase	• Dinas Pertanian dan Perkebunan Kab. Sragen • BLH Kab. Sragen Implementation: BBWS Bengawan Solo Supervision: • Public Works Agency of Kabupaten Sragen • Dishubkominfo Kabupaten Sragen • Environmental Agency of Kabupaten Sragen Report: Regent of Sragen
13)	Water Utilization	Aquatic life and vegetation around the dam Ketro		Water quality standards in accordance with Government Regulation No. 82 of 2001 and the density of	Greening at the project site and surrounding areas, especially in the catchment area Prohibiton of domestic activities	Irrigation area	During operations and maintenance	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed	Irrigation area	6 months during the construction phase	• Dinas Pertanian dan Perkebunan Kab. Sragen • BLH Kab. Sragen Implementation:

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				the vegetation in the area chatment Dam Ketro	in inundation area			qualitatively			BBWS Bengawan Solo Supervision: • Agriculture and Plantation Agency of Kabupaten Sragen • Dishubkominfo Kabupaten Sragen • Environmental Agency of Kabupaten Sragen Report: Regent of Sragen
14)	Water Utilization	Community income		Productivity of agricultural land irrigated by Ketro Dam	• Water usage management • Greening the project area • Catchment area conservation	Villages and agricultural land that receives water from Ketro Dam	During operation and maintenance of Ketro Dam	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Villages and agricultural land that receives water from Ketro Dam	6 months during the construction phase	Implementation: BBWS Bengawan Solo Supervision: • Agriculture and Plantation Agency of Kabupaten Sragen • Dishubkominfo Kabupaten Sragen • Environmental Agency of

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
											Kabupaten Sragen Report: Regent of Sragen
15)	Operational of Ketro Dam	Public Perception		The intensity of the complaints, protests, or obstacles from people	• Give explanation to the public about the construction activities related to the benefits that can be earned by society • Give an explanation to the public aboutcomplaints mechanismsand their compensation, in the event of disruption or pollution due to construction activity • Conducting appropriate standard operating procedure (SOP)	Ketro village, especially at locations around the site activity	During construction activities	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Ketro village, especially the project site and surrounding areas	6 months during the construction phase	Implementation: BBWS Bengawan Solo Supervision: • Agriculture and Plantation Agency of Kabupaten Sragen • Dishubkominfo Kabupaten Sragen • Environmental Agency of Kabupaten Sragen Report: Regent of Sragen

c. Penjalin Environmental Management and Monitoring Plan

Table 9: *Penjalin Dam Environmental Management and Monitoring Plan Matrix*

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
A.	**PRE-CONSTRUCTION**										
1)	• Survey, Indentification • Technical Planning for Dam Rehabilitation	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities / rehabilitation of Penjalin Dam	Public explanations/ socialization about the planned activities' specific benefit for the communities	Paguyungan village, especially at locations around the site activity	Once during the pre-construction activities	The public perception is monitored by means of direct observation and interviews	Paguyungan village, especially at locations around the site activity	Once during the pre-construction activities	Implementation: BBWS Pemali Juana Supervision: BLH Brebes Report: Regent of Brebes
B.	**CONSTRUCTION**										
2)	Mobilization of equipment and material • Rehabilitation Works • Mobilization of equipment and materia	The decline in air quality and increase in noise distrubances		Ambient air quality standards according to SK Gub Java No. 8 of 2001 and Kep-48 / MENLH / 11/1996 on the standard noise	• Usage of vehicles (trucks) and heavy equipment with good condition. • Maintenance machinery vehicles (trucks) and heavy equipment on a regular basis.	Vehicle (trucks) transport tools and materials	During construction phase	Sampling and laboratory analysis	Project site, and the settlements around the project site	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: BLH Brebes Report: Regent of Brebes

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				level for settlements	• Installation of fence/barrier around the location						
3)	Physical Rehabilitation Works of Penjalin Dam	The decline in water quality		Water quality standards in accordance with Government Regulation No. 82 of 2001	Land clearing in areas that really needed / necessary. Greening at the project site and surrounding areas	Dam site and surrounding area	During construction activities	Samples of water, sampled using a water sampler. Once sampled, then analyzed in the laboratory	Inundation area	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: BLH Brebes Report: Regent of Brebes
4)	• Mobilization of vehicle. • Mobilization heavy equipment • Transport of equipment, materials and workers	• Traffic conflicts on the main access road for project vehicle (either transporting materials or project workers). • Increased traffic volumes around the project site. • Traffic congestion and road user inconvenience. • Damage to the road infrastructure		• Level of damage to roads • Delays and traffic jams • Traffic Count • No. of Accident	• Installation of traffic signs temporarily during construction activities in accordance with the Code of Highways No. 003 / T / BNKT / 1990 and Regulation of the Minister of Transport No. 60 of 2006 • Placement of officers to regulate traffic in main access road of the project vehicle project.	Roads around Penjalin Dam and Project Site	During construction activities	Implementation of MKJI Method 1997 dan Pavement Condition Indeks (PCI)	Roads around Penjalin Dam and Project Site	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Public Works Agency of Kabupaten Brebes • Dishubkominfo Kabupaten Brebes • Environmental Agency of Kabupaten Brebes Report: Regent of Brebes

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					• Scheduling of activities to avoid rush hour traffic or night time. • Repair damage to infrastructure (roads) if made. • Limiting the load materials for transportation based on JBI permit. • Coordinating with relevant agencies.						
5)	Labor recruitment	Employment and business opportunity		• The intensity of the complaint, demands of society related to employment opportunities or remuneratio n. • Amount of local labor hired	• Requirement for hiring of local labor as much as possible, in accordance with the needs and areas of expertise. • Provide opportunities for informal sector growth during construction phase in surrounding area • Cooperating with local government (village) in the local labor	Paguyungan village, especially at locations around the site activity	During construction activities	Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	Paguyungan village, especially at locations around the site activity	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Dinsosnakertran Kab. Brebes • Dinas Perhubungan Kab. Brebes • BLH Kab. Brebes Report: Regent of Brebes

