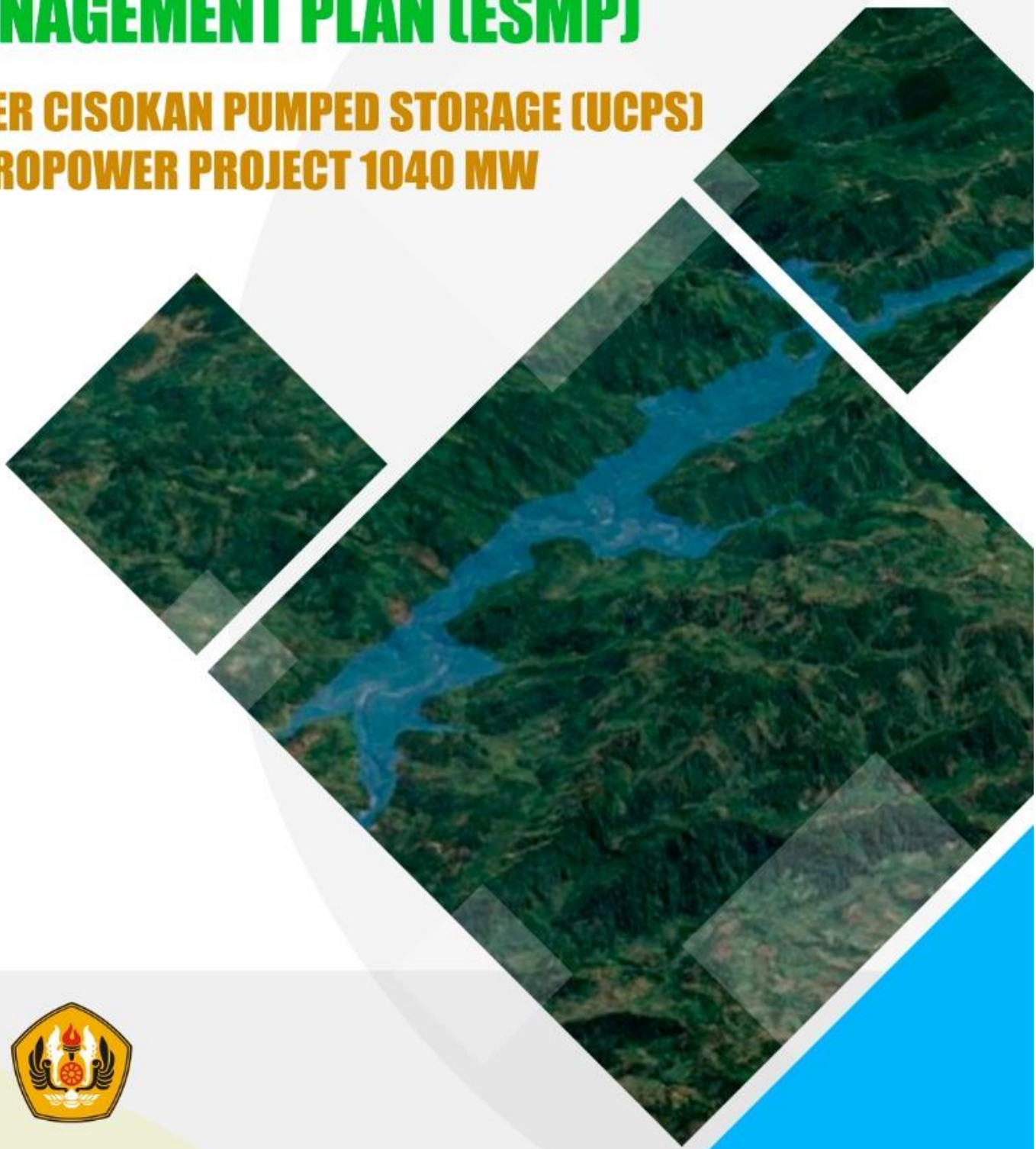
ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

UPPER CISOKAN PUMPED STORAGE (UCPS) HYDROPOWER PROJECT 1040 MW



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LIST OF ABBREVIATIONS

AMDAL = *Analisis Mengenai Dampak Lingkungan Hidup* / Environmental Impact Analysis Report
ANDAL = *Analisis Dampak Lingkungan Hidup*/ Environmental Impact Analysis
BIA = Biodiversity Important Area
BMP = Biodiversity Management Plan
BOD = Biological Oxygen Demand
CESMP = Contractor Environmental and Social Management Plan
C-ESMP = Contractor Environmental and Social Management Plan
CITES = Convention on International Trade in Endangered Species
COD = Chemical Oxygen Demand
CR = Critically Endangered IUCN Category
DAS = *Daerah Aliran Sungai*/Watershed
DI = *Daerah Irigasi*/Irrigation Area
DLH = Dinas Lingkungan Hidup/Environment Agency
DO = Dissolved Oxigen
ESSHS = Environmental, Social, Security, Health and Safety
EIA = Environmental Impact Assessment
EMF = Electromagnetic Field
EN = Endangered IUCN Category
ESCP = Environmental and Social Commitment Plan
ESIA = Environmental and Social Impact Assessment
ESMP = Environmental and Social Management Plan
ESF = Environmental and Social Framework
ESS = Environmental and Social Standards
GBV = Gender Based Violence
GRM = Grievance Redress Mechanism
GW = Giga Watt
Ha = Hectare
HSE = Health, Safety and Environment
HWL = HighWater Level
Hz = Hertz
IEC = Information, Education and Communication Consulting
IMA = Independent Monitoring Agency
IUCN = International Union for Conservation of Nature
LWL = Low Water Level
m = meters
m^3 = Cubic meters
MCK = Mandi Cuci Kakus / bathing, washing/toilet
MW = Megawatt
MUI = *Majelis Ulama Indonesia* / Indonesian Ulema Council
NAB = *Nilai Ambang Batas*/Threshold Value
NO_2 = Nitrogen Dioxide

OESMP = Operational Environmental and Social Management Plan
PAPs = Project Affected Persons
PASP = Project Occupational Health and Safety Plan
P3A = *Petani Pengguna Air*/Water User Farmer
PAUD = *Pendidikan Anak Usia Dini*/Early childhood education
Permen = *Peraturan Menteri*/ ministerial decree
PKWT = Perjanjian Kerja Waktu Tertentu / Fixed Term Work Agreement
PLTA = Pembangkit Listrik Tenaga Air / Hydropower Plant
PLN = *Pembangkit Listrik Negara*/State Electricity Company
PPKH = *Pinjam Pakai Kawasan Hutan*/forest lease-to-use
RCC = Roller Compacted Concrete
RLCP = Reservoir Land Clearing Plan
RKL = *Rencana Pengelolaan Lingkungan Hidup* Environmental Management Plan
RPL = *Rencana Pemantauan Lingkungan Hidup* Environmental Monitoring Plan
RUPTL = *Rencana Usaha Penyediaan Tenaga Listrik*/Electricity Supply BusinessPlan
SEA = Sexual Exploitation and Abuse (SEA)
SCMP = Social Community Management Plan
Sec = Second
SNI = *Standar Nasional Indonesia*/Indonesian National Standard
SOP = Standard Operating Procedure
SPPT = *Surat Pemberitahuan Pajak Terutang*/ Land and Building Tax
STD = Sexually Transmitted Diseases
SUTET = *Saluran Udara Tegangan Ekstra Tinggi*/ Extra High Voltage Transmission Line
TDS = Total Dissolve Solids
TOR = Term of Reference
TPS = Tempat Pembuangan Sementara / Temporary Disposal
TSP = Total Suspended Particulate
TSS = Total Suspended Solid
UCPS = Upper Cisokan Pumped Storage
TMKH = Tukar Menukar Kawasan Hutan / forest area swap
UIP = *Unit Induk Pembangunan* (development business unit)
UKL = *Upaya Pengelolaan Lingkungan Hidup*/Environmental Management Effort
UPL = *Upaya Pemantauan Lingkungan Hidup*/ Environmental Monitoring Effort
UPTD = *Unit Pelaksana Teknis Daerah* / Regional Technical Implementation Unit
UNPAD = Universitas Padjadjaran
VAC = Violence Against Children

1 INTRODUCTION

This document is the Environmental and Social Management Plan (ESMP) for the Upper Cisokan Pumped Storage (UCPS) Hydropower Plant (PLTA) with a capacity of 1040 MW and a 500 kV Transmission Line. The purpose of the ESMP is to guide implementation of mitigation measures and monitoring requirements identified through the EIA process in 2011 and the updated ESIA in 2020 which complies with the World Bank Environmental and Social Standards (ESS1 – ESS10) of the Environmental and Social Framework. Both the ESIA and the ESMP were updated in 2020 by PLN in collaboration with UNPAD.

The ESMP is a living document that details the appropriate environmental and social impact mitigation and monitoring measures required during the construction, inundation, and operational phases of the UCPS Hydropower Plant. Preparation of this ESMP is guided by the results of evaluation of the potential environmental and social impacts presented in the ESIA document. The ESMP document will be used as a key reference in the preparation of the Contractor ESMP (C-ESMP) document which will contain the necessary environmental and social management actions during construction in accordance with the details of the construction plan carried out by the contractors for each package. A number of topic specific environmental and social management are included as sub-plans of the ESMP. These sub-plans are the SCMP *(Social Community Management Plan)* which guides the management of social and community issues during construction and operation of the UCPS; the BMP *(Biodiversity Management Plan)* which guides the management of biodiversity during construction and operation of the UCPS. The LARAP *(Land Acquisition and Resettlement Action Plan)* documents the requirements with regards to the project-affected community.

1.1 Purpose and Objectives

This ESMP is a living document that is adapted, updated and improved as the project progresses. The broad aims of the ESMP are:

- Ensuring compliance with national regulatory authority stipulations and guidelines, as well as ensuring compliance with the World Bank Environmental and Social Framework.
- Ensuring that there is sufficient allocation of resources in the project budget so that the scale of ESMP-related activities is consistent with the significance of project impacts.
- Realising the agreed environmental and social objectives for the Project and verifying environmental and social performance through information on impacts as they occur.
- Responding to changes in Project implementation not considered in the impact assessment process thus far or responding to unforeseen events.

To achieve these objectives, the ESMP contains the following information:

- Definition of the environmental and social commitments and mitigation strategy identified in the ESIA for construction, inundation and operation phases, and any

supplementary E&S studies which will be implemented over the lifetime of the Project;

- Description of the management actions necessary to implement the commitments and mitigation strategy, including the manner in which they will be executed, the schedule, the resources and performance indicators.
- Description of the means of monitoring and assessing the performance of the social and environmental actions, so that they can be adapted and/or improved, plus the corresponding documentation.
- Definition of responsibilities: organisational structures, roles, communications and reporting process required for the implementation of the ESMP.

The implementation of this ESMP will ensure that PLN, contractors, consultants, and their subsidiaries carry out the construction and operation of the Scheme with due regard for environmental and social protection and provision.

It will be the responsibility of PLN to ensure the following requirements are met:

- Enforce and comply with all relevant environmental and social laws (see Chapter 4).
- Fulfill all commitments of the PLN 1040 MW PLTA Upper Cisokan Pumped Storage Environmental and Social Impact Assessment 2020.
- Fulfill all ANDAL, RKL and RPL commitments in accordance with Indonesian Regulations.
- Protect the environment and communities around the project.
- Enforce environmental and social compliance, awareness and understanding among employees, contractors, subsidiaries, and consultants, through:
    - Training and Inductions.
    - The assignment of roles and responsibilities under this ESMP.
    - The relationship between environmentally and socially responsible performance and overall performance.
    - Foster a shared sense of responsibility for environmental and social performance among all project participants.
    - Monitor environmental and social performance and implement continuous corrective actions as necessary.
    - Ongoing interaction with various stakeholders involved in the project.

- Communicate regularly with stakeholders, including government agencies and regulatory agencies, host communities and interest groups, to report on environmental and social performance, regulatory compliance, and project progress, and to understand and address stakeholder concerns.

The implementation of the ESMP by PLN and the associated reporting and communication will provide a mechanism by which government agencies, communities

and other stakeholders can be informed about the project's environmental and social impact management and enable participation in these processes. The ESMP provides clarity and transparency around PLN's plans, responsibilities, legal obligations and targets.

1.2 Environmental Approvals

Environmental permits from the ANDAL, RKL and RPL (AMDAL) were issued for the project on 12 April 2007, under the Environmental Management Law No.23 of 1997, as well as additional environmental permits from ANDAL on the quarry and access road were issued in March 2011.

In 2018, an activity permit for the UCPS project was also issued through an Environmental Permit for the Upper Cisokan Pumped Storage Hydropower Plant (UCPS) with a capacity of 4x260 MW in West Bandung Regency and Cianjur Regency by PT. PLN (PERSERO) Central Java Development Main Unit I. NUMBER 660/18 / 11.1.02.0 / DPMPTSP / 2018 and Environmental Permit for the Construction of High Voltage Transmission Line (SUTET) 500 kV PLTA Cisokan Hulu in West Bandung Regency and Cianjur Regency by PT . PLN (PERSERO) Central Java Development Main Unit I. NUMBER 660/19 / 11.1.02.0 / DPMPTSP / 2018.

1.3 ESMP Organization and Structure

This ESMP is designed as the main document in the control plan hierarchy during the project phase (Construction, Inundation, and Operations). The ESMP establishes the environmental and social management framework that will be applied to the project. The plan covers Environmental and Social Management Principles, Communication, Reporting, Monitoring and Review Procedures that all parties must comply with, including the relevant sub-plans.

The UCPS Hydropower ESMP framework for the Project Phase during the Construction, Inundation, and Operations stages comprises the following sub-plans:

Plan	Purpose	Responsibility	Timing
Contractors Environmental and Social Management Plan (CESMP)	Detailed processes and procedures for management of environmental, social, security, health and safety impacts during construction.	PLN will approve and supervise the CESMP. Each Contractor for each Package will prepare and implement their CESMP.	Cleared prior to contractor mobilisation
Social and Community Management Plan	Aligns with ESF requirements, in particular ESS 2, ESS 4, and ESS 10. Processes and procedures to manage social and community issues. Aspect specific plans under the SCMP are: Labor Management Plan and Grievance Redress Mechanism for workers.	PLN will implement the SCMP The Contractor will implement via their CESMP	Prepared prior to project appraisal.

	Gender Action Plan. Gender Based Violence, Action Plan (Sexual Exploitation and Abuse/ Sexual Harassment (SEA/AH)) and Violence against children (VAC). Stakeholder Engagement Grievance Redress Mechanism for communities. Influx management.		
Biodiversity Management Plan	Meet the ESS6 requirements of net gain of critical habitat. Manage construction-related impacts, direct impacts from infrastructure footprint and indirect impacts from induced development.	PLN will implement the BMP The Contractor will implement via their CESMP	Prepared prior to project appraisal/ BMP and Critical Habitat Assessment for Transmission Line to be prepared.
Reservoir Preparation Plan	Aligns with ESS4, to avoid damage and impacts on households and the wider community, and ESS6 to minimize environmental and biodiversity impacts, and achieve no net loss / net gain, during preparation of the reservoirs and inundation.	PLN will prepare the RPP, for implementation by the selected contractor.	Prepared within two years of the project effective date to allow all activities to be done prior to inundation.
Cultural Heritage Management Plan	Aligns with ESS8, to avoid and protect cultural heritage sites, and respectfully move graves and cultural sites prior to inundation.	PLN will implement. The Contractor will implement via their CESMP	Prepared prior to appraisal.
Transmission Line Environmental and Social Management Plan	Detailed processes and procedures for design and for management of environmental, social, security, health and safety impacts during construction. construction and operation of the TL.	PLN will prepare and implement the TL ESMP. The selected contractor will implement via their CESMP.	Outline provided prior to appraisal. To be completed for bid documents for design and construction of the TL.
Quarry Management Plan	Details the preparation, operation and restoration of the Gunung Karang quarry The plan details the measures required to prevent and reduce environmental and social impacts during the operation of the quarry.	Main Contractor, Lot 1a and Lot 1b. The selected contractor will prepare and implement via their CESMP. PLN will review and approve, with the support of the Supervision Engineer.	Prior to mobilization to site.
Operational Environmental and Social Management Plan	Detailed processes and procedures for flow management, management of downstream impacts, biodiversity management, reservoir management,	PLN will prepare and implement	At least six months prior to inundation.

	dam safety, and stakeholder engagement		

Any reference to 'ESMP' in this document means all procedures in this document and their corresponding sub-plans.

1.4 ESMP Roles and Responsibilities

PLN, the Supervision Engineer (ESSHS), Contractors and the Independent Environmental and Social Panel will all have the responsibility to supervise, implement, review and/or revise the various sub-plans, as shown in Table 1. The draft TOR for the Environmental and Social Review Panel is appended to the ESIA.

Table 1 List of Plan, Tasks, Sub-Plans and the Roles and Responsibilities for Supervision, Review, Revision and Implementation

Plan	Key tasks or sub-plans	PLN Project Management Team (Environmental Unit)	Supervision Engineer (ESSHS)	Contractors	Independent Environmental and Social Panel
UCPS Environmental and Social Management Plan		Preparation and Implementation	Supporting		Review and expert advice
	Capacity Training	Preparation and Implementation	Supporting		Review and expert advice
	Plan Monitoring and Review	Preparation and Implementation	Supporting		Review and expert advice
	Communication / Reporting to external agencies	Preparation and Implemnetion	Supporting		Review and expert advice
	Environmental and Social Monitoring	Preparation and Implementation	Supporting		Review and expert advice
Contractors Environmental and Social Management Plan		Approve Supervision	Technical Review & Support PLN to Approve, and Supervise Contractor	Preparation Implementation	Review of preparation and implementation
Reservoir Preparation Plan		Preparation Supervision	Supervise Contractor	Implementation (via CESMP)	Review and expert advice
Social and Community Management Plan		Implementation	Supervision of Contractor	Implementation (via CESMP)	Review and expert advice
Cultural Heritage Management Plan		Implementation	Supervision of Contractor	Implementation (via the CESMP)	Review and expert advice
Biodiversity Management Plan		Implementation	Supervision of Contractor	Implementation (via the CESMP)	Review and expert advice
Transmission Line Environmental and Social Management Plan		Preparation Implementation	Supervision of Contractor	Implementation (via the CESMP)	Review and expert advice
Quarry Environmental Management Plan		Approve Supervision	Technical Review & Support PLN to Approve	Preparation Implementation (CESMP)	Review and expert advice

Plan	Key tasks or sub-plans	PLN Project Management Team (Environmental Unit)	Supervision Engineer (ESSHS)	Contractors	Independent Environmental and Social Panel
			Supervision of Contractor		
Operational Environmental and Social Management Plan		Preparation Implementation			Review and expert advice

1.5 Description of the ESMP Sub-Plans

Each of the ESMP sub-plans are described in the following subsections.

1.5.1 Contractor Environmental and Social Management Plan (CESMP)

Objectives:

The objectives of the CESMP includes, but is not limited to:

- Compliance with the Project ESMP and sub-plans (including SCMP and BMP), World Bank Group EHS Guidelines, World Bank ESF and ESS.
- Avoiding and minimizing the adverse environmental, social, and health related impacts from the construction activities being undertaken by the contractors, sub-contractors, and consultants.
- Assisting in ensuring Project compliance with all relevant legislation at local, provincial, and national level.
- Training and capacity building of workers.
- Providing project monitoring and evaluation (i.e., compliance monitoring) for effective implementation of the mitigation measures and to ascertain efficacy of the environmental and social management and risk control systems in place.
- Incident management and response, including grievance redress.

Description:

Guidelines for the Contractor ESMP are detailed in Appendix 1. The plan should address the following:

1. Design requirements and environmental and social protection measures for construction camps.
2. Occupational Health, Safety and Securityrisk assessment and management..
3. Detailed methodologies for mitigation measures.
4. Ensuring sufficient staff, resources, budgets to implement the C-ESMP.
5. Management and monitoring of high-risk work activities.
6. Emergency preparedness and response.
7. Explosives and blasting safety and management.
8. Labor management and labor grievance mechanism.

9. Gender management and management of Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA) and sexual harassment.
10. Cultural heritage avoidance and management of chance finds.
11. Management and of camp facilities.
12. Worker code of conduct.
13. Provision for camp followers.
14. Biodiversity management.
15. Erosion and sedimentation control.
16. Particulate emissions and dust management.
17. Noise and vibration management.
18. Earthwork, cut and fill slopes.
19. Borrow pits and spoil management.
20. Tunnelling, drilling, blasting and underground works.
21. Hazardous materials management.
22. Waste management.
23. Water management.
24. Prevention of pollution.
25. Construction traffic management.
26. Vegetation clearing, replanting and site restoration.
27. Community engagement, community health and safety and grievance mechanism.

Timing Schedule and budget:

The detailed plan must be approved by PLN and the World Bank in place and communicated at least three months prior to the start of construction. The budget is included in the contractor contract.

Responsibilities:

The contractor is responsible for the preparation and implementation of the CESMP. The Supervision Engineer is responsible for technical review and support to PLN in approving the plan, as well as supervising the implementation and monitoring of the plan.

1.5.2 Reservoir Preparation Plan

Objectives:

The objective of the Reservoir Preparation Plan is to meet the requirements of ESS4 and ESS6 and to avoid and minimize the potential adverse environmental and social impacts related to preparation of the upper and lower reservoirs. The reservoir preparation activities will also contribute to avoiding and mitigating impacts of erosion, sedimentation, water quality and safety during operation. The plan will contain a detailed

methodology for preparing the land and removing contaminants prior to inundation, based on further assessment of water quality and habitat impacts and mitigation measures. The plan will also detail how access and security are to be managed during reservoir preparation.

Description:

The plan should ensure the following:

- Management of vegetation removal and and seek to minimize the loss of biomass in the land clearing for the reservoir.
- Minimize direct impacts on fauna in the area by checking for presence immediately prior to clearing and ensuring that fauna have time to move away from the area.
- Coordinate the timing of vegetation removal to provide opportunities for the local communities to use the cleared vegetation in safe and organized manner.
- Minimizes the impact on water quality during inundation and operations by removing sources of contamination such as latrines and sewage dumps.
- Protect residual forest during reservoir preparation.
- Ensure all slopes and spoil banks are stablised.
- Ensure security of the site and prohibit access to the public and a consultation program.

The plan will detail methods to:

1. Clearly demarcate the land to be cleared of vegetation to avoid unnecessary tree felling and removal of vegetation, and to protect remaining forest, riparian zones of creeks and other important habitats.
2. Schedule reservoir filling to minimise the time that land is left idle, maximize efficiency of clearing and saving vegetation, while minimizing opportunities for vegetation regrowth.
3. Implement slope stabilization, spoil bank stabilisation and other sediment and erosion controls to minimize soil entering natural waterways.
4. Implement dust control measures to reduce impacts on sentive receptors.
5. Coordinate plans to provide opportunities for local communities to utilise the cleared vegetation.
6. Procedures for covering or removing sources of contamination.
7. Procedures for managing wildlife encounters/movement during clearing process.
8. Prohibit access to the site and ensure security of the area.

Timing Schedule and budget:

The plan must be prepared, cleared by the World Bank and communicated at least three months before the start of the reservoir clearing process. This budget has been allocated in the calculation of the Contractor's budget.

Responsibilities:

The contractor will implementof the plan through their CESMP. PLN will prepare, approve and supervise the plan. The Supervision Engineer will conduct a technical review of the plan, support PLN to approve the plan, and supervise the implementation and monitoring of the plan.

1.5.3 Social and Community Management Plan (SCMP)

Objectives:

- Compliance with World Bank Group EHS Guidelines, Work Bank ESF and ESS2, ESS4 and ESS10.
- Maintain open and transparent communication with the host community including affected individuals, groups, local communities, local government authorities and other interested parties throughout the project cycle, including providing information about the project, and handling complaints and concenrns through processes including a Grievance Redress Mechanism.
- Ensure that all stakeholders are fully informed and relevant project impacts are disclosed and that appropriate mitigation and management measures are identified and implemented.
- Manage any disruption to community connectivity during construction and after reservoir inundation.
- Develop an accessible, transparent and efficient complaint procedure for people involved in and/or impacted.
- Establish a system of investigation, response, and prompt complaint resolution.
- Managing and monitoring the labour management performance of third parties related to contract workers.
- Mitigate and manage gender aspects and issues during the construction period, specifically including the preparation of a Gender Action Plan (GAP) which aims to mitigate the negative social and environmental impacts of the project for women.
- Managing vulnerabilities to Gender-Based Violence (GBV) during the construction period, including preparation of a GBV Prevention and Response Action Plan outlining how the project will put in place the necessary protocols and mechanisms to address GBV risks; and how to address any GBV allegations that may arise.
- Maintain broad support (stakeholder buy-in) for the project at the local level.

Description:

This SCMP consists of the Stakeholder Engagement Plan (SEP), Grievance Redress Mechanism (GRM) , Labor Management Procedure (LMP), Gender Action Plan, and

Gender-Based Violence Action Plan which also address Sexual Exploitation and Abuse (SEA), and Violence Against Children (VAC), and inclusion of vulnerable and disadvantaged-group.

The plan includes the following programs / plans:

1. Cultural and Environmental Awareness and Education Programs for workers regarding host community traditions, lifestyle and others, and workers' codes of conduct.
2. Health Program to manage health risks between workers and host communities.
3. Management Plan for obligations, representation and guarantees of third parties as providers of employment to contract workers.
4. A community relations plan to document communication procedures, Grievance Redress Mechanism, changes in connectivity between communities (loss of footbridges), and risks around reservoir filling, blasting and other construction-related impacts, etc.
5. Stakeholder identification plan, stakeholder categorization, stakeholder engagement plan, information disclosure and Grievance Redress Mechanism.
6. Project labor management procedures govern the ways in which PLN will manage and monitor Contractor / sub-contractor performance in relation to contract workers, with a focus on compliance of these Contractors / sub-contractors with their contractual agreements (obligations, representation and guarantees), including a separate Grievance Redress Mechanism for workers.
7. Gender Action Plan (GAP) which aims to mitigate the negative social and environmental impacts of the project for women.
8. A GBV Prevention and Response Action Plan outlining how the project will put in place the necessary protocols and mechanisms to address GBV risks; and how to address any GBV allegations that may arise.

The SCMP is not presented in the Appendices to the SMP, but in a standalone document.

Timing Schedule and budget:

This plan is prepared prior to project appraisal. The plan must be operationalised within the Contractor's CESMP.

Responsibilities:

PLN is responsible for the implementation of the plan. The Contractor must ensure the CESMP is consistent with this plan for managing social and community aspects. Supervising of plans is the responsibility of the Supervising Engineer, together with the responsibility of supervising the construction CESMP.

1.5.4 Cultural Heritage Management Plan

Objectives:

- Compliance with Work Bank ESF, and ESS8.
- Prevent the loss of tangible and intangible cultural resources, or graves and religious buildings during construction, inundation, and operation.
- The CHM Plan references the findings of the Physical Cultural Resources Survey Report 2009, and any subsequent finds.

Description:

The plan includes:

1. Methods and responsibilities for identifying, marking and protecting cultural heritage resources during construction.
2. Methods and responsibilities for relocating/removing graves and religious buildings as part of the resettlement process and reservoir preparation.
3. A Chance Find Procedure that identifies what action to take if cultural heritage items, sites or objects are found, and the responsibilities for implementing the procedure, including contractor training and awareness.

Timing Schedule and budget:

The plan is implemented by PLN and prepared prior to appraisal. The plan must be operationalised within the Contractor's C-ESMP. The budget is included in the overall ESMP costs that are detailed in Appendix 5.

Responsibilities:

The plan will be implemented by PLN. Further technical details of the plan (if any) will be prepared by the Contractor in their CESMP and supervised by the Supervision Engineer (with approval/supervision by PLN). The contractor has the responsibility to implement resource protection and follow chance find procedures. The Supervision Engineer is responsible for managing relocation and displacement, by coordinating the process with the resettlement process.

1.5.5 Biodiversity Management Plan (BMP)

Objectives:

- To meet the World Bank ESF ESS6 requirements of net gain of critical habitat. and.
- To provide a simple, well structured, adaptive management approach to terrestrial biodiversity conservation in the project area of influence following international best practice for biodiversity conservation
- Manage construction-related impacts, direct impacts from infrastructure footprint and indirect impacts from induced development.
- To provide detailed technical guidance and methods for land clearing, wildlife management, protection of biodiversity important areas to minimize the potential impacts on habitat and wildlife from project construction activities.

- To provide a long-term vision and an integrated plan for the maintenance and enhancement of habitat for threatened terrestrial mammal species in the project area of influence, while also addressing the influences from, and on, resettlements and land uses in the catchment.
-

Description:

Within the project area of influence:

- Minimising the direct impacts from Construction on the Biodiversity Important Areas (BIAs).
- Protect and replant at least 3,800ha of contiguous forest habitat to provide sufficient habitat for viable populations of threatened wildlife and achieve net gain of critical and natural forest and riparian habitat.
- To cease all illegal hunting and poaching of wildlife and illegal logging and land clearance.
- All 10 listed endangered wildlife species (see Table 1 of BMP) are present, and populations are increasing in number.
- To take an Integrated Catchment Management (ICM) approach to UCPS safeguards and ecosystem improvement that takes into account the ongoing / baseline threats to biodiversity conservation from the community and rural development.
- To create a common understanding amongst stakeholders and the community about the biodiversity values and threats.

The management priorities are:

1) Minimising the direct impacts from Construction on the Biodiversity Important Areas (BIAs).
2) Focus on the immediate and medium-term needs of the Critically Endangered Pangolin and Javan Slow Loris, Endangered Javan Gibbon and Grizzled Leaf Monkey, and Javan Leopard to sustain and enhance local populations.
3) Protecting and expanding forest habitats to connect the BIAs together and into the wider landscape while addressing the indirect impacts on biodiversity. Reforestation across the Upper Cisokan watershed will furthermore reduce sedimentation and increase dam life.
4) Ensuring community development programs, resettlement and other activities in the catchments are complimentary to the reforestation and wildlife protection efforts (and do not compromise /undermine them).
5) Develop an organizational structure and network that addresses the immediate and longer-term needs of effective ICM.

Based on the BMP Action Plan, there are five aspects that need to be considered by PLN and each aspect has several programs that need to be executed and budgeted by PLN in collaboration with relevant stakeholders.

a. The direct construction-related impacts will be mitigated and managed by:
    - Demarcating the Biodiversity Important Areas (BIAs), Corridors and Buffer Zone Area as Restoration Areas within and adjacent to the project footprint and minimizing disturbance to these areas.
    - Protecting the Restoration Area from poaching and illegal harvesting.
    - Reforesting disturbed areas within the project footprint and the Restoration Area.
    - Increasing environmental awareness and education in the community on the biodiversity conservation initiatives starting with the aim of creating a common understanding amongst stakeholders and the community about the biodiversity values and threats.
b. Reforestation and forest management will be performed by:
    - Revegetating restoration area with suitable plant species as recommended in BMP Action Plan
    - Ensuring adequate supply of plants, including appropriate varieties / species in nurseries managed by local people.
    - Developing agroforestry system to opportunities for local income.
    - Protecting the remaining wildlife habitats through habitat improvement and species enrichment, including improvement of ecological connectivity between forest patches and other ecosystem functions.
    - Protecting the forested areas from encroachment and illegal logging and hunting or poaching.
    - Exploring mechanisms and designs to incorporate community benefits from forest management.
c. Wildlife management will be carried out by:
    - Ensuring critically endangered, endangered, and other protected wildlife can survive and or increase their population sizes by reducing direct and indirect threats through prevention and mitigation of habitat destruction, preventing wildlife disturbance and deaths, and illegal hunting.
    - Avoiding (reducing) conflict between human and wildlife caused by common resource utilization (food resources) and local communities' livestock predation by wildlife.
d. Stakeholder participation will be undertaken and managed by:
    - Increasing knowledge, awareness, and participation of local stakeholders in the Upper Cisokan management, including biodiversity conservation.

- Improving coordination and cooperation within PLN and between PLN, Perhutani, local government, and the local communities related to ICM.
- Harmonizing the activities of the various parties (e.g. PLN, Perhutani, and Community) in the project area of influence to optimize the protection of wildlife and their habitats, and local communities' livelihoods.
- Looking for political support for funding and resources that can be alocated to finance Upper Cisokan management.

e. Community engagement will be performed and managed by:

- Engaging local communities to ensure that they can participate fully in the Upper Cisokan management plans and obtain benefits from the development of the area.
- Integrating the BMP into the Resettlement Planning and highlighting the potential opportunities for resettled areas to contribute to reforestation and to achieve a more successful and sustainable livelihood restoration program.
- Ensuring that any livelihoods that are adversely affected by the BMP are compensated for.
- Increasing communities' income generating activities that are appropriate with biodiversity conservation in the restoration area and Upper Cisokan management in general.
- Improving the sustainability of land use managed by the Perum Perhutani through sustainable land cultivation by local communities.

The Biodiversity Management Plan (BMP) is not presented in the Annex to this document, but in a separate document.

Timing Schedule and budget:

The BMP is prepared prior to project appraisal. The budget is estimated within the BMP included in the ESMP budget.

Responsibilities:

The BMP will be implemented by PLN. PLN will require ongoing support from, and collaboration with, Perhutani (government forestry agency and landowner), expert biodiversity conservation practitioners, conservation NGOs, government stakeholders and the host communities. The Contractor will implement the BMP via their CESMP. The Supervision Engineer will supervise the Contractor's implementation of the BMP via their CESMP.

1.5.6 Transmission Line Environmental and Social Management Plan

Objectives:

- Design and planning phase mitigation measures based on international good practice.

- Detailed processes and procedures for the management of environmental, biodiversity, social, health and safety aspects during construction and operation of the TL.

Description:

The outline of theTransmission Line Environmental and Social Management plan is presented in Appendix 4. This is based on the route alignment selected by the engineering design team and the tower land acquisition completed prior to the ESIA update in 2020, and preliminary biodiversity data and desk top analysis of risks based on good international industry practice. The outline contains relevant industry good practice, but it is not a final plan because site specific risks and risk mitigation measures need to be determined. Further studies are required to understand the baseline conditions in the transmission line corridor and quantify the risks to biodiversity, specifically avifauna and other sensitive volant species, and as such it is recognized that a separate Biodiversity Management Plan (including Critical Habitat Assessment) may be required. There is time within the project program to complete these studies and prepare a final ESMP before the bid documents are prepared and issued.
The draft Transmission Line ESMP details potential adverse impacts on sensitive receptors and mitigation measures related to:

1. Design aspects relating to avoiding hazards and risks.
2. Design instructions, including a detailed review of the alignment of the TL to avoid as much as possible the fragmentation of the BIAs.
3. Audit of the grid stations at Cibinong and Saguling.
4. Landuse within the corridor selected for the towers and transmission lines.
5. Communities and community land within the corridor.
6. Required earthworks.
7. Dust, Noise and Vibration.
8. Control of sediment and erosion.
9. Control of community access and safety.
10. Occupational Health and Safety aspects, particularly for high-risk activities associated with working at height and with electricity.
11. Biodiversity, with particular emphasis on understanding avifauna in the area, native and migratory species, particularly in relation to bird collisions and electrocution.
12. Cleaning and maintenance of corridor vegetation.
13. Electric transmission.
14. EMF exposure on communities.
15. Stakeholder engagement.
16. Potential induced development along the route.

Timing Schedule and budget:

The final plan will be prepared by PLN following further study work, particularly on biodiversity aspects and the design of mitigation measures along the transmission line, and cleared by the World Bank prior to the finalisation of bid documents for the design and installation of the transmission lines. The ESMP update will start in the first year of project implementation and will be completed by the second year. The budget for the preparation and execution of the plan is included in the Contractor's contract. Budgets should be allocated and made available in the fiscal year during the construction phase.

Responsibilities:

PLN is responsible for preparing the TL ESMP. The Contractor must then prepare their CESMP in accordance with the TL ESMP. The CESMP will be approved by PLN, in place and communicated to all staff and stakeholders at least one month prior to mobilisation. The Contractor will be supervised by the Supervision Engineer.

1.5.7 Quarry Management Plan

Objectives:

- Details the preparation, operation, and restoration of the Gunung Karang quarry.
- Details the measures required to mitigate the environmental and social impacts during the operation of the quarry.

Description:

The plan is outlined in Appendix 6. The plan will address specific management and monitoring requirements relating to the operation of the andesite mine.

The potential impacts and mitigation measures relating to quarry activities are as follows:

1. Baseline environmental audit prior to handover to the contractor.
2. Land clearing and stripping of overburden.
3. Blasting.
4. Sediment and erosion, and run-off.
5. Dust, vibration and noise.
6. Biodiversity.
7. Control of community access and safety.
8. Restricted access for the surrounding community to water sources at the mine site.

Timing Schedule and budget:

The plan will be prepared by the selected Contractor, and will be approved and cleared by PLN and the World Bank and communicated at least one month before mobilization. The budget for the preparation and execution of the plan is included in the Contractor's contract.

Responsibilities:

The Quarry Management Plan will be prepared and implemented by the selected Contractor via their CESMP. The Plan will be reviewed and approved by PLN, with the support of the Supervision Engineer . The Contractor will be supervised by the Supervision Engineer.

1.5.8 Operational Environmental and Social Management Plan

Objectives:

- Reducing the potential adverse impacts of reservoir filling and hydropower operation on host communities, downstream communities, the environment, and biodiversity.
- Ensure that environmental issues are monitored and managed throughout the life of the electricity scheme.
- Manage restoration and rehabilitation of remaining secondary forest and reservoir areas.
- Ensure that an adequate and realiable minimum flow is discharged from the dam to the river environment downsteam.
- Ensure that access to the reservoir sites is restricted and strictly enforced to avoid unauthorized access by community members. Safety measures/ safety devices/ emergency response procedures will be in place to minimize risk of injury or drowning.
- Emergency procedures for dam safety will be in place.
- Adaptive management procedures for emerging risks and impacts, including encroachment, and failure of plans to meet ESHS objectives.

Description:

Guidelines for planning are listed in Appendix 7. The plan will document procedures for managing:

1. Environmental flows downstream of each reservoir during inundation and operation (via the RPP)
2. Fuel storage and handling.
3. Access and reservoir safety (through the Dam Safety and RPP).
4. Reservoir buffer areas and biodiversity management (through the BMP).
5. Wastewater and solid waste management.
6. Downstream Management Plan - to manage water supply during low flow periods and manage sedimentation and erosion of riverbed.
7. Community relations and grievance procedures (through the SCMP) .

8. An adaptive management procedure for emerging risks and impacts, including encroachment, failure of the biodiversity offsets, improvements to river management and habitat changes.

Timing Schedule and budget:

The plan will be prepared, cleared by PLN and the World Bank six months prior to inundation of the reservoirs by PLN with support from the Supervision Engineer. Most of the operational budget is provided by PLN as stated in Appendix 5.

Responsibilities:

Further details of the plan will be prepared by PLN with support from the Supervision Engineer and implemented by PLN.

1.5.9 Environmental Monitoring Plan

Objectives:

The objective is to detect changes in the key environmental quality parameters, which can be attributed to the project (construction, inundation and operation) in order to plan the necessary corrective measures. The results of the monitoring program are used to evaluate the following: (i) extent and severity of the environmental impacts against the predicted impacts; (ii) performance of the environmental protection measures or compliance with pertinent rules and regulations; (iii) trends in impacts; and (iv) overall effectiveness of the project ESMP.

Description:

A plan is included in Appendix 8. A detailed monitoring plan will be finalized and implemented to assess impacts from inundation and operations. The plan will also provide basic monitoring during construction (not already covered by CESMP) and further operations. Monitoring locations will be based on a basic monitoring site, control site and impact site.

Monitoring under this plan does not include specific monitoring of the processing system and other mitigation and management measures during construction which will be the Contractor's responsibility under the CESMP.

Timing Schedule:

The plan must be prepared, cleared by the World Bank at least one month before the start of construction.

Responsibilities:

Environmental monitoring during construction will be carried out by Engineer Supervision. During inundation and operation, the PLN Environmental Unit will update and implement the monitoring plan.

1.6 Approvals

Relevant work will not start until documents have been approved and approval requirements are discussed in the plan. Any subsequent changes to any part of the ESMP or sub-plans must go through the same approval process (described in Section 11). The ESMP documents relating to construction activities will be reviewed and agreed upon jointly by PLN and the World Bank. The involvement of government agencies is also required in the process of reviewing and approving ESMP documents relating to permit.