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					recruitment						
6)	Labor recruitment	Employment and business opportunity		• The intensity of the complaint, demands of society related to employment opportunities or remuneratio n. • Amount of local labor hired	• Requirement for hiring of local labor as much as possible, in accordance with the needs and areas of expertise. • Provide opportunities for informal sector growth during construction phase in surrounding area • Cooperating with local government (village) in the local labor recruitment	Paguyungan village, especially at locations around the site activity	During construction activities	Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	Paguyungan village, especially at locations around the site activity	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Dinsosnakertran Kab. Brebes • Dinas Perhubungan Kab. Brebes • BLH Kab. Brebes Report: Regent of Brebes
7)	Construction Activities	Decrease of Public Convenence		The intensity of the complaints and protests from people who realized in the form of obstacles / barriers of society to construction	• Conducting appropriate standard operating procedure (SOP) • Watering regularly (dry season) • Limitations on working hours so as not to	Paguyungan village, especially at locations around the site activity	During construction activities underway	Through Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	• Project site • Surrounding Area (Paguyungan Village)	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Dinas Perhubungan Kab. Brebes • BLH Kab. Brebes

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				activities	interfere with the comfort of the surrounding community. • Traffic control equipment and material • Transportation of materials dredged less than 24 hours each day						Report: Regent of Brebes
8)	Construction Activities	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities / rehabilitation of Penjalin Dam	• Give explanation to the public about the construction activities related to the benefits that can be earned by society • Give an explanation to the public aboutcomplaints mechanismsand their compensation, in the event of disruption or pollution due to construction activity • Conducting	Paguyungan village, especially at locations around the site activity	During construction activities	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Paguyungan village, especially the project site and surrounding areas	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Dinas Transportasi Kab. Brebes • BLH Kab. Brebes Report: Regent of Brebes

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					appropriate standard operating procedure (SOP)						
C.	**POST CONSTRUCTION**										
9)	Mobilization of equipment and material and project workers during operational phase	The decline in air quality and increase in noise distrubances		Ambient air quality standards according to SK Gub Java No. 8 of 2001 and Kep-48 / MENLH / 11/1996 on the standard noise level for settlements	• Usage of vehicles (trucks) and heavy equipment with good condition. • Maintenance machinery vehicles (trucks) and heavy equipment on a regular basis. • Installation of fence/barrier around the location	Vehicle (trucks) transport tools and materials	During construction phase	Sampling and laboratory analysis	Project site, and the settlements around the project site	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: BLH Brebes Report: Regent of Brebes
10)	Domestic acivities and operation and maintenance of Penjalin Dam	The decline in water quality		Water quality standards in accordance with Government Regulation No. 82 of 2001	Land clearing in areas that really needed / necessary. Greening at the project site and surrounding areas	Dam site and surrounding area	During construction activities	Samples of water, sampled using a water sampler. Once sampled, then analyzed in the laboratory	Inundation area	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: BLH Brebes Report: Regent of Brebes
11)	Mobilization of operational vehicle.	• Traffic conflicts on the main access road for project vehicle (either		• Level of damage to roads • Delays and traffic jams	• Installation of traffic signs temporarily during construction	Roads around Penjalin Dam and Project Site	During construction activities	Implementation of MKJI Method 1997 dan Pavement	Roads around Penjalin Dam and Project Site	6 months during the construction phase	Implementation: BBWS Pemali Juana

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
		transporting materials or project workers). • Increased traffic volumes around the project site. • Traffic congestion and road user inconvenience. • Damage to the road infrastructure		• Traffic Count • No. of Accident	activities in accordance with the Code of Highways No. 003 / T / BNKT / 1990 and Regulation of the Minister of Transport No. 60 of 2006 • Placement of officers to regulate traffic in main access road of the project vehicle project. • Scheduling of activities to avoid rush hour traffic or night time. • Repair damage to infrastructure (roads) if made. • Limiting the load materials for transportation based onJBI permit. • Coordinating with relevant agencies.			Condition Indeks (PCI)			Supervision: • Public Works Agency of Kabupaten Brebes • Dishubkominfo Kabupaten Brebes • Environmental Agency of Kabupaten Brebes Report: Regent of Brebes

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
12)	Water Utilization	Productivity of agricultural land		The area of agricultural land that can be served by the irrigation dam Penjalin	The setting of raw water services for irrigation service area Greening at the project site and surrounding areas Catchment area conservation	Irrigation area	During operations and maintenance	Observation and Interviews	Irrigation area	6 months during the construction phase	Implementation: • BBWS Pemali Juana • Dinas Pertanian dan Perkebunan Kab. Brebes • BLH Kab. Brebes Supervision: • Public Works Agency of Kabupaten Brebes • Dishubkominfo Kabupaten Brebes • Environmental Agency of Kabupaten Brebes Report: Regent of Brebes
13)	Water Utilization	Aquatic life and vegetation around the dam penjalin		Water quality standards in accordance with Government Regulation No. 82 of 2001 and the density of	Greening at the project site and surrounding areas, especially in the catchment area Prohibiton of domestic activities	Irrigation area	During operations and maintenance	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed	Irrigation area	6 months during the construction phase	• Dinas Pertanian dan Perkebunan Kab. Brebes • BLH Kab. Brebes Implementation:

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				the vegetation in the area chatment Dam Penjalin	in inundation area			qualitatively			BBWS Pemali Juana Supervision: • Agriculture and Plantation Agency of Kabupaten Brebes • Dishubkominfo Kabupaten Brebes • Environmental Agency of Kabupaten Brebes Report: Regent of Brebes
14)	Water Utilization	Community income		Productivity of agricultural land irrigated by Penjalin Dam	• Water usage management • Greening the project area • Catchment area conservation	Villages and agricultural land that receives water from Penjalin Dam	During operation and maintenance of Penjalin Dam	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Villages and agricultural land that receives water from Penjalin Dam	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Agriculture and Plantation Agency of Kabupaten Brebes • Dishubkominfo Kabupaten Brebes • Environmental Agency of