1.7 Document Version Control

The plan is a living document, which can change or be modified as a result of project development or changes to the site. The review procedure for changes or other changes is documented in section 12.

ESMP is a controlled document; later versions should be documented in this section, with a brief summary of the changes.

This document is the final draft version, 2021, for public disclosure prior to appraisal.

This ESMP replaces previous ESMP documents relating to the UCPS hydroelectric scheme and associated 500 kV transmission lines.

In the future, revisions due to changes will be carried out by PLN and subject to approval by the World Bank. Revisions will be identified as revisions 1, 2, 3 etc.

2 PROJECT DESCRIPTION

2.1 Main Features of the UCPS Hydropower Plant

The main features of the hydropower plant are:

- An upper dam 75.5 m high is built on the Cirumamis River, with a watershed area of approximately 10.5 km^2. The reservoir will have 13.47 million m^3 active storage and 14 million m^3 full storage. The reservoir surface area when the water level is at a maximum will be 80 ha. The fluctuation of the operational level between the highest and lowest water levels is 19 m. The upper dam body will be constructed of compacted concrete; besides that, the walls of the weir will also be reinforced so that erosion due to water fluctuation has no effect on the weir body structure.
- The Cirumamis e-flow will match inflow in all cases except where inflow reduces to 0.01m^3/s or below, the minimum e-flow will be maintained at 0.01m^3/s.
- A 98.0 m high lower dam will be built on the Cisokan River, with a watershed area of approximately 374 km^2. The reservoir will have active storage of 11.5 million m^3 and full storage of 63 million m^3. The reservoir surface area at highest water level will be 260 ha. The difference in water level during operation between the highest and lowest water levels is 4.5 m. The dam body will be constructed from compacted concrete.
- The Cisokan e-flow will match inflow in all cases except as follows:
    - During the wet season inundation period, e-flow will equal inflow minus 6.21m^3/s for all flows greater than 7.91m^3/s; e-flow will equal 1.7m^3/s for all flow lower than 7.91m^3/s.
    - During operation, where inflow reduces to or below 0.75m^3/s e-flow will be 0.55m^3/s. e-flow will be 0.01m^3/s for all flow at or below 0.01m^3/s. This may reduce the active storage volume and generation capacity of UCPS during these low flow periods.
- A power plant with a capacity of 1,040 MW (260 MW x 4 units) and a pump capacity of 1,100 MW, placed in an underground power station. Tunnels will connect the power station to the reservoirs. A switchyard and administrative office will complement the hydropower station. The generation duration is 6.5 hours / day and the pump duration at maximum input is 8.5 hours / day.
- Two transmission networks connect the UCPS hydropower plant with the Cibinong-Saguling network in the north (15.5 km and 15.9 km).
- The UCPS hydropower plant will generate electricity during peak electricity demand, using base load electricity to pump water from the lower reservoir to the upper reservoir, then release the water to generate electricity.
- After initial inundation, most of the water in the watershed will be passed through middle outlets and spillways, with only surface water being retained in the reservoir to compensate for evaporation losses as described above.
- A new 27 km long road has been constructed to provide access to the construction sites, and the existing 7 km long road between the Gunung Karang Quarry and the new access road has repaired.

- The existing Gunung Karang Quarry will be used as a rock foundation and dam building materials.
- A short 20 kV grid will be constructed prior to construction to help provide electricity during construction.

Major construction activities are expected to take 50 months and are planned to be operational between 2024 & 2025.

2.2 Technical Details

The Project will be implemented through the following four (4) contract packages:

- Package 1: Civil Works consisting of Lot 1A for the Upper and Lower Dams and Lot 1B for Waterway, Powerhouse, Switchyard and Building Works.
- Package 2: Electromechanical Works (Pump-Turbine, Generator-Motor and Auxiliary Equipment).
- Package 3: 500kV Transmission Line.
- Package 4: Hydraulic Metal Works (Gate, Valve and Penstock).

The technical details of the Upper Cisokan Pumped Storage hydropower plant are presented in Table 2.

Table 2 Technical Detail UCPS Hydropower Plant

I. Generating Data	**Description**	
Installed Power Plant Capacity - (MW)	1,040 (260 MW x 4 units)	
Average Cycle Capacity	1,030 (257.5 MW x 4 units)	
Maximum Input - Pump (MW)	1,100 (275 MW x 4 units)	
Turbine Maximum Discharge (m^3 / sec)	108 per unit	
Maximum Gross Head (m)	301,5	
Minimum Gross Head (m)	278	
Loss Head, Generation (m)	10	
Difference in water level - generator (m)	276	
Duration of Electric Power when maximum output (hours/day)	6.5	
Maximum pump duration when input (hours/day)	8.5	
II. Scale and Reservoir Hydrology	**Upper Reservoir**	**Lower Reservoir**

River		Cirumamis River	Cisokan River
Watershed upstream of the dam (km^2)		10.5	374.0
Surface area of the reservoir when the water is high (km^2)		0.8	2.6
High water level (HWL) (m)		796.5	499.5
Low water level (LWL) (m)		777.5	495.0
Effective reservoir depth (m)		19.0	4.5
Active storage (m^3)		13,470,000	11,500,000
Total volume (m^3)		14,000,000	63,000,000
Average flow of incoming water from the river (m^3/sec)		0.4	14.9
Flood design (1/10.000) (m^3/sec)		230	1,430
III. Major Civil Construction			
1)	**Dam**	Upper Dam	Lower Dam
	Type	Concrete Gravity (RRC)	Concrete Gravity (RRC)
	Height (m)	75.5	98.0
	Dam peak length (m)	375	294
	Dam peak elevation (m) MASL	800.5	503.0
	Dam Body Volume (m^3)	369,00	508,000
2)	**Spillway**	Upper dam	Lower dam
	Tipe	Centre overflow	Centre overflow
	Normal Discharge capacity m^3/sec)	230	1,220
	Gate Type	No Gate	Radial gates
	Dimensions Height x Width (m)	-	13.5 x 10.0
	Amount	-	2
3)	**Intake**		
	Type	Side Intake	
	Gate	Steel wheeled type gate	
	Amount	2	
4)	**Circular Headrace Tunnel**		
	Length (m)	±1,217 (No. 1), 1,158 (No. 2)	
	Inner diameter (m)	7.4 circular section	
	Amount	2	
5)	**Surge tanks**		
	Type	Restricted orifice type with upper chamber	
	Inner Diameter (m)	15.0	
	Height (m)	78 m(No.1), 81 m(No.2)	
	Amount	2	
6)	**Penstock**		
	Planted *Penstocks* Steel Pipes	Planting steel pipe	
	Length (m)	475 ~ 529 (unit 1 = 475 m, 2 = 485 m, 3 = 517 m, 4 = 529 m	
	Inner Diameter (m)	5.9 ~ 4.17 ~ 3.1	
	Thickness (mm)	20 ~ 52	
	Amount	2 (ID = 5.9 m), 4 (ID = 4.17 ~ 3.1m)	
7)	**Underground Powerhouse**		

	Cave profil type Height (m) Max Width (m) Length (m)	Bullet shape 51.15 26 156.6
8)	**Tailrace Tunnel (water channel)**	
	Length (m) Inner Diameter (m) Amount	Estimate. 268m (No. 1), 241m (No.2), 211 m (No. 3), 186 m (No.4) 5,2 m 4
9)	**Outlet**	
	Type Gate Amount	Side Outlet Steel Wheeled-type gate 4
IV. Electro-Mechanical Equipment		
1)	**Turbine Pump**	
	Type	Vertically, one stage Francis Reversible type
	Rated Net Head/ Min Pump Head (m)	276 / 296
	Maximum Turbine Release/ Maximum Pump Release (m3/s)	108 / 90
	Rated Out/ Turbine Shaft Output Max. Pump Input (MW)	269 / 275
	Rated Speed (rpm)	300
	Amount	4
2)	**Generator-Motor**	
	Type	Vertical Shaft, 3-Phase AC synchronous
	Rated Generator Output (MVA)	300
	Motor Input (MW)	275
	Rated Voltage (kV)	18
	Rated Power Factor	0.9 lagging
	Rated Frequency (Hz)	50
	Rated Speed (rpm)	300
	Number of Units	4
3)	**Generator Transformer**	
	Type Rated Power (MVA) Rated Frequency (Hz) Rated Voltage LV Winding (kV) HV Winding (kV)	3-Phase OFWF 300 50 18 (Generator Motor Voltage)
4)	**Switchyard**	
	Type Rated Voltage (kV) Number of Feeders	Outdoor (AIS) Breaker and Half (1^1) 500 8

V. Transmission Line		
1)	to Saguling – Cibinong	
	Voltage Length	500 kV 16 km
2)	to Tasik- Depok Line	
	Voltage Length	500 kV 16 km
VI. Preparatory Work		
1)	**Land Acquisition**	
	Upper Reservoir Lower Reservoir Disposal Area Access Road: a) Existing road (6.7 km) b) New road (27.4 m) Transmission lines (31 km)	105 ha 356 Ha 79 Ha - - 107 ha 105 ha
2)	**Access Road**	
	Existing Road New road	6.7 km long, 8 m wide 27.4 km long, 8 m wide
3)	**Base Camp**	
	Area of land Area of building	10 ha 5000 m^2
4)	**Distribution Line**	
	Length of lines Voltage	35 km 20 kV

(Sumber: PLN Enjiniring/Nippon Koei/Newjec Inc./Indokoei International/Wiratman, 2019)

2.3 Construction Materials

The materials used in the UCPS construction include concrete aggregate materials, natural fillers and water-resistant materials with an estimated total volume of 2,133,808 m^3. Tunnel excavated material will be dumped at three locations; Cipedes Village, Sukaresmi and Bojong Salam Village, Rongga District.

The PLN quarry (Gunung Karang) will be used as a source of rock and base material, while the excavated waste material from the tunnel and power plant will be stored and stabilized in the project area. Other sources of construction materials; iron, cement and fly ash obtained from outside the city are transported to the location. The PLN andesite quarry at Gunungkarang, is located near Karangsari Village and Sarinagen Village, Cipongkor District, West Bandung Regency approximately 11 km to the east of the project site.

Figure 1 Quarry Gunungkarang in Karang Sari Village and Sarinagen Village, Cipongkor District, West Bandung Regency

2.4 Access Road

Access roads for the transportation of materials, workers and equipment, stretches from the Quarry Gunungkarang to the upper and lower dam sites. Road access consists of new roads and improvements to existing roads. The details of the length of the access road that have been constructed are as follows:

- Total length of access road = ± 33,7 km
- Repair of existing roads = 6,7 km
- Construction of new roads = ± 27 km
- Road Width = 8 m
- Total road Alignment = 15-40 m (varies, based on technical requirements)
- Construction Type = Asphalt

2.5 Dam Construction

Dam construction will be carried out 24 hours a day, 7 days a week during the placement of the RCC. In the RCC process, the concrete must be continuously shed and compacted to minimize cooling at the joints. The RCC mixture will be transported to the dam from the concrete plant by large trucks. Placement of RCC concrete can still be done during rain with an intensity of <5 mm/day.

Concrete manufacturing activity with a capacity of 120 m^3/day, with a storage warehouse that can accommodate a load of 1,600 tons, is provided to meet operational needs for 24 hours. The building will have a storage capacity of approximately 300 tons of cement and fly ash on a working day, so that the warehouse has five days' worth of storage time. The power plant will be powered by a diesel generator.

Concrete production of 60m^3/day is planned to meet the usual concrete mix that will be used for other activities. A cement storage building with a capacity of 500 tons will be required. A concrete mixer truck with a capacity of 6 m^3 will carry the mortar to the site. Pre-construction works of reservoir areas and rivers.

Before being flooded, the reservoir area must be stabilized, and cleared of vegetation and potential sources of pollution.

Clearing vegetation is done by cutting down trees and other plants using a chain-saws and other heavy equipment. The communities will still have access to this cleared agricultural products; remaining material will be buried and stabilized outside the flooded area.

Sources that cause water pollution (MCK channels, fuel storage, workshops, and fishponds) will be repaired and graves will be relocated.

2.6 Transmission Line Construction

Two 500 kV transmission lines will connect the Upper Cisokan Power Plant with the Java-Bali Network on the Saguling-Cibinong network in the North (15.5 km and 15.9 km). The total length of the new transmission lines is 31.4 km, and the 'free space' corridor is 34 m long. The towers and corridors will require an area of approximately 100.38 ha consisting of agricultural and plantation land. The connection locations on the grid have been selected, with detailed modeling of the Java-Bali network, to maximize the efficiency of the Upper Cisokan Pump Hydropower Plant and the limitations and redundancies of the existing transmission line system.

The first route stretches from Lembur Sawah Village, Sukaresmi Village, Rongga District, West Bandung Regency to Sukadana Village, Haurwangi Village, Haurwangi District, Cianjur Regency. There are 37 towers on the first line, which has a line length of 15.5 km. The second route is from Lembur Sawah Village, Sukaresmi Village, Rongga District, West Bandung Regency to Leuweung Kalong Village, Ramasari Village, Haurwangi District, Cianjur Regency. The number of towers in the first line is 45 with a length of 15.9 km.

The total number of towers for the construction of the transmission lines is 82 towers and the total land area is 105.26 ha. The land requirement for the free space corridor is approximately 100 ha (31.4 km long, 34 m wide). Land for the towers has been acquired and compensation has been delivered to all but 1 landowner, who is living in another province. The Transmission line LARAP 2011 identified lands to be affected by the Right of Way but will need to be reconfirmed as part of detailed design. Based on Minister of Energy and Mineral Resources Regulation Number 27 of 2018, PLN, as the project owner, is obliged to pay compensation to holders of title to land, buildings and/or the plants associated with land, buildings and/or plants that suffer a reduction of economic value due to being crossed by an electric power transmission network, whether in activities of construction of a new electric power transmission network, activities of replacement or addition of new towers/poles, or expansion of the area/width of the right of way and minimum horizontal and vertical axis safe distance corridors of existing networks. The

formula for calculation of the compensation is stipulated in this regulation. Compensation must also be paid for damage to buildings and plants that occurs during the construction of an electric power transmission network.

3 ROLES AND RESPONSIBILITIES

PLN remains responsible for the management and implementation of the ESMP during construction, although this can be delegated to the Supervision Engineer, as a representative of PLN. Once the reservoirs are ready to be inundated, PLN will be responsible for managing and implementing the ESMP operational procedures. The roles and responsibilities related to ESMP preparation, implementation and monitoring are presented in Table 3.

Table 3 Roles and Responsibilities

Roles	Responsibilities
PLN (Environmental Unit)	1. Implementation, Monitoring and compliance of the ESMP Project, inculding the performance of the contractors, subcontractors, staff and Supervisory Engineer. 2. Preparation of ESMP updates, studies and sub-plans with support from technical advisory consultants. 3. Review the performance of ESMP Project and make any changes that may be appropriate to improve the environmental management of site activities. 4. Compliance of the project activities with ESIA and approval of ANDAL requirements 5. Implementation of environmental and social operational management plans.
Supervision Engineer	1. Supervision of Contractor C-ESMP. 2. Working in accordance with the ESMP. 3. Preparation of the dam safety documents. 4. Sediment management study. 5. Communicate and report incidents, monitoring and other information to PLN and the relevant government agencies as required. 6. Making any recommendations to PLN that may be appropriate for improving the environmental management of site activities.
Contractors	1. Preparation and implementation of C-ESMP, in accordance with this document 2. Maintain and keep all environmental and social administrative records in accordance with the C-ESMP which references to the ESMP, and reporting these records to the Supervision Engineer 3. Work according to the C-ESMP
All contractor staff, consultants, and subcontractors	1. Work according to the C-ESMP 2. Make any recommendations to the contractor, supervisory engineer and/or PLN that may be appropriate to improve the environmental and social management of site activities
PLN Office (Environmental Unit)	1. Supervisor of Environmental and Social Management and Monitoring 2. Acceptance and review of environmental management and environmental monitoring reports.
Environmental Management Agency (BPLHD) of West Java Province	Acceptance and review of environmental management and environmental monitoring reports

Roles	Responsibilities
Environmental Office of West Bandung and Cianjur Regencies	1. Acceptance and review of environmental management and environmental monitoring reports 2. EMF Supervision and Monitoring
Officers from the Manpower Office, Social Service and Service Office	1. Supervisor of local job opportunities 2. Acceptance of local employment opportunities reports 3. Receipt of social management reports
Cipongkor Sub-Districts, Rongga, Campaka, Cibeber, Haurwangi and Bojong Picung	Supervision of Socialization and Prioritization of Local Workforce Placement
Land Office of West Bandung and Cianjur Regencies	Supervision of Environmental and Social Management

Notes:

If an incident occurs with the risk of significant environmental damage or injury to persons, work must be stopped to ensure that damage is minimized, the situation is safe, and cleaning or any precautions are taken. If this is identified by the Environmental Monitoring Team, this should be done through the Project Manager if possible. If the Project Manager is not available, and there is an urgent need to prevent environmental injury or damage, then the Environmental Monitoring Team (or other Site Supervision personnel, including the Contractor) has the ability (and duty) to shut down the relevant section. work if necessary to prevent further injury or injury.

4 LEGAL AND INSTITUTIONAL FRAMEWORK

This project is located in two administrative areas in the West Java Province, namely West Bandung Regency and Cianjur Regency according to the Decree of the Governor of West Java Number 593 / Kep-596-Pemksm / 2018 dated June 8, 2018 concerning the Third Amendment to the Decree of the Governor of West Java Number 593 /Kep.1386/Pemum/2011 concerning Stipulation of Land Acquisition Location for the Construction of the Upper Cisokan Pumped Storage (UCPS) hydropower plant in West Bandung Regency and Cianjur Regency for the UCPS hydropower plant.

This project has been approved and implemented based on several relevant laws and regulations applicable in Indonesia.

The key to the laws and regulations are as follows:

- Regional Regulation No.22 of 2010 concerning the Regional Spatial Plan of West Java Province in 2009-2029
- Law of the Republic of Indonesia No. 32 of 2009 concerning Environmental Protection and Management.

Other related laws and regulations include guidelines and standards for land use, water quality, protection of endangered species, environmental management, and social aspects in relation to energy and electricity projects whose full list is listed in Annex B of the ESIA.

4.1 West Java Province Spatial Plan

According to Indonesian law, activities that are required to make an Environmental Impact Assessment (*AMDAL*) must see whether the activities to be carried out are in accordance with the spatial layout. If requirements are not met, these activities are rejected for the AMDAL process.

The Cisokan hydropower project activities must receive an AMDAL certification. The AMDAL activity is region-specific and must, therefore, be adjusted to the Spatial Plan for the Province of West Java, West Bandung Regency and Cianjur Regency.

Under the West Java Provincial Spatial Plan 2009-2029, the regional development regulations for West Java Province are divided into five development zones (Development Area Plans) and one special zone. The UCPS hydropower plant is located in the Sukabumi Development Zone and its surrounding area. Apart from other development problems, the direction of the development zone for Sukabumi and its surroundings is to carry out strategic infrastructure development, and to build industries that do not pollute or require excessive water abstraction.

The West Java infrastructure development plan is set out in Annex 4 of the spatial plan concept and includes plans for transportation infrastructure, water and irrigation, energy and electricity, and housing/ housing infrastructure. The development plan for energy and electricity infrastructure is as follows:

- Construction of electrical installations and distribution networks to increase and evenly distribute electricity supply to all regions of West Java.
- Renewable energy development, including:
    - geothermal,
    - micro-hydro,
    - solar and wind power, and
    - biofuels.
- Development of non-renewable energy for electricity supply.

The basis for the West Java Provincial Regulation No. 22/2010 includes Law No.5 of 1960 concerning Basic Agrarian Basic Regulations, Law of the Republic of Indonesia No. 5 of 1990 concerning Protection of Biological Natural Resources and Their Ecosystems, Law Republic of Indonesia No.41 of 1999 concerning Forestry, and Law of the Republic of Indonesia No. 7 of 2004 concerning Water Resources. Law of the Republic of Indonesia No.7 of 2004, concerning Water Resources is currently no longer valid and has been replaced by Law of the Republic of Indonesia No.17 of 2019 concerning Water Resources. One of the requirements for submitting AMDAL is the suitability of the activity with the regional spatial plan.

The detailed development of UCPS hydropower plant has been included in the West Bandung Regency Spatial Plan as regulated by the West Bandung Regency Regional Regulation (Perda) No.2 of 2012 concerning the West Bandung Regency Spatial Plan for 2009 - 2029 and is also included in the Regency Spatial Plan Cianjur as regulated in the Regional Regulation (Perda) of Cianjur Regency No. 17 of 2012 concerning the 2011-2031 Cianjur Regency Spatial Plan. Thus, the construction of Upper Cisokan Pumped Storage in detail is in accordance with the West Bandung Regency Spatial Plan and the Cianjur Regency Spatial Plan.

4.2 Protection and Management of The Environment

The Environmental Impact Analysis (AMDAL) process is mandatory for every business and/ or activity that has a significant impact on the environment. This is stated in the Law of the Republic of Indonesia No.32 of 2009 concerning Environmental Protection and Management, namely in Article 22 Paragraph (1).:

Law of the Republic of Indonesia No.32 of 2009 concerning Protection and Management of the Environment revokes Law No.23 of 1997 concerning Environmental Management. The implementation of AMDAL was originally regulated in Government Regulation PP 27 of 1999 concerning Environmental Impact Analysis. Government Regulation No.27 of 1999 was revoked and declared invalid with the promulgation of Government Regulation No.27 of 2012 concerning Environmental Permits on February 23, 2012.

Minister of Environment Regulation No.5 of 2012 is no longer valid with the enactment of Minister of Environment Regulation No.38 of 2019. The updated regulation of the Minister of Environment No.38 came into effect in 2019. Minister of Environment Regulation No.5 of 2012 is no longer valid with the enactment of Minister of Environment Regulation No.38 of 2019. The last revision of AMDAL for Cisokan Hydroelectric Power Plant was carried

out in 2011, as a result, the provisions applied in the construction of the Cisokan Hydroelectric Power Plant, at that time, were the Minister of Environment Regulation No.5 of 2012.

Based on the Regulation of the State Minister for the Environment of the Republic of Indonesia No. 05/2012 concerning types of business plans and/ or activities that require an environmental impact analysis in the hydropower sector as listed in Appendix I, namely:

a. dams with a height of more than or equal to 15 meters;

b. an area that is submerged in water is more than or equal to 200 hectares, and;

c. an energy capacity of more than 50 MW

Plans and activities falling under any of these categories require AMDAL because there is a potential risk of impacts on air quality (odor and noise), water quality, flora and fauna, social, economic, and cultural aspects, especially related to land acquisition.

The UCPS hydropower plant uses a Pumped Storage system with two dams which dam the Cisokan River and Cirumanis River. Lower Dam is approximately 98 m high with an inundation area of 260 ha while Upper Dam is approximately 75 m high with an inundation area of 8O ha The total area of inundation (immersion) for the two dams is 340 ha. The energy capacity produced is 1,040 MW.

With the criteria for the UCPS hydropower plant, these activities are included in the AMDAL mandatory criteria.

Based on Article 5 Paragraph (1) Government Regulation No.27 of 2012 concerning Environmental Permits that the AMDAL preparation as referred to in Article 4 Paragraph (1) is written into the AMDAL document which consists of: Terms of Reference, Andal and RKL-RPL.

ANDAL (Environmental Impact Analysis) is a careful and in-depth study of the significant impacts of a plan and/ or activity. (Article 1 Number 7 Government Regulation No.27 of 2012). RKL (Environmental Management Plan) is an effort to deal with the impact on the environment as a result of a planned business and/ or activity (Article 1 Number 8 of Government Regulation No.27 of 2012). RPL (Environmental Monitoring Plan) is an effort to monitor environmental components affected by the impact of a business plan and/ or activity.

Based on Article 2 of Government Regulation No.27 of 2012, every business and/ or activity that is required to have an AMDAL or UKL-UPL is required to have an Environmental Permit. Environmental permits are obtained through phases of activities including AMDAL and UKL-UPL preparation, AMDAL assessment and UKL-UPL inspection and application and issuance of environmental permits.

According to Article 47 Paragraph (1) Government Regulation No.27 of 2012:

a. environmental permit issued by the Minister for environmental feasibility decisions or UKL-UPL Recommendations issued by the Minister.

b. governor, for environmental feasibility decisions or UKL-UPL Recommendations issued by the governor; and

c. regents/ mayors, for Decisions on Environmental Feasibility or UKL-UPL Recommendations issued by the regents/ mayors.

PT. PLN (Persero) Central Java Development Main Unit 1 has obtained an environmental permit for hydropower activities at the UCPS hydropower plant activity location with a capacity of 4 x 260 MW in West Bandung Regency and Cianjur Regency based on the Decree of the Investment and Integrated Services Office One Gate Government of West Java Province No. 660/18/11.1.02.0/DPMPTSP/2018 dated 25 May 2018.

This environmental permit comes out with due regard:

1. Letter of the Governor of West Java No.660.1/1241-BPLHD dated 12 April 2007 regarding the ANDAL, RKL/RPL Study Assessment for the Development of the Upper Cisokan Hydro Power Plant (Pumped Storage) in West Bandung and Cianjur Regency
2. Letter of the Governor of West Java No.660/1985-BPLHD dated 21 April 2011 regarding the Revised Study Assessment for ANDAL, RKL/RPL Upper Cisokan Pumped Storage with a capacity of 4x260 MW (Intermediate Road Development Activity Plans, construction of access roads, quarry mining and Fly Ash Utilization Coal) in West Bandung Regency and Cianjur Regency;
3. Application letter for PT PLN (Persero) Central Java Development Main Unit I No.0110/KLH.01.02/IUPJBTI/2018 dated 24 April 2018 regarding Upper Cisokan Pumped Storage Hydropower Plant with 4x 260 MW Capacity in West Bandung and Cianjur Regencies;
4. Head of the Office of Investment and One Stop Services of the Regional Government of West Java Province No. 503/2635/ESDA dated May 15, 2018 regarding Technical Considerations;
5. Letter of the Head of the West Java Provincial Government Environmental Service No.660.1/2588/Bid-1/2018 dated May 17, 2018.

Based on Article 49 of Government Regulation no. 27 of 2012 that environmental permits that have been issued by the Minister, governors, or regents/ mayors must be announced through mass media and/ or multimedia which is carried out within 5 working days of issuance.

The Environmental Permit for the UCPS hydropower plant development was announced on 6 June 2019.

The enacted Job Creation Law simplifies both environmental and business licensing. Terms and obligations in environmental agreement remain part of the load terms and obligations in business license issued to business actors. During the permit acquisition process, business is not revoked, however, if there is a violation of conduct, as stipulated in the AMDALl document or UKL-UPL, then activities and licensing are halted.

4.3 Other related laws and regulations

In addition to the spatial plan for the West Java Province and the Law on Environmental Protection and Management, there are other relevant laws and regulations.

4.3.1 Electricity Laws and Regulations

The construction of the UCPS hydropower plant involves the supply and utilization of electricity as well as electricity support businesses. Based on Article 1 paragraph 4 of the Law of the Republic of Indonesia No. 30 of 2009, electricity generation is' the activity of producing electricity'. Article 1 paragraph 5 of the Law of the Republic of Indonesia No. 30 of 2009, defines power transmission electricity as the distribution of electricity from generation to the distribution system or to consumers, or the distribution of electricity between systems.

Several articles in the Electricity Law were amended and abolished by the Job Creation Act, one of which is article 30 of the Electricity Law so it reads that there is compensation for owners of land and everything on it that is used either directly or indirectly for power plant construction and transmission activities.

4.3.2 Land Acquisition Legislation and Process

The construction of a power plant and transmission is included in the category of development for the public interest, as regulated in Article 10 letters c and f of Law No.2 of 2012. The construction of the UCPS hydropower plant, plant includes construction activities of two dams, generators, transmission networks, substations, grids and distribution of electric power. These activities requires land. The land acquisition process refers to Presidential Regulation No.71 of 2012 as amended by Presidential Regulation No. 40 of 2014 for a second amendment to be made to Presidential Regulation No.99 of 2014.

The Law on Land Acquisition for Development in the Public Interest was amended by the Job Creation Law. For this reason, PLN must adjust the incomplete land acquisition mechanisms and processes such as residual land and village treasury lands in the Rongga and Cipongkor Districts with the new regulations in the Job Creation Law. The payment for the remaining land and village treasury land has not been completed by PLN.

Land acquisition for the Project is subject to new laws and regulations. Omnibus Law (Undang Undang Cipta Kerja), Law No. 11 of 2020, especially in Chapter VIII concerning the Land Acquisition for Development for Public Interest strengthens Law no. 2 of 2012. Law 11/2020 comes into force since the enactment of Government Regulation no. 9/2021

concerning the Implementation of Land Acquisition for Development for Public Interest on February 2, 2021. The remaining land acquisition is part of the outstanding tasks that must be carried out and completed by PLN before the commencement of construction, will be subject to this new legislation (Transitional Provisions, Article 140, Government Regulation 19/2021). All land acquisition settlements for the Cisokan Project are carried out under the new legislations.

The Policies of the Republic of Indonesia relating to the land acquisition are as follows:

1. Law No. 5/1960 concerning Basic Agrarian Regulations.
2. Law No. 2 of 2012 on Land Acquisition for Development for Public Interest.
3. Law No 11 of 2021 on Omnibus Law (Undang Undang Cipta Kerja) especially in Chapter VIII concerning Land Acquisition for Development for Public Interest
4. Government Regulation No 11 of 2021 concerning Implementation of Land Acquisition for Development for Public Interest
5. Presidential Regulation Number 62 of 2018 concerning Management of Social Impacts in the context of Provision of Land for National Development.
6. Regulation of the Minister of ATR/BPN Number 6 of 2020 concerning Provisions for the Implementation of Presidential Regulation No. 62 of 2012.
7. West Java Governor Regulation Number 32 of 2013 concerning Technical Guidelines for Implementation of Land Acquisition Preparation for Development for Public Interest.
8. Regulation of the Minister of Environment and Forestry Number P.7/MENLHK/SETJEN/KUM.1/2/2019 concerning Amendments to the Regulation of the Minister of Environment and Forestry Number P.27/MENLHK/SETJEN/KUM.1/7/2018 concerning Borrowing and Use of Forest Area Guidelines.
9. West Java Governor Regulation Number 32 of 2013 concerning Technical Guidelines for Implementing Land Preparation for Development for Public Interest.
10. Decree of the Governor of West Java 593/Kep.596-Pemksm/2018 concerning the third amendment to the Decree of the Governor of West Java Number 593/Kep.1386/Pemum/2011 concerning the Stipulation of Land Acquisition Location for Upper Cisokan Pumped Storage Hydro Power Plant Development in West Bandung and Cianjur Regency.
11. Regulation of the Director of PLN Number 0344.P/DIR/2016 concerning Small Scale Land Acquisition under 5 ha.
12. Memorandum of Understanding for West Java Provincial Government, Cianjur Regency Government, West Bandung Regency Government with PT. PLN (Persero) Regarding the CSR Program for the Construction of Upper Cisokan Pump Storage Plants Number: 671/06/Admrek/2009;671/2064/Bappeda;205.2/PRJ-34 PLN/2009;013.MoU/040/DIR/2009

4.3.3 Legislation concerning Village Treasury Land

The construction of UCPS hydropower plant uses village treasury lands in two sub-districts, namely Cipongkor District and Rongga District, West Bandung Regency. Village treasury lands are regulated under Law Number 6 of 2014 concerning villages. Village treasury land is considered a village asset according to Article 76 paragraph (1) of the Village Law. Villages that are managed have a higher compensation value when compared to private land controlled by individuals due to the element of public interest. This is a determining factor when considering the amount of compensation for Village Treasury Land as the object of land release.

The development of the UCPS hydropower plant will affect the rural area. PLN must, therefore, pay attention to the development of villages or rural area development carried out in collaboration with the city/district government or local village government.

As explained in Article 83 paragraph 3, the Development of Rural Areas includes:

a. the utilization of the Village area in the framework of determining the development area in accordance with the Regency/City spatial layout;

b. services carried out to improve the welfare of rural communities;

c. infrastructure development, increasing rural economy, and developing appropriate technology; and

d. village community empowerment to increase access to services and economic activities.

Article 84 paragraph (1) states that the Development of Rural Areas by the Government, Provincial Government, Regency/ City Government, and/ or third parties related to the utilization of Village Assets and Village spatial planning must involve the Village Government.

The release and payment of compensation for village treasury land for Cisokan Hydroelectric Power Plant must be carried out in reference to Permendagri Number 1 of 2016. Article 33 Paragraph (2) letter b Permendagri Number 1 of 2016, states that if the replacement land is not yet available, then the replacement land is first given in the form of money. Article 33 Paragraph (2) letter c states that the replacement in the form of money, as referred to in letter b, must be used to purchase replacement land of an equivalent value. This can be interpreted as compensation for village treasury land can be made using money which goes towards buying replacement land that is equal in value to the agreed upon compensation. The next arrangement concerns the location of replacement land. Article 33 Paragraph (2) letter d, Permendagri Number 1 of 2016 states that the replacement land should be located in the local village. Article 33 Paragraph (2) letter e states that if the location of the replacement land is not available in the local Village, as referred to in letter d, the replacement land can be located in a Village in a directly adjacent a District.

If with Law 2 of 2012, the provisions for releasing village treasury lands are carried out with reference to Article 34 of the Minister of Home Affairs Regulation No.1 of 2016, which states that the implementation stages of releasing village treasury must be carried out with the permission of the respective Regional and Provincial Governors. The permission from the Governor is the basis for the Officials Making the Land Acquisition Commitment to provide compensation to the Village for land acquisition in the form of village treasury land.

Regarding the compensation that must be made by PLN as a work provider in the construction of PLTA Cisokan, there are changes in the Job Creation Law. The changes are as follows:

Article 46, concerning compensation for village treasury land, includes an additional change in the form of compensation. According to Article 46 paragraph (4), compensation for the object of village treasury land acquisition as referred to in paragraph (1) letter c can be given in a deep form, including:

a. Money
b. Residential land
c. Resettlement
d. Share ownership, and
e. Another form agreed upon by both parties.

Article 34 paragraph (2) of the Job Creation Law states that the compensation of losses is carried out based on the results of the assessment which will be submitted to the Land Institution along with the minutes of the announcement of the location for the construction of PLTA Cisokan. The compensation value is final and binding.

4.3.4 Settlement Laws and Regulations

Residents affected by the inundation of Upper and Lower Dam have made new settlements. The resettlement by PLN at the Central Java Development Main Unit, refers to Law Number 1 of 2011 concerning Housing and Settlement Areas, as described in Article 86 paragraph 1 of Law Number 1 of 2011 concerning Housing and Settlement Areas. In accordance with these regulations, PLN is required to maintain the sustainable function of housing and settlement areas for the benefit of improving the quality of life of individuals.

4.3.5 Construction Activities Legislation

Construction activities in the Upper Cisokan project, both main and supporting construction, must comply with the provisions in the Construction Services Law No.2 of 2017 which replaces Law 18 of 1999 concerning Construction Services, along with its implementing regulations.

According to Article 59 Paragraph (1) of Law No.2 of 2017, in the implementation of construction services, service users and service providers are required to meet security,

safety, health and sustainability standards. Then in Article 85 Paragraph (1) of Law No.2 of 2017 that the public can participate in the supervision of the implementation of construction services by accessing information and information related to construction activities that have an impact on the interests of the community and making complaints, lawsuits and efforts to get compensation or compensation for impacts caused by construction service activities.

Currently, PT Brantas Abipraya has completed the construction of the 27 KM access road which will be continued by PT Pembangunan Perumahan (PP) Persero. All impacts due to construction work have been completed and will continue to be completed by PT PLN (Persero) Central Java Development Main Unit 1 as long as there are still complaints from the public.

PLN must pay attention to the amendments to the Construction Services Law by the Job Creation Law to the dam construction and transmission activities that will be carried out. The elimination of several articles in the Construction Services Law, which obligates:

a. the opening of a foreign construction service representative office;
b. prioritizing the use of domestic construction materials, technology and technology transfer processes;
c. up to date to technology that is efficient and environmentally sound;
d. formation of operational cooperation with agencies from a qualified national construction service business that has a business license in every construction service business activity in Indonesia and employs more Indonesian workers than foreign workers.

4.3.6 Employment and OHS Laws and Regulations

Labor Regulations related to Occupational Health and Safety

1. Law Number 13 of 2003 concerning Manpower

One of the important discussions in Law Number 13 of 2003 concerning Manpower related to Cisokan Hydropower workers is the protection of occupational safety and health which are rights that must be accepted by workers and fulfilled by companies, in this case, PLN. Furthermore, the mandatory provisions for PLN in providing protection for workers in the construction of Cisokan Hydropower are regulated in Articles 86 and 87 of Law Number 13 of 2003 concerning Manpower Article 86 explains that:

(1) Every worker/ laborer has the right to receive protection:
   a. Occupational Health and Safety;
   b. Morals; and
   c. Treatment in accordance with human dignity and religious values.
(2) To protect the safety of workers/ laborers in order to achieve optimal work productivity, efforts are made to Occupational Health and Safety.
(3) The protection as meant in paragraph (1) and paragraph (2) will be implemented in accordance with the prevailing laws and regulations.

Article 87 explains that:

(1) Every company is obliged to implement an Occupational Health and Safety management system that is integrated with the company management system.

(2) Provisions regarding the implementation of the Occupational Health and Safety management system as referred to in paragraph (1) will be regulated by a Government Regulation.

The protection of occupational health and safety, especially in the construction of the Cisokan Hydropower, is important to be implemented, with the aim that the realization of the Cisokan hydropower is optimal and in accordance with the provisions of the laws and regulations regulated in Indonesia. In line with this, the International Labor Organization (ILO) also explains that the productivity achieved in carrying out work is a numerical comparison between the amount produced and the amount of each source used during production, which is fulfilled and balanced.

The implementation of occupational health and safety in the construction of the Cisokan is intended to reduce the risk of accidents and diseases due to work, control of dangerous places in the workplace, treatment and rehabilitation during the construction of Cisokan Hydropower.

All workers in the construction activities of the UCPS hydropower plant project have their normative rights following Law No.13 of 2003 concerning Manpower. Some of which have been amended by the Job Creation Act. Changes to the Manpower Law are:

1. The loss of the maximum time limit provisions in the Fixed Time Work Agreement (PKWT).
2. Permit to use foreign workers is replaced only with a plan to use foreign workers approved by the central government and there are exceptions such as for startups, research, etc.
3. Overtime per day is added from a maximum of 3 hours to 4 hours, a maximum of 18 hours a week.
4. Rest weekly for one day for 6 working days in one week. The provision of weekly rest for 5 working days is not regulated.
5. The elimination of the phrase "the need for a decent life" as a reference for calculating the minimum wage, which has an impact on the broader shift in the concept of wage protection.
6. Removal of restrictions on the types of work that can be outsourced.
7. The paradigm shift of termination of employment is easier because it opens the possibility of layoffs only through notification from employers to workers without prior negotiation.
8. Less government interference in industrial relations by restoring work relations to an agreement between employers and workers, such as the matter of non-permanent contracts time limit and the right to long rest that can be agreed upon in the work agreement.

2. **Law Number 1 of 1970 concerning Occupational Safety**

As has been explained in the protection of occupational health and safety based on Law Number 13 of 2003 concerning Manpower, a more specific arrangement or *lex specialis* that regulates worker safety in the construction of Cisokan Hydropower has been regulated in Law Number 1 of 1970 concerning Work Safety.

PLN must be in accordance with those regulations stipulated in Article 14 of Law No.1 of 1997 concerning Work Safety, namely:

a. Placing all the required work safety requirements, both for rules in the work safety legislation and all the implementing regulations that apply to the workplace concerned, in places that are easily seen and legible and according to the instructions of the supervisory officer or occupational health expert.

b. Installing, all required work safety pictures and all other guidance materials in places that are easily seen and legible according to the instructions of supervisory employees or occupational safety expert.

c. Providing free of charge, all personal protective equipment required for workers and every other person who enters the workplace, accompanied by instructions required according to the instructions of the supervisory employee or occupational safety expert.

3. Law Number 36 of 2009 concerning Health

This Law participates in regulating occupational health as referred to in the previous Law. Occupational health is regulated in the sixth part concerning Occupational Health, further in Article 23 which explains that:

(1) Occupational health will be implemented to achieve optimal work productivity.
(2) Occupational health includes occupational health services, prevention of occupational diseases and occupational health.
(3) Every workplace is obliged to provide occupational health.
(4) Provisions regarding occupational health as referred to in Paragraph (2) and Paragraph (3) are stipulated by a Government Regulation.

Based on this explanation, it means that PLN as a work provider is obliged to guarantee the work health of workers who are involved in the construction of the Cisokan hydropower.

4. Government Regulation Number 88 of 2019 concerning Occupational Health

Government Regulation Number 88 of 2019 concerning Occupational Health is the implementing regulation of Law Number 36 of 2009 concerning Health. Based on the two regulations, it is explained that Occupational Health is an effort aimed at protecting everyone who is in the workplace so that they can live healthily and free from health problems and bad effects resulting from work. Whereas the definition of a workplace is any room or field, closed or open, mobile or permanent, where the worker works, or where workers often enter for business purposes and where there is a source of danger in accordance with the provisions of laws and regulations.

This means that in the implementation of occupational health for the workforce, the construction of Cisokan Hydropower is mandatory because Article 3 of the PP on Occupational Health explains that "Occupational Health Providers as referred to in Article 2 are addressed to everyone who is under the workplace". This is also reflected in the explanation related to occupational health which has always been an integral part

of the guarantee of occupational health and safety as regulated in the Manpower Act, the Occupational Safety Law and the Health Law. In addition, policies related to occupational health insurance for workers are in line with the principles in the National Health System in Indonesia.

The following is an explanation of what health insurance protection that PLN can provide as the main company in the construction of Cisokan Hydropower to workers who are bound in it, based on Article 2 of Government Regulation Number 88 of 2019 concerning Occupational Health:

Article 2

(1) The central government, regional governments and the community are responsible for implementing occupational health in an integrated, comprehensive and sustainable manner.
(2) The Occupational Health Administration as referred to in paragraph (1) includes efforts:
    a. disease prevention;
    b. health improvement;
    c. disease management; and
    d. health restoration.
(3) Efforts as referred to in paragraph (2) shall be implemented in accordance with occupational health standards.
(4) The occupational health standard as referred to in paragraph (3) shall be implemented with due observance of the National Health System and the national occupational health and safety policy in accordance with the provisions of laws and regulations.

In Government Regulation Number 88 of 2019 concerning Occupational Health, it is also regulated in relation to the standards that must be carried out by occupational health providers as regulated in Articles 4,5, 6 and 7 which consist of standards for efforts to prevent occupational diseases, efforts to improve health in workplace, efforts to deal with disease for workers, as well as efforts to restore health to workers.

Furthermore, PLN as an occupational health provider based on the PP Health at work is obliged to provide supporting facilities in order to guarantee the health of workers who are tied to the construction of Cisokan Hydropower, including:

a. Human resources consisting of health workers and non-health workers as supervisors;
b. Health service facilities such as the nearest health center as a form of cooperation;
c. Occupational Health Equipment such as personal protective equipment in accordance with risk factors or occupational safety and health hazards in the Cisokan hydropower plant; and
d. Recording and reporting related to the implementation of occupational safety and health insurance carried out by employers, managers and managers of work places, and/ or health service facilities.

Furthermore, the recording and reporting are submitted in stages to the Central Government and Regional Governments as surveillance of the implementation of occupational health in the construction of the Cisokan Hydropower plant.

5. Law Number 40 of 2004 regarding Social Security

This Social Security Law is the basis for the guarantee of the rights that should be received by workers. Social securities as regulated in Article 18 of Law Number 40 of 2004 cover:

a. health insurance;
b. accident insurance;
c. pension plan;
d. pension guarantee; and
e. life insurance.

Based on this explanation, insurance matters relating to occupational health and safety include health insurance, work accident insurance and death insurance. Based on this Law, PLN as a work provider is obliged to guarantee the health of the workforce organized nationally based on the principles of social insurance and the principle of equity.

The health insurance that is held can be carried out by PLN as a work provider with the aim of ensuring that participants get the benefits of health care and protection in meeting basic health needs, given the condition of Indonesia which is currently in a state of the Covid-19 pandemic, this health insurance needs to be further improved along with the there are many parties in the construction of the Cisokan hydropower plant. In this case, PLN does not only provide health insurance to workers, but all family members of the participants are entitled to receive health insurance benefits. PLN must also provide occupational health insurance which remains valid for a maximum of 6 (six) months if during the construction of the Cisokan Hydropower there are workers who experience termination of employment.

The health insurance provided by PLN as a work provider will be in the form of individual services in the form of health services that include promotive, preventive, curative and rehabilitative services, including drugs and consumable medical materials that are needed. Furthermore, it will be given to government-owned or private health facilities that collaborate with the Social Security Administering Body. Except in an emergency situation, services can be provided at health facilities that do not cooperate with the Social Security Administering Bodies.

While the explanation for the provision of work accident insurance by PLN, then PLN as a work provider must follow the work accident insurance arrangements as described in Article 29 that work accident insurance is held nationally based on the principle of social insurance, with the aim of ensuring that participants receive health service benefits and monetary compensation. cash if a worker has a work accident or suffers from occupational disease.

As a construction work that has a high hazard, the guarantee of work accidents is the second thing that must be provided as a guarantee of occupational safety and health

for workers in the construction of the Cisokan Hydropower. Meanwhile, PLN must provide benefits in the form of health services in accordance with their medical needs and receive benefits in the form of cash in the event of a permanent total disability or death to the worker who has a work accident. Work accident security benefits in the form of cash are given at the same time to the heirs of workers who die or workers with disabilities according to the level of disability. Further provisions regarding the amount of cash benefits, heir rights, compensation and medical services.

However, in this case, there are actually several different arrangements as described in this Social Security Law where participants who receive social security in the form of health insurance and work accidents are workers who have paid regular contributions as well as if there are additional family members as regulated in Article 30 of the Social Security Law. Meanwhile, this is different from what is regulated in the Occupational Health Law which explains that health insurance is not paid for by the worker himself but has been guaranteed by the government.

However, even though there are differences in the arrangements for occupational safety and health insurance. The workforce for the construction of Cisokan Hydropower must still be fulfilled and guaranteed by the work provider, namely PLN and further policies are regulated by PLN.

6. Law Number 24 of 2011 concerning Social Security Administering Bodies

In the context of implementing occupational health and safety insurance, Law Number 24 of 2011 concerning Social Security Administering Bodies has the function of administering health insurance programs. As explained in Article 14 of the BPJS Law that "Everyone, including foreigners who have worked for at least 6 (six) months in Indonesia, must be a participant of the Social Security program.".

This means that companies related to the workforce are required to gradually register workers who are participants of social security recipients, including in the construction of the Cisokan Hydropower, in which PLN is obliged to provide occupational safety and health guarantees to the workforce of the construction of Cisokan Hydropower as it should be regulated in Article 14 of the BPJS Law. Furthermore, it is explained in Article 15 of the BPJS Law, that:

Article 15

(1) An Employer is obliged to gradually register himself and his Workers as Participants with the BPJS in accordance with the Social Security program being participated in.
(2) Employers, in registering as referred to in paragraph (1), are required to provide complete and correct data on themselves and their Workers and their family members to BPJS.
(3) The stages referred to in paragraph (1) shall be regulated by a Presidential Regulation.

As for the company's implementation of the construction of Cisokan hydropower in the context of implementing occupational health and safety guarantees for its workers,

it can be done by following the health insurance and work accident insurance and death insurance programs as described in Article 6 paragraph (1) of the BPJS Law.

7. Government Regulation Number 50 of 2012 concerning Implementation of the Occupational Health and Safety Management System
   Government Regulation Number 50 of 2012 describes the Occupational Health and Safety Management System which is part of the overall company management system in the context of controlling risks related to work activities in order to create a safe, efficient and productive workplace. In this case, PLN as a work provider company certainly must have company management as regulated in Government Regulation Number 50 of 2012, especially related to the construction of the Cisokan Hydropower.

   Furthermore, in the running of occupational safety and health guarantees that have been carried out by PLN during the construction of the Cisokan Hydropower, an Occupational Health and Safety Management System Audit will be carried out as part of a systematic and independent inspection of the fulfillment of predetermined criteria to measure the results of activities that have been planned and implemented in the application of the Occupational Health and Safety Management System in the employer company.

   Based on the Elucidation of Article 5 paragraph 2 the requirements that must be fulfilled as a work provider company are obliged to carry out the Occupational Health and Safety Management System as follows: Article 5 paragraph (2) The obligations referred to in paragraph (1) apply to companies:
   a. employing workers / laborers at least 100 (one hundred) people; or
   b. has a high level of potential danger.

   Furthermore, the description of work with a high level of potential danger is as follows "high level of potential hazard" is a company that has a potential hazard that can cause accidents that harm human life, disruption of production processes and pollution of the work environment"

   Based on the requirements as described in Article 5 paragraph 2 PP Number 50 of 2012, the construction work of the Cisokan Hydropower is one that is included in the work that must be accompanied by an occupational safety and health management system, which is based on data provided by PLN that the number of workers The total involved in the construction of the Cisokan Hydropower includes 2700 workers, which means that in this case one of the requirements for the implementation of Occupational Health and Safety Management System in this development can be fulfilled.

   In addition, based on the understanding of the high level of potential danger described in the explanation of article 5 letter b of Government Regulation Number 50 of 2012, the construction work of Cisokan Hydropower is one of the jobs with high potential hazards because the risk of work accidents does not only cover human loss but also resulting in disruption of the production process and pollution of the work environment.

Therefore, this Occupational Safety and Health Management System must be fulfilled by PLN as a work provider and is carried out in order to prevent and reduce occupational accidents and occupational diseases by involving elements of management, workers/ laborers, and/ or trade/ labor unions. Article 6 paragraph (1), it is explained that what PLN can do as a work provider is as follows:

Article 6 paragraph (1)

a. the stipulation of OHS policies;
b. OHS planning;
c. the implementation of the OHS plan;
d. monitoring and evaluation of OHS performance; and
e. Performance improvements and enhancements of Occupational Health and Safety Management System

The explanation is as follows:

a. The Stipulation of OHS Policies

   The OHS policy stipulation carried out by PLN is carried out as referred to in Article 6 paragraph (1) letter a carried out by the entrepreneur by compiling the policy must at least:

   a) conduct an initial review of the OHS condition which includes:
      1. identification of potential hazards, risk assessment and control;
      2. a comparison of the implementation of OHS with companies and other sectors that are better;
      3. review of the cause and effect of a dangerous event;
      4. compensation and interference as well as the results of previous assessments relating to safety; and
      5. assessment of the efficiency and effectiveness of the resources provided. b. pay attention to continuous improvement of OHS management performance; and c. pay attention to input from workers/ labor and/ or trade/ labor unions.

   The OHS policy made by the company contains at least a number of related issues

      1. vision;
      2. company objectives;
      3. commitment and determination to implement the policy; and
      4. framework and work program covering general and/ or operational company activities.

   PLN as a work provider must disseminate the stipulated OHS policy to all workers/ laborers, people other than workers/ laborers who are in the company, and other related parties.

b. OHS planning

   The OHS plan is prepared and stipulated by the entrepreneur with reference to the OHS policy that has been determined, while in preparing the OHS plan as referred to in paragraph (2) the entrepreneur must consider:

   a) the results of the initial review;
   b) identification of potential hazards, risk assessment and control;
   c) laws and regulations and other requirements; and
   d) resources owned.

PLN as a work provider in compiling an OSH plan must involve an OSH Expert, an OHS Advisory Committee, workers / labor representatives, and other parties involved in the company.

The OHS plan contains at least:
a. goals and objectives;
b. priority scale;
c. hazard control efforts;
d. determination of resources;

4.3.7 Quarry Mining Regulations

The rocks for the construction of the UCPS hydropower plant dam using granite taken from Gunung Karang belong to PT Indonesia Power's SHGB. Quarry mining is included in the category of rock mining commodity as regulated in Article 2 Paragraph (2) letter d of Government Regulation No. 23/2010 concerning the Implementation of Mineral and Coal Mining Business Activities. This government regulation is a mandatory rule from Law No.4 of 2009 concerning Minerals and Coal (Minerba). Law No.4 of 2009 has been amended, namely by Law No.3 of 2020 concerning Amendments to Law No.4 of 2009.

In mining and quarry transportation activities, PLN and contractors must pay attention to the provisions of the Minerba Law which part of the article has been amended by the Job Creation Law.

PT. PLN (Persero) has a Cooperation Agreement with PT Indonesia Power Saguling Power Generation and Operation & Maintenance Unit Regarding Land Use and Quarry Gunung Karang which is located in Karangsari Village, Cipongkor District, West Bandung Regency for the Purposes of Construction of PT PLN's UCPS hydropower plant Central Java Development Main Unit I.

4.3.8 Borrowing and Use of Forest Areas Permit Legislation

The construction of the UCPS hydropower plant is in a forest area. For this reason, PLN is required to have a land use permit based on the Minister of Forestry Regulation Number: P.16/Menhut-II/2014 concerning Guidelines for Borrowing and Using Forest Areas. Based on the Decree of the Head of the Investment Coordinating Board No.63/I/IPPKH /PMDN/ 016 concerning Borrowing and Use of Forest Areas for the construction of the UCPS hydropower plant in Limited Production Forest Areas and Permanent Production Forests on behalf of PT PLN (Persero) in the Regency West Bandung and Cianjur Regency, West Java Province, covering an area of approximately 409 hectares.

For forest land status, the current status of forest lease-to-use (PPKH) with a land area of 155.89 hectares (ha) can be used because it has obtained principle permits and dispensation permits, which are currently in the process of fulfilling the requirements for issuing borrow-to-use permits. Meanwhile, the Land Borrowing and Use of Forest Area (PPKH) compensation area of 161.5623 Ha of 311.78 Ha (51.82 percent) has been released and the handover of land for compensation phase I covering an area of 152.27

Ha is currently in the process of application. issuance of technical considerations for land compensation candidate phase II from the West Java Provincial Forestry Service (Dishut Prov Jabar). Then for the status of forest area swap (TMKH) with a land area of 229.36 ha has obtained a principle permit and is currently in the process of applying for a dispensation permit.

4.3.9 Legislation concerning Utilization of Water Resources and Water Permit

The construction of the UCPS hydropower plant is a development of electricity procurement from water resources. According to the general explanation contained in the Law of the Republic of Indonesia No.17 of 2019 concerning Water Resources, it is explained that one of the uses of water resources can be made for businesses that use water as a medium or the main element in their operations such as hydroelectric power.

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The construction of the UCPS hydropower plant, which uses water resources as the main medium, has the potential to provide a source of energy as defined in Article 1 number 16 Law of the Republic of Indonesia No.17 of 2019 concerning Water Resources. The development of the Cisokan Pumped Storage Hydroelectric Power Plant, aims to harness this potential energy and provide benefits to human livelihoods. In utilizing this potential, PLN is obliged to follow the regulations related to management of water resources (Chapter 5) and Permitting on use of Water Resources (Chapter 6) of Law Number 17 of 2019 concerning Water Resources.

Regarding the requirement for developing a water resources management plan, which includes conservation, utilization and control of the potential water energy, PLN is obliged to follow the requirements contained in Law of the Republic of Indonesia No.17 of 2019 concerning Water Resources for development of the UCPS hydropower plant.

In 2014, the Ministry of PUPR issued Ministerial Decree No. 619 / KPTS / M / 2014 concerning the granting of water resources utilization permits (SIPA) from the Cisokan River to PT. PLN (Persero). The permit conditions state the following:

1. The maximum abstraction of water for filling the reservoirs from the Cisokan River is 6.21m^3/s during four months of we season, measured at one measuring point using a volumetric measuring device.
2. To ensure there is enough water for maintaining river ecological function, the Q95 of the reliable water flow (0.55m^3/s) should be released at all times. (*This is a minimum flow).*
3. In the dry season, if flow in the Cisokan River is less than 0.55m^3/s, then PLN should release a minimum flow of 0.55m^3/s for river ecosystem maintenance, by taking additional compensation water from the reservoir.

4. In extreme climate conditions, the bottom outlet should be opened to fulfill additional irrigation water downstream, in accordance with the lowest realized irrigation water take requirements during the past 13 years which is 0.01m^3/s as the result of water balance during extreme climate year.

4.3.10 Legislation concerning Extra High Voltage Air Line (SUTET) Transmission

To distribute the electricity generated by the UCPS hydropower plant, an interconnection to the Java-Bali transmission network is needed. The interconnection to be built is a 500kV Extra High Voltage Transmission Line (SUTET). The network will be built in two transmission lines to the north which are connected to the Cibinong-Saguling transmission line (a distance of 15.5 km and 15.9 km respectively), as many as 82 towers are needed, the minimum tower height is 30.5 m.

In the construction of the UCPS hydropower plant transmission lines, PT PLN (Persero) the Central Java Development Main Unit 1 must follow the Minister of Energy and Mineral Resources RI Regulation No.2 of 2019 concerning Amendments to the Minister of Energy and Mineral Resources Regulation No. High Voltage Air Flow of Delivery for the Distribution of Electric Power.

4.3.11 Fulfillment of Endangered Wildlife and Biological Resources Protection

The construction of UCPS hydropower plant is carried out in forest areas and therefore requires PLN to pay more attention to the ecosystem of biological resources and rare wildlife found in the operating site. The Cisokan forest area has one plant species that is listed in CITES (restricting international trade), namely *Cyathea contaminans* tree ferns. The survey identified several species considered rare in Java, including *Pangium edule*, *Syzygium polycephala*, *Albizia procera*, *Bischofia javanica*, *Castanopsis javanica*, and *Arenga pinnata*. The last three species are known to be protected by law and have received a 'rare' status within the past 10 years (2007-2017). Several fauna species are also found, such as wild pig, Javan leopard, pangolin, and Javan gibbon. Based on the results of the baseline and subsequent studies, the development of UCPS hydropower plant will be required to follow the regulations for the protection of biological resources and endangered wildlife as regulated in Law of the Republic of Indonesia No.5 of 1990 concerning Protection of Biological Natural Resources and Their Ecosystems, as well as the Law of the Republic Indonesian No. 21 of 2004 concerning the Cartagena Protocol concerning Biosafety of the Convention on Biodiversity.

The implementation arrangements are regulated in the Republic of Indonesia Government Regulation No. 7 of 1999 concerning Preservation of Plant and Animal Species, Republic of Indonesia Government Regulation No.28 of 2011 concerning Management of Nature Reserves and Nature Conservation Areas and Government Regulation of the Republic of Indonesia No.108 of 2015 concerning Amendments to Government Regulation No.28 of 2011 concerning Management Nature Reserve Areas and Nature Conservation Areas.

Protection of ecosystems of biological resources and rare wild animals in the UCPS hydropower plant area is an activity included in the conversion of living natural resources

and their ecosystems as regulated in Article 5 of Law of the Republic of Indonesia No.5 of 1990 concerning Protection of Living Natural Resources and the ecosystem, as follows:

I. Each person is forbidden to:

a) take, cut, possess; damage; destroy; take care of; or trade protected flora or its parts, alive or dead
b) export protected flora or its parts, alive or dead from any places in Indonesia

2. Each person is forbidden to:

a) catch, wound, kill, store, possess, and trade protected fauna alive
b) store, possess, care of, and trade dead protected fauna
c) export protected fauna from any places in Indonesia
d) trade, store or possess skin, body or any other part of protected fauna or things made from part of fauna
e) take, damage, destroy, trade, store or possess eggs and/or nests of protected fauna

Act Number 7 of 1999 clarifies which species are protected, with the fauna and flora sections above indicating which species are concerned in Cisokan.

4.3.12 Legislations for the Protection of Children, Women and People with Disabilities

In implementing the UCPS hydropower plant project, the potential for disturbance to the surrounding community can occur, for example, such as a vulnerable or sensitive community who can be treated as PAP or affected communities. As required by the World Bank ESF, benefit sharing and creation sharing must be developed to provide equitable development, sustainability, and smooth project implementation for the project. Based on discussions with PLN UIP JBT 1, the benefit sharing mechanism has been discussed and will be regulated accordingly. This should be based on government or national rules and regulations and company policies. Although, based on PLN Social and Stakeholder Mapping data related to gender, it is clear that women's participation in both the field and non-agriculture is generally not very high (51% in agriculture and 13% in non-agriculture) so it shows that there is no major change in the main occupation among Project Affected Persons from a gender perspective. This situation also shows that there are job opportunities for women. Food craftsmen/ traders, village officials, Islamic school staff and home traders are some of the jobs performed by women at the project site.

In addition, as required by the World Bank ESF, the construction of the UCPS hydropower plant also needs to pay attention to rights for the community, especially women, children and people with disabilities such as the provision of educational facilities and the development of related services is very important considering the low access to PAPs, both facilities and services, early childhood education (PAUD), junior high schools (SMP/ MTs) and senior high schools (SMA/ MA). This is related to minimizing the impact that will occur on these facilities.

In infrastructure projects, major civil works, such as The UCPS hydropower project is a megaproject implemented by PLN, can exacerbate GBV both in public and private spaces. Women are increasingly filling roles in construction projects, which may lead to increased economic empowerment and participation in decision-making roles. However, women stepping into traditionally male-dominated roles can initially experience tension and even violence from some male colleagues. Hence, it is essential that prevention and response policies and procedures for GBV be enshrined in the workplace through the development of GBV action plan to manage the risk of GBV that project may cause towards the community. The availability of prevention and mitigation strategies for Gender Based Violence (GBV) is part of the Social and Community Management Plan (SCMP) framework prepared for the construction of a 1040 MW UCPS and 500kV transmission line.

Towards the fulfillment of protection arrangements for women, children and people with disabilities. PLN is obliged to pay attention to and comply with existing laws and regulations as a form of prevention of impacts that occur on women, children and people with disabilities, both at the central and regional levels, such as:

a. Law Number 23 of 2003 concerning Child Protection;
b. Law Number 35 of 2014 concerning Amendments to Law Number 23 of 2002 concerning Child Protection;
c. Law Number 8 of 2016 concerning Persons with Disabilities;
d. Government Regulation Number 65 of 2015 concerning Guidelines for Diversion Implementation and Handling of Children Not Aged 12 Years Old;
e. Regent Regulation Number 84 of 2018 concerning Amendments to Perbup No. 2 of 2018 concerning the Establishment of the UPTD in the Cianjur Regency Government Its existence is based on the work area in the nearest sub-district;
f. Cianjur Regency Regional Regulation Number 6 of 2015 concerning Implementation of Child Protection;
g. Cianjur Regency Regional Regulation No. 3 of 2010 concerning the Eradication of Trafficking in Persons;
h. Cianjur Regency Regional Regulation Number 1 of 2020 concerning the Prevention and Handling of Deviant Sexual Behaviors;
i. Cianjur Regent Regulation Number 84 of 2019 concerning Duties, Functions and Work Procedures of Regional Technical Implementing Units in the Field of Population Control, Women Empowerment and Child Protection at the Office of Population Control, Family Planning, Women's Empowerment and Child Protection in Cianjur Regency.

4.3.13 Legislations Related to CSR

The existence of the Cisokan hydropower project has implications for the surrounding environment. The surrounding environment expects social and environmental responsibility from the project implementer, namely PT PLN (Persero) Central Java Development Main Unit 1. Law No.40 of 2007 concerning Limited Liability Companies in Article 74 regulates the obligation to carry out corporate social and environmental responsibility for a limited liability company whose business activities are managing

natural resources and companies whose business activities are related to natural resources. This obligation is the company's commitment to participate in sustainable economic development in order to improve the quality of life and the environment that is beneficial, both for the company itself, the local community, and society in general.

4.4 **International Commitments**

International provisions relating to Labor and Working Conditions are as follows:

1. ILO fundamental conventions which have been ratified by the Government of Indonesia as follows:

a. Freedom of Association and Protection of the Rights to organise Convention, 1948 (No.87)
b. Right to Organize and Collective Bargaining Convention, 1949 (No.98)
c. Forced Labour Convention, 1930 (No.29)
d. Abolition of Forced Labour Convention, 1957 (No.105)
e. Minimum Age Convention, 1973 (No.138)
f. Worst Forms of Child Labour Convention, 1999 (No.182)
g. Equal Remuneration Convention, 1952 (No.100)
h. Discrimination (Employment and Occupation) Convention, 1958 (No.111)

2. The Convention on The Elimination of All Forms of Discrimination Against Women was ratified through Law Number 7 of 1984 concerning Ratification of the Convention on the Elimination of All Forms of Discrimination Against Women

3. Article 7, International Covenant on Economic Social and Cultural Rights, explains that States Party to this Covenant recognize the right of everyone to enjoy just and favorable working conditions, and in particular guarantee:

a. the pay that gives all workers, at the minimum:
    1. fair wages and remuneration that corresponds to work that is equal without discrimination of any kind, especially for women who must be guaranteed working conditions that are not lower than those enjoyed by men with the same wages for the same work;
    2. a decent life for themselves and their families, in accordance with the provisions of this Covenant;
b. safe and healthy working conditions;
c. equal opportunities for everyone to be promoted to a higher level, without being based on any considerations other than seniority and ability;
d. rest, reasonable working hours, and periodic holidays with pay or other benefits on public holidays.

United Nation Framework Convention on Climate Change, which has been ratified through Law Number 6 of 1994 concerning Ratification of the United Nations Framework Convention on Climate Change and the Kyoto Protocol to The United Nations Frameworks Convention on Climate Change which Indonesia, has ratified through Law

Number 17 of 2004 concerning Ratification of the Kyoto Protocol to The United Nations Framework Convention on Climate Change (Kyoto Protocol to the United Nations Framework Convention on Climate Change).

In 2015, the 21st Session of The Conference of the Parties to the United Nations Framework Convention on Climate Change/ COP 21 UNFCCC was held in Paris. This conference successfully adopted the Paris Agreement to the United Nations Framework Convention on Climate Change. This Paris Agreement contains provisions regarding a nationally determined contribution (NDC) which is expected to be implemented in 2020.

Indonesia, through the President of the Republic of Indonesia, Joko Widodo, stated that the Paris Agreement must reflect balance, justice and be in accordance with national priorities and capabilities so that it needs to be binding, long-term and ambitious but not hinder the development of developing countries like Indonesia. For this reason, Indonesia is committed to reducing emissions by 29% under any effort or business as usual (BAU) by 2030 which can be increased to 41% with international cooperation.

Based on this statement, Indonesia has drafted a Draft Law on Ratification of the Paris Agreement to The United Nations Framework Convention on Climate Change.

International provisions related to Community Health and Safety are as follows:

a. Protocol of 2002 to the Occupational Safety and Health Convention, 1981

b. Labor Standards Number 155, Occupational Safety and Health Convention, 1981, ratified through Presidential Regulation Number 34 of 2014 concerning Ratification of Convention Concerning the Promotional Framework for Occupational Safety and Health/Convention 187, 2006.

c. Article 12 of the International Covenant on Economic Social and Cultural Rights was ratified through Law Number 11 of 2005 concerning Ratification of the International Covenant on Economic Social and Cultural Rights which explains that:

> 1. The State Parties to the present Covenant recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health
>
> 2. The steps which the State Parties to the present Covenant will take to achieve the full realization of this right shall include those necessary to bring about:
>
> > (a) provisions for the reduction of the stillbirth and mortality rates of children and the healthy development of children;
> >
> > (b) improvement of all aspects of environmental and industrial health;
> >
> > (c) prevention, treatment and control of all infectious, endemic and other occupational diseases;

(d) the creation of conditions which will warrant all medical care and attention in the event of a person's illness;

Land acquisition for inundation, access roads, and transmission sites must abide by international provisions related to Land Acquisition, Restriction on Land Use and Involuntary Resettlement, one of which is Article 11 paragraph 1, the International Covenant on Economic Social and Cultural Rights is ratified by law Number 11 of 2005, concerning Ratification of the International Covenant on Economic Social and Cultural Rights. The law highlights that States Party to this Covenant recognize the right of everyone to an adequate standard of living for him and his family, including food, clothing and housing, and for the continuous improvement of living conditions. Party States will take appropriate steps to ensure the realization of this right, recognizing the importance of international cooperation based on voluntary agreements.

Indonesia has ratified the International Provisions related to the Convention on Biological Diversity with Law Number 5 of 1994, concerning the Ratification of the United Nations Convention on Biological Diversity and the ratification of the Biosafety Convention with Law Number 21 of 2004 concerning Ratification of the Cartagena Protocol on Biosafety to The Convention on Biological Diversity (Biological Security of the Convention on Biodiversity)

Indonesia is also signatory to the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).

The International Covenant on Economic, Social and Cultural Rights was ratified through Law Number 11 of 2005 concerning Ratification of the International Covenant on Economic Social and Cultural Rights.

International provisions related to Cultural Heritage are as follows:

Article 15 of the International Covenant on Economic Social and Cultural Rights was ratified through Law Number 11 of 2005 concerning Ratification of the International Covenant on Economic Social and Cultural Rights which explains that:

1. The States party to the present Covenant recognize the right of everyone:

a. to participate in cultural life;

b. to enjoy the benefits of scientific progress and its application;

c. to benefit from the protection of moral and material interests arising from the scientific, literary or artistic works which they have created.

2. The steps which States party to the present Covenant shall take to achieve the full realization of this right shall also include the steps necessary to preserve, develop and disseminate science and culture.

3. The States party to the present Covenant are committed to respect the freedom necessary for scientific research and creative activity.

4. The States party to the present Covenant recognize the benefits to be reaped from the promotion and development of international relations and cooperation in the field of science and culture.

5 KEY POTENTIAL OF ENVIRONMENTAL AND SOCIAL IMPACTS

The following is a summary of the key potential environmental and social impacts, as assessed in the ESIA Report.

5.1 Construction

Table 4 Summary of Impacts and Mitigation during Construction Phase

No.	Object Characteristic	Impact	Mitigation Measures
1.	Erosion and Sedimentation - a stream with an additional concentration of suspended solids entering the water stream Cirumamis, Cisokan and Cilenkong Rivers: Moderate Impact Significance Cijambu River: Minor Impact Significance	Risk of high sediment load and turbidity in the Cirumamis, Cijambu, Cilengkong and Cisokan rivers downstream from worksites and spoil disposal areas and tunnelling dewatering. Reduced water clarity and appearance Reduced light entering which results in reduced primary productivity (reduced food and reduced habitat for invertebrates, fish and birds), and reduced processing of photosynthesis. Reduced number of aquatic invertebrates due to downstream drift. Erosion and stability of river banks. Damage to the fish's gills and mouthparts. Reduced visibility and fish avoidance, affecting migration, food and breeding. Reduced water quality for horticulture, water supplies and supplies for other water uses.	1. Reducing the discharge of sediment-laden water into water bodies directly without treatment at the quarry, upper dam construction sites and lower dam construction sites. Runoff and dewatering sediment control measures will be implemented in construction sites, camps, site installations, and spoil disposal areas using silt traps, sediment retention ponds and runoff drainage channels at all locations, and particularly the quarry, upper dam construction sites and lower dam construction sites. 2. A comprehensive land clearing SOP will be established to cover the management of erosion and sediment discharges, and treatment of sediment run off and communicated to clearing teams. 3. Socialization of the domestic waste management program to the community by piloting domestic waste management, especially the construction of private toilet facilities.

		Small changes in water temperature	
	Erosion and Sedimentation - increased sedimentation of fine materials on riverbeds Cirumamis, Cisokan and Cilenkong Rivers: Moderate Impact Significance Cijambu River: Minor Impact Significance	Plankton disruption, reducing primary production and basic animal foraging abilities. Reduced nesting habitat for fish and adversely affects the ability of fish eggs to reach adulthood. Reduced ability of fish to eat benthic invertebrates. Changes in river flow, shelter and water depth and flow by creating obstruction and filling of river basins that add to the potential for flooding. Sources of sediment for buffering and carried downstream, affecting further deposition. Changes in sediment input with high organic material that can reduce dissolved oxygen, resulting in fish/invertebrate mortality. Covering of rock faces which can reduce habitat for invertebrates. This could have an impact on changes in the number and types of existing invertebrate species from sensitive species to more tolerant species such as snails. This, in turn, could lead to changes in fish populations due to reduced food species.	

	Erosion and Sedimentation – Soil Loss and Productivity Cirumamis, Cijambu, Cisokan and Cilenkong Rivers: Moderate Impact Significance	Erosion results in the loss of topsoil, soil fertility, soil structure and slope stability. This changes the ability for the land to produce food and trees. Changes in soil and slope stability will change the plant species that would naturally colonise the areas. It can lead to changes in plant communities, introduce weed species, and reduce long term biodiversity.	
2.	Aquatic Habitat and Water Quality – Pollutants Cisokan, Cirumamis and Cirendeu Rivers: Minor-Moderate Impact Significance	Risk of surface and groundwater pollution from accidental spillage of hazardous substance	Pollution prevention and protection measures, such as bunding of all inventories of hazardous materials, tank overfilling prevention measures, are planned and implemented on construction worksites.
	Aquatic Habitat and Water Quality – Domestic Waste Cisokan, Cirumamis and Cirendeu Rivers: Minor-Moderate Impact Significance	Risk of pollution from construction camp sewage and wastewater and runoff from worksites	Construction camps equipped with sewage and wastewater treatment plants and discharges compliant with IFC EHS guidelines Implementation of a wastewater discharge monitoring programme during construction.
	Aquatic Habitat and Water Quality –Sedimentation Cisokan, Cirumamis and Cirendeu Rivers: Minor-Moderate Impact Significance	Increase in the amount sediment has an impact on decreasing water quality and river habitat quality in the Cisokan River, Cirendeu River and Cirumamis River	1. Management controls to reduce, capture and keep soil erosion to a minimum. 2. Divert the river flow away from the work area within the river, and minimize the amount of work in the river channel. 3. No intentional dumping of material into the water flow. 4. Promptly restore the conditions of work-affected areas by re-planting suitable vegetation. 5. If possible maintain riparian vegetation as close as possible to river as a holding zone to help capture sediment before it enters the water body

	Aquatic Habitat and Water Quality – Physical Changes Cisokan, Cirumamis and Cirendeu Rivers: Minor-Moderate Impact Significance	Damage and physical change to rivers and riparian areas lead to landslides where slopes are inadequately stabilized, and increase of water temperature and light exposure where vegetation cover is removed.	1. Management controls to reduce, capture and keep soil erosion to a minimum. 2. Promptly restore the conditions of work-affected areas by re-planting suitable vegetation. If possible maintain riparian vegetation as close as possible to river as a holding zone to help capture sediment before it enters the water body
3.	Air Quality Gunung Karang Quarry: Major Impact Significance Access Road and Main Construction Site: Minor-Moderate Impact Significance	Decline in air quality will affect sensitive receptors such people and wildlife. Air quality may be affected in the form of dust, particulate matter and gas emissions from exhausts. Dust mainly comes from the use of roads, cleared land and riverbeds in the work area and during reservoir cleaning, material stockpiling, quarry operations, stone grinding, blasting in quarries and work sites, and cement manufacturing sites. Particulates (other than dust) and gas are emitted from vehicles, heavy machinery, diesel generators and asphalt processing sites. Impacts on respiratory health of surrounding communities. Impact will be less on workers who will wear PPE.	1. Set a schedule for mining activities, mobilization of vehicles, and land clearing activities. 2. Using tools, machines, and vehicles that are still roadworthy. 3. Covering loaded trucks to prevent material spilling along the road. 4. Regular watering of the road that will be traversed by the material transportation from the quarry to the main construction sites, especially roads near Settlement areas. Cover or compact exposed areas and stockpiles to reduce the potential for dust. Ensure additional watering schedules during dry season conditions. 5. Concrete collection plants and dusty equipment should be located as far away from the settlement as possible
4.	Noise Gunung Karang Quarry: Major Impact Significance Access Road and Main Construction Site: Moderate Impact Significance Transmission Line:	Sensitive receptors such people and wildlife may be impacted by increased noise levels. Increased noise at the site: 1) Gunungkarang quarry due to mining, crushing and heavy vehicle activities, 2) along the access road from the quarry to the main construction site, 3) construction activities of the upper dam, lower dam, and other supporting facilities, 4)	1. Using a dampening barrier in Gunungkarang quarry 2. Conducting socialization activities to the community 3. Turn off vehicles and equipment when not in use 4. Set the number and schedule of use of vehicles and heavy equipment.

	Negligible Impact Significance	mobilization activities tools and materials in the construction of a 500 kV transmission line tower	5. Set the time for activities at locations close to the receptors, such as settlements, access roads, and public infrastructure.
5.	Vibration Gunung Karang Quarry: Major Impact Significance Access Road: Negligible-Minor Impact Significance Main Construction Site: Minor-Moderate Impact Significance	Sensitive receptors such as people and wildlife may be affected by vibration from construction activities. Incovenience and disruption to the activities of residents. Disturbance to nearby wildlife. May cause structural impacts on buildings in the surrounding settlements. The main sources of vibration are heavy vehicles and machinery used to clear land and for the purpose of rock mining and construction, quarry blasting, waterways, lower dams and power house sites, stone mill, cement and asphalt processing sites, diesel generators, and trucks and or other vehicles using the access road and road at the construction site.	1. Carry out blasting activities at the Gunungkarang quarry, tunnel portals and lower dam location in accordance with the established Standard operational procedures. 2. Conduct socialization of activities to receptor communities 3. Set the operational time of all machines and vehicles that produce vibrations. 4. Through the Grievance Mechanism provide an avenue to receive complaints andresolvie problems arising from the impact of vibrations
6.	Access to Water Resources in Gunung Karang Quarry Gunung Karang Quarry: Major Impact Significance	Loss of water resources in Gunung Karang Quarry due to andesite mining by reducing the deposits that act like an aquifer which lead to increasing water runoff. This will affect the nearby dependent communities.	Provide clean water through drilling wells or other communal water supply models for the communities around the Gunung Karang Quarry.
7.	Land Acquisition and Resettlement General UCPS: Moderate Impact Significance	The acquisition for additional land could have affected the community who has the land or livelihood in those lands.	1. Implementation of proposed action plan identified in the LARAP implementation review report to complete the identified outstanding tasks and issues 2. Implementation of LARF for the additional land acquisition.