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
											Kabupaten Brebes Report: Regent of Brebes
15)	Operational of Penjalin Dam	Public Perception		The intensity of the complaints, protests, or obstacles from people	• Give explanation to the public about the construction activities related to the benefits that can be earned by society • Give an explanation to the public aboutcomplaints mechanismsand their compensation, in the event of disruption or pollution due to construction activity • Conducting appropriate standard operating procedure (SOP)	Paguyungan village, especially at locations around the site activity	During construction activities	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Paguyungan village, especially the project site and surrounding areas	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Agriculture and Plantation Agency of Kabupaten Brebes • Dishubkominfo Kabupaten Brebes • Environmental Agency of Kabupaten Brebes Report: Regent of Brebes

d. Greneng Environmental Management and Monitoring Plan

Table 10: *Greneng Dam Environmental Management and Monitoring Plan Matrix*

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
A.	**PRE-CONSTRUCTION**										
1)	• Survey, Indentification • Technical Planning for Dam Rehabilitation	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities / rehabilitation of Greneng Dam	Public explanations/ socialization about the planned activities' specific benefit for the communities	Tunjungan village, especially at locations around the site activity	Once during the pre-construction activities	The public perception is monitored by means of direct observation and interviews	Tunjungan village, especially at locations around the site activity	Once during the pre-construction activities	Implementation: BBWS Pemali Juana Supervision: BLH Blora Report: Regent of Blora
B.	**CONSTRUCTION**										
2)	Mobilization of equipment and material • Rehabilitation Works • Mobilization of equipment and materia	The decline in air quality and increase in noise distrubances		Ambient air quality standards according to SK Gub Java No. 8 of 2001 and Kep-48 / MENLH / 11/1996 on the standard noise	• Usage of vehicles (trucks) and heavy equipment with good condition. • Maintenance machinery vehicles (trucks) and heavy equipment on a regular basis.	Vehicle (trucks) transport tools and materials	During construction phase	Sampling and laboratory analysis	Project site, and the settlements around the project site	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: BLH Blora Report: Regent of Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				level for settlements	• Installation of fence/barrier around the location						
3)	Physical Rehabilitation Works of Greneng Dam	The decline in water quality		Water quality standards in accordance with Government Regulation No. 82 of 2001	Land clearing in areas that really needed / necessary. Greening at the project site and surrounding areas	Dam site and surrounding area	During construction activities	Samples of water, sampled using a water sampler. Once sampled, then analyzed in the laboratory	Inundation area	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: BLH Blora Report: Regent of Blora
4)	• Mobilization of vehicle. • Mobilization heavy equipment • Transport of equipment, materials and workers	• Traffic conflicts on the main access road for project vehicle (either transporting materials or project workers). • Increased traffic volumes around the project site. • Traffic congestion and road user inconvenience. • Damage to the road infrastructure		• Level of damage to roads • Delays and traffic jams • Traffic Count • No. of Accident	• Installation of traffic signs temporarily during construction activities in accordance with the Code of Highways No. 003 / T / BNKT / 1990 and Regulation of the Minister of Transport No. 60 of 2006 • Placement of officers to regulate traffic in main access road of the project vehicle project.	Roads around Greneng Dam and Project Site	During construction activities	Implementation of MKJI Method 1997 dan Pavement Condition Indeks (PCI)	Roads around Greneng Dam and Project Site	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Public Works Agency of Kabupaten Blora • Dishubkominfo Kabupaten Blora • Environmental Agency of Kabupaten Blora Report: Regent of Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					• Scheduling of activities to avoid rush hour traffic or night time. • Repair damage to infrastructure (roads) if made. • Limiting the load materials for transportation based on JBI permit. • Coordinating with relevant agencies.						
5)	Labor recruitment	Employment and business opportunity		• The intensity of the complaint, demands of society related to employment opportunities or remuneratio n. • Amount of local labor hired	• Requirement for hiring of local labor as much as possible, in accordance with the needs and areas of expertise. • Provide opportunities for informal sector growth during construction phase in surrounding area • Cooperating with local government (village) in the local labor	Tunjungan village, especially at locations around the site activity	During construction activities	Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	Tunjungan village, especially at locations around the site activity	6 months during the construction phase •	Implementation: BBWS Pemali Juana Supervision: • Dinsosnakertran Kab. Blora • Dinas Perhubungan Kab. Blora • BLH Kab. Blora Report: Regent of Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					recruitment						
6)	Labor recruitment	Employment and business opportunity		• The intensity of the complaint, demands of society related to employment opportunities or remuneratio n. • Amount of local labor hired	• Requirement for hiring of local labor as much as possible, in accordance with the needs and areas of expertise. • Provide opportunities for informal sector growth during construction phase in surrounding area • Cooperating with local government (village) in the local labor recruitment	Tunjungan village, especially at locations around the site activity	During construction activities	Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	Tunjungan village, especially at locations around the site activity	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Dinsosnakertran Kab. Blora • Dinas Perhubungan Kab. Blora • BLH Kab. Blora Report: Regent of Blora
7)	Construction Activities	Decrease of Public Convenence		The intensity of the complaints and protests from people who realized in the form of obstacles / barriers of society to construction	• Conducting appropriate standard operating procedure (SOP) • Watering regularly (dry season) • Limitations on working hours so as not to	Tunjungan village, especially at locations around the site activity	During construction activities underway	Through Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	• Project site • Surrounding Area (Tunjungan Village)	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Dinas Perhubungan Kab. Blora • BLH Kab. Blora Report:

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				activities	interfere with the comfort of the surrounding community. • Traffic control equipment and material • Transportation of materials dredged less than 24 hours each day						Regent of Blora
8)	Construction Activities	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities / rehabilitation of Greneng Dam	• Give explanation to the public about the construction activities related to the benefits that can be earned by society • Give an explanation to the public aboutcomplaints mechanismsand their compensation, in the event of disruption or pollution due to construction activity • Conducting	Tunjungan village, especially at locations around the site activity	During construction activities	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Tunjungan village, especially the project site and surrounding areas	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Dinas Transportasi Kab. Blora • BLH Kab. Blora Report: Regent of Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					appropriate standard operating procedure (SOP)						
C.	**POST CONSTRUCTION**										
9)	Mobilization of equipment and material and project workers during operational phase	The decline in air quality and increase in noise distrubances		Ambient air quality standards according to SK Gub Java No. 8 of 2001 and Kep-48 / MENLH / 11/1996 on the standard noise level for settlements	• Usage of vehicles (trucks) and heavy equipment with good condition. • Maintenance machinery vehicles (trucks) and heavy equipment on a regular basis. • Installation of fence/barrier around the location	Vehicle (trucks) transport tools and materials	During construction phase	Sampling and laboratory analysis	Project site, and the settlements around the project site	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: BLH Blora Report: Regent of Blora
10)	Domestic acivities and operation and maintenance of Greneng Dam	The decline in water quality		Water quality standards in accordance with Government Regulation No. 82 of 2001	Land clearing in areas that really needed / necessary. Greening at the project site and surrounding areas	Dam site and surrounding area	During construction activities	Samples of water, sampled using a water sampler. Once sampled, then analyzed in the laboratory	Inundation area	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: BLH Blora Report: Regent of Blora
11)	Mobilization of operational vehicle.	• Traffic conflicts on the main access road for project vehicle (either		• Level of damage to roads • Delays and traffic jams	• Installation of traffic signs temporarily during construction	Roads around Greneng Dam and Project Site	During construction activities	Implementation of MKJI Method 1997 dan Pavement	Roads around Greneng Dam and Project Site	6 months during the construction phase	Implementation: BBWS Pemali Juana

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
		transporting materials or project workers). • Increased traffic volumes around the project site. • Traffic congestion and road user inconvenience. • Damage to the road infrastructure		• Traffic Count • No. of Accident	activities in accordance with the Code of Highways No. 003 / T / BNKT / 1990 and Regulation of the Minister of Transport No. 60 of 2006 • Placement of officers to regulate traffic in main access road of the project vehicle project. • Scheduling of activities to avoid rush hour traffic or night time. • Repair damage to infrastructure (roads) if made. • Limiting the load materials for transportation based onJBI permit. • Coordinating with relevant agencies.			Condition Indeks (PCI)			Supervision: • Public Works Agency of Kabupaten Blora • Dishubkominfo Kabupaten Blora • Environmental Agency of Kabupaten Blora Report: Regent of Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
12)	Water Utilization	Productivity of agricultural land		The area of agricultural land that can be served by the irrigation dam Greneng	The setting of raw water services for irrigation service area Greening at the project site and surrounding areas Catchment area conservation	Irrigation area	During operations and maintenance	Observation and Interviews	Irrigation area	6 months during the construction phase	Implementation: • BBWS Pemali Juana • Dinas Pertanian dan Perkebunan Kab. Blora • BLH Kab. Blora Supervision: • Public Works Agency of Kabupaten Blora • Dishubkominfo Kabupaten Blora • Environmental Agency of Kabupaten Blora Report: Regent of Blora
13)	Water Utilization	Aquatic life and vegetation around the Greneng Dam		Water quality standards in accordance with Government Regulation No. 82 of 2001 and the density of the vegetation	Greening at the project site and surrounding areas, especially in the catchment area Prohibiton of domestic activities in inundation area	Irrigation area	During operations and maintenance	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Irrigation area	6 months during the construction phase	• Dinas Pertanian dan Perkebunan Kab. Blora • BLH Kab. Blora Implementation: BBWS Pemali Juana

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				in the area catchment Greneng Dam							Supervision: • Agriculture and Plantation Agency of Kabupaten Blora • Dishubkominfo Kabupaten Blora • Environmental Agency of Kabupaten Blora Report: Regent of Blora
14)	Water Utilization	Community income		Productivity of agricultural land irrigated by Greneng Dam	• Water usage management • Greening the project area • Catchment area conservation	Villages and agricultural land that receives water from Greneng Dam	During operation and maintenance of Greneng Dam	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Villages and agricultural land that receives water from Greneng Dam	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Agriculture and Plantation Agency of Kabupaten Blora • Dishubkominfo Kabupaten blora • Environmental Agency of Kabupaten Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
											Report: Regent of Blora
15)	Operational of Penjalin Dam	Public Perception		The intensity of the complaints, protests, or obstacles from people	• Give explanation to the public about the construction activities related to the benefits that can be earned by society • Give an explanation to the public aboutcomplaints mechanismsand their compensation, in the event of disruption or pollution due to construction activity • Conducting appropriate standard operating procedure (SOP)	Paguyungan village, especially at locations around the site activity	During construction activities	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Paguyungan village, especially the project site and surrounding areas	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Agriculture and Plantation Agency of Kabupaten Blora • Dishubkominfo Kabupaten Blora • Environmental Agency of Kabupaten Blora Report: Regent of Blora