8.	Livelihood Change General UCPS: Major (Neutral) Impact Significance	There was a slight shift in the profession for a number of residents during construction activities.	1. Involving local workers in project implementation especially for affected communities.
			2. Use of cooperatives and monitoring so that change can run well
	Livelihood Change – Women Land Owners General UCPS: Major (Positive) Impact Significance	Through the livelihood restoration and income rehabilitation programs, women are given more responsibility to improve their livelihood and income	
9.	Demographic Change General UCPS: Negligible (Neutral) Impact Significance	Increase in the community population in the project area due to the influx of newcomers	
10.	Impact on Income General UCPS: Minor-Moderate (Positive) Impact Significance	Community is provided a new market during the construction phase and opportunities to expand business with the access road by opening kiosks and increasing the distribution of village. This will improve the economy.	
11.	Risk of Labour from Outside the Project Area General UCPS: Major Impact Significance	Workers from outside the project area such as contractor workers will come to the project area so that it can have an impact on the community, especially in community social activities during the construction process	1. Control of worker behavior
			2. Implement Camp Management for Workers
			3. Develop a workforce recruitment system starting from the number of labor requirements, the required criteria, the transparency of the admission path and the form of the employee acceptance test
12.	Terrestrial Biodiversity General UCPS: Major Impact Significance	Habitat loss and habitat fragmentation. Decline in aquatic biota due to elevated sedimentation rates. Increase in human-wildlife interactions, including hunting.	Implement the Biodiversity Management Plan Specific Biodiversity Management Plan for Transmission Line to be developed following updated assessment of biodiversity risks and impacts, and Critical Habitat Assessment of the transmission line corridor

		Wildlife disturbance from construction noise, lighting, increased human presence, and land clearing activities. Mortality from traffic collision, and electrocution by collision with power transmission lines.	
13.	Impact on Cultural Heritage General UCPS: Major Impact Significance	Cultural heritage features such as private graves and religious buildings within the project area (hydropower plant and transmission lines) which should also be respected and protected during reservoir construction and preparation.	1. Implement the Cultural Heritage Management Plan and Chance Find Procedures
			2. Conducting consultations with the community regarding cultural objects around the project
			3. Requires monitoring of cultural objects during construction activities to minimize damage or loss of cultural objects, such as marking and constructing a fence around cultural objects.
			4. Intangible cultural heritage requires the preparation of a conservation plan for customary values
			5. Survey any new work areas (not already surveyed) prior to physical works starting and update the Cultural Hertige Management Plan.
14.	Community Perceptions around the Project/ Public Social Disturbance from Around the Project General UCPS: Minor-Moderate Impact Significance	UCPS hydropower construction activities generate public perceptions regarding the impacts. Especially the problems or negative perceptions expressed by residents, including regarding the process of land acquisition, labor recruitment, compensation for community comfort, health, blasting disturbances, cracks in houses, absence of electricity,	1. Periodic socialization of the activities to be carried out by PLN in areas related to the community.
			2. Tabulate PLN activities along with time, target completion, and person in charge so that the information can facilitate the community. Implement the project grievance mechanism.

		unsuitable SPPT value and unpaid remaining land.	
15.	Impact on Traffic Safety General UCPS: Minor-Moderate Impact Significance	The traffic intensity during the construction process will be very high, especially due to the mobilization of heavy vehicles from the quarry to the main construction site.	• Carry out management efforts, which include installing warning signs, regulating the operation of heavy vehicles, conducting periodic outreach to the public, and recording complaints. • Keep pedestrians, cyclists and motorcyclists separate from heavy vehicle operations where possible, especially at high-risk locations. Contractor to prepare and update detailed traffic management plans with site specific measures.
16.	Economic Employment and Business Opportunities General UCPS: Major (Positive) Impact Significance	Employment opportunities and opportunities for income through products and services will increase due to easier access and increase in market	
17.	Community Lifestyle, Health and Culture General UCPS: Moderate Impact Significance	Impact on lifestyle, health and culture due to the entry of migrant workers if workers and labor camps are not properly managed and cultural awareness programs are not introduced.	• The introduction of cultural awareness programs and planned management can help assimilation and understanding between communities. • The contractor will provide training on infectious diseases. • Mitigation of potential labor impacts will be managed through the Construction Management Plan and the Workers' Barracks/Basecamp
18.	Occupational Health and Safety - Working near water such as rivers and reservoirs. - Working at heights, particularly during dam wall construction and transmission line construction and stringing. - Working in confined spaces during tunneling for example. - Working underground.	The impact on workers is illness, injury, or fatality from high-risk construction activities (working at height, near water, in confined spaces, with explosives, near heavy machinery, on slopes/unstable ground, exposure to sun/heat/wet weather, hazardous materials, with electricity, and exposure to illnesses communicable diseases such as COVID-19)	• Identification of potential hazards to project workers, particularly those that may be life-threatening. • Conduct a hazard and risk identification and create a risk register using the Hazard Identification, Risk Analysis, and Risk Control (HIRARC) method. The Risk Register will identify controls such as elimination, substitution, modification, and protective and protective measures. • Provision of preventive and protective measures, including modification, substitution, or

	- Working with heavy machinery, particularly on steep and unstable slopes, tunneling, on public roads, in quarry. - Working with explosives. - Working on slopes and unstable ground. - Working with low voltage and high voltage electricity. - Using vehicles on public and project roads. - Extended or elevated exposure to dust, noise, the sun, heat and wet weather. - Working at night / shift work / fatigue / heat stress. - Working with hazardous materials such as fuels, cement, and fly ash. - Exposure to illnesses, communicable diseases, COVID-19 and others. - Exposure to mental or physical harassment, SEA/SH, and injury from interpersonal conflicts. - Exposure to floods, earthquakes, landslides and other natural disasters. General UCPS: Critical Impact Significance		elimination of hazardous conditions or substances. • Training of project workers and maintenance of training records. • Documentation and reporting of occupational accidents, diseases, and incidents. • Emergency prevention and preparedness and response arrangements to emergency situations established under ESS4. • Remedies for adverse impacts such as occupational injuries, deaths, disability, and disease. Such remedies should consider, as applicable, the wage level and age of the project worker, the degree of adverse impact, and the number and age of dependents concerned. To manage the risk health and safety must be prioritized by the PLN, Supervision Engineer and the Contractors and with proper implementation, regular monitoring and improvement of the mitigation measures.

5.2 Inundation

The inundation phase is the period of time when the reservoirs are filled and commissioned. Hydrology impacts during inundation are assessed separately from the operational phase because the hydrological regimes are different. Inundation will occur during the wet season (December to May), to minimise the risk that the rivers will be at low flow conditions.

Table 5 Summary of Impacts and Mitigation during Inundation Phase

No.	Object Characteristic	Impact	Mitigation Measures
1.	River Flow on the Cisokan and Cirumamis Rivers Cirumamis and Cisokan River: Minor-Moderate Impact Significance	Changes to the natural flow regime in the Cisokan River and none to Cirumamis River. There will be an impact of UCPS operation by reducing the flow in the Cisokan River by <6.21 m^3/s to fill the two reservoirs.	The e-flow regime (from Section **Error! Reference source not f ound.** of the ESIA) to be implemented, which will allow for natural flow fluctuations downstream in the Cisokan River and maintenance of natural downstream flow in the Cirumamis River. Inundation to occur in the wet season only (December to May) to maximise the water available to fill the reservoirs and reduce the risks of significant downstream dewatering. Monitoring the quality of water, fish and river habitats will be carried out before filling and during filling to determine the impact and changes to the residual flow rates if needed. Coordination with the Cihea Irrigation Scheme to ensure that their irrigation water needs during the wet season are achieved, even if this results in a slower filling time for the UCPS.
2	River Habitat and Biodiversity Cirumamis and Cisokan River: Moderate Impact Significance	Reducing the availability of water habitats for biodiversity Creating an environment that supports the growth of algae in river bodies Reduces the river's ability to transport sediment and	1. Adjust the bottom outlet of the lower dam to minimize the risk of drying out the riparian habitat and growing algae. 2. The water availability in the river will be maintained and the habitat in the waterfall and steep and

No.	Object Characteristic	Impact	Mitigation Measures
		impairs algae growth on river banks Changing the sign of the rainy season; for fish to start migrating or laying eggs. This can reduce fish breeding.	swiftly flowing river will also be maintained as a result. 3. Clearing the soil surface and strengthening receding land with vegetation in the inundated area before the inundation process is carried out. 4. The water availability downstream of the lower dam in the Cisokan River will reduce during inundation. The UCPS will take up to 6.21 m^3/s water discharge to filling the reservoir and will release the rest. The reduction in wetted area and depth of the Cisokan River will have a minor impact on available river and riparian habitat, but within the normal range that the river experiences. 5. No species have been identified that are sensitive to reduced flow or wetted area. There are no migratory species sensitive to changes in seasonal flow and all identified species are adaptable to changing river flow, velocity, wetted area etc. 6. Monitoring the quality of water, fish and river habitats will be carried out before filling and during filling to determine the impact and changes to the residual flow rate if needed.
3.	Draw-Down Erosion-Sedimentation Impact of the Upper and Lower Dams Upper and Lower Dams: Minor Impact Significance	The potential for erosion on the upper and lower dam reservoir slopes due to inundation activities due to decreased soil cohesion.	Clearing the soil surface and strengthening receding land with vegetation in the inundated area before the inundation process is carried out.
4.	Reduced Vegetation and Loss of Habitat General UCPS: Major Impact Significance	Decrease in function and fragmentation of animal habitats, loss of food sources for wildlife, which become obstacles to movement of wildlife and undermine metapopulation viability and ultimately species survival	Revegetation and reforestation activities to increase the area of vegetation cover.

No.	Object Characteristic	Impact	Mitigation Measures
5.	Habitat Fragmentation and Barriers General UCPS: Major Impact Significance	Crossable rivers will become uncrossable dam areas adding to fragmentation impacts for terrestrial species.	Artificial corridors to meet the needs of animal crossing habitats fragmented in the form of canopy bridges and animal culverts.
6.	Population Decline and Threats to Protected Wildlife General UCPS: Major Impact Significance	Inundation activities will reduce the terrestrial habitat, while the area around it is a cultivated area that lacks potential as wildlife habitat. Without mitigation, populations of various species of animals in the area will shrink and there is a potential for local extinctions.	Revegetation and reforestation activities to increase the area of vegetation cover. Artificial corridors to meet the needs of animal crossing habitats fragmented in the form of canopy bridges and animal culverts.
7.	Downstream Users of the Cisokan River Cisokan River: Moderate Impact Significance	Potential reduction in water debit for downstream users from the lower dam.	The inundation process is carried out in accordance with the e-flow regime (detailed in Section **Error! R eference source not found.**. of the ESIA) Consultation to be carried out with the Cihea Irrigation Scheme members prior to and during the inundation period. Ensure good communications and engagement with downstream users and convey information regarding any temporary changes to flow in a timely manner. The inundation process is carried out in accordance with the established SOP. Monitoring of impacts on downstream users in terms of changes in availabity of water flow, in particular any impacts to the Cihea Irrigation Scheme
8.	Community Connectivity Cisokan River: Major Impact Significance	The inundation process causes the loss of the community access to the bridge which is in the lower reservoir	Construction of alternative road access or replacement bridges
9.	Community Safety	Community accesses the dam areas during inundation raises the risk of drowning accidents	Enforced and monitored restricted access to dam area. Emergency response procedures in place

No.	Object Characteristic	Impact	Mitigation Measures
			Security in place

5.3 Operation

Table 6 Summary of Impacts and Mitigation at Operational Phase

No.	Object Characteristic	Impact	Mitigation Measures
1.	River Flow Discharge and Water Availability for UCPS Downstream Users Cisokan River: Minor Impact Significance	Changes in flow, discharge patterns and flood frequency in the downstream UCPS. There will be a very small impact of UCPS operation by reducing the flow in the Cisokan River by 0.20 m^3/s to make up for evaporative losses in the two reservoirs.	1. Future studies required assess impacts of proposed reservoir sediment management and the impacts on erosion and deposition downstream.
			2. Reservoir water quality assessment.
			3. Maintenance of downstream e-flow regime. The flow downstream in the Cirumamis River will be maintained at the rate of inflow, except during periods at or below 0.01m^3/s where it will be maintained at 0.01 m^3/s
			4. Ensure procedures for the implementation of consultation and coordination with downstream users regarding changes in flow to downstream areas
			5. Monitor the upstream flow of the Cisokan river and use daily water flow monitoring data to adjust the operation of bottom outlet valves at both dams and quantify the hydrological impacts.
			6. Operate emergency flood procedures to minimize the risk of downstream flows. Early warning systems and communication and education

No.	Object Characteristic	Impact	Mitigation Measures
			systems for downstream communities.
2.	River Habitat Cisokan River: Minor-Moderate (Neutral) Impact Significance	Changes in river habitats in the upper dam inundation areas increase the quality of water bodies due to the self-purification process, thereby increasing the quality of the habitat for aquatic biota	Development of riparian habitats in buffer zones. Monitoring before and after the Upper Cisokan hydropower plant operates, along sections of the Cisokan river and tributary, will provide evidence of changes in riparian biodiversity, and potential signs of mitigation efforts to prevent significant loss / change.
3.	Erosion and Sedimentation Cisokan River: Minor-Moderate Impact Significance	The increase in the amount of sedimentation in the UCPS reservoir is due to the potential for erosion in the reservoir area and erosion that comes from changes in land use in the Cisokan watershed.	1. Studies to improve the understanding of existing sediment movement in the river and the impacts of the dams retaining sediment and of the sediment management plan (to be prepared by the Supervision Engineer).
			2. Monitoring locations that are identified as landslide zones and unstable slopes in the reservoir area. If possible, it is necessary to strengthen the vulnerable zone
			3. Measuring the amount of sedimentation in the two UCPS reservoirs periodically as a basis for mitigation actions during operations.
			5. Implement sediment management measures as per the outcome of 1. above under an adaptive management program.
4.	River Water Quality Cisokan River: Minor-Moderate Impact Significance	Decreasing water quality and changing river habitat in the Cisokan river; especially the increase in pollutant levels from domestic waste and suspended solids.	1. Management through clearing vegetation in the reservoir and stabilizing potential landslides
			2. Maintaining a constant flow of water in and out of both reservoirs will avoid water quality problems due to stagnant water
			3. Prohibiting fishing activities in the reservoir, depriving nutrients from fish feed residue so that

No.	Object Characteristic	Impact	Mitigation Measures
			water quality problems will get better
			4. Education and awareness campaigns for households in the catchment to use sanitary systems for domestic wastewater.
5.	Biodiversity – Forest DegradationMajor Impact Significance		Implementation of the Biodiversity Management Plan (BMP). A specific Biodiversity Management Plan for Transmission Line is to be developed following updated assessment of biodiversity risks and impacts, and Critical Habitat Assessment of the transmission line corridor.
	Biodiversity – Hunting and Capturing Wild Animals: Minor-Moderate Impact Significance		
	Biodiversity – Increased Access and Development Minor Impact Significance	Development and accessibility can increase pressure on land and wildlife. If not managed carefully, these changes will increase damage to vegetation and threaten biodiversity	
	Biodiversity – Electrocution and Collision of Wildlife on the Transmission Line Major Impact Significance	Electrocution of wild animals can occur directly if the cables or transformers in the transmission line are not properly insulated or if cables are too close. Injury or death can occur from birds flying into cables. Electrocution and collision provide permanent risks during bird migration, especially from September to January, and year-round for other large resident species	
	Biodiversity – Revegetation of Buffer Areas Major (Positive) Impact Significance	Changes in the microclimate in the buffer zone and a reduction in the potential for sedimentation resulting from the area around the reservoir Revegetation will have a direct impact on improving	Monitoring and evaluating the implementation of buffer zone revegetation activities in line with the expected objectives as part of BMP implementation

No.	Object Characteristic	Impact	Mitigation Measures
		environmental conditions around the upper and lower dams. In addition, buffer zone management can reduce land access to the weir body, so that the weir body will be safe from direct contamination and reduce the risk of accidents.	
6.	Land Use Change along Transmission Line Transmission Line: Negligible Impact Significance	Changes in land use will have an impact on many aspects including hydrological, landscape, sediment erosion, environmental health, food security and wood supply.	
7.	Visual Impact on Transmission Line Transmission Line: Negligible Impact Significance	The east side of the transmission line, the level of visual disturbances due to the stretch of the transmission network is "low", due to being blocked by hills. Meanwhile, in the western part, most of the visual disturbances were "moderate". The transmission network is clearly visible in the northern part of this area because this area is a rice field area.	
8.	Developments along the access road by immigrants Access Road: Negligible (Positive) Impact Significance	Given the economic activity, this may lead to increased settlements in the area	
9.	Electric and magnetic fields (EMF) of the Transmission Line Transmission Line: Negligible Impact Significance	The public is concerned about the impact that will be caused by the existence of transmission line and pylons and electromagnetic fields. There is a potential impact on people living or working near the transmission line in the form of electric and magnetic field impacts from the transmission line, which can have an impact on health or	Conducting intensive outreach to the public regarding the extent of the impact caused by the Transmission Line It is necessary to educate the public about the impact of the transmission line on health. It is necessary to monitor the amount of electromagnetic radiation regularly along the transmission line

No.	Object Characteristic	Impact	Mitigation Measures
		damage to electrical equipment	
10.	Transmission Line: Occupational Health and Safety: - Work-ing at heights. - Working in confined spaces. - Working underground. - Working near water - Vehicle incidents. - Exposure to noise - Working with electricity - Exposure to EMF - Exposure to natural disasters and emergencies. General UCPS: Major Impact Significance	The impact on workers is illness, injury, or fatality from high-risk construction activities (working at height, with electricity)	• Identification of potential hazards to project workers, particularly those that may be life-threatening. • Conduct a hazard and risk identification and create a risk register using the Hazard Identification, Risk Analysis, and Risk Control (HIRARC) method. The Risk Register will identify controls such as elimination, substitution, modification, and protective and protective measures. • Provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances. • Training of project workers and maintenance of training records. • Documentation and reporting of occupational accidents, diseases, and incidents. • Emergency prevention and preparedness and response arrangements to emergency situations established under ESS4. • Remedies for adverse impacts such as occupational injuries, deaths, disability, and disease.

No.	Object Characteristic	Impact	Mitigation Measures
			Such remedies should consider, as applicable, the wage level and age of the project worker, the degree of adverse impact, and the number and age of dependents concerned.
			• To manage the risk health and safety must be prioritized by the PLN, Supervision Engineer and the Contractors and with proper implementation, regular monitoring and improvement of the mitigation measures.

6 SUPERVISION AND CONTROL OF CONTRACTOR COMPLIANCE

PLN oversight monitoring of contractors' environmental, social, security, health and safety (ESSHS) performance will continue throughout construction, from mobilization through demobilization, for all work packages. This will involve both site visits and reviews of records kept by the contractor and of reports submitted by the contractor. The frequency of site visits should be commensurate with the magnitude of the of the ESSHS risks of the activities being carried out and permanence of potential impacts that could result from ongoing activities.

Good practice guidelines require an independent Supervising Engineer appointed by the Owner's Team (PLN) to be present onsite on a permanent basis. PLN entered into a contract with PT Prima Layanan Nasional Enjiniring (PLNE) for engineering services, contract management and construction supervision for UCPS. PLNE then awarded a contract, through international competitive bidding, to the Joint Operation Venture of Nippon Koei Co., Ltd., NEWJEC Inc., PT Indokoei International and PT Wiratman as a Design Consultant. As the Project will be financed by WB, PLN was requested to engage an independent international consultant for the engineering services to during construction tof the Project, hereinafter called the Supervision Engineer.

The main responsibilities of the Supervision Engineer, as "the Engineer" for Package 1 and as "Project Manager" for Packages 2, 3 and 4, are as listed below:

- Project management on behalf of PLN, including engineering services, provision of interpretations, rulings and instructions with respect to the specifications and/or the drawings, organization and management of coordination meetings with the contractors, and review of contractor's monthly reports.
- Finalizing the design and preparation of construction drawings for Package 1, review of the design and other contract documents for Package 2 to 4 (supply and installation), and site supervision and quality control of all contract packages.
- Contract management including claim management, project schedule and cost control, verification of payments, and coordination of the four contract packages including interfaces.
- Documentation and correspondence management.
- Risk management.
- Monitoring of environmental, social, security, health and safety risk management of all contract packages, and
- Assisting PLNE to manage project administration in terms of technical aspects.

6.1 Supervision Arrangements for ESSHS

ESSHS supervision will be provided by the Supervision Engineer and will include, but

not be limited to, the following:

- Review, comment and provide recommendations for updates and / or approval for the Contractors' Environmental and Social Management Plan, including ensuring that such programs are appropriately consistent and coordinated with the UCPS 2021 Environmental and Social Impact Assessment, Environmental and Social management Plan (including all sub-plans and including all aspects of environmental, social, security, labor, occupational health and safety and community health and safety risk management), Indonesian regulations and permits and the World Bank Environmental and Social Standards , and are consistent with the relevant requirements of the contracts for all packages.
- Monitor and overall supervision of the environmental, social, security, health and safety risk management activities of the contractors; particularly with respect to their Environmental and Social Management Plans and ensuring the contractor has suitable capacity and resources to implement the Plans.
- Convening and coordinating the site environmental, social, security health and safety committee, which will include representatives from PLN, the Supervision Engineer and each of the contractors and their major subcontractors.
- Undertake regular periodic joint environmental, social, security health and safety patrols and inspections to identify and eliminate risky and unsafe work procedures and/or practices and prohibit these.
- Require the contractors to provide, for review and approval by the Supervision Engineer Consultant, formal job safety and environmental analysis reports for each type of work activity. Such job safety and environmental analyses will be reviewed and approved by the Supervision Engineer prior to commencement of the related work activity.
- Plan, document and implement environmental, social, security, safety and health emergency response drills.
- In conjunction with PLN, develop site environmental, social, security, health and safety training requirements to be implemented by the contractors, the Supervision Engineer and PLN for all their respective workers engaged on the Project.
- Supervise the implementation of the Contractors' Environmental and Social Management Plan and the performance of measures to avoid, mitigate, monitor and remedy risks and impacts. Supervise corrective actions, grievance management and incident response, including timely technical advice to contractors and PLN as necessary. Promptly advise PLN on non-compliances, non-conformances, grievances and incidents.
- Provide on-the-job mentoring and training of PLN staff in the supervision of contractors Environmental and Social Management Plans. Prepare and implement annual training plans to support the capacity building within PLN's construction management staff.
- Prepare monthly reports on environmental, social, security, health and safety risk management performance to PLN, incorporating the outputs of the contractor's

reports, the Supervision Engineer's documentation audits, site audits and inspections, non-conformances, non-compliances, incidents and grievances, training completed, and emerging issues.

6.2 Monthly ESSHS Reporting

The Supervision Engineer, with cooperation of PLNE, will issue Monthly Progress Reports to PLN.

The Monthly Progress Reports will provide information on the implementation and monitoring of ESSHS activities:

- Site security, safety and health protection and risk management including risks identified and managed in the month and emerging issues.
- Site environmental and social protection and risk management including risks identified and managed in the month and emerging issues.
- Status of submission and approval of contractors Environmental and Social Management Plans.
- Summary of hazardous products and waste registers.
- Quality assurance, including corrective action reports and clearance status.
- Personnel reporting (including numbers of workers, by nationality, gender and origin, camp accommodation numbers, key personnel positions and measures to fill any gaps in key personnel etc.).
- Construction plant and equipment inventory.
- Plant and equipment importation; progress and inventory.
- Training; off-site and on-site training (including technical and environmental, social, security, health and safety training conducted by the Supervision Engineer and contractors).
- Water quality data obtained at the various construction sites.
- List of field notes or Non-Compliance Report.
- Environmental, social, security, health and safety incidents and near misses (statistics on incidents, corrective actions, reports of significant incidents, progress towards close out);
- Grievances (statistics, reports of significant grieances, progress towards close out).
- Any other requirements of the UCPS Environmental and Social Management Plan (and the sub-plans) and the Environmental and Social Commitment Plan.

The Monthly Progress Reports will also include sequential (digital) photographs of

significant or relevant features, events or issues occurring during the reporting period.

6.3 Non-compliances and corrective actions

Non-compliance is where there is failure to fulfil required ESSHS measures in the C-ESMP and the ESMP other subplans by the Contractor or any other workers on the Project as well as failure to apply required corrective mitigation measures. It is the role of the Supervision Engineer to implement the compliance audit, corrective actions and prevention action procedures for UCPS.

The Supervision Engineer will be permanently on site and perform a number of daily, weekly and monthly audits, inspections and meetings to determine compliance. The Supervision Engineer will be required to develop and implement a detailed auditing and inspection programme and detailed procedures for identifying and managing non-compliances and corrective actions and for enforcement action for review and approval from PLN.

Corrective actions will arise from the audit and inspection programme. They may include changes to work instructions, further staff training, additional staff or resources, replacing worn pieces of equipment, updating mitigation measures and the C-ESMP, etc. They will be communicated to the Contractor and copied to PLN.

Progress meetings and reports will include a summary of audit findings, non-compliances, corrective actions opened, in progress and closed out.

It is the responsibility of the Contractor to immediately initiate corrective actions and provide regular updates to the Supervision Engineer. Once completed, Contractors will provide details of the actions undertaken on the non-compliance/corrective action report and submit to the Supervision Engineer within the agreed timeframe. Once satisfied, the Supervision Engineer will close out the non-compliance/corrective action request.

Where there is continual or significant non-compliances or breaches of the ESMP, sub-plans, C-ESMP and corrective action requests, serious incompetency, under-resourcing or other issues with the ESSHS performance of the Contractor, the Supervision Engineer will manage these issues under enforcement provisions in the contract.

6.4 Incident management and response

The Supervision Engineer will supervise the response to incidents. The Supervision Engineer will be required to provide PLN with detailed procedures for incident management and response as part of the overall ESSHS management system. They will be alerted to incidents as per the reporting process described below and will contribute advice and resources as necessary to minimize and avoid harm and contain / control the site. The Supervision Engineer will investigate the incident and provide support to PLN for any required root cause analysis processes. The Supervision Engineer provide corrective action requests for the Contractor to implement and will supervise as per the process above.

7 ENVIRONMENTAL AND SOCIAL MANAGEMENT CONSTRUCTION PHASE

Standard mitigation measures and standards for minimizing the key environmental impacts during construction are shown in the following Table 7 until Table 16.

Table 7 Soil/Overburden Removal and Placement

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
Generation of suspended solids from exposed soil and runoff into watercourses	Development activities outside of water bodies should not give rise to storm water containing elevated suspended solids under the majority of rainfall events.	• No direct discharge of sediment laden water without treatment. • Earthworks and land clearance should be minimized and phased.
	Provide treatment to achieve a reduction in suspended solids prior to discharge to a natural water course.	• Storm water should be diverted around exposed work areas. • Sediment treatment via retention basins, swales, ponds, filter cloth and other mechanisms suitable for the volume of water and the available space. • Any discharges to rivers should occur during high flow. • Stockpiling should occur at least 10m from a water course. • Compaction and re-vegetation of exposed areas as soon as practicable. • Provision of storm water cut off drains wherever possible to divert run off around work areas.
Introduction of invasive species	Fill material should not contain invasive species.	• The use of imported fill will be minimized. • Machinery should be cleaned prior to working on site to reduce the opportunity of the spread of weed seeds.
Disturbance of land for fill / alluvial material.	Soils and excavated rock should be reused where possible in the development – to reduce the need for spoil sites, borrow pits and / or the need to import fill.	• Reuse stockpile soils and excavated rock before excavating new soils.
Efficiency of control measures over time	Control measures should continue to work appropriately throughout the construction period.	• Earthworks control measures should be inspected and maintained in efficient operating condition over the construction period.

Table 8 Excavation and Blasting

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
Noise disturbance of local populations	Noise must not unreasonably intrude on village life.	• Keep current lists of all noise producing machinery • This machinery operation to occur only during designated hours (to be confirmed by contractor in agreement with villages).

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
		• Blasting to occur at the same time each day, and/or a warning siren should sound prior to blasting
Vibration disturbance of local populations	Vibration must not unreasonably intrude on village life.	• Keep a current list of all vibration producing machinery. • This machinery operation to occur only during designated hours (to be confirmed by contractor in agreement with villages). • Blasting to occur at the same time each day, and / or a warning siren should sound prior to blasting.

Table 9 Material Stockpilling

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
Runoff of suspended sediments from stockpiles	Stockpiling activities should not give rise to storm water containing elevated suspended solids. Provide treatment to achieve a reduction in suspended solids.	• No direct discharge of sediment laden water without treatment. • Stockpiles should be compacted as much as practical and not be exposed for extended periods. Plant with grasses or similar to temporarily stablise the slopes. • Stockpiles should be reused as soon as practicable. • Storm water should be diverted around stockpiles.
Dust generation from stockpiles	Dust must not cause a hazard or nuisance to village life.	• Stockpiles should be compacted as much as practical not be exposed for extended periods. • Stockpiles should be reused as soon as practicable.

Table 10 Tunnel and Power Station Construction

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
Contaminants in water discharged from tunnels and power station cavern during construction.	No direct discharges of tunnel water to any water course. Provide treatment prior to discharge to achieve a reduction in suspended solids and neutralization of pH if necessary.	• Settlement ponds and / or sediment infiltration gallery. • Monitoring immediately upstream and 50m downstream of the discharge with a clarity tube to estimate any effects on clarity; for nutrients to detect explosives residue and for pH. • Any discharges to rivers should occur during high flow. • Spill kits and emergency procedures should be used for spills of chemicals, fuels and oils and staff trained.

Table 11 Concrete Manufacture and Use, Cement and Fly-Ash Stockpilling and Use

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
Contaminants in water discharged from concrete manufacturing,	No direct discharges to any water course. Provide treatment prior to discharge to achieve a reduction	• Settlement ponds and / or sediment infiltration gallery for the treatment of stormwater and wash water.

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
storage or use, and cement and fly ash stockpiling, including a rise in pH.	in suspended solids and a reduction in pH to between 7 and 9 pH.	• Monitoring immediately upstream and 50m downstream of the discharge with a clarity tube to estimate any effects on clarity; for pH to detect alkali discharges. • Any storm water discharges rivers should occur during high flow. • Water to be reused where possible in the process. Procedures for handling of anhydrated cement material and wet cement to avoid spills.
Community nuisances	Noise and dust must not unreasonably intrude on village life	• Concrete batching plants and other noisy / dusty equipment to be located as far as practical from villages. • Machinery to be maintained and effective noise muffling equipment to be installed.

Table 12 Fuel Storage and Use

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
Pollution risk associated with the storage and use of fuels for all plant, generators and vehicles	No oil, lubricants, fuels or containers should be drained or dumped to ground, streams or rivers. Accidental spills will be minimized, and procedures put in place to clean up the environmental damage.	• Keep a current list of all fuels stored on site. • Keep the Safety Data Sheet of all hazardous materials used on site. • Develop appropriate storage, transport and use practices to recognized standards. • Diesel to be stored in truck tankers or in overhead tanks to a maximum of 5000 liters. • Diesel to be stored on flat ground, and at least 100m from a waterway. • Bunding to capture 110% of fuel must be placed around fuel storage area or fuel to be stored / contained in double-walled vessels.. • All refueling of vehicles and plant to be done on flat ground. • All significant vehicle and plant maintenance will be undertaken offsite where possible at third party service providers or in dedicated workshop on a hardstand with collection and treatment of drainage. • Spill kits and emergency procedures should be used and staff trained. • There will be no deliberate discharge of oil, diesel, petrol or other hazardous materials to the surrounding soils and waterways.

Table 13 Cultural Heritage Site Disturbance

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
Finding and disturbance of previously unknown sites.	No sites will be disturbed once identified.	• Follow the 'chance find' procedure.

Demolition or damage to a surveyed cultural heritage site	No sites will be disturbed or damaged.	• Follow the Cultural Heritage Management Plan.

Table 14 Works In and Near River

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
Sediment discharges arising from working in and near the river. For blasting in or near the river, refer to the blasting issues, above	Work in the wetted area of the riverbed should be minimized, and only in relation to the construction of the dams, or to insert culverts and bridges for stream crossings.	• Stabilize works daily and prior to storm events. • Works will be minimized to maintain as much riparian vegetation as possible. • Diversion of the river around the work areas wherever possible. • Culverts will be placed in access tracks where they cross streams more than 3 metres wide and 0.5m deep. • Minimise disturbances to riparian areas and river banks and bed. • Blasting and earthworks will be done in dry river beds, once water has been diverted, and has sediment containment and treatment ponds/devices down-gradient to capture and treat sediment prior to discharge.

Table 15 General Construction Issues

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
Noise of machinery associated with construction activities	Noise must not unreasonably intrude on village life.	• Keep current lists of all noise producing machinery and noisy activities • This machinery operation to occur only during designated hours (to be confirmed by contractor in agreement with villagers). • Use of complaints register and procedures to address issues as they arise. • Concrete batching plants and other noisy equipment to be located as far as practical from villages. • Monitor ambient noise as per the Construction Environmental Monitoring Plan.
Dust generation from construction activities	Dust must not cause a hazard or nuisance to village life	• Water will be used to suppress dust. • Use of complaints register and procedures to address issues as they arise. • Concrete batching plants and other dusty equipment to be located as far as practical from villages.
Vibration disturbance from construction activities	Vibration must not unreasonably intrude on traditional village life.	• Keep a current list of all vibration producing machinery and activities causing vibration. • Use of complaints register and procedures to address issues as they arise.
Increased utilization of roads by traffic associated with construction activities	There should be no significant increased risk to local populations from traffic associated with construction.	• Traffic management plan prepared and updated as necessary to eliminate or control all safety risks.

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION MEASURE
		• Traffic safety measures along the access road, including footpaths, signage and speed humps. • Training of locals regarding the hazards of traffic. • Training of vehicle drivers regarding the driving risks through villages and along remote roads. • Use of complaints register and procedures to address issues as they arise
Pollution risk activities occurring on site	Develop appropriate storage, transport and use practices for storage and handling of mixed classes of dangerous goods in packages and intermediate bulk containers. There will be no solid or liquid waste disposal directly or indirectly to any water course (whether flowing or not).	• Keep current lists of all potentially contaminating materials used on site. • Develop and implement appropriate storage, transport and use practices to recognized standards. • Solid waste will be taken off site for disposal. • Spill kits and procedures should be available and training undertaken, for all hazardous or potentially polluting activities.
Village concerns regarding construction impacts.	Monitoring will be undertaken to ensure villager's concerns are recorded and addressed.	• A complaints record will be kept of all issues raised by villagers in response to construction activities. The record will include responses by the contractor.

Table 16 Impacts on Villages

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION METHOD
Deterioration of current quality of life and livelihoods.	Villagers understand the staging and progress of the project, and when and how they may be affected. Villagers have the ability to communicate issues to PLN and contractors. Villagers have the expectation that issues will be addressed and resolved by negotiation. Villagers should enjoy the benefit of Employment wherever possible.	• Set up a communication network for discussing issues between PLN, Contractors and the villagers. • Ongoing consultation. • Provide opportunities for locals to work on the project. • Provide training opportunities for locals working on the project.
Adequate compensation for lost land, assets and livelihoods and for resettlement.	All parties receive fair compensation	• The LARAP process to address all compensation and resettlement issues.
Health and safety risks from such activities as increased traffic, blasting, heavy machinery operating	Health and safety risks to villagers are minimized. Villagers will be adequately informed of all potential hazards to health and safety. Villagers have the expectation that issues will be addressed and resolved by negotiation.	• Refer to the sections above discussing impacts from traffic hazards and blasting hazards.
Nuisance issues such as noise, dust and vibration	Nuisances will be minimized. Villagers have the expectation that issues will be addressed and resolved by negotiation.	• Refer to the sections above discussing nuisance effects.

ISSUE	KEY PRINCIPLE / MITIGATION STANDARD	MINIMUM MITIGATION METHOD
Traffic causing safety risks to road users	Construction traffic will be managed to minimize the impact on existing road users.	• Signage to be used to identify current risks to road users. • PLN and Contractors to discuss major traffic issues with village representatives prior to the event to discuss course of action.
Sediment and other discharges affecting river water uses such as fishing and bathing.	Sediment discharges to the river will be minimized. There will be no routine or deliberate discharges or any other substances.	• Refer to the sections above discussing erosion and sediment control, and the discharge of pollutants to waterways.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT OF INUNDATION AND OPERATIONAL PHASE

Mitigation measures and standards to minimize the major environmental impacts during inundation and operation are shown in Table 17 below.

Table 17 Mitigation Standards and Measures for Minimizing Impacts of the Scheme during Inundation

A. Reservoir Impoundment

ISSUE	OBJECTIVE / MITIGATION STANDARD	MITIGATION ACTION
Increased waste and rotting biomass	Garbage must not block the way of water intake	Follow the procedures outlined in the Reservoir Cleansing Plan.
Sedimentation	Maintain water quality according to established standards	Carrying out replanting around the buffer area,
Change in fish species	Maximizing reservoir life	Develop a watershed management plan
Reduced downstream flow during inundation	• No fish species were lost • Maintain river flow to the downstream area of the UCPS	• Monitor fish species and flow discharge • To drain the Cisokan River at a minimal discharge
Changes in erosion and sedimentation patterns downstream of the lower dam on the Cisokan River	Minimizing changes in erosion and Sedimentation patterns of the Cisokan River in the lower dam area	• Maintain a residual flow from the upper reservoir of approximately 0.5m^3/s, and provide a natural flushing flow whenever possible • Maintain a residual flow from the lower reservoir of about 6 m^3/s, and provide a natural flushing flow whenever possible. • Modelling / assessment of changes to erosion and deposition downstream of Lower Dam in Cisokan River
Change in water quality	Minimizing the decline in river water quality	• Monitor water quality

B. Dam Operation and Power Plants

ISSUE	MITIGATION OBJECTIVE / STANDARD	MITIGATION MEASURE
Changes in downstream flows.	• Maintain downstream environmental flows at least the inflow, as per the regime described below. • Maintain water quality in accordance with baseline water quality. • Ensure the integrity of downstream habitats	• Monitor hydrological flows in the Cirumamis and Cisokan Rivers. • Implement policies and operation procedures to maintain environmental flows • Modelling / assessment of changes to erosion and deposition downstream of Lower Dam in Cisokan River
Noise creation	Noise levels should not affect local households, livestock or wildlife species.	Proper operation of facility equipment and sounds barriers
Road traffic	Operation vehicles will not interfere or affect local villagers	• Proper maintenance of vehicles • Maintain the safety features of the access road.

Table: Proposed operational regime for inflow and outflow during inundation

Scenario	High flow, average flow, moderately low flow	Moderately low flow to Q97	Q97 – Q 100
Natural inflow m^3/s	>= 7.91	7.91 >< 1.97	<=1.70
Intake for UCPS Scheme m^3/s	6.21	6.21 >< 0 (Inflow - 1.70)	0
Residual flow discharge downstream lower dam m^3/s	>= 1.70 (Inflow – intake)	1.70	1.70

Table: Proposed operational regime for inflow and outflow during operation

Scenario	All flows = >0.75	Very low flow		Extreme low flow
Natural inflow m^3/s	>= 0.75	0.75 - 0.55	0.55 - 0.01	<0.01

Intake for UCPS Scheme m^3/s	0.20	0.20 - 0 (Inflow – 0.55)	0 (water released from active storage)	0 (water released from active storage)
Residual flow discharge downstream lower dam m^3/s	>= 0.55 (Inflow – intake)	0.55	0.55	0.01

C. Transmission Line Operations

ISSUE	MITIGATION OBJECTIVE / STANDARD	MITIGATION MEASURE
Illness, unease or other disturbances regarding electromagnetic field radiation.	The effects of EMF radiation on residential properties and workplaces should be minimized.	• Regular monitoring of EMF. • Maintain a complaints service and follow up on any complaints, to the satisfaction of the complainant.
Avifauna collision/electrocution on the transmission lines	Design structures to avoid/minimize collison/electrocution of avifauna on the transmission lines	• Implement mitigation measures as specified in the TL Biodiversity Management Plan (to be prepared)

9 ENVIRONMENTAL MONITORING FRAMEWORK

The Environmental and Social Monitoring Plan is attached in Appendix 8 which details the minimum monitoring requirements. Table 18 provides a matrix of the parameters to be monitored, the project stage with respect to the monitoring required, and the monitoring objectives.

Table 18 Matrix Monitoring

PARAMETERS	TIMEFRAME AND TYPE OF MONITORING				
	Pre-construction	Construction		Operational	
	Baseline benchmarking	Construction-related impacts	Pre-operation baseline	Post construction	Operation-related impacts
River Water Quality					
River Habitat and macro invertebrates					
Fish					
Dust, Noise, Vibration					
Erosion Sedimentation					
Rainfall					
Reservoir Water Level					
River Flow					
Groundwater level					
Biodiversity					
Weeds in the reservoir					
Cultural Heritage Resources					
Dam and land stability					
Downsteam Users					
Social economic					

	Environmental Impact Monitoring
	Climatic or operational monitoring

10 GRIEVANCE REDRESS

10.1 Overview

The community and labor Greivance Mechanisms for the UCPS project are detailed in the Social and Community Management Plan. The Grievance Redress Mechanism detailed in the SCMP will receive and manage grievances from stakeholders. It applies to all grievances that arise as a consequence of any Project activity. This process is designed to provide a system for managing grievances from the general public and does not replace the Indonesian legal processes, existing employee grievance systems, normal business-to-business dialogue, or other stakeholder's management and communication procedures already in place.

There are no restrictions on the type of issue a stakeholder can raise under this procedure. However, when a complaint is received that would be more appropriately handled under a separate company process established for that purpose (such as employment or business integrity-related issues), it will be re-directed to prevent parallel processes from being followed. All complaints received under this procedure shall be tracked until close out, regardless of the process under which they are handled. The decision given by the company for each complaint will be processed in accordance with the specified GRM.