e. Tempuran Environmental Management and Monitoring Plan

Table 11: *Tempuran Dam Environmental Management and Monitoring Plan Matrix*

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
A.	**PRE-CONSTRUCTION**										
1)	• Survey, Identification • Technical Planning for Dam Rehabilitation	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities / rehabilitation of Tempuran Dam	Public explanations/ socialization about the planned activities' specific benefit for the communities	Tempuran village, especially at locations around the site activity	Once during the pre-construction activities	The public perception is monitored by means of direct observation and interviews	Tempuran village, especially at locations around the site activity	Once during the pre-construction activities	Implementation: BBWS Pemali Juana Supervision: BLH Blora Report: Regent of Blora
B.	**CONSTRUCTION**										
2)	Mobilization of equipment and material • Rehabilitation Works • Mobilization of equipment and material	The decline in air quality and increase in noise distrubances		Ambient air quality standards according to SK Gub Java No. 8 of 2001 and Kep-48 / MENLH / 11/1996 on the standard noise	• Usage of vehicles (trucks) and heavy equipment with good condition. • Maintenance machinery vehicles (trucks) and heavy equipment on a regular basis.	Vehicle (trucks) transport tools and materials	During construction phase	Sampling and laboratory analysis	Project site, and the settlements around the project site	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: BLH Blora Report: Regent of Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				level for settlements	• Installation of fence/barrier around the location						
3)	Physical Rehabilitation Works of Tempuran Dam	The decline in water quality		Water quality standards in accordance with Government Regulation No. 82 of 2001	Land clearing in areas that really needed / necessary. Greening at the project site and surrounding areas	Dam site and surrounding area	During construction activities	Samples of water, sampled using a water sampler. Once sampled, then analyzed in the laboratory	Inundation area	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: BLH Blora Report: Regent of Blora
4)	• Mobilization of vehicle. • Mobilization heavy equipment • Transport of equipment, materials and workers	• Traffic conflicts on the main access road for project vehicle (either transporting materials or project workers). • Increased traffic volumes around the project site. • Traffic congestion and road user inconvenience. • Damage to the road infrastructure		• Level of damage to roads • Delays and traffic jams • Traffic Count • No. of Accident	• Installation of traffic signs temporarily during construction activities in accordance with the Code of Highways No. 003 / T / BNKT / 1990 and Regulation of the Minister of Transport No. 60 of 2006 • Placement of officers to regulate traffic in main access road of the project vehicle project.	Roads around Tempuran Dam and Project Site	During construction activities	Implementation of MKJI Method 1997 dan Pavement Condition Indeks (PCI)	Roads around Tempuran Dam and Project Site	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Public Works Agency of Kabupaten Blora • Dishubkominfo Kabupaten Blora • Environmental Agency of Kabupaten Blora Report: Regent of Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					• Scheduling of activities to avoid rush hour traffic or night time. • Repair damage to infrastructure (roads) if made. • Limiting the load materials for transportation based on JBI permit. • Coordinating with relevant agencies.						
5)	Labor recruitment	Employment and business opportunity		• The intensity of the complaint, demands of society related to employment opportunities or remuneratio n. • Amount of local labor hired	• Requirement for hiring of local labor as much as possible, in accordance with the needs and areas of expertise. • Provide opportunities for informal sector growth during construction phase in surrounding area • Cooperating with local government (village) in the local labor	Tempuran village, especially at locations around the site activity	During construction activities	Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	Tempuran village, especially at locations around the site activity	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Dinsosnakertran Kab. Blora • Dinas Perhubungan Kab. Blora • BLH Kab. Blora Report: Regent of Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					recruitment						
6)	Labor recruitment	Employment and business opportunity		• The intensity of the complaint, demands of society related to employment opportunities or remuneration. • Amount of local labor hired	• Requirement for hiring of local labor as much as possible, in accordance with the needs and areas of expertise. • Provide opportunities for informal sector growth during construction phase in surrounding area • Cooperating with local government (village) in the local labor recruitment	Tempuran village, especially at locations around the site activity	During construction activities	Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	Tempuran village, especially at locations around the site activity	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Dinsosnakertran Kab. Blora • Dinas Perhubungan Kab. Blora • BLH Kab. Blora Report: Regent of Blora
7)	Construction Activities	Decrease of Public Convenence		The intensity of the complaints and protests from people who realized in the form of obstacles / barriers of society to construction	• Conducting appropriate standard operating procedure (SOP) • Watering regularly (dry season) • Limitations on working hours so as not to	Tempuran village, especially at locations around the site activity	During construction activities underway	Through Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	• Project site • Surrounding Area (Tempuran Village)	6 months during the construction phase	Implementation: BWS Kalimantan III Supervision: • Dinas Perhubungan Kab. Blora • BLH Kab. Blora Report:

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				activities	interfere with the comfort of the surrounding community. • Traffic control equipment and material • Transportation of materials dredged less than 24 hours each day						Regent of Blora
8)	Construction Activities	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities / rehabilitation of Tempuran Dam	• Give explanation to the public about the construction activities related to the benefits that can be earned by society • Give an explanation to the public aboutcomplaints mechanismsand their compensation, in the event of disruption or pollution due to construction activity • Conducting	Tempuran village, especially at locations around the site activity	During construction activities	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Tempuran village, especially the project site and surrounding areas	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Dinas Transportasi Kab. Blora • BLH Kab. Blora Report: Regent of Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					appropriate standard operating procedure (SOP)						
C.	**POST CONSTRUCTION**										
9)	Mobilization of equipment and material and project workers during operational phase	The decline in air quality and increase in noise distrubances		Ambient air quality standards according to SK Gub Java No. 8 of 2001 and Kep-48 / MENLH / 11/1996 on the standard noise level for settlements	• Usage of vehicles (trucks) and heavy equipment with good condition. • Maintenance machinery vehicles (trucks) and heavy equipment on a regular basis. • Installation of fence/barrier around the location	Vehicle (trucks) transport tools and materials	During construction phase	Sampling and laboratory analysis	Project site, and the settlements around the project site	6 months during the construction phase	Implementation: BWS Kalimantan III Supervision: BLH Berau Report: Regent of Berau
10)	Domestic acivities and operation and maintenance of Tempuran Dam	The decline in water quality		Water quality standards in accordance with Government Regulation No. 82 of 2001	Land clearing in areas that really needed / necessary. Greening at the project site and surrounding areas	Dam site and surrounding area	During construction activities	Samples of water, sampled using a water sampler. Once sampled, then analyzed in the laboratory	Inundation area	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: BLH Blora Report: Regent of Blora
11)	Mobilization of operational vehicle.	• Traffic conflicts on the main access road for project vehicle (either		• Level of damage to roads • Delays and traffic jams	• Installation of traffic signs temporarily during construction	Roads around Tempuran Dam and Project Site	During construction activities	Implementation of MKJI Method 1997 dan Pavement	Roads around Tempuran Dam and Project Site	6 months during the construction phase	Implementation: BBWS Pemali Juana

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
		transporting materials or project workers). • Increased traffic volumes around the project site. • Traffic congestion and road user inconvenience. • Damage to the road infrastructure		• Traffic Count • No. of Accident	activities in accordance with the Code of Highways No. 003 / T / BNKT / 1990 and Regulation of the Minister of Transport No. 60 of 2006 • Placement of officers to regulate traffic in main access road of the project vehicle project. • Scheduling of activities to avoid rush hour traffic or night time. • Repair damage to infrastructure (roads) if made. • Limiting the load materials for transportation based onJBI permit. • Coordinating with relevant agencies.			Condition Indeks (PCI)			Supervision: • Public Works Agency of Kabupaten Blora • Dishubkominfo Kabupaten Blora • Environmental Agency of Kabupaten Blora Report: Regent of Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
12)	Water Utilization	Productivity of agricultural land		The area of agricultural land that can be served by the irrigation dam Tempuran	The setting of raw water services for irrigation service area Greening at the project site and surrounding areas Catchment area conservation	Irrigation area	During operations and maintenance	Observation and Interviews	Irrigation area	6 months during the construction phase	Implementation: • BBWS Pemali Juana • Dinas Pertanian dan Perkebunan Kab. Blora • BLH Kab. Blora Supervision: • Public Works Agency of Kabupaten Blora • Dishubkominfo Kabupaten Blora • Environmental Agency of Kabupaten Blora Report: Regent of Blora
13)	Water Utilization	Aquatic life and vegetation around the Tempuran Dam		Water quality standards in accordance with Government Regulation No. 82 of 2001 and the density of the vegetation	Greening at the project site and surrounding areas, especially in the catchment area Prohibiton of domestic activities in inundation area	Irrigation area	During operations and maintenance	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Irrigation area	6 months during the construction phase	• Dinas Pertanian dan Perkebunan Kab. Blora • BLH Kab. Blora Implementation: BBWS Pemali Juana