This Grievance Redress Mechanism is developed to anticipate and manage grievance from Affected People and other stakeholders related, but not limited to the following associated Project's impacts:

- Social issues/impact because the quarry is a source of income for several local people
- Community health and safety
- Reduce water quantity
- Noise, vibration, and dust nuisances
- Land disturbance
- Environmental parameters quality
- Employment or recruitment
- Potential for accidents and mortalities for road users
- Staffs/contractors/suppliers behavior
- Gender-Based Violence and Violence Against Children

10.2 Roles and responsibilities for GRM

PLN Project Manager as the senior-most official in the GRM Management and reports directly to the PLN Management:

- Communicate Company Policies and the GRM to Contractor, sub-contractors, all relevant parties, staff, and personnel;

- Responsible for the establishment of Grievance Unit and trains managers and staff involved in Grievance Unit;
- Coordinate with Contractor Project Manager to be actively involved in Grievance Unit;
- Any complaints that cannot be resolved by the Grievance Unit and/or related managers, PLN Project Manager will take initiative to organize a meeting with Grievance Unit and the related managers to resolve the complaints;
- Ensure Contractor to establish and implement their internal GRM to address any complaints related to their workers; and
- Perform review, audit, and improve the GRM.

Grievance Unit is led by the Grievance Officer, who is the primary point of contact for the Unit and will coordinate the implementation of the GRM with the Village Facilitators, UCPS Project Public Relation, PLN HSE (Health, Safety, and Environment) Officer, and Community Liaison Officer:

- Receive, Screen, and Process Grievances
- Notify and/or deliver the complaints to related section managers
- Establish and maintain a grievance register to record, organize and document all complaints and the resolution/commitment.
- Prepare and deliver a concise weekly report to the Contractor Project Managers
- Propose ways to resolve complaints in coordination with Contractors Project Manager to PLN Project Manager.
- Communicate with PLN Project Manager approved responses to the complaining party and/or publish the final result of grievance resolution through the public meeting as scheduled in SEP.
- Interface with the communities through meetings and other outreach approaches to receive complaints
- Submit regular reports to PLN Project Manager regarding the implementation of GRM and propose meeting with PLN Project Manager to resolve complaints that cannot be resolved by Grievance Unit and/or related managers.

3. All Personnel:
   - Support the implementation of grievance mechanism based on his/her position, specific role, and responsibility.

4. Contractors and Sub-Contractors:
   - Support the implementation of grievance mechanism; and
   - Establish and implement their own GRM for their employee to address any complaints related to their workers

11 REPORTING

External reporting by PLN is required as shown in Table 20.

Table 19 Reports and Reporting Requirements by PLN (with support of Supervision Engineer)

TYPE OF REPORT AND PURPOSE	FREQUENCY OF SUBMISSION	RECEIVER OF REPORTS
The ESMP updates (including any changes in management and monitoring procedures) and any sub-plans prepared under the ESMP.	As required, prior to implementation For approval before implementation	• DLH (Environment Agency) West Java Province • DLH (Environment Agency) Cianjur Regency and West Bandung Regency World Bank
ESMP implementation progress, including: Progress to date and upcoming events Significant issues (ongoing, new, emerging, closed) Environmetnal and social monitoring and survey data collected that month. Recommended updates and adaptations to management plans. Stakeholder engagement activities and issues Incidents - statistics Grievances Training	Monthly detailed reports. Quarterly overview as part of Project reporting.	World Bank
Lost time injury incident or workplace death or significant environmental event or incident, including significant breach of laws, discovering the archaeological site, human remains or artifacts	Within 24 hours after the incident (according to the incident procedure, which outlines the severity of the incident requiring reporting)	• DLH (Environment Agency) Cianjur Regency and West Bandung Regency The World Bank

TYPE OF REPORT AND PURPOSE	FREQUENCY OF SUBMISSION	RECEIVER OF REPORTS
Major changes in project activities that may affect Environmental Approval	Within 1 week after identification of important event	• DLH (Environment Agency) West Java Province World Bank
Incident reports for minor incidents that have been corrected. Includes grievance reporting.	Once a year.	• DLH (Environment Agency) Cianjur Regency and West Bandung Regency
	Monthly as part of monthly reporting	World Bank
Non-compliance reports	Every year	• DLH (Environment Agency) West Java Province
	Monthly as part of monthly reporting	World Bank
Implementation of Electricity Safety (K2)	Every 3 month	• Department of Manpower (Disnakertrans) Cianjur Regency and West Bandung Regency

12 CAPACITY AND TRAINING

12.1 Capacity

This management plan will be implemented within PLN's Environmental Management System. The management system provides PLN with the systems and structures to enable implementation of the plan, monitoring, reporting and delegation of roles to third parties.

12.2 Training

12.2.1 Management and Implementation

All those responsible for the management and implementation/operation of any aspect of the ESMP will be adequately trained for their role. Evidence of training should be maintained on site, for inspection/auditing purposes.

PLN will maintain a training schedule, and procedure for keeping records. Records of training attendance and training programs will be kept and be available for inspection/auditing. The Contractors will also maintain their own training schedule and records.

PLN with the Environmental Unit internally, has some well-trained and experienced people who can develop, implement, monitor, evaluate and report on the ESMP. External training, and/or the use of third-party contractors or consultants will be required to develop the in-house capacity and gap-fill the skills and resources in technical areas such as biodiversity management and environmental monitoring.

The Supervision Engineer has a requirement to train the ESHS staff of PLN Engineering and UPK to supervise C-ESMP and may also provide targeted training to the contractors, based on need.

12.2.2 Management and Implementation/Operation

Training is required for all staff undertaking work in accordance with the ESMP. A training schedule will be developed for each sub plan to the ESMP and procedure for keeping records. Records of training attendance and training programs will be kept and be available for inspection/auditing purposes.

12.2.3 Instream Environmental Monitoring and Interpretation of Results

Instream monitoring and data interpretation will be carried out by suitably qualified personnel. Where the supervision engineer or PLN do not have these skills, they may subcontract the work.

12.2.4 Hazardous Substances Management and Emergency Procedures

All staff involved in the handling and use of chemicals, fuel and explosives must be trained in handling, spill and emergency procedures. Evidence of training should be kept for inspection/ auditing purposes.

12.2.5 Concrete Management

All staff involved in the manufacturing, transport and handling of concrete must be trained in handling, spill, dust, water management and emergency procedures. Evidence of training should be kept for inspection / auditing purposes.

12.2.6 Sediment Control and Control Discharges

Training will be provided by a third party, or provide evidence of previous training, for the construction, maintenance and monitoring of environmental protection and discharge treatment devices. Evidence of training should be kept for inspection/auditing purposes.

Specific capacity building is required in the following areas (Table 21)

Table 19 Capacity Building

A. Capacity Building for Construction Phase

Implementer	Training Scope	Purpose/Objective	Training Material	Trainees/ Audience	Schedule & Budget
Supervision Engineers	Implementation and Monitoring of ESMP	• The requirements of the ESMP • How to execute the environmental requirements of the project, • How to supervise, monitor and audit • How non-compliance with the ESMP will be handled,	• Key issues covered in ESMP • The agreed environmental monitoring checklist, • The environmental monitoring form • Particular attention will be paid to the specific provisions in each contract's technical specifications indicating how the ESMP is to be complied with • Regulation	• Environmental Supervision Engineers, • PLN staff, • Contractor's Safety and Env. Officer • Workers as part of the training given to the ESHS Manager	•Construction phase. •The budget allocated in Supervision Engineers' contract
	• Health and Safety	• The health and safety requirements mentioned in ESMP • Health issues identified by the Contractors	• Key issues covered in ESMP • The agreed environmental monitoring checklist, • The ESHSl monitoring form • Health and safety provisions in each contract's technical specifications	• Supervision Engineers, • PLN staff, • Contractor's Safety and Env. Officer • Workers as part of the training given to the ESHS Manager	

Implementer	Training Scope	Purpose/Objective	Training Material	Trainees/ Audience	Schedule & Budget
			• Regulation		
	• Hazardous Substances Management and Emergency Procedures: must be trained in handling, spill and emergency procedures	How to handle, implement dan monitoring the hazardous substances and emergency procedures	• Key issues covered in ESMP • General Hazardous Procedures • Hazardous Materials Storage • MSDS Requirement • Emergency procedures • Hazardous and Emergency Regulation	All staff involved in the handling and use of chemicals, fuel and explosives (Contractor, Supervision Engineers, PLN)	
	• Concrete and Asphalt management	How to implement Concrete and Asphalt management in handling, spill, dust, water and emergency procedures.	• Key issues covered in ESMP • Emergency procedures • Procedures to handle spill, dust and water.	All staff involved in the manufacturing, transport and handling of concrete and asphalt (Contractor, Supervision Engineers, PLN)	
	• Sediment Control, and Control of Discharges	• To manage the impact of Construction, and maintenance • To manage the environmental protection • To monitor discharge	• Key issues covered in ESMP • The control of discharge and Sediment Control procedures	• The officers in charge of construction, maintenance and monitoring (Contractor, Supervision Engineers, PLN)	
Contractors	OSH training and capacity training for each activity that has risk.	To ensure all staff are trained and have suitable skills and experience to avoid and manage risks while carrying out their tasks.	• In-house materials, task-specific.	• Workers	•Construction phase. •The budget allocated in Contractors' contract
	• Safe control and driving of heavy road-construction vehicles •	To ensure safe passage during and after working hours	• Procedure of Safe control of road traffic • Procedure of driving the heavy road-construction vehicles	• The management of traffic officer • Drivers • Pedestrians in and around the project construction areas	•Construction phase. •The budget allocated in Contractors' contract

Implementer	Training Scope	Purpose/Objective	Training Material	Trainees/ Audience	Schedule & Budget
	Training and awareness programs	The safety risks regarding road construction and heavy vehicle operations.	• Brochure • Leaflet	The community, including school children	
	• Concrete and Asphalt management	How to implement Concrete and Asphalt management in handling, spill, dust, water and emergency procedures.	• Key issues covered in ESMP • Emergency procedures • Procedures to handle spill, dust and water.	All staff involved in the manufacturing, transport and handling of concrete and asphalt	
	• Hazardous Substances Management and Emergency Procedures: must be trained in handling, spill and emergency procedures	How to handle, implement dan monitoring the hazardous substances and emergency procedures	• Key issues covered in ESMP • General Hazardous Procedures • Hazardous Materials Storage • MSDS Requirement • Emergency procedures • Hazardous and Emergency Regulation	All staff involved in the handling and use of chemicals, fuel and explosives	
	• Sediment Control, and Control of Discharges	• To manage the impact of Construction, and maintenance • To manage the environmental protection • To monitor discharge	• Key issues covered in ESMP • The control of discharge and Sediment Control procedures	• The officers in charge of construction, maintenance and monitoring	
PLN • By External specialists (forest ecology, primate ecology, and fish ecology)	Biodiversity management	How to implement the biodiversity management plan	• Biodiversity Management Plan, • Options, strategy of the Plan	PLN Staff	•Prior to main Construction implementation •The budget provided in ESMP App. 10
PLN • By archaeologists	Cultural heritage	How to manage cultural heritage finding and the appropriate protection techniques and procedures for relocation of the documented religious facilities and graves	• Procedure of Chance finding	• Officers of Contractor • Officers of Supervision Engineer • PLN Staff	•Prior to main Construction implementation •The budget provided in ESMP App. 10

B. Training for Inundation and Operation Phase

Implementer	Training Scope	Purpose/ Objective	Training Material	Audience	Schedule & Budget
PLN • By External specialists (forest ecology, primate ecology, and fish ecology)	• Biodiversity Management	Understanding the theory and practicalities of: • reestablishing indigenous habitats in buffer zone areas, • the protection of buffer zone areas and the reservoirs from occupation, for safety reasons.	• Theory and practicalities of managing habitats for primates • Biodiversity Management Plan • Management Model 1-5	PLN Environmental Unit staff	• Prior to main Construction implementation • The budget provided in ESMP App. 10
PLN By External specialists (ecologists and hydrologists)	• River habitat management	Understanding the theory and practicalities of: • ecology and habitat of rivers, • the habitat changes due to sediment and flow changes downstream • adaptive management.	• The methods to monitor habitat condition and change downstream of reservoirs. • Instream monitoring and data interpretation. • Adaptive river management.	PLN Environmental Unit staff	
	• Environmental flows downstream	Understanding the theory and practicalities of environmental flows downstream of each dam.	• The relevant procedures for measuring and maintaining environmental flows	All staff involved in operating the power station	
	Dam safety	Understanding the operations and maintenance manuals and emergency management procedures.	• Management plans	All staff involved in operating the power station	

13 PLAN MONITORING AND REVIEW

The PLN Environmental Unit will periodically monitor and audit the effectiveness and implementation of the plan whether a document review is required. Audit programs and procedures include the scope, frequency and methods as well as the responsibilities and requirements for conducting audits and reporting results.

The frequency of audits reflects the level of significance of environmental impacts and the results of previous audits.

13.1 ESMP Review

The ESMP will be reviewed periodically to evaluate environmental and social controls and procedures to ensure they remain applicable to activities. The review will be carried out by the PLN Environmental Unit, as follows:

- The complete ESMP will be reviewed at least annually.
- Relevant parts of the ESMP will be reviewed following a re-labeling incident.
- The relevant parts of the ESMP will be reviewed upon receipt of the updated sub-plan.
- At the request of stakeholders, including Government Bodies (BPLHD), Contractors, Supervision Engineer or host communities.

The ESMP review will include analysis of data collection and results, monitoring reports, incident reports, complaints, feedback from stakeholders, Government Agency reports (BPLHD), minutes of consultation meetings and training notes, to evaluate the effectiveness of the procedure. Field visits, interviews and other audit methods can also be used.

The ESMP update, after review, will follow the procedure in Section 9.2.

13.2 New Impacts and Activities

All new activities and impacts that are not covered by the main ESMP or any sub-plans, should be included and new revisions of the plan resulting through the update procedure.

13.3 ESMP Control and Updates

The ESMP will be issued as a 'controlled document' to all relevant staff and organizations. The procedure to be followed to control the issue of the documents, provide a review of its effectiveness and provide updates is as follows:

1. Issued copies by the Environmental Unit of PLN will be numbered.
2. The Environmental Unit will initiate a review of any relevant sections following modification to the Environmental Approval, issue of a new approval, or a change to internal procedures based on corrective actions or improvements in methodologies.
3. The Environmental Unit will ensure the document is reviewed and that all sections are up to date.

4. Any parts of the ESMP that require Government Agency approval will be lodged with the relevant agencies and may not be implemented until an approval has been provided.
5. All controlled copies will be updated following a change, coordinated by the Environmental Unit.
6. All updated sub-plans will be forwarded to the Environmental Unit in order to update the relevant appendices in this plan.
7. Updates will be communicated to all interested and affected stakeholders.
8. Updates will be recorded in Section 1.7.

13.4 Government Agency Review

All reports, registers and monitoring results must be made available to the Government Agency (BPLHD) on request. The Government Agency (BPLHD) must have the ability to audit the results and carry out duplicate monitoring or auditing at any time to ensure compliance with the ESMP and any approvals issued.

Where the Government Agency (BPLHD) does not have the capacity to audit, PLN will ensure that an independent audit is carried out at the request of the Government Agency (BPLHD) and to their satisfaction.

13.5 World Bank Review

The implementation of ESMP will be submitted quartely to World Bank for review.
All ESMP revision will be submitted to World Bank for review and approval, before it is applied.

14 CLOSING

This Environmental and Social Management Plan (ESMP) sets out the reuqirements for the management of Environmental and Social aspects due to the construction of 1040 MW UCPS and 500kV Transmission Line.

Jatinangor, April 2021

Faculty of Agro-Industrial Technology – UNPAD

(Dr. Ir. Edy Suryadi, MT.)

Dean

1 APPENDIX 1: ENVIRONMENTAL AND SOCIAL SPECIFICATIONS FOR CONTRACTOR

1.1 Expectations from the Contractors

The following is a list of expectations with regards to the Contractor's performance:

a. Compliance with Indonesian environmental legislation;
b. Works to contract terms and other tender terms;
c. Will have submitted a Project Safety Action Plan (PSAP) to the Supervision Engineer and must include implementation measures in bad weather conditions or accidental leakage, dust, or emissions.
d. Organizing any construction team to participate in site inspections carried out by the PLN (Environmental Unit) Project Management Team (PLN)/or Supervision Engineer and Government Agencies, and carry out any corrective action PLN / the Supervision Engineer instructs;
e. Provide and update information to the Supervision Engineer relating the work activities that can contribute to, or continue to create, adverse environmental conditions;
f. Stop construction activities that cause adverse impacts upon receiving instructions from the Supervsion Engineer and propose and implement corrective actions and implement alternative construction methods, if necessary, in order to minimize environmental impacts;
g. Prepare Contractor Compliance Report for the Supervision Engineer which is prepared monthly.
h. Within six months of commencement of construction, the Contractor will prepare a Landscape Implementation Program (LIP) and submit it to the Supervision Engineer for review and approval. LIP must indicate the location and work of the contractor carried out in order to safeguard the land in the location affected by the access road construction.
i. Design and implement a Unit consisting of the Chief Contractor Engineer or his deputy, and the ESHS Staff responsible for as described below, receive, process and reach resolution regarding public complaints arising from construction activities. Recording of the complaint and its resolution must be kept for review by Supervision Engineer.
j. Contractors who employ more than 100 employees are obliged to form an electricity safety committee.

1.2 Contractor's Environmental, Social, Health and Safety (ESHS) Team

The Contractor's Occupational Health and Safety and Environment (ESHS) Team is to be led by a ESHS Manager and be fully staffed to ensure all roles and responsibilities are met by competent and trained practitioners. The Manager is expected to have at least ten years working experience in ESHS management, training, monitoring for similar scale of infrastructure construction projects. The ESHS officers must be familiar with Indonesia's legislative regulations and World Bank EHS Guidelines and ESF.

The ESHS Manager and team are responsible for preparing, implementing and managing the CESMP. The roles and responsibilities are, but are not limited to, the following:

a. Delivering EHS training to staff and subcontractors, in relation to induction, and in relation to the workers responsibilities on site. Training may also be directed by PLN and the Supervision Engineer.
b. EHS supervision of the project site to check the Contractor's implementation of the C-ESMP at the project site, equipment and work methodology in relation to pollution control and implementation of appropriate environmental prevention;
c. Monitoring of implementation of EHS risk identification and prevention measures and contractor compliance with respect to environmental protection, pollution prevention and control measures, and contract terms, advice to contractors on environmental progress, monitoring, proactive pollution prevention measures;
d. Carry out checks and recommend preventive measures to the Contractor in cases where non-compliance with the C-ESMP is found. Participate in the monitoring and implementation of remedial measures to reduce environmental impacts.
e. Review the success of the C-ESMP to confirm prevention efforts are within budget.
f. Prepare monthly Contractor C-ESMP Compliance Report.
g. Include progress of C-ESMP implementation in the contractor's construction progress report.
h. Examination of complaints, evaluation and identification of corrective measures.
i. Carry out additional monitoring work within the specified time frame by the Supervision Engineer.
j. Deliver and implement activities that are coordinated and instructed by Supervision Engineer on all necessary EHS incidents and issues. The diagram below shows the organizational structure of a project development environmental management

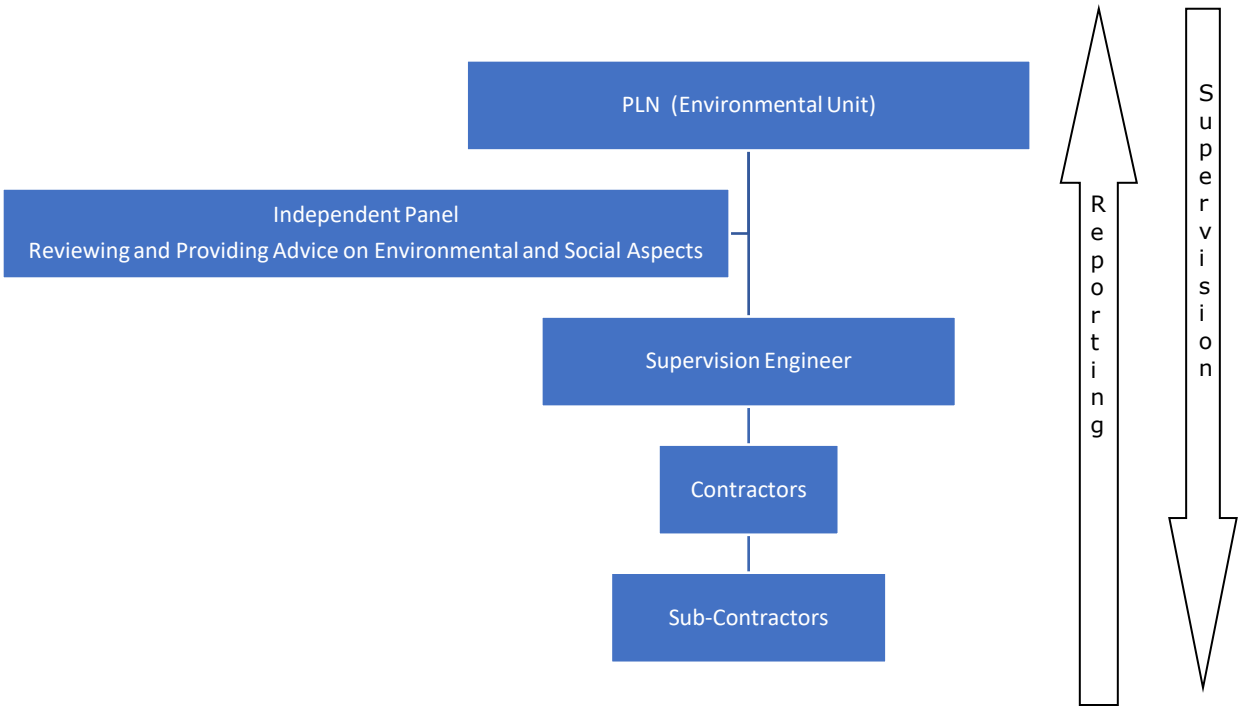

Figure 2 Organizational Structure for Environmental Management during Construction

The contractor will ensure that sufficient resources are provided for ESSHS for the implementation of the C-ESMP during the construction phase

1.3 Construction Activities and Environmental Regulations for Contractors

The Contractor will enforce a Code of Conduct which Workers must follow for the following.

1.4 Prohibitions

These activities are prohibited from being carried out on/or near the project site:
1. Cutting trees for any reason outside the approved construction area.
2. Hunting, fishing, collecting of wild animals or collecting plants.
3. Buying wild animals for their meat or for use as food or for any other reason.
4. Disturbance to anything of archaeological or historical value.
5. Lighting fires outside the barracks / basecamp areas without permission.
6. Using firearms (except licensed security officers).
7. Drinking alcoholic beverages for workers during working hours
8. Cleaning cars and equipment in streams or lakes.
9. Carry out maintenance (oil and filter changes) of cars or equipment outside the licensed area.
10. Dispose of garbage on site and dispose of solid waste in places that do not have a permit.
11. Workers riding motorbikes without wearing helmets.

12. Control of construction vehicles by unlicensed persons.
13. Driving above the speed limit.
14. Keeping of wild animals (especially birds) in barracks / basecamp.
15. Work without PPE (including gloves, boots and masks).
16. Creating noise and disturbance in or near the community.
17. Breaking the customs and traditions of the surrounding community.
18. Use of rivers and streams for washing clothes.
19. Use of welding equipment, welding torches and other sources of ignition where fire can cause a hazard.
20. Wet and solid waste are not separated from construction activities.
21. The scattering of potential pollutants such as fuel.
22. Collection of firewood.
23. Defecating outside the toilet facilities provided.
24. Burn trash and/or clear vegetation.

1.5 Transportation

The contractor must use the route that has been selected to the project site, as agreed with the Supervision Engineer, and use the vehicle weight type appropriate to the road class in the location area. Contractor will limit hauling weight to prevent damage to local roads and bridges for hauling purposes. The contractor will be responsible for damage to local roads and bridges due to overloading, and will be required to make repairs to the damage to be approved by Supervision Engineer.

The contractor must not use vehicles on the road or off-road with excessive emissions and noise. In residential areas, silencers must be installed and maintained in good condition on all machine tools under the control of the Contractor.

Adequate traffic control measures will be undertaken by the Contractor during the term of the Contract and these measures will be subject to the preliminary approval of the Supervision Engineer.

1.6 Manpower or Barrack/Basecamp

The contractor should, where possible, appoint local workers as the majority of the workforce on the project and provide adequate training as needed.

A Minimum Requirements

In the workers' barracks/basecamp the following minimum facilities will be provided:

- Security guardrail at least 2 m high constructed with suitable materials
- At each location there are appropriate and suitable facilities and equipment for washing clothes. Appropriate segregation of MCK facilities will be provided for use by male and female workers.
- Placement of bathrooms, toilets for women and toilets for men (urinal) will be provided at each barracks / basecamp location on the following scale:

- Where there are female workers, there will be one toilet for every 25 women or part of them.
- Where there are male workers, there will be one toilet for every 25 men or part of them.
- Each toilet will be closed and partitioned for convenience of privacy, and will be equipped with a door with a lock.
- Where there are male and female workers, each female toilet and men's toilet (urinal) can be locked from inside, and from outside, and there will be signs in a language that is understood by all workers, for example "Laki-Laki" and "Perempuan".
- Women and men's (urinal) toilets will be equipped with adequate lighting and will maintain the cleanliness of the toilet conditions at all times and
- Water will be provided in or near women's toilets and men's toilets by storing it in buckets.

- Polyclinic. First aid kit must be provided at each construction site and managed by workers who are responsible at all times during working hours on the job site. These workers should be educated about first aid care. Written arrangements will be used regarding the use of existing vehicles to transport injured or sick workers to the nearest puskesmas or hospital.
- The area for storing fuel or oil and for maintenance of workplaces. The area must be closed and have a solid floor to avoid the spread of fuel and oil scattered on the site. The sewer water from the closed area will be discharged into an oil catchment which has been designed according to its use. It must also be roofed and covered to prevent water pollution
- Inexpensive facilities for the management of discharged water from toilets, washing places and others. Standard management must be met at all times, namely the availability of biological oxygen (BO_5) less than 30 ppm, suspended solids less than 50 ppm or in accordance with the provisions in Indonesian regulations.
- Air exhaust drainage system that dumps all surface air exhaust from the barracks / basecamp to a silt settling pond which will be constructed with a minimum of 15 minutes of exhaust air flow from all locations which will be generated again by 20 years of rainfall with a duration of 15 minutes. The runoff coefficient used in the calculation of the volume of the waste pond is 0.9. The sludge settling pond will be maintained in an efficient condition for use during the construction period by storing sludge and soil particles disposed of and stored in an Supervision Engineer approved waste material disposal
- Discharge from the silt settling pond will be discharged into natural waters through a grassy area with a total width of 20 meters with a suitable longitudinal gradient.
- Water discharge facilities must have:
  - MCK waste disposal will be channeled to the septic tank.
  - Kitchen waste can be landfilled. Wastewater from the barracks / basecamp location can be disposed of in kitchen waste which is located 15 meters from the water body. The storage capacity must be able to accommodate at least 1.3 times the maximum volume of discharged water flowed. The base of the embankment should be filled with gravel and covered with wood on the sides, etc. to prevent erosion and collapse of the pile

- Solid waste generated from construction sites can be reused if the waste can be recycled or disposed of at the TPS (temporary disposal) location.
- All barracks / basecamp facilities must be managed in a clean and safe condition during the construction period.
- The barracks / basecamp should have an effective fire prevention policy.

B Activities in the Barracks/Basecamp

The following preventive measures should be implemented in the construction barracks / basecamp:

- To ensure that oil and oil do not leak into water bodies or underground waters.
- Discharge of water should not be discharged into water bodies
- Regular solid waste collection must be carried out and disposed of in a safe manner
- All used equipment, such as first aid kits and cleaning equipment to maintain the sterility and cleanliness of the bathroom, must be done immediately

The contractor will ensure that the office, warehouse and workplace are located in the right area as agreed by the Supervision Engineer and that the distance from existing residential areas is not less than 200 meters. Storage of explosives must be kept as far as possible from residential areas, administrative areas or public areas, warehouse locations must be accepted, approved by the relevant authorities and compliant with existing Indonesian regulations.

The contractor must ensure that the location of the office and warehouse for diesel fuel and bitumen is not less than 50 meters from the water body and is operated so that no pollutants enter the water body, both above ground and underground water, especially during the season. rain. This requires oil to be recycled and a sinkhole around the area with an approved settling pond / oil catchment at each discharge.

C Site Restoration

Upon completion of construction work, all construction facilities for the barracks / basecamp sites and all sites must be returned to their original conditions such as before the commencement of work or according to conditions agreed with the land owner. Various activities must be carried out for site restoration including:

- Soil contamination of oil and fuel should be removed and transported and stockpiled in Supervision Engineer approved effluent areas.
- The construction site of the barracks / basecamp must be planted with grass and trees felled must be replaced with trees of the same species.
- Trees that will be handed over to the community or landowners for further treatment and irrigation.
- Soak pits and septic tanks will be closed and locked.

1.7 Waste and Erosion Management

Solid waste, sanitation and hazardous waste must be responsibly managed through the implementation of the following measures:

A Waste Management

- Minimizing the production of waste that must be managed or destroyed.
- If it generates hazardous waste such as oil, batteries, etc., proper procedures must be implemented regarding its storage, collection, transport and disposal.
- Locating and separating waste areas that clearly indicate the specific materials that can be stored there.
- Management of the inclusion of all construction discharge (including earthworks) at an approved discharge site (> 200 m from a river, stream, lake or wetland and meets Indonesian standards, or the contractor will implement preventive measures in tender documents). Dispose of all waste, metals, used oil and excess materials generated during construction to the licensed area. Use a recycling and separation system for replaceable and recyclable materials.

B Erosion Management

- Disturb as little as possible to the project area, stabilize the project area as quickly as possible, control ditches through the project area, and limit sediment at the site. Build erosion control barriers around cross-sectional boundaries, exhaust pits, and roads.
- Conserve topsoil with its leaf litter and organic material, and reuse this material in disturbed community areas to accelerate the growth of native local vegetation.
- Using native grass protects erosive soil or covers construction surfaces.
- Implement erosion control measures before the rainy season begins and should be carried out quickly after construction.
- At all construction sites, install sediment control structures wherever if necessary, they are slowed or drained of effluent and sediment boundaries until vegetation can be replanted. Sediment control structures include (but are not limited to) patterned felling, tarts, sediment catchment ponds, grass rolls, bush hedges, mud / sediment retaining fences.
- Control of water flow through construction sites and disturbed areas with potholes, mounds, retaining structures, live grass and rocks.
- Maintain and re-implement erosion control measures until vegetation can regrow.

B Maintenance

- Locating and separating maintenance areas (> 15m from rivers, streams, lakes or wetlands). The oil storage must be delivered in an appropriate location and approved by the Supervision Engineer.
- Ensure that all equipment maintenance activities, including oil changes, are carried out in a separate maintenance area, no oil is dumped into soil, water bodies, sewers or sewage systems.
- All spilled fuel products that have been collected and must be disposed of in accordance with standard environmental procedures / guidelines. Storage areas with fill will be located at least 50m from all important drainage structures and water bodies as mandated by the Supervision Engineer.

1.8 Earthwork, Excavation and Filling Slope

All earthworks must be properly controlled, especially during the rainy season.

The contractor will maintain a stable fill slope at all times and carry out it with as little disturbance as possible to areas outside the work boundaries.

The contractor will complete the excavation operation at one location as quickly as possible and it is preferable to do it in one continuous operation to prevent partially done earthworks, especially during the rainy season.

In order to protect the fill slope from erosion, according to the drawings, transverse drainage and lower drainage will be provided on the upper and lower slopes and grass and other plants will be grown to cover the slope.

Unsuitable quarries or materials will be disposed of in the designated waste area as approved by the Supervision Engineer. A new disposal site proposed by the contractor during construction to be approved by the Supervision Engineer after being presented by the contractor as a feasibility report on the new dump site and prevention and restoration measures to be implemented once the site is approved.

The new dump site must not be located where it can cause future landslides, disturb agricultural land and other property, or allow soil from the dump to be drained into water bodies. Sewers may be required to be excavated in or at the ends of the slopes, as instructed by the Supervision Engineer.

1.9 Stockpiles and Borrow Pit

Operations of new excavation sites, on land, riverbeds, or in existing areas, must be approved in advance by Supervision Engineer, and operations will be terminated if instructed by Supervision Engineer. Excavations will be prohibited if they interfere with natural or designated drainage patterns. Riverbeds will be prohibited if they disturb or cause damage to the riverbanks, or work on the river that moves too much material downstream.

The contractor will ensure that all borrow pits that have been used are in good condition and tidy with a stable sloping side, and drainage is made to ensure there is no stagnant water that can cause mosquitoes.

It is ensured that rocks and gravel from rivers are large enough to limit the depth of material transported by one-tenth the width of the river at one location, and will not be transported from wet areas, and will not deflect or disrupt river flows or cause damage or disrupt riverbanks.

The crusher site is subject to Supervision Engineer approval and will not be in sensitive areas or in residential areas, and will operate with suitable dust control devices.

In the quarry and dump site, the Contractor will:

- Identifying and limiting locations for stockpiles and borrow pits, ensuring they are at least 15 meters from critical areas such as slopes, erodible land, and areas that drain water into sensitive water bodies (except for sites designed with stone walls to protect the surrounding environment.
- Limit excavation of material to only approved and restricted areas.
- Hoarding humus when you first open the borrow pits. When the used borrow pit is removed, the previous topsoil must be spread over the entire borrow area and the quality increased to make it smooth, the same surface, tilted to dry.
- Excess waste is stabilized and regrown. Where appropriate, excess organic debris should be scattered throughout the affected sites to encourage replanting.
- Drainage canals in all locations affected by the operation must be protected from excavated soil.
- When the work is completed, all the scraps from the construction must be transported from the site

The contractor will present the borrow pits exploitation plan. The operational borrow pits must include aspects such as:

- Operations must be carried out in stages and valuable materials must be fully utilized for progressive rehabilitation to take place.
- It is most important that operators plan for progressive rehabilitation throughout the operational life. Planning for the final rehabilitation of the excavation site must be made as well as possible prior to its operational termination. Any plan for site rehabilitation should include a brief description of the site prior to commencement of operations including soil, land formation, flora and fauna, drainage and conservation values.
- Storage should be carried out in a systematic manner, generally along slopes, so that used portions can be rehabilitated and replanted without disturbance.
- Where there is a significant volume of waste soil or useless rock generated by the quarry operation, this material should be stored in an appropriate dump site, positioned and shaped to blend with the surrounding environment. Costly reshaping of dump sites should be avoided.
- Minimizing the total disturbed area is the best method for reducing erosion from rainwater flows and weed invasion. Use boundary marks, such as stakes or marking tape, to indicate to the machine operator the areas to be cleaned.
- Contractor submits blasting plans at each site for review and approval by Supervision Engineer prior to implementation.
- Prevents blasting in cloudy or bad weather conditions. Fixed detonation time must be obeyed and informed to the public.
- Rock removal should be carried out in a series of plumps if the material is stable. The orientation of the feed should take into account the geology and the side of the scene where the quarry is visible. The entire trough should be self-drying. Each weed should act as a drying area, passing water along the weed to a suitable discharge pond. If drainage flows downward from one pile to another, erosion will occur and the pile can be damaged.
- Humus is usually a darker, topsoil that contains nutrients, minerals, seeds and organic material that can bind it together. If possible, the integral topsoil should be stored directly in the rehabilitated area. This is done to avoid double landfilling and handling.

- If topsoil has to be stockpiled, be reminded that its quality will deteriorate. The following measures help to maintain soil quality.
  - o Humus must be separated from soil, gravel and other materials; if possible, the topsoil is stacked no more than one meter to reduce "acidification";
  - o topsoil deposits must be protected from erosion;
  - o Replanting in stockpiles (shrubs and grasses) reduces erosion and keeps biological activity at bay;
  - o humus is prohibited from being buried or run over because it will damage the soil structure;
  - o land should be stored in an area not traversed; and
  - o Excessive humus treatment should be avoided
- Project sites should be regularly checked for weed control, their numbers recorded, and if necessary a control program implemented.
- All wastewater from the work area, which contains sediment, must be collected in a settling pond before being discharged from the site. Water from washing, filtering or dust reduction should be managed accordingly. Accepted methods for removing sediment from discharge include sewage ponds, grass screens, aggregate screens, wetlands (shallow ponds with suitable vegetation). For borrow pits in vegetated areas, wastewater must be channeled through the vegetation before it reaches water bodies for sediment filtering.
- Noise impact management that can be achieved through the following efforts:
  - o Limiting operations to the appropriate operating hours. This is the simplest way to prevent the impact of excessive noise. Another effective way is to provide a suitable separation distance to dampen the noise to an acceptable stage.
  - o Closure around crushing and sieving sites. Solid barriers, such as topographical walls, can reduce noise levels most effectively. Relying on plant barriers only results in a marginal reduction in noise levels.
  - o New hydraulic crusher delivers lower noise than with secondary blasting. In general, operators should avoid using surface detonation wires. Adequate punches and delays between shot holes should always be used. Uses the approved non-electric detonator as the quietest delay system for pre-detonation
- The following measures are considered to minimize environmental impacts on air quality.
  - o Wind direction and stockpile placement on site should be considered during the planning stage. Trees should be grown for windbreaks or topography and / or use of embankments, to cover stockpiles and the working area from the wind. Conveyors and loading and unloading bins can be the largest sources of dust, so gated ground, water spray, or approved dust reduction equipment may be required. The descent distance to loading and unloading and the top of the stockpile must be kept to a minimum.
  - o Vehicle speed is a major factor in dust rise. The speed of vehicles on site must be limited. In addition, on haul roads along unpaved roads, it is advisable to slow down especially in residential areas along these lines.
  - o Stockpiles and roads can be sprayed with chemicals such as magnesium chloride to create an impermeable coating, which will reduce dust build-up. As an alternative, still water spray can be used to reduce dust. Waste oil should not be used as a dust damper.

- Depending on the material being transported and the potential for dust generation to be considered in truck loading. In general, the highest pile of conveying material should not exceed the height of the tailgate barrier, unless it is covered. Environmental factors are a big factor in air pollution and dust emissions. Additional measures should be taken during high wind speeds, or during other adverse weather conditions, to minimize dust generation. Reduce vehicle speed, increase water spray for roads and stockpiles and limit the amount of product transported per load of transport, which may be sufficient in adverse weather conditions

- Visual impact can be minimized through:
  - Natural vegetation is a valuable resource which can be used for visibility purposes. Vegetation may not need to be damaged by brief, heavy-machining activities at the cut boundaries. Cleaning must be kept to the minimum level needed for effective operation. Vegetation can also act as an additional barrier to vision.
  - The surface of the borrow pit must be obscured from the view of the road used and places visited by the general public. Wherever possible, work surfaces should be kept away from public places and neighborhoods, and the direction of work should be chosen so that it is hidden from public view. If possible, the top fill should be worked out and rehabilitated as quickly as possible.
  - New borrow pits are prohibited from opening next to roads frequently used by the community, unless they have been obstructed by topography and / or vegetation. The entry point for the road must be made in such a way as to avoid straight view.

1.10 Disposal of Construction and Vehicle Waste

The contractor will perform and enforce day-to-day site cleaning procedures, including maintenance of appropriate disposal facilities for construction remains.

Existing demolition remains to the extent possible are reused to a reasonable extent, in the proposed construction (eg material for stockpiling). Disposal of project remains must be transported only to the designated and Supervision Engineer approved locations. The contractor will ensure that these sites (a) are not located within existing forest areas; (b) has no impact on drainage channels; and (c) has no impact on protected flora. For whatever reason the contractor may not dump material into environmentally sensitive areas..

In the event that the building remains and sediment from the project site are deposited on other adjacent land, the Contractor will quickly remove such as the building remains or sediment and return the affected area to its initial condition according to Supervision Engineer satisfaction.

All transport rules including provision, maintenance, demolition and cleaning of building remains, if necessary, will be considered incidental work and must be planned and implemented by the contractor as agreed and ordered by the Supervision Engineer

1.11 Safety During Construction

The contractor's responsibility includes the protection of any person and property nearby against construction accidents. The contractor will be responsible for complying with all national and local occupational safety and health requirements and other measures necessary to prevent accidents, including the following:

- Mark carefully and clearly safe paths for pedestrians around construction areas;
- If there are schools located in any areas where work traffic passes, assign traffic safety staff to direct traffic during school hours;
- Maintain traffic signs (including paint, sign material, etc.), road signs and road dividers to maintain pedestrian safety during construction;
- Carry out safety training for construction workers, and driver safety training for heavy vehicle drivers, before commencement of work;
- provide personal safety precautions and clothing (gloves, dust masks, boots, etc.) to construction workers and comply with their use;
- Include a Material Safety Data Sheet (MSDS) of any use / removal of chemicals that are on the job site;
- Require all workers to read, or read the entire MSDS. Explain the risks to them and their colleagues, especially those who are pregnant or are starting a family. Encourage workers to share relevant information with their doctors,
- ensure the removal of materials containing asbestos or other toxic materials formed and disposed of by specially trained workers;
- During heavy rains or other emergencies, stop all work and mobilize resources for prevention efforts.
- Install electrical and mechanical equipment that can withstand seismic events during construction

1.12 Environmental Protection and Safety During Blasting

The contractor will submit for Supervision Engineer approval the Blasting Plan for each blasting site. The plan will include the following relevant methods which are to be implemented to ensure safety and minimize environmental impacts:

- The hazard radius should be calculated based on site conditions (eg for small blasts, the minimum radius of the hazard area is from 300m to 400m).
- Make protection from suitable material to ensure safety.
- Temporary evacuation of humans and animals before blasting.
- Where to use the blasting method will be used.
- The location of the blasting must be at least far from the settlement according to Indonesian regulations.
- The direction of explosion should be towards the side of the mountain or in a non-residential area and as far as possible from roads.
- On site communication using signboards and sirens for the community and surrounding traffic.
- Public alert information notification to government and local communities regarding detonation schedules and security measures.
- Provide advance notification (at least 15 minutes) prior to actual detonation, with sirens that can be heard as far as possible.

- Safety checks of all equipment and workers before returning to normal operations

1.13 Nuisance and Dust

To control noise and dust, the Contractor must:

- Keep construction-related traffic at or below 20 km / h on the road within 200m of the site;
- Maintain all vehicle speeds at the location.
- If possible, keep the noise stage with respect to all machinery and equipment at or below 90 db.
- In sensitive areas (including in residential areas, schools, mosques, etc.) more binding measures are implemented to prevent unwanted noise stages.
- Minimize the yield of dust and warfare materials at all times to avoid impacts on the surrounding population and economic enterprises, and in particular for vulnerable communities (children, the elderly).
- Gradual removal of vegetation and preventing large areas from being exposed to rain.
- Spray water as needed on site, and on dusty roads, dugouts or stockpile areas to ensure dust levels in locations near residential, commercial, recreational areas that meet existing Indonesian air quality standards.
- Implementation of appropriate measures to minimize disturbance to vibration or noise generated by construction activities.
- Asphalt heating should be carried out at least 50m from any residential area, the heating area should be leeward, properly closed so that impacts such as smoke, dust and odors to the surrounding area are minimized.

1.14 Demolition of Existing Infrastructure

The contractor will implement appropriate measures during dismantling of existing infrastructure to protect workers and the public from falling building materials and flying objects. Among the following efforts the Contractor will:

- Ensure all compensation and / or resettlement has occurred and access is permitted by PLN, prior to demolition.
- Establishment of defined and restricted waste disposal areas or discharge zones, and / or gutters for safe transfer of waste from top to bottom.
- Saw, cut, milled, sanded, crush or chisel with suitable protection and restraint whenever possible.
- Maintain traffic to avoid traffic hazards from released materials.
- Implement temporary fall prevention measures in scaffolding and on the outer boundary surfaces of work at height, such as handrails and toe guards for protection from falling material.
- Evacuate work areas during blasting operations, and use blasting guards or other means to minimize flying rock blows or disposal of demolition trash if work is carried out in the vicinity of communities or building structures.
- Provide all workers with safety glasses with side shields, face shields, helmets and safety shoes

1.15 Community Relations

To develop appropriate community relations the Contractor will:

- Inform the public about construction and work schedules, blasting schedules, service disruptions, traffic detours & temporary haul routes and demolition, as appropriate.
- Limit construction activities at night. Where necessary ensure night work is carefully scheduled and the public is sufficiently informed so that they can make the necessary measures and preventive measures for a construction method that is agreed by all parties.
- Inform the surrounding community as early as possible and repeat at least one day in advance of any service disruptions (including water, electricity, telephone and access roads). Public notification needs to be made at the project site, at mosques and other meeting places, and at affected homes / economic activities.
- All community infrastructure such as roads, bridges, water supply systems, irrigation systems, etc. those affected during construction must be restored until they are accepted by the community and
- All local roads or those on which the contractor passes require rehabilitation to their original condition.
- Establish and maintain units to receive community complaints arising from construction activities and process to reach settlement agreements. Records of complaints and their agreements should be kept and available for review by Supervision Engineer.

1.16 Cultural Heritage and Chance Finds Procedure

The contractor is responsible for demarcating, protecting and monitoring cultural objects within the project area, and following the historical discovery procedures, as documented in the Cultural Heritage Management Plan. Including community graves, cemeteries, sacred tombs and mosques.

1.17 Hazardous Materials

If the construction site is suspected of containing hazardous materials (for example materials containing asbestos in building materials from demolition of buildings), the Contractor is required to prepare an Supervision Engineer approved Hazardous Waste Management Plan. This plan must be prepared for all parties involved in operational and transportation activities. The removal and disposal of hazardous waste at the project site must be carried out by staff with special training following national and provincial requirements, or internationally recognized procedures.

1.18 Health Services and HIV/AIDS Education

The contractor will provide basic first aid services to all workers as well as emergency facilities for work-related emergency accidents including appropriate medical equipment

for staff, type of operation, and level of care that will be required prior to transport to the hospital.

The contractor will be responsible for implementing a program for the detection of sexually transmitted diseases, particularly with respect to HIV / AIDS, among workers.

The Contractor will at all times take precautions to safeguard the health and safety of Contractor staff. In collaboration with local health workers, the Contractor will ensure medical staff, first aid facilities, polyclinics and ambulance services are available round the clock at any location and at any accommodation facility, and arrange the necessary hygiene requirements accordingly to prevent epidemics.

The ESHS Manager is responsible for identifying risk and maintaining safety systems and protection against health incidents. The occupational health and safety officers must be qualified for this responsibility, and will have the authority to convey instructions and carry out measures for risk identification and incident prevention. During the execution of the work, the Contractor will provide whatever is needed by this officer to carry out his responsibilities and authority.

The contractor will send the Supervision Engineer all details of the accident as soon as possible after the incident. The contractor will record and report on occupational safety and health, staff welfare, and damage to property, as required by Supervision Engineer.

The Contractor will implement HIV / AIDS awareness programs through approved service providers, and will implement other measures specified in the Contract to reduce the risk of HIV transmission between Contractor staff and local communities, to develop initial diagnoses and assist infected individuals.

The contractor during the contract (including the maintenance period): (i) conducts an Information, Education and Communication Consulting (IEC) campaign, at least every six months, the first of which must be held three weeks from the start of construction, conveying to all site staff and workers (including Contractor workers , all Sub-contractors, and all truck drivers and transportation staff to the site for construction activities) and for the surrounding community, regarding risks, hazards and impacts, and prevention of appropriate behavior related to sexually transmitted diseases (STDs) or sexually transmitted infections general and HIV / AIDS in particular; provide STD and HIV / AIDS screening, diagnosis, dedicated counseling and referencing to the national HIV / AIDS Program, (unless agreed otherwise) to all staff and workers on site

1.19 Emergency Environment Procedures

Prior to the commencement of construction, the contractor will send the Environmental Supervision Engineer a Project Occupational Health and Safety Plan (PASP). PASP will include action plans in the event of bad weather conditions or accidental leaks, spills, or emissions. Plans will be reviewed regularly and updated as necessary.

In the event of an accidental oil / chemical / chemical waste leak or spill, the following response procedures must be carried out immediately by the Contractor:

- Officers who find a leak / spill will immediately check if anyone is injured and will inform the ESHS Manager of the Contractor and Supervision Engineer.
- ESHS Manager will ensure that anyone who is injured gets treated and looks for anything that had leaked or spilled.
- If the accident creates serious environmental pollution (eg toxic or chemical spills / leaks, large-scale spills / leaks, or spills / leaks into nearby water bodies used for irrigation / drinking water), the Contractor will immediately inform Supervision Engineer;
- In the event of an accident, staff will immediately take action to stop the spill / leak and drain the spilled / leakage liquid to the nearest non-sensitive area;
- The contractor will assign maintenance staff in suitable safety clothing for cleaning chemical / chemical wastes. Countermeasures can be achieved through spraying with sawdust (if the quantity of spill / leakage is small), or sandbags (if the quantity is large); and / or using a shovel to remove topsoil (if the spill / leak occurs at ground level); and, depending on the nature and extent of the spill, evacuate the site if necessary.
- Spilled chemical must not be flushed into the surrounding drainage system.

There may be environmental emergencies due to unforeseen natural events during the construction and operational stages of the project. By definition, the occurrence of an emergency cannot be known. Accordingly, the contractor will respond to the emergency on a case-by-case basis and will initiate specific actions in the form of notifications and reactions.

The contractor will prepare reports on incidents related to accidents, corrective actions, pollution problems and suggestions for preventive measures against similar accidents so that they do not occur again in the future. Incident reports will be submitted to Supervision Engineer for review and submission to relevant government agencies, if necessary.

1.20 Training

The contractor must ensure that all relevant staff understand the environmental requirements as stated in the environmental laws and regulations and the Contract specifications. The contractor will be responsible for providing appropriate training for all of its staff. This must be adjusted to the stage of responsibility for environmental problems. The contractor should ensure that all site staff members and managerial staff receive additional training. The training materials must be reviewed by the ESHS Manager and submitted to Supervision Engineer for approval.

Refresher training may be required and should be scheduled according to periodic internal reviews of the requirements for the activity concerned. Ward staff training records should be maintained and submitted to Supervision Engineer on request. Records for each project activity should be kept on site whenever possible for easy access during the audit. Ward training records (eg attendance records for environmental understanding training, topics covered) should be kept.

All people who are responsible for management and operations in all aspects of the ESMP will be trained according to their roles. Evidence of training must be kept on site, for inspection / audit purposes.

Training must be carried out for, as a minimum:

- Management of Toxic & Hazardous Materials and Emergency Procedures
  All staff involved in the control and use of chemicals, fuels and explosives need to be trained in spill control and emergency procedures. Evidence of training must be kept on site, for inspection / audit purposes.
- Concrete and Asphalt Management
  All staff involved in the plant, transport and control of concrete and asphalt must be trained in control, spillage, dust, water management and emergency procedures. Evidence of training should be kept for inspection / audit purposes.
- Sediment Control, and Sewage Control.
  Training should be provided by a third party, or provide evidence of prior training, for construction, maintenance and monitoring of environmental protection and waste management equipment. Evidence of training must be kept on site, for inspection / audit purposes.
- Traffic Management and Driver Education
  Training must be provided by a third party, or provide evidence of prior training, for safety control and driving of heavy construction vehicles. Training is also provided for traffic management (including pedestrians) on and around construction road areas, to ensure safe passage during and after working hours. Evidence of training must be kept on site, for inspection / audit purposes

1.21 Remediation Activities

Remediation activities that cannot be carried out effectively during construction must be carried out at the completion of the work (and prior to the execution of the Minutes of receipt of work completion):

- All affected areas must be landscaped and any necessary remedial work carried out without delay, including replanting grass and vegetation;
- Water bodies must be cleaned of residual building materials and drainage & waterways checked to clean their flow routes;
- The entire site must be cleaned and excess material disposed of accordingly; and
- Borrow pits must be restored.

FORM (*Form Number*)

Contractor's Statement on Environmental Conditions

(Contractor representatives must carefully read the statements mentioned below, fill in the relevant information in the blank and signed. This form forms part of the contractor tender and the contract signed by the winning bidder)

I hereby acknowledge what I have read and fully understand the terms of the Environmental Specifications written in the Tender document for the Upper Cisokan hydropower package. I confirm that the tender price has covered all the costs necessary to ensure proper implementation of the Environmental Management Plan and comply with the environmental specifications stated in the tender documents.

I admit that, if a construction contract is awarded to our organization, I will appoint Mr / Ms. . . . . whose CV is attached to our tender to become an ESHS Manager for the packages we are tendering. He will work full time on site and be responsible for all work assigned to him according to the Environmental Specifications

I admit that not fulfilling any of the conditions will result in penalties / fines for my company.

Signature: . . . . . Date:. . . . . .

Name: . . . . . Position in Compamy:. . . . . .

2 APPENDIX 2: RESERVOIR PREPARATION PLAN (RPP)

2.1 Introduction

In accordance with ESS4, PLN will prepare and follow the Reservoir Preparation Plan to avoid damage and impacts on households and the wider community, and to minimize environmental and biodiversity impacts, during preparation of the reservoirs and inundation of the two Upper Cisokan Hydro Power Plant reservoirs. The ESMP should be implemented by all relevant employees, consultants and contractors.

Objective:

- To assess the vegetation clearance needs and determine the level of clearance and preparation required to:
    - Protect and enhance aquatic habitat
    - Minimise water quality impacts
- Implementation of coordinated vegetation clearance with opportunties for ex-land owners and surrounding community to benefit from these activities, including crops, timber and other non-timber resources.
- To ensure all graves and cultural buildings are removed or otherwise protected.
- To minimise the risks of floating debris.
- To minimize the impact on water quality during inundation and operation by pollutants such as hazardous substances, waste disposal (toilet) and garbage disposal.
- To protect remaining forest during inundation preparation by avoiding clearances above the maximum water level.To stablise spoil disposal areas and slopes to avoid landslide and erosion risks.

The following Environmental and Social Management Plans and sub-plans should be implemented during the preparation of the RPP:

- Environmental and Social Management Plan for the Upper Cisokan Hydro Power Plant in 2020.
- Environmental specifications for contractors.
- Cultural Heritage Management Plan.
- Social and Community Management Plan (SCMP).
- Land Acquisition and Resettlement Implementation Plan (LARAP)
- Biodiversity Management Plan (BMP).

The RPP should contain details of:

- Roles and Responsibilities
- Potential environmental and social impacts and associated mitigation measures
- Detailed methods and procedures for each mitigation measure.

- Communication and Reporting.
- Capacity, Training and Financing.

2.2 Background of UCPS Hydro Power Plant Construction

2.2.1 A Overview of the Upper Cisokan Hydro Power Plant

In order to supply the rate of demand and increase the reliability of the Java - Bali system, PLN is planning to build UCPS with a capacity of 1,040 MW with two reservoirs each with an active storage of 10,000,000 m3. Water will flow through the turbine from the upstream reservoir to the downstream reservoir every day, to generate electricity during peak loads (5pm - 11pm). The water that is stored in the lower reservoir will be pumped back to the upper reservoir outside the peak load time (00.30 pm - 09.30 am) every day, using the energy of the base load. In addition, this project will be able to function as a generator that is needed at any time, to serve sudden energy needs. Pumped storage generators will make the energy grid more flexible, and provide cheaper energy for PLN to meet electricity needs during peak loads every day.

In general, the location of UCPS can be seen in Figure 1. The location is in West Java Province, approximately 150 km from Jakarta.

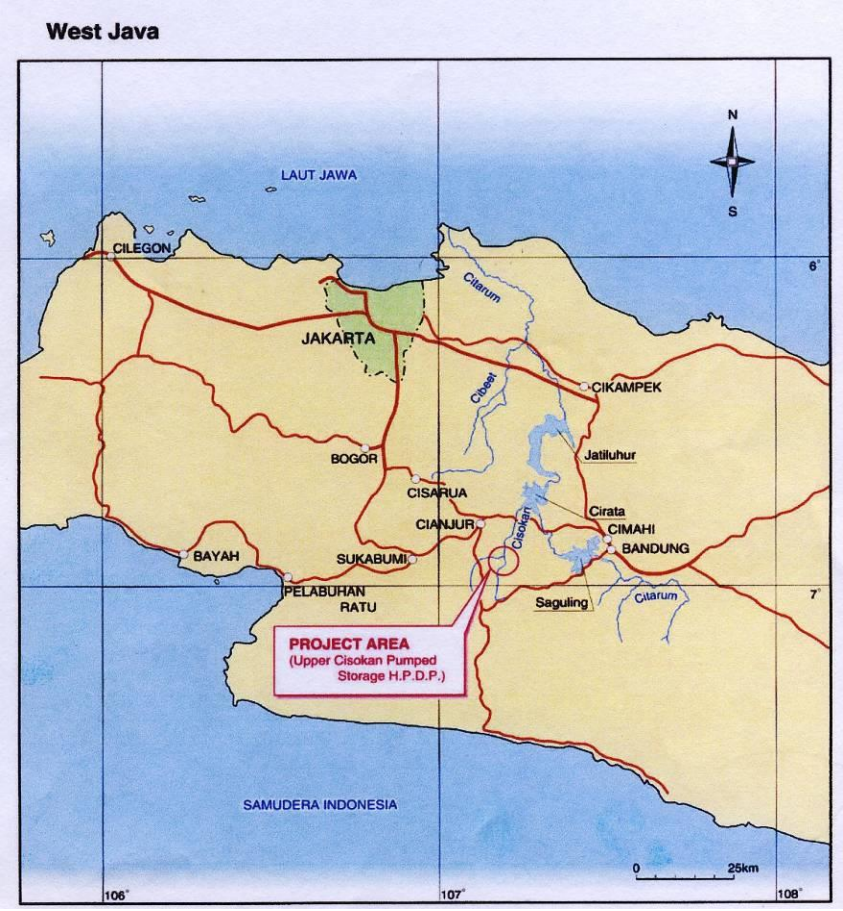

Figure 1 Location of the Cisokan hydropower plant in West Java

The project is located on the Cisokan River which flows in hills stretching from the West-East of the island of Java. The Cisokan River as a tributary of the Citarum river, flows from South to North, then flows into the Java Sea in the northern part of the Java Coast. The Citarum River is the largest river in Java, and there are a number of hydropower plants in this river. In the downstream part closest to the Cirata Hydro Power Plant (1,000 MW) while the Saguling Hydro Power Plant (700 MW) is located close together (different from the watershed).

From an electrical point of view, the location of UCPS is an ideal location for pumped storage type plants, which are relatively close to major city centers such as Jakarta and Bandung, which are the centers of electricity loads in Java. The electrical energy produced by the Cisokan Hydro Power Plant will be connected to the Cibinong - Saguling transmission network through transmission, a new 2 x 500 kV transmission network to the north (total route 31.4 km), for the Java - Bali electricity system.
Overview of the Cisokan Hydro Power Plant:

- The dam height of 75.5 m is located on the Cirumamis river, with a watershed area (DAS) of 10 km^2 and an inundation area of 0.8 km^2 at the highest water level. In operational the water level will fluctuate with the highest water level difference and the lowest water level is 19 m. The dam body is constructed from compacted concrete.
- The height of the lower dam is 98.0 m located on the Cisokan River, with a watershed area of 355 km^2 and an inundation area of 2.60 km^2 at the highest water level. Operation of the reservoir will cause the reservoir water level to fluctuate as high as 4.5 m. The dam body is constructed from compacted concrete.
- Generating capacity of 1,040 MW, and capacity for pumping of 1100 MW, with the power plant located underground. Tunnels will connect the power plant to the two reservoirs. The switchyard and administrative building will be located in a separate area.
- After flooding, water from the watershed will be discharged through the bottom outlet at the bottom of the dam or spillways, and only 'top up' water is required to replace the water evaporating from the reservoir.
- The existing quarry in GunngKarang will be used as aggregate and basic materials for construction activities.
- Prior to the main construction activities, a 20 kV transmission line will be built as a source of energy for construction activities.

2.2.2 Overview of Reservoir Preparation Plan (RPP)

The RPP is to be finalized based on a detailed risk assessment relating to the impacts on water quality and aquatic habitat from vegetation, buildings, hazardous waste and landslides / erosion, to determine the detailed procedures, protocols, engineering design, actions and implementation arrangements required to prepare the land prior to inundation.

Prior to inundation the proposed preparation activities at each reservoir site are listed below, however these will be assessed and confirmed in the final RPP:

1. Relocation / resettlement of project-affected people (refer to LARAP activities). This is almost complete as of December 2020.

2. Clear marking on the ground of the area to be cleared and establishment of restricted access to the site in place to ensure that community members do not enter the site, which is considered as high risk for accidents.

3. Follow the Pre–Clearing Phase Management Actions related to trees, plants, and wildlife as detailed in Appendix 7 (Land Clearing) of the BMP, which ensures flora and fauna of concern in the clearing area are identified immediately prior to clearing and the required action is taken with regards to removal.

4. Viable seedlings and saplings will be removed from the site prior to clearing. These seedlings and saplings will be kept in a nearby nursery and used for vegetation replanting in catchment restoration and reforestation program detailed in the BMP. Appendix 7 (Land Clearing) of the BMP provides further detail on this requirement.

5. Wildlife which are found within the clearing area and do not move away freely, will be moved from the site by a competent authority. Appendix 7 (Land Clearing) of the BMP provides further detail on this requirement.

6. Demolition, or removal of all buildings, including removal of graves and religious buildings (refer to the Cultural Heritage Management Plan). The risk assessment may identify some buildings that can remain, based on the risks of floating debris and pollutants.

7. Slope stabilization work and final preparation of spoil sites. Engineering to be carried out includes installation of gabions and ballast concrete. The gabions will be filled with material from the tunnel excavation. Protection work is carried out in the zone between the highest water level and the lowest water level.

8. Tree removal will be conducted with chainsaws by appropriately trained personnel. Plants, shrubs and other vegetation will be removed using heavy equipment, such as bulldozers.

9. The community will have the opportunity to all waste materials, the remaining materials will be transported and dumped outside the inundation area. The specific details on how this activity will be conducted fairly and safely is still to be determined.

10. Harvesting of crops, non-timber and timber forest products (excluding wildlife capture). The specific details on how this activity will be conducted fairly and safely is still to be determined.

11. Cleaning / removal of potential pollutant sources (toilets, fuel warehouse, workshop room, fishponds)

12. Construction of bridges and connecting roads in the Lower Reservoir area.

2.2.3 Roles and Responsibilities

PLN will be responsible for procurement of contractors and consultants and managing the reservoir preparation process. Everyday environmental management and operations are the responsibility of the Contractor, which is supervised by the Supervision Engineer, as shown in Figure 3 below:

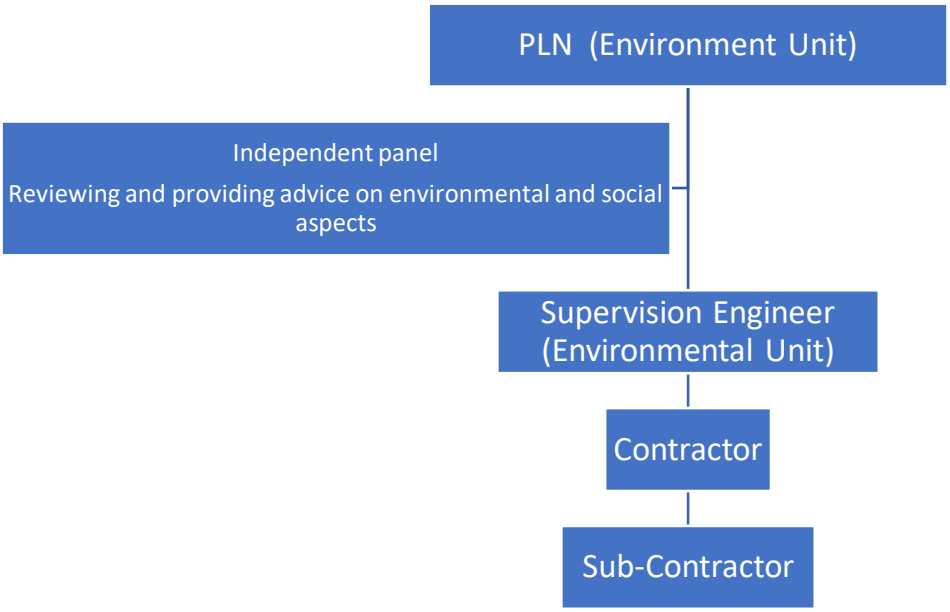

Figure 3 Organizational Structure for Environmental Management during Construction

PLN will engage consultants to prepare the RPP, including carrying out the assessments and studies to conclude the approaches. PLN will prepare the documents and tender the work for a contractor to complete and implement the RPP.The selected contractor will responsible for completing and implementing the RPP. The Supervision Engineer is responsible for overseeing the implementation and review of the RPP.

2.3 ESMP Program

PLN will engage a consultant to prepare the RPP within two years of project effectiveness, and ensure it is complete and cleared at least six months prior to reservoir preparation activities beginning.

2.4 Potential Environmental and Social Impacts and Mitigation

2.4.1 Potential Impacts and Mitigation

The RPP will contain a comprehensive list of potential environmental and social impacts and describe appropriate mitigation measures in detail. As a minimum, the plan must contain procedures relating to the following:

Table 1. Reservoir Preparation Activities in Inundation Areas and Potential Environmental and Social Impacts and Mitigation Measure

Activities	Impact Potential	Mitigation Minimum Standard
Demolition / Building Removal	Destruction or transfer of assets without permission The formation of demolition waste. Floating debris.	The LARAP process handles all matters relating to compensation and resettlement Do not start work before the LARAP process is complete on demolished buildings Use / recycling of materials whenever possible Relocation of religious buildings follows the Cultural Heritage Management Plan
Vegetation Clearing	Disposal of vegetation into water bodies which will affect aquatic habitats and water quality through increased BOD, nutrients, COD. Loss of animal habitat. The felling of plants from private ownership without permission. Loss of livelihoods and food / income sources if people are not given access to them.	The LARAP process handles all matters relating to compensation and resettlement Do not start work before the LARAP process is complete on demolished buildings Minimize the amount of cleared vegetation by marking those that are outside inundation before carrying out activities. Allowing the rest of the logging to be used by the surrounding community.
Reduced forest vegetation	Loss of forest as habitat for endangered mammal species	Avoiding damage to the forest by marking inundation boundaries on the vegetation that must be felled, and implementing the Biodiversity Management Plan. Prevention of logging of forest above the highest water level in each reservoir.
Removal of graves	Complaints from residents. Public unrest. Floating debris.	The removal of graves is carried out in accordance with the Cultural Heritage Management plan
Disposal of polluted materials, fuel, chemicals and others	Residual pollutants affect water quality in the reservoir	All residual chemicals, fuels and other contaminants from households, businesses and agriculture must be disposed of outside

Activities	Impact Potential	Mitigation Minimum Standard
		the inundation area according to standard environmental procedures. Everything is not dumped on the ground or water Polluted soil should be separated and removed from the inundated area, and disposed of in a suitable place. All landfills must be removed and all waste disposed of in a suitable place outside the inundation area All toilets must be stockpiled and cleaned
Slope and spoil bank stabilisation	Limited stablisation leading to erosion and landslides.	Engineers design and supervise slope and spoil bank stabilization procedures. Engineers to sign off on the works prior to inundation.

2.4.2 General Management of Reservoir Land Clearing

The RLCP must document the implementation of land clearing and proper management to avoid claims made to the project as a cause of changes in water quality, and to reduce the development of issues from landowners and communities. The ESMP must contain the following minimums:

- Provides possible benefits to landowners, such as timber use or harvesting of other resources.
- In land clearing activities, local workers can be absorbed.
- Gradually prohibit land occupancy, agriculture, river use and other grounds in inundation areas, to avoid safety issues / risks.
- Outreach to the community regarding the process of clearing land, changing access to land and rivers and other procedures during land clearing.
- soil compaction using grass, cloth, stones and gravel and other materials to avoid dust emission and erosion before inundation
- Clearly delineate areas of vegetation to be cleared to avoid unexpected vegetation clearance, and to protect remaining forest, riverbanks and other important habitats.
- Schedule reservoir filling in advance to obtain efficiencies that maximize vegetation clearance and other rescue, from possible growth of (previously cleared) vegetation.
- Detailed procedures for proper cleaning of contaminant sources.

2.5 Communication and Reporting

Communication and reporting must be managed in accordance with the Environmental Management Plan Scheme of the UCPS HydroPower Plant, including financing and

training required for specific activities related to land clearing, for example waste management (hazardous, liquid, contaminated soil, etc.), and demolition of buildings.

2.6 Capacity and Training

The RPP must include a list of the required personnel capabilities and training to carry out land clearing. This includes the costs required.

The RPP will list the training needed, and the equipment needed for the training implementation process. As a minimum the ESMP must contain the following requirements:

2.6.1 ESMP Management and Implementation:

All those who are responsible for managing and implementing all aspects of the ESMP must receive adequate training in accordance with their roles. The training must be carried out on site, for examination / auditing purposes. Records of trainees and training materials should be kept and made available for inspection / auditing.

2.6.2 Sediment Control and Disposal Control

Training should be conducted by a third party, or evidence of past training available to participants, for environmental protection and erosion control. Training materials should be kept for inspection / auditing purposes.

2.6.3 Demolition and Building Removal

Training must be conducted by a third party, or evidence of training available to past participants, for safe demolition and removal of buildings. Training materials should be kept for inspection / auditing purposes.

2.7 Plan Review

The RPP must cover all review processes and plan changes, in accordance with the Upper Cisokan Pumped Storage Hydro Power Plant review process pattern.

3 APPENDIX 3: CULTURAL HERITAGE MANAGEMENT PLAN

3.1 Introduction

A survey of cultural objects, including religious buildings and private graves, was carried out in the Upper Cisokan Pumped Storage Hydro Power Plant Project area in 2009. None of the sites identified in the survey were registered by local or national authorities of any special legal protection or significance. These sites that have religious significance or other interests with local residents and pilgrims, are sacred graves. However, there are a number of graves and religious buildings in the project area which also require respect and protection during construction and reservoir preparation.

The aim of this program is to prevent the loss of cultural objects, or graves and religious buildings due to accident / negligence.

This plan documents cultural objects, private graves and religious buildings in the UCPS hydropower project area, and includes methods and responsibilities for:
- Protect cultural property during construction.
- Relocation / removal of graves and religious buildings as part of the resettlement process and reservoir preparation.

The plan also includes a Chance Find Procedure to identify what steps to take in the case of found cultural objects.
This plan includes the following:
- Roles and responsibilities of PT PLN (Persero) (PLN) project owner, consultants, contractors and government agencies
- List of cultural objects, graves and religious buildings surveyed from 2009.
- Protection of cultural objects during the construction phase
- The process of relocating cultural objects
- Chance Find Procedure
- Capacity and Training
-
- Review process

3.2 Definitions

Cultural Property: An important source of valuable historical and scientific information, an asset for economic and social growth and an integral part of the cultural identity and customs of society.

Private Cemetery: one or more cemeteries, where there is a new one, usually comes from one of the family members or the local community, but not sacred, not related to cultural or religious significance to the wider community.

Places of Worship: mosques, madrassas, and prayer rooms; buildings where religious activities or sacred activities are carried out.

3.3 Purposes and Objectives

To protect cultural objects or other important places of worship for the local community from damage during the construction period

To relocate, remove or replace cultural objects or other places of worship that are important to the local community which will be inundated by the reservoir, in accordance with the attitude of respect for the community in accordance with religious, cultural and legal regulations in Indonesia.

3.4 ESMP Framework

All procedures in the Upper Cisokan hydropower ESMP remain relevant to this plan, and they will be implemented. Other Management Plans within the ESMP project framework that are relevant to the development and implementation of this plan are:

- Construction Workers Barracks / Basecamp Management Plan
- Reservoir Preparation Plan
- Transmission Network Environmental Management Plan
- Social and Community Management Plan

Outside the ESMP framework, this plan must not conflict with the Upper Cisokan Hydro Power Plant Land Acquisition and Resettlement Plan (LARAP). The LARAP provides detailed protocols for the compensation process, complaints, relocation of public and private buildings, cultural objects, and the resettlement of families and communities.

3.5 Revision, Review and Renewal of Plans

This plan is a dynamic document, which may be amended or modified based on the findings. The review procedure for changes or other alternatives is the same as in the Upper Cisokan hydropower ESMP.

This plan is a controlled document; subsequent versions must be documented and controlled, with a brief summary of the changes.

3.6 Roles and Responsibility

Responsibilities for development, implementation and supervision of this Plan are summarized in the table below.

ROLES	RESPONSIBILITIES
PLN (Environmental Unit)	1. Overall responsible for legal compliance. 2. Supervise the Supervision Engineer, including approval of the final plan and future revisions. 3. Financing Plan

ROLES	RESPONSIBILITIES
	4. Provide coordination between LARAP and Plan requirements
Supervision Engineer	1. Completion of the plan 2. Contractor Supervision 3. Work according to plan 4. Communicate and report incidents, monitoring and other information to PLN and related government agencies. 5. Manage relocation of cultural objects, cemeteries, and buildings of worship in accordance with LARAP procedures and schedules. 6. Supervision of cultural objects, cemeteries, and places of worship that will not be moved. 7. Monitoring the performance of plans and making changes as appropriate to improve management of cultural objects, cemeteries, and places of worship 8. Verification of project activity compliance with EIA and ANDAL approval conditions. 9. Submitting complaints from the public through the complaint management process.
Main Contractor	1. Preparation and implementation of various sub-plans, consistent with this document. 2. Maintain and maintain all administrative and environmental records in accordance with the reporting plan from records to the Supervision Engineer 3. Work according to plan, especially the Discovery Procedure. 4. Protection, supervision and management for cultural objects that will not be removed 5. Protection, monitoring and management of graves and buildings of worship 6. Comply with all relevant laws and regulations
All Staff, Consultant and Sub-Contractor	1. Work according to plan, especially the Discovery Procedure. 2. Make recommendations to contractors, Supervision Engineers and / or PLN that may be appropriate to improve protection of cultural property.

PLN can assign implementation responsibility to the Supervision Engineer.
The institutions that will act as supervisors are listed below:
1. Directorate General of Electricity and Energy Development
2. West Java Province BPLHD
3. Environmental Service of West Bandung and Cianjur districts
4. BPN West Bandung and Cianjur Regencies
5. MUI from the relevant sub-district

Agencies that will provide regular monitoring reports from PLN in accordance with the scope of duties of the relevant agencies and the law:
1. Directorate General of Electricity and Energy Development
2. West Java Province BPLHD
3. Environmental Services of Cianjur and West Bandung Regencies

3.7 Mitigation in Construction Phase

3.7.1 Cultural Object Relocation

Cultural objects that have to be moved and / or relocated will be examined further by cultural archaeologists and will be carried out prior to construction work.

3.7.2 Graves Relocation

The process of moving a grave or grave is in accordance with the teachings of Islam and local customs. The consultation process can identify the specific requirements of each grave / grave.

The main steps are:
1. Discussion with the LARAP team where the tomb is located.
2. Consult with the community and landowners regarding the current grave location and the proposed location, and coordinate with religious leaders (village or regional MUI)
3. The new location needs to be confirmed with the proposed land owner and the community.
4. Prior to relocation, the community will read Al Quran and recite prayers.
5. Before the Excavation, the parties involved pray for the deceased.
6. Continue excavation.
7. The frame /corpse is placed on the shroud
8. The new location should be marked so that it is easily recognizable by family and community, even if it is only in the shape of a rock or tree trunk.
9. Pray in the new location

3.7.3 Masjid and Madrasah Relocation

Relocation of buildings of worship is carried out in accordance with Islamic teachings and rules, and the needs and habits of local residents and visitors from the buildings.

The main steps for:
1. Discuss the program with the Resettlement Team regarding relocation of new buildings to be placed.
2. Verify land ownership and clearly identify the communities that own, or use, the facilities.
3. Consult with communities and land owners on how to move or rebuild facilities properly and within the stipulated time so that disruption to religious activities is minimal.
4. Relocation and reconstruction or relocation of facilities must coincide with the LARAP process for communities and land owners, and must be completed prior to construction

3.8 Cultural Objects That Need Protection

Cultural objects, graves and buildings of worship that are not affected by the project and remain in the location, and must be protected and monitored during the construction period, in accordance with preventive measures.

Management of preventive measures are as follows:
1. A simple fence around a grave, tomb or stone.
2. The marking at this location.
3. Education of workers and visitors regarding site location and its importance, and the need for site protection from damage during construction.
4. Provide safe access for pilgrims to the main sites listed above, during the period of the relevant visit. This includes signaling along the pilgrim's path about risks near construction and providing a safe alternative route for pilgrims to avoid the work area.
5. Regular observational monitoring (monthly or weekly, based on the proximity of cultural objects to the construction work area) to record conditions of actions and any damage. Repair work should be carried out as necessary.
6. Providing complaint services for the public to report physical damage or disturbance to pilgrimage / religious activities.
7. Educate workers about the importance of the site and the necessary protective measures.

If the damage has been done, or if a complaint has been submitted by the local community to the Contractor, the complaint must be reported to the Supervision Engineer along with the proposed measures for preventing or restoring the cultural property. Professional advice will be used where necessary to provide a suitable work plan.

3.9 Chance Finds Procedures

If anyone finds cultural objects, such as (but not limited to) archaeological sites, historical sites, cultural remains and objects, or burials and / or individual graves during excavation or construction, the contractor will:
1. Stop development activities in the Discovery area;
2. Describe the site or area found;
3. Secure the location to prevent damage or loss of cultural objects. If there are items from ancient times or historical remains, a guard should be present until the local government responsible can take over;
4. Promptly notify the Supervision Engineer who will notify PLN and the local government in charge (within 24 hours or less);
5. The local government is responsible for protecting and maintaining the premises before determining the next program procedure. This requires preparation of an evaluation of the findings by archaeologists. The significance and importance of the invention must be assessed according to various criteria relating to cultural heritage; this includes aesthetic, historical, scientific or research, social and economic values;
6. Decisions about how to handle findings should be implemented by the responsible local government. This will include changes in project layout, conservation, maintenance,

restoration and rescue; (such as when finding immovable historical remains that have cultural or archaeological value)
7. Implementation of decisions regarding the management of findings submitted in writing by the relevant local government; and
8. Construction work can start again after a permit is issued by the local government which is responsible for the protection of cultural heritage objects.

3.10 Capacity

The Supervision EngineerEngineer must have the capacity to manage the processes in this plan. As a minimum, expert opinion should be sought from government agencies or specialist consultants who follow:

- Relocation or displacement issues that cannot be resolved through the procedures in this plan.
- Restoration of damage to cultural objects or graves caused by construction-related activities.

3.11 Communication and Reporting

Reporting and review is carried out in accordance with the procedures in the Upper Cisokan Hydro Power Plant ESMP, unless there are additional procedures documented in this plan.

Contractor will report all records of monitoring observations, preventive measures, complaints, and damage to the Supervision Engineeron a quarterly basis. The Supervision Engineer must report supervision records and contractor records to PLN and government agencies on a quarterly basis.

4 APPENDIX 4: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN TRANSMISSION LINE - OUTLINE

4.1 Introduction

The ESMP will cover all activities related to the pre-construction, construction and operation of the 500 kV Transmission Line, which will supply electricity to and from the Upper Cisokan Pumped Storage hydropower plant to the Java-Bali grid.

The rationale for the outline ESMP at this time is because there is not enough data and analysis to conclude the site-specific biodiversity impacts. The outline provides an analysis of the potential risks and practical mitigation measures based on good international industry practice and knowledge of transmission line risks from other countries. Further detailed investigations are planned during project implementation to more accurately predict the actual, site specific risks to biodiversity, particularly avifauna, and then for PLN to prepare detailed migitation measures, including any changes to design, alignment, location and design of tower structures, design of strings and any avoidance infrastructure or operational management that would be required. This work will be completed and finalized into a final ESMP prior to the issue of the bid documents. There is time within the project timeline to complete the additional assessments, prepare a site specific ESMP and and influence the final design and operation. This work will start within the first year of project implementation and be completed within the second year. The bid documents will not be issued before the ESMP is completed.4.2 Overview of the 500 kV Transmission Line Project

The 500kV transmission will connect the UCPS hydropower plant with the Java-Bali electricity system. Two lines will be built, to the transmission, namely: Saguling – Cibinong Transmission in the North (15.5km and 15.9km). The total length of the new transmission is 31.4 km, and the wide of corridor is 34m. The free space of Tower is 3.93ha, while the total corridor for this free space will cover an area of around 102.83 ha.