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				in the area chatment Dam Tempuran							Supervision: • Agriculture and Plantation Agency of Kabupaten Blora • Dishubkominfo Kabupaten Blora • Environmental Agency of Kabupaten Blora Report: Regent of Berau
14)	Water Utilization	Community's income		Productivity of agricultural land irrigated by Tempuran Dam	• Water usage management • Greening the project area • Catchment area conservation	Villages and agricultural land that receives water from Tempuran Dam	During operation and maintenance of Mrancang Dam	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Villages and agricultural land that receives water from Tempuran Dam	6 months during the construction phase	Implementation: BBWS Pemali Juana Supervision: • Agriculture and Plantation Agency of Kabupaten Blora • Dishubkominfo Kabupaten Blora • Environmental Agency of Kabupaten Blora

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
											Report: Regent of Blora
15)	Operational of Mrancang Dam	Public Perception		The intensity of the complaints, protests, or obstacles from people	• Give explanation to the public about the construction activities related to the benefits that can be earned by society • Give an explanation to the public aboutcomplaints mechanismsand their compensation, in the event of disruption or pollution due to construction activity • Conducting appropriate standard operating procedure (SOP)	Tempuran village, especially at locations around the site activity	During construction activities	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Tempuran village, especially the project site and surrounding areas	6 months during the construction phase	Implementation: BWS Pemali Juana Supervision: • Agriculture and Plantation Agency of Kabupaten Blora • Dishubkominfo Kabupaten Blora • Environmental Agency of Kabupaten Blora Report: Regent of Blora

f. Mrancang Environmental Management and Monitoring Plan

Table 12: *Mrancang Dam Environmental Management and Monitoring Plan Matrix*

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
A.	**PRE-CONSTRUCTION**										
1)	• Survey, Identification • Technical Planning for Dam Rehabilitation	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities / rehabilitation of Mrancang Dam	Public explanations/ socialization about the planned activities' specific benefit for the communities	Mrancang village, especially at locations around the site activity	Once during the pre-construction activities	The public perception is monitored by means of direct observation and interviews	Mrancang village, especially at locations around the site activity	Once during the pre-construction activities	Implementation: BWS Kalimantan III Supervision: BLH Berau Report: Regent of Berau
B.	**CONSTRUCTION**										
2)	Mobilization of equipment and material • Rehabilitation Works • Mobilization of equipment and material	The decline in air quality and increase in noise distrubances		Ambient air quality standards according to SK Gub Java No. 8 of 2001 and Kep-48 / MENLH / 11/1996 on the standard noise	• Usage of vehicles (trucks) and heavy equipment with good condition. • Maintenance machinery vehicles (trucks) and heavy equipment on a regular basis.	Vehicle (trucks) transport tools and materials	During construction phase	Sampling and laboratory analysis	Project site, and the settlements around the project site	6 months during the construction phase	Implementation: BWS Kalimantan III Supervision: BLH Berau Report: Regent of Berau

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				level for settlements	• Installation of fence/barrier around the location						
3)	Physical Rehabilitation Works of Mrancang Dam	The decline in water quality		Water quality standards in accordance with Government Regulation No. 82 of 2001	Land clearing in areas that really needed / necessary. Greening at the project site and surrounding areas	Dam site and surrounding area	During construction activities	Samples of water, sampled using a water sampler. Once sampled, then analyzed in the laboratory	Inundation area	6 months during the construction phase	Implementation: BWS Kalimantan III Supervision: BLH Blora Report: Regent of Blora
4)	• Mobilization of vehicle. • Mobilization heavy equipment • Transport of equipment, materials and workers	• Traffic conflicts on the main access road for project vehicle (either transporting materials or project workers). • Increased traffic volumes around the project site. • Traffic congestion and road user inconvenience. • Damage to the road infrastructure		• Level of damage to roads • Delays and traffic jams • Traffic Count • No. of Accident	• Installation of traffic signs temporarily during construction activities in accordance with the Code of Highways No. 003 / T / BNKT / 1990 and Regulation of the Minister of Transport No. 60 of 2006 • Placement of officers to regulate traffic in main access road of the project vehicle project.	Roads around Mrancang Dam and Project Site	During construction activities	Implementation of MKJI Method 1997 dan Pavement Condition Indeks (PCI)	Roads around Mrancang Dam and Project Site	6 months during the construction phase	Implementation: BWS Kalimantan III Supervision: • Public Works Agency of Kabupaten Berau • Dishubkominfo Kabupaten Berau • Environmental Agency of Kabupaten Berau Report: Regent of Berau

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					• Scheduling of activities to avoid rush hour traffic or night time. • Repair damage to infrastructure (roads) if made. • Limiting the load materials for transportation based on JBI permit. • Coordinating with relevant agencies.						
5)	Labor recruitment	Employment and business opportunity		• The intensity of the complaint, demands of society related to employment opportunities or remuneratio n. • Amount of local labor hired	• Requirement for hiring of local labor as much as possible, in accordance with the needs and areas of expertise. • Provide opportunities for informal sector growth during construction phase in surrounding area • Cooperating with local government (village) in the local labor	Mrancang village, especially at locations around the site activity	During construction activities	Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	Mrancang village, especially at locations around the site activity	6 months during the construction phase •	Implementation: BWS Kalimantan III Supervision: • Dinsosnakertran Kab. Berau • Dinas Perhubungan Kab. Berau • BLH Kab. Berau Report: Regent of Berau