The location of the link to the existing transmission has been selected following detailed modeling of the Java-Bali transmission system, in order to obtain maximum efficiency of the Upper Cisokan Hydroelectric Power Plant and bottlenecks.

4.2 ESMP Framework

This TL ESMP will corresponds to the Upper Cisokan Pumped Storage Hydropower Plant ESMP. The plan will include:

1. PLN general policy relating to transmission line construction.
2. Roles and responsibilities of PLN, contractors and government agencies.
3. Impact and management procedures.
4. Environmental and social monitoring procedures.
5. Capacity
6. Financing

All plans and procedures for the Cisokan hydropower ESMP that are relevant to the Transmission Line design, construction and operations will be followed. Sub-plans of the ESMP plans related to the UCPS Hydropower Plant ESMP relevant to the transmission lines, are as follows:

1. Contractors Environmental and Social Management Plan
    a. Occupational Health and Safety
    b. Management and monitoring of high-risk work activities.
    c. Emergency preparedness and response.
    d. Labor management and labor grievance mechanism.
    e. Gender management and management of Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA) and sexual harassment.
    f. Cultural heritage.
    g. Management and maintenance of camp facilities.
    h. Worker code of conduct.
    i. Erosion and sedimentation control.
    j. Particulate emissions and dust management.
    k. Noise and vibration management.
    l. Earthworks (cut/fill).
    m. Hazardous materials management.
    n. Waste management.
    o. Water management.
    p. Prevention of pollution.
    q. Construction traffic management.
    r. Vegetation clearing, replanting and site restoration.

2. Cultural Heritage Management Plan (Contractor will refer to the CHMP in their CESMP).
    a. Protection of resources during construction
    b. Procedure for handling discovery

3. Social and Community Management Plan (Contractor will refer to the SCMP in their CESMP).
    a. Stakeholder Engagement Plan (SEP),
    b. Grievance Redress Mechanism (GRM)
    c. Labor Management Procedure (LMP),
    d. Gender Action Plan, and Gender-Based Violence Action Plan which also address Sexual Exploitation and Abuse (SEA), and Violence Against Children (VAC), and inclusion of vulnerable and disadvantaged-group.

4. Biodiversity Management Plan for Transmission Line will be developed following updated assessment of baseline conditions, biodiversity risks and impacts, and Critical Habitat Assessment of the transmission line corridor.

5. LARAP which contains procedures for the management of resettlement, compensation, and other social issues related to the development process.

This ESMP draft is an improvement to the previous ESMP document relating to the Upper Cisokan hydropower 500kV transmission line. The Transmission Line ESMP will be completed following additional assessment on the biodiversity impacts under ESS6 and will be included in tender documents for the transmission line detailed design and construction contract.

4.3 Overview of Important Parts of PLN General Policy Relating to Transmission Line Construction.

The compensation and rehabilitation policy follows the National regulation on land acquisition (Keppres 55/93), which aims to ensure that people whose land is acquired for national development must be compensated with a compensation value for land and assets in accordance with the value of land / assets that must be replaced; for example, an appropriate price so that the owner can receive the same or better reimbursement of what was exempted.

As far as possible, PLN seeks all possibilities to avoid land acquisition and displacement through technical alternatives. If the impact cannot be avoided, PLN will accurately record all affected residents, their condition is improving or at least not becoming worse than the condition before the project was started. Compensation for all assets released by PLN will be carried out in accordance with the LARAP. PLN will also increase community knowledge about the land acquisition process through outreach to the community, community awareness programs, community assistance, and developing complaint handling procedures, as well as conducting monitoring to help overcome various problems faced by communities affected by the PLN project.

This policy will be followed by PLN and supported by government agencies related to transmission lines.

This policy covers people affected by the transmission project, regardless of ownership status.

4.4 DefinitionS

The **"project"** also includes all impacts associated with PLN activities, such as the need for access roads. Families who lose all their productive assets (agricultural land, house or business), or if uneconomical assets remain, will be entitled to compensation including their remaining uneconomical land or assets in accordance with the replacement value and get assistance that can increase their standard. their life or at least not lowering their standard of living. All families affected by the project and recorded by the land acquisition committee are entitled to compensation.

"Free space" is the space around the conductor with the minimum distance to the object as defined by the PLN technical guidelines where no residents or physical buildings are permitted. Areas where PLN is temporarily but not released on a permanent basis are called "temporarily used" areas. Land or other assets acquired for free or temporary areas will receive compensation value.

4.5 Impacts

Table 1 Significant Impacts and Management Procedures

NO	Impact	Purpose / Objective	Procedure
I	**DESIGN STAGE**		
1	The alignment of the TL will disturb or fragment natural or critical habitat.	Identify specific design requirements for the TL alignment with the aim of avoiding impacts on habitat and sensitive species.	• Further baseline biodiversity studies, specifically to understand species at risk of impact such as birds of prey, both resident and migratory species. • Assess best global practice with regards to siting of transmission lines • The ESMP will be updated to inform the final design based on the findings of the additional biodiversity studies.
	The Transmission Infrastructure will have a negative impact on fauna, birds in particular, due to collision and electrocution risk.	Identify specific design requirements for the tower design and bird diversion measures based on best global practice.	• Specific studies to identify the design requirements for the alignment, tower design (including distance between strings) and the bird diversion measures (such as lasers, balls, lights etc.) • The ESMP will be updated to inform the final design based on the findings of the additional biodiversity studies.
2	Restlessness or concern of land owners / building occupants due to land acquisition	• Minimizing anxiety and worries of land / building owners / users	• Following the LARAP Process • General outreach to the wider community.

NO	Impact	Purpose / Objective	Procedure
		• Develop general knowledge about the project	• Discuss construction and operational problems, impacts and risks. • May be part of the LARAP consultation process.
3		• To minimize anxiety and social anxiety of the wider community •	• General outreach to the wider community. • Discuss construction and operational problems, impacts and risks. •
II	**CONSTRUCTION STAGE**		
1.	Construction of towers and stringing has inherent high OHS risks, such as working at height.,	• Identify hazards and risks using the Hazard Identification, Risk Analysis, and Risk Control (HIRARC) method. A Risk Register will identify controls such as elimination, substitution, modification, and protective and protective measures.	• The Occupational, Health and Safety hazards and risks which are specific to transmission line construction and operation will be thoroughly assessed using HIRARC method and updated in the ESMP. • The Contractor will be required to record and prepare and maintain a risk register. • The Contractor CESMP will be approved by PLN and the Supervision Engineer
1	Expectations of work opportunities by the surrounding community	• Maximize opportunities for local workers, based on available local positions and expertise	• Have internal policies for employ local communities based on available local positions and expertise and ensure alignment with the SCMP, and Labor Management requirements
			• Ensure the Contractor has a policy to employ local communities based on available local positions and expertise, and ensure alignment with the SCMP, and Labor Management requirements
			• Announce / advertise locally available positions
2	Less protected animals due to project workers	• No animals allowed to be searched, hunted , collected for use or sale or also harmed by the workforce	•
			• Monitoring and reporting of incidents o
	Disturbance to the surrounding community by project workers	• Disturbance to surrounding communities tar must be minimized	• Follow community communication procedures in LARAP
			• Workers must follow construction environmental management plan procedures to minimize disturbance
			• Carry out complaint process
3	Erosion and sedimentation to water bodies and discharge		• Workers must follow construction environmental management plan procedures

NO	Impact	Purpose / Objective	Procedure
	clearing of vegetation to water bodies Water	• quality and river habitats are maintained according to current quality	• Monitoring and reporting of incidents
4	Disposal of pollutants to the soil or water bodies	• Intentional disposal of pollutants • All spills must be cleaned appropriately	• Workers must follow construction environmental management plan procedures
			• Monitoring and reporting incidents
5	Clearing Vegetation without appropriate compensation as appropriate approved or implemented	• No vegetation clearance is carried out without instructions from PLN or the LARAP Team	• Following PLN instructions • Minimize the amount of vegetation clearing • As far as possible carry out manual vegetation clearance and avoid vegetation clearing by machine • Dispose of materials to the disposal sites
6	Designated Disturbance or damage to cultural objects due to land clearing	• To avoid damage or destruction of new or undiscovered cultural objects	• Follow the Cultural Heritage Management Plan
7	Concern about field radiation electricity and magnetism (EMF) on health or electricity disruption	• Minimize public anxiety about the impact that can occur from electricity transmission.	• Inform the public about the problems and risks of being
	electrocuted or falling.	• Avoid accidents or casualties related to transmission infrastructure and operations.	• Disseminate to the public about the risks
III	**OPERATION STAGE**		
1	Concern about electric field radiation and magnetism (EMF) on health or electrical disturbances	• Minimize community anxiety regarding the impact that can occur from power transmission	• Inform the community about problems and risks • Announce results of EMF monitoring • Implement the process complaint management
		• Operate transmission in accordance with SNI standards	• Measure EMF radiation in accordance with SNI standards
2	Electrocution or fall or cause injuries or casualties	• Avoid accidents or casualties related to transmission infrastructure and operations.	• Secure the tower and provide a notification board. • Provide emergency procedures and contact details • Maintain incident records
3	Pruning unauthorized trees. Reduced production of trees and forest habitats	• Minimizes the amount of pruned trees, consistent with agreement with land owners	• Education and training of tanger workers on the area of land covered by maintenance, and appropriate felling procedures.

4.6 Mitigation

Many of the construction related impacts will be similar to those of the construction of the hydropower plant, such as vegetation clearances, sedimentation, run-off, dust, noise, vibration, and noise, although the duration and severity are likely to be lower. High risks to occupational health and safety and community health and safety impacts relate to working at height and electrocution risk.

A number of operational impacts, however, to workers, communities and biodiversity will be transmission line specific. These hazards are electrocution potential, electromagnetic fields, and working at height on pylons.

4.6.1 Detailed design, route alignment and design of towers and strings.

Land acquisition of tower locations has been completed, based on route optimization and constructability assessments. Further biodiversity studies are required to determine the risks to habitat and species from the alignment. These studies will identify the design requirements for the alignment, tower design (including distance between strings) and the bird diversion measures (such as lasers, balls, lights etc.) will be confirmed. The ESMP will be updated to inform the final design.

4.6.2 Occupational Health and Safety

The Occupational, Health and Safety hazards and risks which are specific to transmission line construction and operation will be thoroughly assessed and updated in the ESMP. Th Contractor will be required to prepare and maintain a risk register. Hazards and risks will be identifed using the Hazard Identification, Risk Analysis, and Risk Control (HIRARC) method. The Risk Register will identify controls such as elimination, substitution, modification, and protective and protective measures.

4.6.3 Community Impacts

The existing Social and Community Management Plan will be applied to the transmission line construction. The project will seek ways to minimize physical impacts on communities whenever possible by shifting the transmission line slightly. Particular attention will be given to avoiding as far as possible densely populated areas, schools and other public facilities, shopping areas and residential areas. If there are no other options, the project must raise the tower to get free area, so that the transmission will be located on top of the building with the allowable distance.

Table 2 contains a list of Project Affected Villages and Project Activity Components

Tabel 2 Villages on the Transmission Line

REGENCY	SUB-DISTRICT	VILLAGE	TRANSMISSION LINE ROUTE
Total: 2	**Total: 3**	**Total: 11**	
West Bandung	Rongga	Sukaresmi	North line 1 North line 2

Cianjur	Bojongpicung	Cibarengkok	North line 1 North line 2
		Haurwangi	North line 2
		Hegarmanah	North line 1
		Jatisari	North line 1
		Kemang	North line 2
		Mekarwangi	North line 2
		Neglasari	North line 1
		Ramasari	North line 1
		Sukajaya	North line 1
		Sukarama	North line 1 North line 2
		Sukaratu	North line 1 North line 2

4.6.4 Biodiversity Impacts

4.6.4.1 Risk Mitigation of Transmission Infrastructure on biodiversity

Impacts from transmission infrastructure will be mitigated through the mitigation hierarchy with a focus on avoidance (especially of collision and electrocution risk), mitigation (especially of habitat fragmentation effects), and offsetting of residual impacts. The risks for biodiversity from the transmission line remains poorly understood and follow up studies are required tp qualify and quantify risks and develop appropriate mitigation actions. Key actions based on transmission line risks from other parts in the world include the following. Their relevance for the UCPS project needs to be determined in a separate Biodiversity Management Plan for the Transmission Lines, but are discussed here to provide PLN with a basis for designing mitigation strategies:

- Bring line design in line with avian-safe structures, using appropriate horizonal and vertical cable spacing
- Insulate energized parts
- Apply anti-perch structures
- Create canopy bridges where mammal mortalities occur
- Wire-marking to avoid collisions
- Monitoring of animal fatalities by checking along entire length of transmission lines
- Surveillance of inspection roads, protected BIA and Working zones for poaching, hunting, timber harvesting etc. with the cooperation of local landowner
- Install and maintain signs banning hunting, snaring and other activities that could harm protected wildlife,
- Community consultation regarding conservation, and risks of encroachment and over exploitation of forest resources
- Offsetting strategy to compensate for forest habitat losses of species that trigger Critical Habitat

The environmental and biodiversity impacts of the transmission lines can be categorized into three main problems, each requiring specific mitigation strategies: (1) Electrocution; (2) Collision; and (3) Habitat loss and fragmentation. However, a specific Biodiversity

Management Plan for Transmission Line is to be developed following updated assessment of biodiversity risks and impacts, and Critical Habitat Assessment of the transmission line corridor.

4.6.4.2 Mitigating Animal Electrocution

Reducing power line electrocutions is a raptor conservation priority worldwide. The best strategy is to bury the power lines underground, but this is estimated to be significantly more expensive than above-ground infrastructure, especially for high voltage lines (Prinsen et al. 2012). If burying power lines is not an option, physical separation between distribution structures that prevents animals from touching two structures simultaneously is a key mitigation strategy. APLIC (2006) recommends a minimum of 152 horizontal centimeters (cm) and 102 vertical cm of separation between phase-to-phase and phase-to-ground contacts in the vicinity of a likely perch. Structures meeting APLIC's recommendations for raptors are described as "avian friendly." Above 230kV, engineering considerations usually dictate operational safety clearances that exceed recommended avian spacing recommendations (MWH and Stantec 2018).

Retrofitting for avian-safe structures can include one or more of the following strategies (APLIC 2006):

1. Line design or configuration: Increasing separations to achieve adequate separation for the species at risk. When the power line is located within the distribution area of large raptors or storks, this distance should be increased to 1.4 m;
2. Insulation: Covering conducting elements and/or covering grounded parts with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors. If upright insulators or horizontal disconnectors are present, these should be covered. The height of insulated chains should be more than 0.70 m;
3. Applying perch management techniques: Avian electrocution risk is lower for transmission structures than distribution poles because engineering requirements necessitate larger clearances (APLIC 2006). For transmission lines, APLIC (2006) recommends an additional 0.5 cm of separation for each additional 1kV over 60kV. Transmission line ratings reflect the phase-to-phase voltage differential; the phase-to-ground voltage differential is smaller. The phase-to-ground voltage can be calculated by dividing the line voltage by the square root of three (1.732) and should be used to determine the appropriate phase-to-ground clearance for transmission lines (MWH and Stantec 2018).

An additional key mitigation measure to prevent primate electrocution is permanent insulation of the wires (Lokschin et al. 2007). While this requires additional investment from the power company, it avoids expensive power outages when animal electrocution causes short-circuits. The following structures require different insulation measures (Prinsen et al. 2012):

- Terminal structures - All terminal structures should be constructed with sufficient insulation on jumper wires and surge arrestors.

- Strain structures (where jumpers are used) - At least two jumper wires should be suspended below the cross-arm, and the third jumper insulated. Alternatively, all jumpers should be insulated.
- Take-off structures - Switches should be designed so that perching by birds on switch gears is unlikely, and/or all dangerous components are insulated. Switch gears should be mounted below the cross-arm. Alternatively, insulated perch sites are installed well above the switch gear over the whole length of the transmission line.
- Intermediate structures with horizontal configuration of lines - Large enough to accommodate the wingspan of the largest perching bird species in the country, if all three phases are above the cross-arm. Alternatively, two outer conductors should be suspended below cross-arm.
- Intermediate structures with vertical or 'delta' configuration of lines - Large enough to accommodate the 'tip-of-toe to tip-of-beak or outstretched wing' or 'head-to-foot' dimension of largest animal species present (leopard).

Anti-perch devices can be useful to prevent birds from perching and potentially getting electrocuted, but they need to be carefully positioned and shaped so that they do not force birds to perch even closer to energized parts. Alternatively, if many birds are attracted to the nesting opportunities provided by transmission towers, and removal of such nests is costly, the provision of artificial nests has shown to be a cost-effective way to reduce natural nests (natural nests decay quickly and can cause short circuits) (Shimbun 2017).

Furthermore, maintenance of natural canopy bridges, and the preparation of artificial canopy bridges over the roads and over or under electric power supply lines could further minimize mortality of primates and other arboreal mammals in forest patches (Lokschin et al. 2007, Al-Razi et al. 2019). This requires regular patrolling of transmission line routes to look for electrocuted animals and determine whether alternative crossing structures such as canopy bridges could guide animals away from transmission infrastructure. Community monitoring along powerlines further helps identify electrocution hotspots, so that mitigation measures (e.g., arboreal bridges) can be spatially applied (Lokschin et al. 2007).

4.6.4.3 Mitigation of Bird Collision

Although different bird species fly at different heights above the ground, there is general consensus that the lower power line cables are to the ground, the better for preventing bird collision. There is also consensus that less vertical separation of cables is preferred as it poses less of an 'obstacle' for birds to collide with **Error! Reference source not found.**). Horizontal s eparation of conductors is therefore preferred (Prinsen et al. 2012).

The most frequently used measure is wire-marking, which alerts birds to the presence of power lines and provides them with more time to avoid the collision (Janss 2000). Since the assumption is that birds collide with overhead cables because they cannot see them, fitting the cables with devices to make them more visible to birds in flight has become the preferred mitigation option worldwide. Besides thickening, coating or colouring the often least visible, thin ground wires, a wide range of potential 'line marking' devices have been developed, including: spheres, swinging plates, spiral vibration dampers, strips, bird flappers, aerial marker spheres, ribbons, tapes, flags, fishing floats, aviation balls and crossed bands. There is generally a lack of quality evaluative research of the effectiveness of these devices at the international level, but the evidence to date suggests generally positive results (Prinsen et al.

2012). Jenkins et al. (2010) conclude that, barring some notable exceptions, "any sufficiently large form of marker (which thickens the appearance of the line at that point by at least 20 cm, over a length of at least 10-20 cm), placed with sufficient regularity (at least every 5-10 m) on either the ground wires (preferably) or the conductors, is likely to lower general collision rates by 50-80%". Barrientos et al. (2011), who reviewed 21 wire-marking studies, similarly conclude that wire marking reduced bird mortality by 55-94%.

4.6.4.4 Mitigating Habitat loss and fragmentation from transmission line

The key mitigation strategies that compensate for the direct and indirect impacts to Critical Habitats are:

1. Reducing impacts from forest fragmentation, unauthorized and illegal land clearing away from the road, and illegal hunting.
2. Offseting the areas directly and indirectly affected by transmission line infrastructure to ensure net gain for the habitat of Critically Endangered species, following ESS6.

Where the transmission line passes through *Perhutani* land, the collaboration between PLN and *Perhutani* through the renewed PKS should ensure that *Perhutani*, as the legal authority for these forest areas, implements actions that prevent illegal logging and hunting, including the placement of signposts, patrolling of forest edges and areas, community outreach, and law enforcement.

3. Where Critical Habitat is lost, this will be offset through the landscape-level reforestation program in the UCPS landscape, under the working agreement (PKS) between PLN and *Perhutani* for reforestation in working zones 1, 2, 3 and 4.

4.7 Roles and Responsibilities

PLN is responsible for the management and implementation of the Transmission ESMP at all stages of the project, although responsibility for development is represented by the Supervision Engineer, as PLN's representative. In operations, PLN or its representative will be responsible for the management and implementation of the ESMP. PLN is responsible for the management and implementation of the Transmission ESMP at all stages of the project, although development responsibility is represented by the Supervision Engineer, as PLN's representative. In operations, PLN or its representatives will be responsible for the management and implementation of the ESMP.

Table 1. Summary of Roles and Responsibilities

Company or Institution	Responsible
PLN (Environment Unit)	• Implement, monitor and comply with the ESMP including the performance of contractors, subcontractors, staff and Supervision Consultants. • Review ESMP performance and make changes as needed to improve environmental management at activity sites. • Conformity of the project activity with the ESIA / AMDAL and its endorsement. • Communication and incident reporting, monitoring and other information to PLN and to Government agencies as needed.

Company or Institution	Responsible
PLN or its Subsidiaries	• Implementation of the Operational Environmental and Social Management Plan. • Implementation of Environmental Monitoring during operations • Communication and incident reporting, monitoring and other information to PLN and to government agencies as needed.
Supervision Engineer	• Supervision of construction and implementation of the Worker's Barracks / Basecamp Management Plan by the Contractor. • Works according to the ESMP • Communicate and report incidents, monitoring and other information to PLN as needed. • Making recommendations to PLN what is appropriate for improving environmental management at the location of the activity.
Contractor	• Prepare and implement a construction management plan and workers' barracks / basecamp, consistent with this document. • Maintain and maintain all administrative documents and environmental data in accordance with the ESMP and report these data to the Supervision Engineer
All Staff and Subcontractors	• Works according to ESMP and sub-plans • Make recommendations to contractors, Supervision Engineers and / or PLN that may be needed to improve environmental management at the activity location.
Directorate General of Electricity and Energy Development (Electricity Supervisor)	• Supervision of Environmental Management and Monitoring • Review environmental reports and monitoring from PLN
Head of Bojongpicung & Camat Rongga	· Supervision of socialization and priorities for local workforce recruitment
Environmental Service Office of Cianjur Regency	· *Review of environmental reports and monitoring from PLN* · *ESMP Supervision and Monitoring*
BPLHD West java province.	· Review environmental reports and monitoring from PLN
Environmental Office of West Bandung Regency	· Review the Environmental and Monitoring Reports from PLN · ESMP Supervision and Monitoring
BPN West Bandung Regency	· Environmental supervision and management · LARAP supervision along the transmission line
BPN Cianjur Regency	· Environmental supervision and management · LARAP supervision along the transmission line
Perhutani	· LARAP supervision along the transmission line
Labour office west bandung regency and Cianjur Regency	· Supervision of local workers

Table 4. Environmental and Social Monitoring Plan

NO	IMPACT SIGNIFICANCE	PURPOSE / OBJECTIVE	PROCEDURE
I	**PRE-CONSTRUCTION STAGE**		
1.	Social anxiety and restlessness	● Measure the effectiveness and success of socialization during pre-construction. Understand what problems are going on in the community and develop further programs to develop understanding and acceptance	● Conduct interviews with a sample of families from the surrounding community. The interviews focused on what the family understood about the project, and their feedback on recent outreach. Use the results to develop a pre-to / during construction consultation program.
2.	Land / building owner concerns due to land acquisition	● . Formally Review *the* results of the LARAP compensation process in accordance with the meeting and take into account the expectations of the land and building owners.	● Use the LARAP process to survey land and building owners in the compensation program according to their satisfaction with the compensation process and results.
II	**CONSTRUCTION STAGE**		
1	Decrease in protected animals as a result of project workers	● No animals are allowed to be searched, hunted, collected for use or sale or also harmed by labor.	● Record every incident of successful attempted or hunting actions, including animal species, protection status, the amount and method. ● Recording evidence of animal killed throughout the project site
2	Erosion and sedimentation to water bodies and clearing of vegetation to water bodies. Water	● quality and river habitat are maintained at their current quality	● Observation of successful earthworks and sediment control efforts. ● Observation of water quality regarding discoloration and clarity. ● Observation of record keeping ● Monitoring and reporting of incidents
3	Discharge of pollutants to the soil or related water bodies Cleansing of lines, cleaning of tower sites, construction of foundations	● Monitor the effectiveness of countermeasures and prevention efforts and make changes if necessary	● Observe the success of waste water countermeasures and prevention efforts ● Close observation of water quality for changes in color, clarity and smoothness due to oil / diesel. ● PH measurement Keeping ● observations and monitoring records ● Monitoring and reporting of incidents
4	Unauthorized clearance of vegetation related to clearing of project paths and sites	● Monitor clearing completed vegetation according to proposed plans and compensation agreements.	● Observe clearing of vegetation.

NO	IMPACT SIGNIFICANCE	PURPOSE / OBJECTIVE	PROCEDURE
	Noise impacting residents due to project activities.	• Monitor noise in neighboring locations.	• Measure noise in accordance with Ministerial Decree No. 48 of 1996 concerning Noise Level.
III	**OPERATION STAGE**		
1	Concerns about electric and magnetic field radiation (EMF) on health or on electrical disturbances	• Monitor the effectiveness of socialization regarding the operation of transmission lines.	• Survey of the surrounding community regarding their involvement in the consultation, their understanding of the project and other concerns. Incorporate community feedback into the management process.
		• Measuring EMF radiation Measuring EMF	• radiation, in accordance with SNI standards
2	Noise in families due to electricity transmission.	• Monitoring noise at nearby family locations.	• Measuring noise in accordance with Ministerial Decree No. 48 of 1996 concerning Noise Level.
3	Unauthorized logging of vegetation. Reduced production of trees and forest habitats	• Minimize the amount of vegetation removed or cut down consistent with landowner agreements	• Observe vegetation clearance methods and results
	Electrocution or fall or cause injury or loss of life	• Monitor accidents or fatalities related to transmission infrastructure and operations	• Keep records of all incident

4.8 Communications and reports

Table 5. summary of the report (Example)

type andreports Objectives	Frequency	Rapporteur's	reports submitted to the report:
Data monitoring electric field and magnetic field (EMF)	Within 1 month after getting a report / analysis of the monitoring results.	PLN	Government Agencies (refer to Table 1 Summary of Roles and Responsibilities)

4.9 Review and Improvement Reports

Review Transmission Line ESMP will be carried out by PLN.

5 APPENDIX 5: ESTIMATE OF COSTS

No	Description ESMP	Cost Estimated ($ US)	Remarks
1	**Contractor - Implementation of Environmental, Social, Security, Health and SafetyRisk and Impact Mitigation** • Traffic management and safety • Occupational health and safety • Community health and safety • Environmental controls • Handling complaints • Public Relations • Environmental quality monitoring • Capacity training • Monitoring and review (review) • External communication / reporting • Procedure for protecting cultural objects and sites and chance find procedures • Biodiversity protection and revegetation within the work footprint • Social and public relations • Construction management and worker base campTransmission line ESHS management • Quarry ESHS management	$0	Included in the Contract with the Contractors
2	**Engineering Supervision - environmental, social, security, health and safety supervision of the Contractors.**	$ 4,000,000	Included in the contract with the Construction Supervision Engineer.

No	Description ESMP	Cost Estimated ($ US)	Remarks
	• Supervising the implementation of C-ESMP. •		
3	**PLN Environmental Unit** • Salaries and wages • Official Travel Fee	$ 900,000	(5 years)

No	Description ESMP	Cost Estimated ($ US)	Remarks
4	**ESHS Strengthening Institutions, Training and Capacity Building** • PLN Environmental Unit • Local government, communities and stakeholders • Onsite training • Offsite training • Capacity Development • equipment and logistics	$ 240,000	
6	**SCMP** **Stakeholder Engagement** **Grievance mechanism** **GBV** **Economic empowerment program** **Women's knowledge enhancement program** **Household energy use assessment** **Local labor employment support**	$ 2,100,000	
5	**Technical Assistance to PLN Environmental Unit PHJ** • Outside consultants • Manuals and procedures • Assist the development of environmental databases • ESMP protocols and procedures • Assisting the development of PLN PHJ Environmental Unit • Help Implement ESMP updates • TOR	$ 240,000	(2 years)
6	**Independent Environmental and Social Panel**	$ 144,000	(4 years)

No	Description ESMP	Cost Estimated ($ US)	Remarks
7	**Procedures for finding and saving cultural objects – implementation of chance find procedures**	$ 24,000	
8	**Biodiversity Management Plan and Forest Partnership Framework** • ICM facilitation team • Revegetation • Rescue operations • Provision of guards • Infrastructure and equipment • Education • Community based forestry	$8,000,000	First 5 years
11	**Additional studies and plans:** Cisokan river erosion and sedimentation study, preparation of Reservoir Preparation Management Plans, Transmission Line Environmental and Social Management Plan, Operational Environmental Management Plan	$4,000,0000	
12	**Dam safety planning:** Reservoir Filling Plan, Emergency Procedures, Dam Operations and Maintenance.	$0	Within the TOR of the Engineering Consultant (under Supervision Engineer)
	The total estimated ESMP cost is	**$19,648,000**	

6 APPENDIX 6: QUARRY MANAGEMENT PLAN

6.1 Introduction

The contractor is responsible for the preparation, operation and restoration of the Gunungkarang quarry for the Upper Cisokan Hydro Power Plant which needs to be completed. The Environmental and Social Management Plan (ESMP) details the measures required to prevent and reduce environmental and social impacts and disturbance to the surrounding community. The ESMP should be carried out by all staff, consultants and sub-contractors.

The following should be considered in preparing the Quarry Management Plan:

- Environmental and Social Management Plan Framework of UCPS Cisokan
- Environmental specifications for contractors
- Cultural Heritage Management Plan
- Biodiversity Management Plan
- Roles and Responsibilities
- Important social and environmental impacts
- Efforts to address both general and specific environmental and social impacts.
- Monitoring
- Communication and Reporting
- Capacity, Training and Financing.

6.2 Background of Upper Cisokan Pumped Storage (UCPS) Hydropower Plant

6.2.1 Overview of the Upper Cisokan Pumped Storage (UCPS) Hydropower Project.

In order to meet the rate of demand and the significant development of the Java – Bali system, PLN is planning to build the Upper Cisokan Pumped Storage with a capacity of 1,040 MW with two reservoirs each with an active volume of 10,000,000 m^3. The upper reservoir will flow water to generate electrical energy during peak loads. The collected water from the reservoir will be pumped to the upper reservoir at base load or outside peak load after 10-12 pm every day, using the electrical energy supplied from the base load power plant. In addition, this project will recover residual energy and regenerate it such as additional equipment to the power system. The Upper Cisokan Pumped Storage Hydro Power Plant will be more flexible in the power grid, and PLN provides a cheaper method to meet daily peak loads and additional load demands.

Location of Upper Cisokan Pumped Storage (UCPS) in West Java Province generally show in figure below.

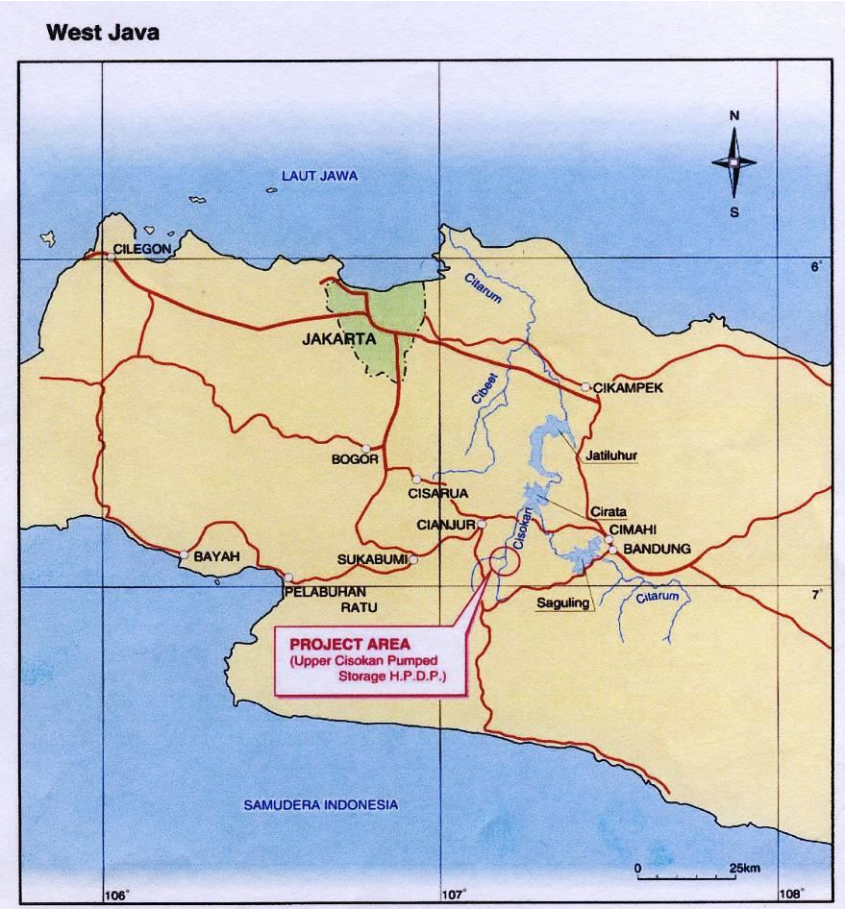

Figure 8 Location Map of Java and West Java Province

This location is in West Java Province. PLTA UCPS is located in the hills that cross from west to east along the island of Java, and is located about 150 km from Jakarta. The reservoir is in the line and dam of two rivers (Cisokan and Cirumamis) in the Cisokan river watershed, the main tributary of the Citarum river, which flows into the Java Sea on the north coast of Java and there are a number of hydropower plants. 1,000 MW) and Saguling (700 MW).

From an electrical point of view, the UCPS hydropower plant is an ideal location for pumped storage plants, very close to important major city centers in Java - Jakarta, and Bandung, as industrial centers and population concentrations in Java. The electrical energy generated by the UCPS hydropower plant will be connected to the Cibinong - Saguling transmission network through two new 500 kV transmissions, which are approximately 15.5 km and 15.9 km. The two transmission networks will be connected to the Java – Bali electricity system.

6.2.2 Overview of the Project Plan

The main description of the UCPS project plan is generally described as follows:

- The Upper Dam is 75.5 m high and is located on the Cirumamis River, with a storage area of 10 km^2 and an inundation area of 0.8 km^2 at the highest water level. During operation, the water level will fluctuate between the highest water level and the lowest water level, which is 19 m. The dam will be built with compacted cement.
- The 98 m high Lower Dam is located on the Cisokan river, with a storage area of 355 km^2 and an inundation area of 2.6 km^2 at the highest water level. During operation, there will be water level fluctuations between the highest and lowest water levels of 4.5 m. The dam will be built with compacted cement.
- The generating capacity is 1,040 MW, the pumping capacity is 1,100 MW, the power house will be built underground. The tunnels will connect the power house to the puddle. The switchyard and administration building will be a complete Power Plant.
- Two new 500 kV transmission lines which are roughly 15.5 km and 15.9 km apart.
- After flooding is carried out, most of the water from the catchment area will be flowed through the water gates at the bottom (bottom outlet) or spillways, with only holding water in the reservoir as much as water loss due to evaporation.
- A 27 km long new road will be built for the road to the construction site, and a 7 km long road upgrade.
- Gunung Karang Quarry will be used as building material for the UCPS
- The 20 kV distribution network will be built before construction activities begin which will be used as energy for construction activities.

6.2.3 Overview of Gunungkarang Quarry Site

Construction materials will be supplied from existing stone quarries located in Gunungkarang, Karangsari Village and Sarinagen Village, West Bandung Regency. Mining activities will include drilling, blasting, milling, and transporting materials to the UCPS. The material needed for construction is around 2,133,808 m^3 or about 1,571,000 tons.

Gunungkarang was used as material for the construction of the Saguling hydropower plant in 1981. Rock cliffs and the remnants of the previous mining are still there and the road used by the previous mining still exists.

The general condition of the rock source based on the interpretation of topographic maps is an andesite reserve. Gunungkarang was considered the easiest to reach and had the best quality of the eight sites assessed at the time of detailed design.

Based on the interpretation of the Topographic map from National Coordinator for Survey and Mapping Agency Indonesia, the Andesite reserves in Gunungkarang are around 60 ha, while the land in the mining location that has been acquired and owned

by PLN is 25 ha. Based on the estimated material in the area more than 12 million cubic meters.

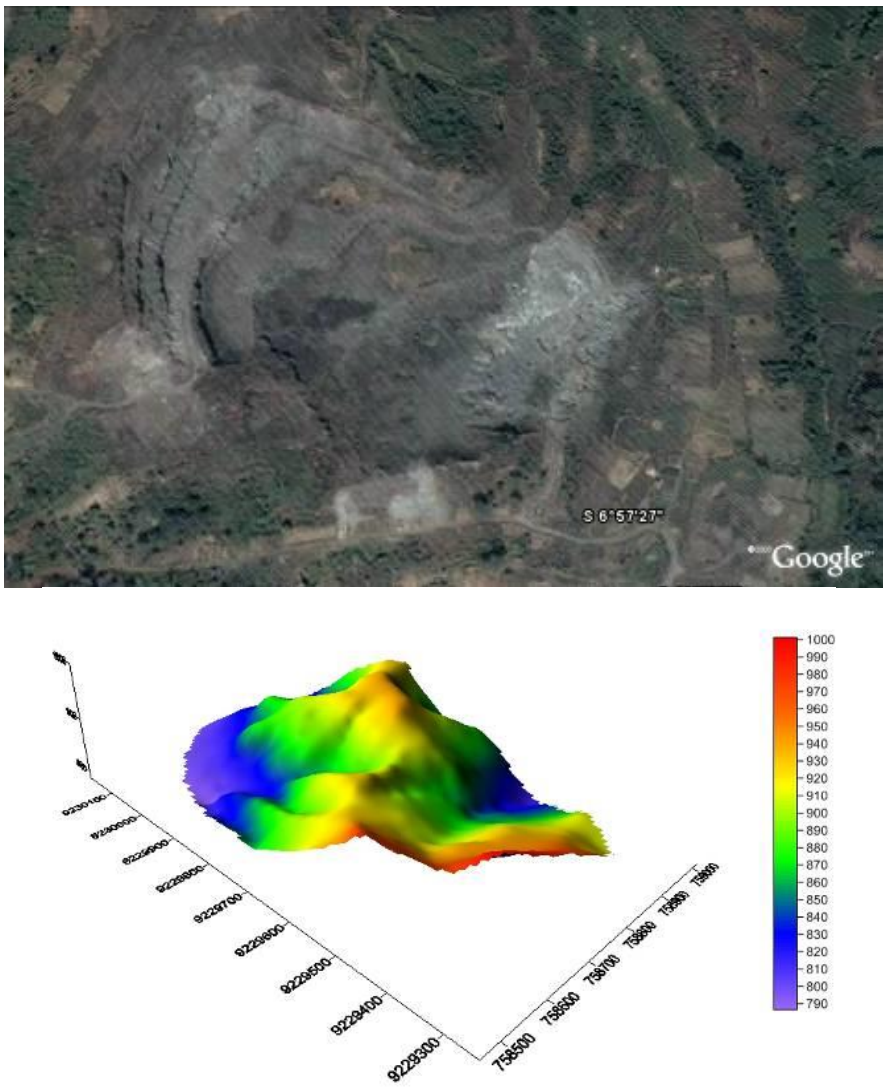

Figure 9 Digital Elevation Model of Quarry Gunung Karang

6.2.4 Mining Main Activities

Before construction

- Land Clearance - bulldozer or manually remove vegetation (depending on slope and other site conditions)
- Surface stripping - removing topsoil and other material unnecessary for construction, with a bulldozer. Collection of soil and rock for later use / rehabilitation.

Mining Operations

- Excavation of rock: using explosive and drilling techniques
- Rock loading and hauling: from the Quarry site to the stone crushing facility.
- Stone crushing and storage: large stones are broken down to size using a series of crushers and conveyors, and storage according to size and type for transport to the construction site. Stone crushers will be placed in a location that is flat and open, close to the road transport and energy source (generator and / or distribution network 20 kV)
- Asphalt Making: Asphalt Workplace
- Offices and other facilities: The office will be resident and located close to the Quarry entrance. Other facilities include a maintenance area, a place of worship, a health clinic, a generator, a workshop and a security post.
- Water supply: water will be supplied from springs in the quarry area which will be used for mining and the process of crushing stones and sprinkling dust.
- Transport of rock and sand to the construction site using a dump truck. The material will be transported by dump truck to the construction site estimated at 9 trucks per hour (with a capacity of 30 tonnes)

Recovery / Repair

- Improvement of the shape of the Quarry location is carried out with soil and fertilization to restore soil stability and fertility, which is then planted with productive plants. Reclamation activities / activities will be carried out after mining activities are completed.