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					recruitment						
6)	Labor recruitment	Employment and business opportunity		• The intensity of the complaint, demands of society related to employment opportunities or remuneratio n. • Amount of local labor hired	• Requirement for hiring of local labor as much as possible, in accordance with the needs and areas of expertise. • Provide opportunities for informal sector growth during construction phase in surrounding area • Cooperating with local government (village) in the local labor recruitment	Mrancang village, especially at locations around the site activity	During construction activities	Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	Mrancang village, especially at locations around the site activity	6 months during the construction phase	Implementation: BWS Kalimantan III Supervision: • Dinsosnakertran Kab. Berau • Dinas Perhubungan Kab. Berau • BLH Kab. Berau Report: Regent of Berau
7)	Construction Activities	Decrease of Public Convenence		The intensity of the complaints and protests from people who realized in the form of obstacles / barriers of society to construction	• Conducting appropriate standard operating procedure (SOP) • Watering regularly (dry season) • Limitations on working hours so as not to	Mrancang village, especially at locations around the site activity	During construction activities underway	Through Observation, intervieiws, and questionnaires to obtain data, then alayzed quantitatively.	• Project site • Surrounding Area (Mrancang Village)	6 months during the construction phase	Implementation: BWS Kalimantan III Supervision: • Dinas Perhubungan Kab. Berau • BLH Kab. Berau Report:

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				activities	interfere with the comfort of the surrounding community. • Traffic control equipment and material • Transportation of materials dredged less than 24 hours each day						Regent of Berau
8)	Construction Activities	Public Perception		The intensity of the complaints and protests from people, in the form of various demands of society to the proponent, or public objection or acceptance statement to the planned activities / rehabilitation of Tempuran Dam	• Give explanation to the public about the construction activities related to the benefits that can be earned by society • Give an explanation to the public aboutcomplaints mechanismsand their compensation, in the event of disruption or pollution due to construction activity • Conducting	Berau village, especially at locations around the site activity	During construction activities	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Mrancang village, especially the project site and surrounding areas	6 months during the construction phase	Implementation: BWS Kalimantan III Supervision: • Dinas Transportasi Kab. Berau • BLH Kab. Berau Report: Regent of Berau

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
					appropriate standard operating procedure (SOP)						
C.	**POST CONSTRUCTION**										
9)	Mobilization of equipment and material and project workers during operational phase	The decline in air quality and increase in noise distrubances		Ambient air quality standards according to SK Gub Java No. 8 of 2001 and Kep-48 / MENLH / 11/1996 on the standard noise level for settlements	• Usage of vehicles (trucks) and heavy equipment with good condition. • Maintenance machinery vehicles (trucks) and heavy equipment on a regular basis. • Installation of fence/barrier around the location	Vehicle (trucks) transport tools and materials	During construction phase	Sampling and laboratory analysis	Project site, and the settlements around the project site	6 months during the construction phase	Implementation: BWS Kalimantan III Supervision: BLH Berau Report: Regent of Berau
10)	Domestic acivities and operation and maintenance of Mrancang Dam	The decline in water quality		Water quality standards in accordance with Government Regulation No. 82 of 2001	Land clearing in areas that really needed / necessary. Greening at the project site and surrounding areas	Dam site and surrounding area	During construction activities	Samples of water, sampled using a water sampler. Once sampled, then analyzed in the laboratory	Inundation area	6 months during the construction phase	Implementation: BWS Kalimantan III Supervision: BLH Berau Report: Regent of Berau
11)	Mobilization of operational vehicle.	• Traffic conflicts on the main access road for project vehicle (either		• Level of damage to roads • Delays and traffic jams	• Installation of traffic signs temporarily during construction	Roads around Mrancang Dam and Project Site	During construction activities	Implementation of MKJI Method 1997 dan Pavement	Roads around Mrancang Dam and Project Site	6 months during the construction phase	Implementation: BWS Kalimantan III

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
		transporting materials or project workers). • Increased traffic volumes around the project site. • Traffic congestion and road user inconvenience. • Damage to the road infrastructure		• Traffic Count • No. of Accident	activities in accordance with the Code of Highways No. 003 / T / BNKT / 1990 and Regulation of the Minister of Transport No. 60 of 2006 • Placement of officers to regulate traffic in main access road of the project vehicle project. • Scheduling of activities to avoid rush hour traffic or night time. • Repair damage to infrastructure (roads) if made. • Limiting the load materials for transportation based onJBI permit. • Coordinating with relevant agencies.			Condition Indeks (PCI)			Supervision: • Public Works Agency of Kabupaten Berau • Dishubkominfo Kabupaten Berau • Environmental Agency of Kabupaten Berau Report: Regent of Berau

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
12)	Water Utilization	Productivity of agricultural land		The area of agricultural land that can be served by the irrigation dam Mrancang	The setting of raw water services for irrigation service area Greening at the project site and surrounding areas Catchment area conservation	Irrigation area	During operations and maintenance	Observation and Interviews	Irrigation area	6 months during the construction phase	Implementation: • BWS Kalimantan III • Dinas Pertanian dan Perkebunan Kab. Berau • BLH Kab. Berau Supervision: • Public Works Agency of Kabupaten Berau • Dishubkominfo Kabupaten Berau • Environmental Agency of Kabupaten Berau Report: Regent of Berau
13)	Water Utilization	Aquatic life and vegetation around the dam Mrancang		Water quality standards in accordance with Government Regulation No. 82 of 2001 and the density of the vegetation	Greening at the project site and surrounding areas, especially in the catchment area Prohibiton of domestic activities in inundation area	Irrigation area	During operations and maintenance	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Irrigation area	6 months during the construction phase	• Dinas Pertanian dan Perkebunan Kab. Berau • BLH Kab. Berau Implementation: BWS Kalimantan III

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
				in the area chatment Dam Mrancang							Supervision: • Agriculture and Plantation Agency of Kabupaten Berau • Dishubkominfo Kabupaten Berau • Environmental Agency of Kabupaten Berau Report: Regent of Berau
14)	Water Utilization	Community's income		Productivity of agricultural land irrigated by Mrancang Dam	• Water usage management • Greening the project area • Catchment area conservation	Villages and agricultural land that receives water from Mrancang Dam	During operation and maintenance of Mrancang Dam	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Villages and agricultural land that receives water from Mrancang Dam	6 months during the construction phase	Implementation: BWS Kalimantan III Supervision: • Agriculture and Plantation Agency of Kabupaten Berau • Dishubkominfo Kabupaten Beray • Environmental Agency of Kabupaten Berau

No	Impact Source	Impact Type	Impact Magnitude	Impact Indicator	Environmental Management Measures			Environmental Monitoring Measures			Institution of Environmental Management and Monitoring
					Environmental Management Measure	Environmental Management Location	Environmental Management Period	Environmental Monitoring Measure	Environmental Monitoring Location	Environmental Monitoring Period	
											Report: Regent of Berau
15)	Operational of Mrancang Dam	Public Perception		The intensity of the complaints, protests, or obstacles from people	• Give explanation to the public about the construction activities related to the benefits that can be earned by society • Give an explanation to the public aboutcomplaints mechanismsand their compensation, in the event of disruption or pollution due to construction activity • Conducting appropriate standard operating procedure (SOP)	Mrancang village, especially at locations around the site activity	During construction activities	Direct observation and interviews using a questionnaire. Data monitoring results are collected, then analyzed qualitatively	Mrancang village, especially the project site and surrounding areas	6 months during the construction phase	Implementation: VWS Kalimantan III Supervision: • Agriculture and Plantation Agency of Kabupaten Berau • Dishubkominfo Kabupaten Berau • Environmental Agency of Kabupaten Berau Report: Regent of Berau

5. Consultation and Announcement

Consultation and public announcement will be implemented in accordance with guidance in ESMF.

6. Roles and Responsibility

Roles and responsibility of the related institutions in implementing this EMP are shown below.

Table 13: *Roles and Responsibility of EMP Implementation*

Activity	Sup-project Stage		
	Pre-construction	Construction	Operation
EMP Application	B(B)WS	Contractor/Consultant	B(B)WS
Consultation	B(B)WS		B(B)WS
Collection and Analysis of Monitoring Data		B(B)WS	B(B)WS
Quarterly report of EMP implementation	B(B)WS	B(B)WS	B(B)WS
Environment Performance Monitoring Report (Biannualy)	B(B)WS	B(B)WS	B(B)WS
EMP Update and Review	B(B)WS, Dir O&P		
EMP Application Supervision	Dir. O&P, Ministry PUPR, Environmental Agency, World Bank		

7. Update, Review, and Version Control from EMP

The EMP is subject to be renewed/updated when one or more sub-projects' add or change its activities thus potentially generating new impacts or changing the scale of existing impacts. In updating the EMP, B(B)WS will be supported by Regional Safeguard Specialist of the CPIU.

The process of of EMP updating is described below.

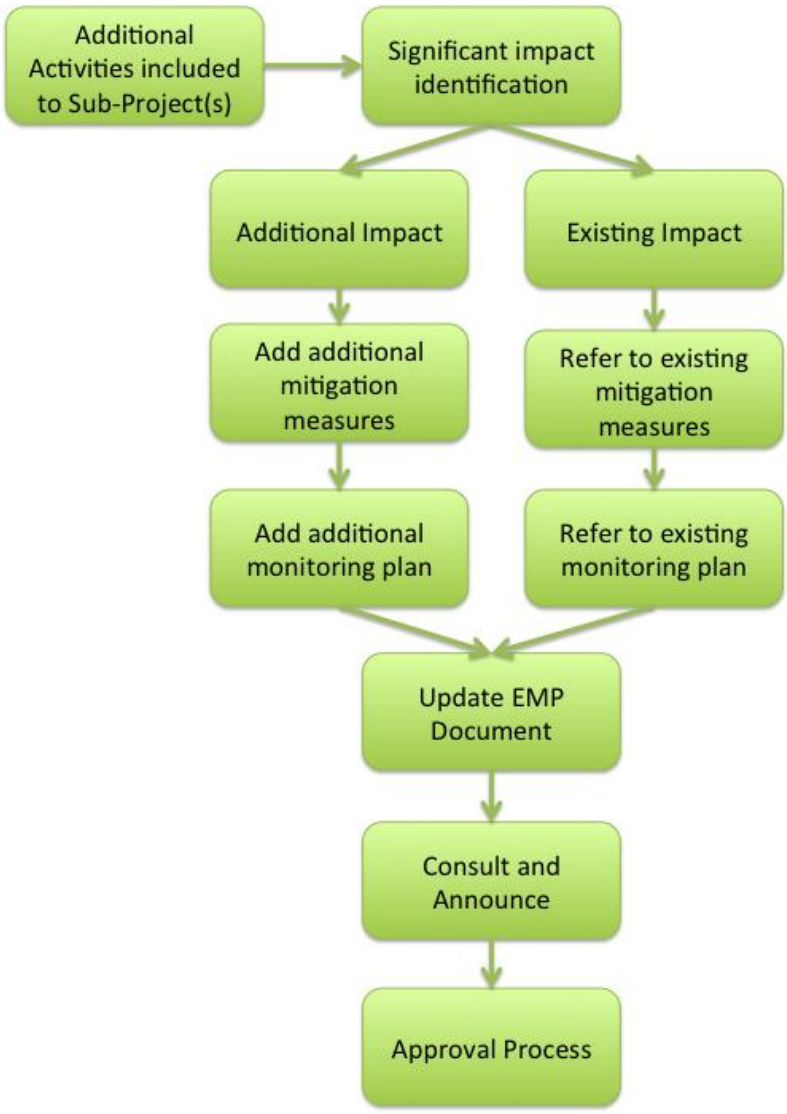


Figure 8: *EMP Updating Process*

In addition to update, EMP will be reviewed if:

- There is any incompatibility to EMP
- An environmental incident or serious health and safety occurs
- Sub-project activities are significantly changed.

A review requires National Safeguard Specialist to assess the possibility to improve the EMP in order to prevent the recurrence of incident/inconformity, or to prevent or to minimize any new risk.

Each document revision will have new revision number. Each revised document will be distributed to CPIU, and other relevant Shareholders. The previous revision will be no longer valid.