6.3.2 Activities covered by the ESMP Quarry

ESMP quarry should include environmental management as follows:

- Land clearing and preparation
- Storage of soil humus and soil stripping.
- Blasting
- Stone Crusher
- Asphalt Preparation Process
- Working hours
- Rock hauling arrangements
- Community convenience.
- Land Improvement

This plan does not include procedures and remedies for:

Land acquisition and relocation of families, agricultural land and businesses. This activity is covered by the land acquisition and resettlement plan (LARAP).

Road construction. This issue is covered in the development activity management plan.

6.4 Roles and Responsibilities

PLN will still be responsible for the environmental conditions of mining activities, even though every day environmental management and operations are the responsibility of the Contractor, which is supervised by the Supervision Engineer, as shown in Figure 1 below:

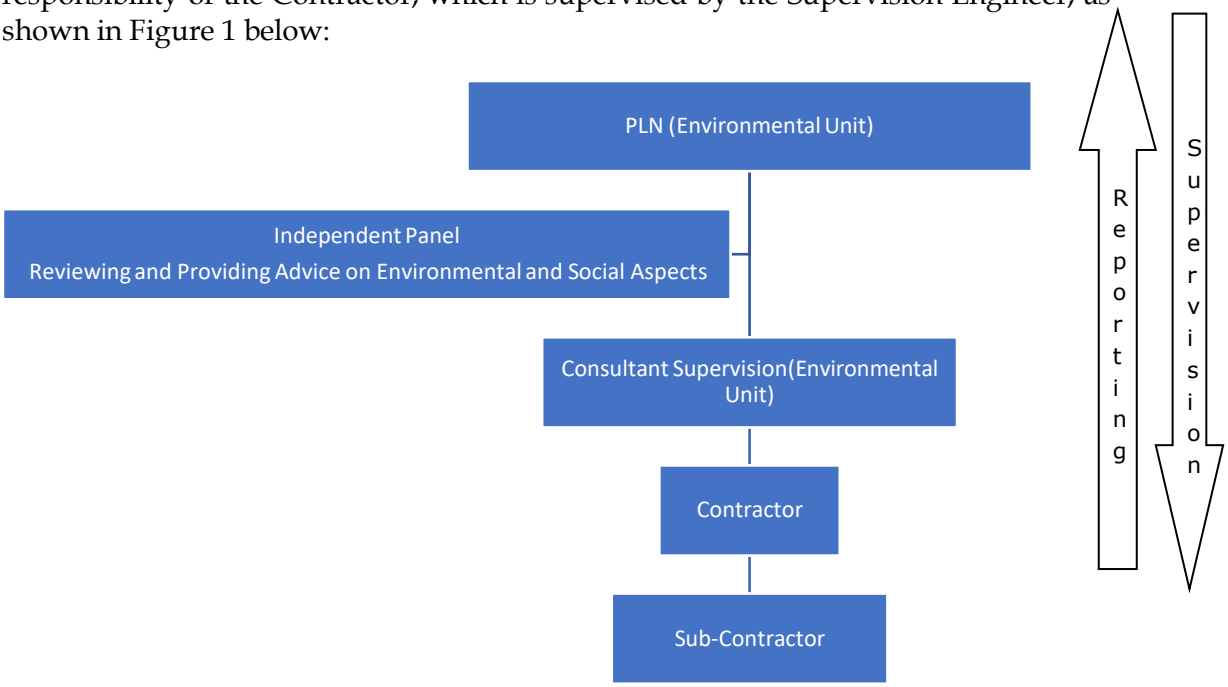

Figure 11 **Organizational Structure for Quarry Environmental Management during Construction**

The quarry contractor should employ an environmental manager, of environmental engineering or equivalent, who has extensive experience (minimum 5 years experience required) in environmental management, supervision and monitoring of mining or mining activities and is aware of the required environmental regulations.

The Quarry Contractor is responsible for completing and implementing the mining ESMP. The supervision consultant is responsible for supervising the implementation and review of the Mining ESMP.

The Mining ESMP outlines the roles and responsibilities of the following areas:

- PLN
- Supervision consultant
- Mining Contractor
- Staff and sub-contractors.
- Quarry Manager
- Government Agencies

PLN will conduct an environmental audit prior to handover to the Contractor, to provide an environmental baseline and a benchmark for eventual site closure and rehabilitation.

6.5 ESMP Program

Contractors are required to submit a Quarry ESMP for approval from the supervisory consultant no less than six months prior to preparation of work in the Quarry area.

Within six months of completion of construction, the contractor must prepare a landscape plan and submit it for approval by a supervisory consultant. This Landscape Plan should include the initial design in the temporary and the permanent landscape plan during mining and after mining.

6.6 Potential Environmental & Social Impacts and Efforts to Address

6.6.1 Main potential Impacts

The Quarry ESMP contains a comprehensive list of potential environmental and social impacts and provides an explicit means of addressing them where appropriate. The minimum plan contains the following:

Mining - activity relationships and potential environmental and social impacts andof businesshandle

Activity	Potential Impacts	Minimum Standards for management
Clearing vegetation	· Loss of land / crop production · Loss of animal habitat · Causing the run-off of sediment and vegetation debris to water bodies affecting the habitat in the water	· Minimizes the amount of vegetation cleared. • Provide opportunities for communities to remove and utilize wood and other resources prior to commencement of clearing. • Mark clearing area to avoid over clearing • Check for the presence of wildlife before clearing

Activity	Potential Impacts	Minimum Standards for management
Stripping	· Slope stability · Sediment run-off to water bodies thus affecting aquatic habitats. · Dust emissions impacting health of communities, and wildlife	· No sediment-entering streams without treatment. · Earthworks and land clearing areas as small as possible. · Provide treatment to obtain dissolved sediment into water bodies. · As far as possible, rainwater and groundwater should not be discharged into open land locations. · The flow of water into the river must be carried out in a high-water discharge condition. · The location for storing materials is no closer than 10 m from the water body. · The waste rock and stripping should be placed in a well-planned dump area, and shaped with the surrounding landscape. · Compaction and plant crops into open land as soon as possible · The earthworks control effort should be checked and kept in order to work in an efficient condition. · Existing sewers are not exposed to stripping activities. · To the extent possible, the stripping of topsoil should be located directly on the site being rehabilitated.
Stockpiles. (Hoarding)	· Unstable land originates from improper leveling of the soil or unstable dumping, which has the potential to cause soil movement or erosion. · The flow of sediment to water bodies has an impact on aquatic habitats. · Dust emissions interfere with comfort and health	· Refer to earthworks and dust management measures.

Activity	Potential Impacts	Minimum Standards for management
Fugitive Dust Emissions	• Sensitive receptors such as nearby communities impacted by fugitive dust emissions • Sensitive ecological receptors such as vegetation and fauna impacted by fugitive dust	· Dust suppression through regular watering, particulary during the dry season. · Maintain open stockpile and soil compaction and planting as soon as possible. · Closure/coverage of cargo materials during transportation to avoid dust dispersal along the route · Trucks Maintain a slow speed in densely populated areas.

Activity	Potential Impacts	Minimum Standards for management
Noise, air blast and vibration from blasting	Disturbance to communities. Disturbance to wildlife Damage to building structures.	· Ground vibrations due to blasting activities must not exceed the *peak particle velocity* (ppv) 6 mm / s for 95% bursts in 12 months and no bursts of 12 mm / s ppv (KepMenLH No.49 1996) · Prior to blasting, a sign / alarm must be given to workers and residents of the blasting activity. The sign must be given no later than 15 minutes prior to blasting. · Avoid blasting in thick cloudy weather and adapted to environmental conditions. · Ensure strict supervision of detonation schedules and locations by trained staff. · There needs to be some time between explosions. · Remove all staff and visitors from the activity area before blasting. · Carry out work safety checks before resuming work. · Organize educational programs with the community regarding the potential impact of blasting, warning signs of blasting, schedules and others. · Activities to comply with KepMenLH No.48 / MENLH / II / 1996 regarding noise standards. · Transportation and vehicle maintenance is carried out periodically to reduce noise due to the operation of construction equipment. · Implementation of Blasting only during mining working hours (daytime) · Use of the access road only during working hours. · The stone crusher is operated by means of a vacuum cleaner / filter. · Using covers around crushers and dust-cutting plants. Use solid boundaries, such as walls and topographic shapes, and vegetation.
Asphalt making	· Dispose of pollutants to soil and watercourses (see fuel storage and use below). · Noise emission	· Run rainwater from the location before disposal.

Activity	Potential Impacts	Minimum Standards for management
Stone Transport	· Disturbance and health for local communities · Noise and Vibration (see above)	· All drivers will be trained in driving Security · Only use the access road during daytime. · Education for local communities about road safety. Avoiding transportation on the access road when school children are on their way to and from school. · Communicate transport estimates on a regular basis to the public.
Storage and use of fuels, chemicals and explosives.	· Materials discharge into water bodies affects water quality and aquatic biota. · Materials discharge into the ground causing pollution.	· All spills and residual oil deposits must be disposed of in accordance with environmental procedures / guidelines, and not disposed of on land or water. · Fuel storage and filling areas must be located at least 50 m from drainage systems and critical water bodies or as directed by the Supervision Engineer. · Ensure all equipment maintenance activities, including oil changes, are all carried out in the maintenance area, drainage line or sewage system. · Explosive / flammable materials must be stored under lock and key, with duty personnel.
Altering water flow	· Reducing the flow of water from springs to water and irrigation / drinking water · Change the direction of water flow · Increased runoff	· Build temporary ponds to treat sediment and reduce the speed of surface water flow, especially during heavy rains. · Creating a channel from the settling pond to the Cireundeu river · Making clean water channels from special springs for the community. · Divert groundwater and surface water around the Quarry site to the Cireundeu river

Activity	Potential Impacts	Minimum Standards for management
Site Improvement	· Erosion and deforestation after mining is complete. · Uncontrollable weeds	· Minimizing the use of external stockpiles · Equipment should be cleaned before working on site to reduce the chance of weed developing. · Local species and productive plants as part of the site restoration and improvement plan. · Stabilization of all slopes and unstable areas. Any natural waterways to be restored and enhanced. · Move all stockpiles

6.6.2 General Operational Management of the Quarry

The Quarry ESMP will document general mining operations and their management for good records in order to reduce future social and environmental risks. The ESMP must contain the minimum that must be followed:

- Operations must be carried out in accordance with the stages with all valuable materials collected so that rehabilitation can be carried out progressively.
- Progressive (gradual) rehabilitation plans as activities take place. Plans for completion of pit rehabilitation must be in place well before the end of operations. A plan for rehabilitation should include a brief description of the location prior to commencement of operations, covering: soil, landform, flora and fauna, drainage, and conservation value.
- Stockpiles must be worked in a systematic manner, generally across or down slopes, so that the exterior can be rehabilitated and can be covered with vegetation without further disturbance.
- Minimizing the total area disturbed by the best method reduces erosion due to runoff and weed growth. Using boundary markers, to clearly mark the the area to be cleared.
- Moving stones should be carried out in a pile if the material is stable. The orientation of the mount must take into account the geology and scenic beauty. All weaves must have drainage. Each plinth should act as a drying drain, carrying water to the final flow location or pond. If the drainage system creates a flow along the face from one feed to the next, then erosion will occur and the fill may be lost.
- If the topsoil has to be stockpiled, keep in mind that this will degrade the quality value while the topsoil is stockpiled. The following methods will help maintain soil quality
  - o Humus should be kept separate from surface dumped soil, gravel and other material; where possible, the topsoil pile should not exceed one meter in height to reduce acidity.
  - o Topsoil supplies must be protected from erosion;

- Planting in the stockpile (shrub or grass) can reduce erosion and will maintain biological activity in the soil;
- Humus should not be buried or thrown away, as it will damage the soil structure.
- Soil should be stored somewhere off the road; and
- Excessive humus handling should be avoided.

- The site should be checked regularly for the presence of invasive weeds, the presence of these weeds should be recorded, and if necessary a control program implemented.
- All wastewater from the work area, which contains sediment, must be collected in a sediment pond prior to discharge from the site. Water from washing, filtering, or reducing dust must be treated. Acceptable methods for the reduction of sediment from streams include settling ponds, hay filters, filter aggregates, (shallow ponds planted with marsh plants). For spoil banks in vegetated areas, run-off must be directed through vegetation prior to reaching tributaries to enable further sediment filtering.
- The techniques below should be considered in order to minimize environmental impact on water quality.
  - The dominant wind direction and the placement of stockpiles on site should be considered during the planning stage. To reduce the impact of wind gusts, trees can be used to hold or topography and/or be used for stockpiles, to cover *stockpiles* and the work environment. Conveyors and transfer points can be dust sources, sealed off, sprinkled with water, or installed dust catchers if necessary. The distance between the waterfall and the highest point where the stockpile is kept is to a minimum.
  - Vehicle speed is an important factor in generating dust. The speed of vehicles on site needs to be strictly regulated. If the transportation is carried out along an unpaved road, it is advisable to slow down the vehicle, especially along roads that are close to residents.
  - Used oil should not be used as a dust remover.
- Physical impacts should be reduced through:
  - Natural vegetation as a useful resource may be used as a barrier. Plants may be damaged by the use of nearby heavy equipment. Minimum cleaning is possible to a minimum for operational efficiency. Vegetation is also required as an additional barrier.
  - The surface of the Quarry must be closed from road users and public visitors. Existing topographical features may be useful as an effective barrier and landscape alteration should be planned for appearance in harmony with the surrounding environment. As far as practical, the workplace should be far from the "point of view" and neighbors and work directions should be chosen carefully and protected from critical views. If possible the uppermost part of the terrace was worked out first and rehabilitated immediately.

6.7 Occupational Safety, Health and Environment Rules

As part of the Quarry ESMP, the contractor must prepare and require the following work procedures that must be obeyed by workers:

6.7.1 Prohibition.

Activities that are not allowed in and near the project site:

1. Cut down trees for any reason outside the quarry.
2. Hunting, fishing / catching fish, catching wild animals, or collecting plants.
3. Buy wild animals, or their meat for food or other purposes.
4. Disturbance to any structure of architectural or historical value.
5. Burning outside the barracks without permission.
6. Using firearms (unless there is a security guard's permission)
7. Consumption of alcohol by workers during working hours.
8. Washing cars or machine tools in the river or on the lake.
9. Perform repairs (soil changes and filters) of cars and equipment outside the permitted areas.
10. Dispose of trash and leftovers not at the tat provided.
11. Workers ride motorbikes without wearing helmets.
12. Protecting construction or vehicles by unauthorized persons.
13. Drive the vehicle beyond the allowable speed.
14. Have a cage for wild animals (especially birds) in the Barracks (Base camp)
15. Work without the use of safety PPE (including gloves, boots and masks)
16. Making noise and disturbing the community
17. Disrespect local customs and traditions.
18. Use rivers and water bodies to wash clothes.
19. Using tools, carbide torches and other materials that can cause a fire hazard.
20. Mixing up rubbish with construction waste.
21. Removal of potential pollutants, such as oil;
22. Storing and using explosive materials
23. Collect firewood.
24. Go to the toilet outside the provided facilities.
25. Burn trash and / or clear vegetation.

6.7.2 Safety

Standard Procedures Safety will be documented in the Quarry ESMP . At a minimum, the plan must include the following:

1. Strict rules on access limits to the Quarry area, so that those who are not interested are prohibited from entering.
2. All personnel must be provided with (and use) safety equipment (PPE), such as safety helmets, safety shoes, vests, dust masks, goggles, and brightly colored vests.
3. Radio communication equipment is provided as a coordinating facility in the field.
4. Conduct periodic monitoring of heavy vehicles and safety equipment.
5. Limiting the operating hours of heavy equipment and equipment, to minimize the risk of worker fatigue.
6. Checking the access road to the project stone haul site due to steep road routes.

6.8 ESMP Communication and Reporting

6.8.1 General Communication Matrix

The Quarry ESMP should include a communication matrix that shows lines of communication for village communities, potential employees, workers, government agencies and other individuals for complaints or other matters during the quarry operation.

Table 1 Responsibility Communication

Who May Concern	Main Attention	Contracts and Management Plans which is Relevant	Contact Person

6.8.2 Community Complaints

The Quarry ESMP will document a detailed grievance process, including the methods used to receive and records complaints from communities and government agencies.

6.8.3 Reporting

The Quarry ESMP will include a reporting schedule for all routine monitoring activities, protests and actions contained in the ESMP as part of the Contractors reporting to the Supervision Engineer and PLN.

6.9.1 Capacity / Capability

ESMP Quarry should list the required capacities for all participants regarding quarry environmental management. This should cover a budget.

6.9.2 Training

ESMP Quarry wil include a list of required exercises, and a process for receiving training and implementation of training. The minimum ESMP will contain those required for:

6.9.3 Management and operation of the ESMP.

All those responsible for managing and operating aspects of the ESMP should receive adequate training for their duties. Evidence of the implementation of the training must be on site, for examination / auditing purposes. Attendance registers for trainees and training programs should be kept and made available for inspection / auditing.

6.9.4 Hazardous materials management and emergency response procedures

All staff involved and using chemicals and fuels will be trained in handling, scatter and emergency response procedures. Evidence of training must be kept for inspection / auditing.

6.9.5 Asphalt Management

All staff processing, transporting and handling asphalt will be trained in handling, spillage, dusting, water management and emergency response procedures. Evidence of training must be kept for examination / auditing purposes.

6.9.6 Sediment Control, and Waste Flow Control

Training will be carried out by third parties, or evidence of prior training is available, for construction, maintenance and monitoring of environmental protection and wastewater treatment. Evidence of training must be kept for examination / auditing purposes.

6.9.7 Traffic management and driver counseling.

Training must be carried out by a third party, or evidence of prior training is available, for safe handling and drivers of heavy vehicles and heavy equipment for mining activities. Evidence of training must be retained for the purposes of the inspection / auditing process.

6.9.8 Blasting and handling of explosives.

Training should be conducted by a third party, or evidence of prior training is available, for safe handling and use, and emergency response procedures. Evidence of training must be kept for examination / auditing purposes.

6.9 Plan Review

The Quarry ESMP must include a process *review* and plan improvement, in connection with the process *review* planr elated to the Upper Cisokan Hydro Power Plant Environmental Management Plan.

6.10 Quality Standards for Noise and Vibration

Standards for Levels Which Cause Damage Impacts KepMenLH No.49 Year 1996

Vibration		Frequency (Hz)	Vibration Limit, highest, mm / sec			
Parameter	Unit		Category A	Category B	Category C	Category D
Vibration Speed	mm / sec	4	<2	2 - 27	> 27 - 140	> 140
		5	<7.5	<7.5 - 25	> 25 - 130	> 130

Vibration		Frequency (Hz)	Vibration Limit, highest, mm / sec			
Parameter	Unit		Category A	Category B	Category C	Category D
Frequency	Hz	6.3	<7	<7 - 21	> 21 - 110	> 110
		8	<6	<6 - 19	> 19 - 100	> 100
		10	<5.2	<5.2 - 16	> 16 - 90	> 90
		12.1	<4.8	<4.8 - 15	> 15 - 80	> 80
		16	<4	<4 - 14	> 14 - 70	> 70
		20	<3.8	<3,8 - 12	> 12 - 67	> 67
		25	<3,2	<3,2 - 10	> 10 - 60	> 60
		31,5	<3	<3 - 9	> 9 - 53	> 53
		40	<2	<2 - 8	> 8 - 50	> 50
		50	<1	<1 - 7	> 7 - 42	> 42

Category A : Does not cause damage

Category B : Can cause cracks in plaster (crack / detached)

Category C : Can cause damage to building pillars.

Category D : Causes damage to building pillars.

Noise quality standards according to KepMenLH No.48 / MENLH / II / 1996

Designation of Areas / Environment for Activities	Noise level dB (A)
	-
a. Area Designation	
1. Housing and settlements	55
2. Trade and services	70
3. Offices and commerce	65
4. Green open spaces	50
5. Industry	70
6. Government and public facilities	60
7. Recreation	70
8. Special	
- Air Bandarlabuhan	
- Train Station *)	
- Seaport	70
- Cultural Heritage	60
b. Environment of Activities	
1. Hospital or the like	55
2. School or the like	55
3. Worship Place or the like	55

Remarks:

*) is adjusted to the provisions of the Minister of Transportation

7.5

7 APPENDIX 7: OPERATIONAL ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

7.1 Introduction

The Environmental and Social Management Operational Plan (OESMP) identifies the methods for PLN to control and / or reduce the environmental and social impacts of operational activities associated with the Upper Cisokan 1040MW Pumped Storage Hydro Power Plant. This includes the early stages of inundation.

The PLN Environmental Unit is required to complete the OESMP during the construction phase (at least six months prior to inundation), preparation for the inundation and operational stages. This TOR documents the OESMP requirements. OESMP documents must be adhered to by all staff, consultants and contractors.

Purpose:

- To reduce the potential negative impacts of inundation and the Upper Cisokan hydropower plant on surrounding communities, downstream communities and the environment.
- To ensure that environmental problems are monitored and managed throughout the life of the Cisokan Hydro Power Plant.
- To integrate the restoration and rehabilitation of critical habitat as per the BMP into the operational phase.
- To ensure a suitable minimum water discharge is flowed from the dam to the downstream river environment as per the e-flow regime in the ESIA.
- To ensure the dam is safe and the risk of injury or drowning is minimized.

At a minimum, the OESMP implementer must be consistent and follow the environmental management plan and operational procedures.

- Environmental and Social Management Plan UCPS Hydro Power Plant, 2020
- Social and community management plans.
- Biodiversity management plan
- Transmission Line environmental management plan
- Environmental Monitoring Plan
- Monitoring of Dam Infrastructure and Equipment (Operational Manual)
- Emergency operations, including flood management (Operational Manual)

OESMP Details:

1. Duties and responsibilities of all parties involved in the project
2. The role of OESMP in broader power generation and infrastructure operational procedures and the PLN ISO14001 Environmental Management System.
3. Key environmental and social risks for inundation and operations.
4. The following key procedures and methodologies, during inundation and operational periods:

A. Inundation
B. Water flows downstream from eachdam
C. Water quality, fisheries and river habitat management
D. Reservoir and storage area management
E. Emergency operations
F. Management of biota / biological diversity and restoration of buffer zone
G. Fuels, Chemicals, Solid Waste, andSanitation System Management
H. Operation of transmission line
I. Community Relations

5. Relation to Environmental Monitoring Plan
6. Responsibility for reporting and methods.
7. OESMP Update Process

7.2 Purposes and Objectives

OESMP will specify the aims and objectives of the plan. Must contain at least:

1. The implementation of OESMP will ensure that PLN, contractors, consultants, and subsidiaries operate the UCPS hydropower plant in order to protect the environment and society
2. To implement and comply with all relevant environmental laws (see section 4)
3. PLN Fulfills all of the 2010 UCPS 1040MW Hydro Power Plant ESIA commitments.
4. Meets all environmental approval commitments.
5. To maintain and improve the quality of the affected environment according to UCPS hydropower
6. Increase environmental compliance, awareness and understanding between employees, subsidiaries, consultants and contractors, through:
   - Regular training
   - Duties and responsibilities under the OESMP;
   - The linkage of performance and environmental responsibility to overall performance
   - Foster a shared sense of responsibility for environmental performance among all project participants;
   - Monitoring environmental performance and making continuous improvements as needed
   - Continuous interaction among stakeholders involved in the project.
7. Communicate regularly with relevant parties, including government agencies and regulatory agencies, local communities and interest groups, to report on environmental performance, regulatory compliance and progress with operating schemes, and to understand and address stakeholder concerns.

7.3 Environmental Agreements

PLN lists in the OESMP all relevant Environmental Agreements that must be fulfilled.

7.4 Organizational Structure of OESMP

PLN explains that OESMP is in line with the framework of the UCPS Hydropower Environmental and Social Management Plan (2020), Operational Management Procedure and ISO14001 Environmental Management System.

The relevant sub-plans are:
i) Social and Community Relations Plan
ii) Biota / Biodiversity
iii) Management PlanReservoir and Dam Management Plan.

Figure 1 illustrates the organization scheme of the Upper Cisokan Pumped Storage Hydropower Plant ESMP, and Figure 1 illustrates the ESMP framework for the Inundation and operational stages.

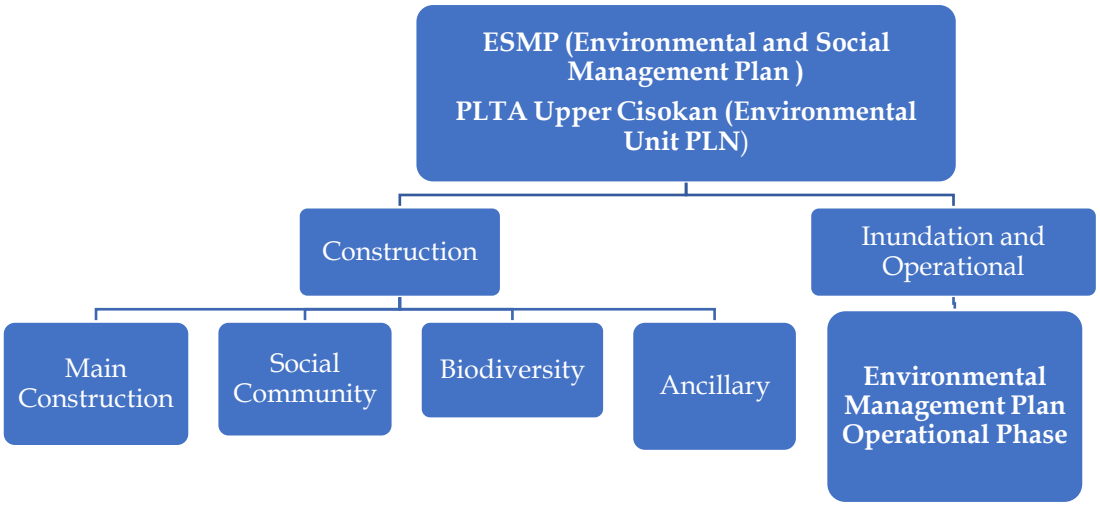

Figure 1 Combine ESMP Framework at Construction and Operational Phase

The reference to 'OESMP' in this document becomes a procedural and fulfillment document for this sub-plan. All sub-plans must be consistent with the main plan at the top of the hierarchy, and must be consistent with the plans at the same level.

7.5 Approval

Inundation will not commence until the OESMP document is approved and the conditions for approval are discussed in the final version of the plan, by the PLN Environmental Unit and / or the relevant government agency. Any subsequent changes to the OESMP or sub-plans are discussed through the same approval process.

7.6 Document Control

The ESMP is a dynamic document, which may be subject to changes or modifications as a result of project development or changes to the project area. A review of the procedure for changes or other changes is documented in Section 18.0.

The OESMP is a controlled document; subsequent versions should be documented in this section, with a brief summary of the changes.

7.7 Overview of The Scheme

PLN will provide an overview of the hydropower plant, including technical and location details of all major infrastructure, operational routines, and an explanation of key aspects of local communities and the environment.

7.8 Roles and Responsibilities

PLN will detail various roles and responsibilities the responsibilities of internal departments and external staff and consultants, contractors and government agencies in the OESMP will be explained in detail.

PLN will be responsible for the management and implementation of the OESMP, although technical tasks can be delegated to a consultant. In general, the roles and responsibilities are summarized in the table below.

Table 1. Roles and responsibilities of

POSITION	RESPONSIBILITY
PLN (Environmental Unit)	· OESMP implementation, monitoring and compliance including the performance of contractors and consultants. · Review OESMP performance and make changes as appropriate to improve environmental management and community relations. · Operational compliance with ESIA and ANDAL approval.
All staff, consultants and contractors	· Work in accordance with OESMP and sub-plans · Make recommendations to PLN that may be appropriate for improving environmental management operations

POSITION	RESPONSIBILITY
Directorate General of Electricity and Energy Utilization (DG LPE)	· Environmental management supervision and monitoring · Acceptance and *review* of environmental management and environmental monitoring reports.
West Java Province BPLHD	· Acceptance and *review* of environmental management and environmental monitoring reports.
Environmental Office of Cianjur and West Bandung Regencies	· Acceptance and *review* of environmental management and environmental monitoring reports. · Supervision and monitoring of ESMP
ANDAL Cianjur district office	· Acceptance and *review* of environmental management and environmental monitoring reports. · Supervision and monitoring of ESMP
Land Agency Office of West Bandung district	· Supervision of Environmental Management
Office of the Land Agency of West Bandung district	· Environmental Management Supervision
for Project Affected Sub-district Heads in West Bandung and Cianjur Districts	· Monitoring Community liaison

7.9 Potential Environmental and Social Impacts

Risks In the OESMP, PLN will document the main environmental and potential social impacts during the inundation of land to form a reservoir, and the scheme of operations. This list should be maintained throughout the life of the hydropower plant, and updated when new impacts are identified, or when impacts are resolved and no longer require monitoring or management.

The following is a summary of the environmental and social impacts assessed as potential in the Report ESIA (2020).

Table 2 Summary of Key Impacts and Preventive Measures

IMPACT OF	PREVENTION MEASURES	HANDLING DETAILS
Changes in downstream environment due to reduced river flow during inundation.	River and habitat surveys before and during inundation. Minimum discharge and discharge fluctuation from both dams during inundation	Section 8.10 Section 8.11
Reduced river flow for downstream users during inundation.	Minimum discharge and discharge fluctuation from both dams during inundation Consultation before inundation	Section 8.11
Water quality and habitat change between the two dams	Water quality monitoring, fisheries monitoring, management and operational guidance Clearing weeds and other vegetation around dam	Section 8.12 Section 8.13
Reduced flow in the area downstream during low flow conditions, where water demand approaches, or exceeds, inflow.	Minimum water discharge from both dams Flow monitoring to obtain accurate records of the low flow conditions and minimum discharge according to the scheme. Consultation with downstream users.	Section 8.11
Loss of habitat or endangered species from secondary vegetation from native forest, due to land use change and hydropower operation.	Monitoring and management through a biodiversity management plan. Greenbelt restoration process for re-establishment of rare plant habitat	Section 8.15

IMPACT OF	PREVENTION MEASURES	HANDLING DETAILS
Changes in erosion and deposition of the Cisokan river, downstream from the lower dam, due to decreased sediment levels.	River surveys and habitat surveys are prioritized before and during inundation.	Section 8.12
Land unstable due to water level fluctuation.	Treatment of soil stability prior to inundation. Keep an eye on slope stability.	Section 8.13
Loss of access to river environments and land between dam areas, and changes in community relations.	Alternative fisheries, bathing locations. Sanitation facilities provided. Pedestrian bridges are provided at the lower reservoir and the Cisokan river.	Section 8.13 Section 8.17
Risk to community entering the dam area.	Safety and precautions in two reservoirs to prevent crossing Dissemination of risks	Section 8.18 Section 8.17
Risk of flooding in downstream areas	Emergency warning system and socialization	Section 8.14
Electric field and magnetic field disturbances and health impacts	Operations in accordance with national standards Regular monitoring Complaints handling process	Section 8.16

7.10 Reservoir Filling Plan

In accordanace with ESS4, PLN is required to prepare a Reservoir Filling Plan. The inundation process will begin once the dam is fully constructed, the slopes have been stabilized and the reservoir has been cleared of vegetation and sources of contamination in accordance with the Reservoir Preparation Plan. The diversion structure in the upper reservoir will be dismantled and the diversion tunnel in the lower dam will be permanently closed.

Inundation will occur during the rainy season (December to May), when river flows are higher and there is less risk of low flow conditions. It is planned that the Indonesian Large Dam Safety Committee will approve the initiation process of flooding the dam.

Water demand and the estimated volume of water available for filling are presented in Table 20. The total water required to fill the reservoirs prior to commissioning is 63,530,000m^3. The live storage area in the upper reservoir will not be filled during inundation, since it will remain 'empty' and available for the water to be pumped from the lower reservoir as part of the commissioning process.

PLN will first prepare a Reservoir Filling Plan covering the reservoir filling schedule, including holding points/elevation, surveillance and notification procedures, frequency of instrumentation readings, thresholds for triggering alarms, notification and warning procedures together with the Operational and Maintenance Plan, no less than six months prior to the initiation of filling.

All water filling requirements will come from the Cisokan River. Based on the 2014 decree and PLN's water resources utilization permit. The the maximum water debit of the Cisokan River that can be utilized is 6.21 m^3/s. Therefore, the UCPS will take up to 6.21 m^3/s to fill the reservoirs and will release the rest downstream of the dam. All inflow from the Cirumamis River will be discharged via the upper dam bottom outlet during inundation. Water may be pumped up to the upper reservoir periodically during filling or during the commissioning period.

The estimated total number of days to fill the reservoir is 122 (four months). The water balance is simply set based on the average flow conditions and does not include other losses of the hydrological system apart from reservoir evaporation and residual flow discharge downstream from the lower reservoir.

Table 20. Water Balance During Wet Season (Dec – May) Inundation

Water required	**m^3**
Upper reservoir filled to lower water level (dead storage only):	530,000
Lower reservoir filled to upper water level (dead and active storage):	63,000,000
Total [f]:	63,530,000

Average daily water balance	m^3
Average daily inflows to the scheme [a]	1,892,160
Maximum daily retention of water in the scheme @ 6.21m^3/s [b]:	536,544
Average daily evaporation [c]:	17,000
Average daily outflow from the lower dam [d]:	1,338,616
Estimated number of days to fill [e]:	122

Notes:

(a) Only the Cisokan River. The range of average monthly mean flows in the Cisokan River @ Lower Dam in the wet season is 15.82-27.2, the average of this data is 21.9.
(b) UCPS will take up to 6.21m3/s. Less water will be retained if the inflow drops below 7.91 m^3/s to ensure there is a minimum e-flow of 1.7 m^3/s.
(c) Evaporation
Average daily evaporation is determined based on a value of 5 mm / day (17,000m3/day, 0.2 m3/s), and the full reservoir area is about 80 ha for the upper reservoir and 260 ha for the lower reservoir. This is conservative, because the surface area of each reservoir is less than that number at the time of filling, but it will have little effect on the total number of days required for filling.
(d) Inflow minus retention minus evaporation
(d) = (a) – (b) – (c)
(e)
Total water required (f) divided by (b-c), rounded up to the nearest number of days.
The estimated number of days is the minimum, as it is based on the maximum water retention rate in the scheme of 6.21m^3/s. If there are periods of low flow then less water will be retained in order to release water downstream of the lower dam to meet the e-flow requirements (described in more detail Section 10). The minimum e-flow during inundation is 01.7m^3/s.

Table 21 Total Water Required for Filling

Reservoir	Dead Storage volume (m^3)	Active Storage volume (m^3)	Total volume required for filling (m^3)
Upper, on Cirumamis	530,000	0	530,000
Lower, on Cisokan	51,500,000	11,500,000	63,000,000
Total	52,030,000	11,500,000	63,530,000

The OESMP should contain detailed methods for the management of environmental and social impacts from initiating inundation in the reservoir. This section should be maintained and updated on a regular basis when new impacts are identified, after an incident or after the results of monitoring indicate changes to the preventive measures needed or when impacts have been resolved and no longer require supervision or monitoring.

The following is a summary of the key environmental and social impacts assessed as potential in theReport ESIA (2020) specifically for inundation, mitigation purposes and OESMP efforts. Impacts related to operations as well as inundation should be included in the following sections.

Table 3 Mitigation of Reservoir inundation Impacts and Efforts to Minimize Impact

PROBLEMS	PREVENTION OBJECTIVES / STANDARDS PREVENTION	EFFORTS
Losses downstream during inundation	All downstream owners are informed of possible changes, and all problems from downstream owners that have been taken into account	Before and during inundation, consultation with all owners in the downstream, downstream areas, and including the farmers in the Cihea Irrigation Scheme. Regulate water flow whenever possible to meet downstream needs.
	Maintain the ability of the downstream area for fish habitat.	Survey of low flow conditions in the Cirumamis and Cisokan Rivers, prior to inundation, to understand the potential impacts on the biodiversity of these wetlands during dry periods.
	Maintain residual flow as per the tables above.	Record the incoming and outgoing water flow. Adjusts the daily bottom valve based on the inflow and the minimum e-flow requirements.

7.11 Downstream River Management Plan

Introduction

The Environmental and Social Management Plan (ESMP) includes all activities related to environmental and social management of the downstream area of the Cisokan river during the inundation and operational stages of the Upper Cisokan Pumped Storage (UCPS) Hydropower Plan.

7.11.1 Cirumamis River and Waterfalls

Prior to inundation the diversion infrastructure will be blocked and removed. The reservoir will start to fill behind the dam. The bottom outlet will discharge all

inflow. No variation in flow will be experienced downstream of the upper dam in the Cirumamis River during this phase.

Water will be pumped from the lower dam to the upper dam to fill the dead storage in the reservoir during the inundation period and / or during commissioning. During the commissioning stage the active storage will be filled by pumping water from the lower reservoir and released back to the lower reservoir through the power generation plant.

In emergencies during this phase, the bottom outlet of the upper dam can be adjusted to allow a maximum discharge of 0.96 m^3/s.

7.11.2 Cisokan River:

Prior to inundation the diversion tunnel will be permanently closed. The lower reservoir will start to fill with flow from the Cisokan River. The filling is proposed to take at least four months (122 days) based on a maximum fill rate of 6.21m^3/s and based on calculations of average river flow over the wet season (the water balance is provided in Section 4). On a average monthly flow basis, the intake of water and the downstream releases are represented in **Error! Reference source not found.**. This is t o indicate what releases would occur during average flow. In reality, the downstream flow will increase and decrease with the natural river flow.

Table 22 Representation of average downstream e-flow releases during inundation during the wet season

	Dec	Jan	Feb	Mar	Apr	May
Average m^3/s	20.76	15.82	24.05	25.45	27.20	18.10
UCPS intake m^3/s	6.21	6.21	6.21	6.21	6.21	6.21
Downstream e-flow release m^3/s	14.55	9.61	14.24	19.24	20.99	11.89

Using January average monthly flows as an example of the lowest average flow release downstream, this flow is equivalent to the median annual flow (refer Table x). For average and above river flow conditions during the wet season, there is little impact on downstream flow. This is because the flow is within the normal wet season range and will increase and decrease in the normal flow patterns.

If there are drier periods in the wet season then the rate of intake will reduce accordingly, to allow for sufficient e-flow in the river for irrigation and ecological purposes. The minimum permitted e-flow for UCPS lower dam under the Indonesian regulatory framework is 0.55 m^3/s (Section **Error! Reference source not found.**). H owever, since this is equivalent to 30% of the Q97 flow this is very low and unlikely to be naturally experienced during the wet season. Because it is a short inundation period is not necessary to stress the river to this extent. A proposed discharge flow regime is provided in the table below.

Table 23 Proposed regime for inflow and outflow during inundation

Scenario	High flow, average flow, moderately low flow	Moderately low flow to Q97	Q97 – Q 100
Natural inflow m^3/s	>= 7.91	7.91 >< 1.97	<=1.70
Intake for UCPS Scheme m^3/s	6.21	6.21 >< 0	0
		(Inflow - 1.70)	
Residual flow discharge downstream lower dam m^3/s	>= 1.70 (Inflow – intake)	1.70	1.70

The only sensitive downstream receptor is the Cihea Irrigation Scheme[1]. There is an opportunity to adjust downstream flow during periods to ensure that there is enough water for the Cihea Irrigation Scheme to meet their requirements. This will take coordination with the Irrigation Scheme operators and a regime agreed between parties. The agreed regime will be documented in the Reservoir Filling Plan. Filling will take more time if the flow of the river reduces to less than 7.91 m^3/s and / or more water is released for the irrigation scheme needs.

In case of emergencies during inundation, the operational emergency procedures will be initiated. The bottom outlet allows for maximum discharge of 42.5 m^3/s.

7.11.3 Overview of the Important Parts of UCPS Construction and Operations for Downstream Users of the Cisokan River

The downstream area from the Cisokan river flow directly passes is the Salamnunggal village, Panyusuhan Village, and Cikondang Village. After the three villages, the Cisokan river will receive water input from the Cikondang river.

The largest use of the Cisokan river at downstream of the lower dam is used as a source of irrigation water for the Cihea irrigation area. The water flow of the Cisokan river will be drained at the weir in Cisokan weir (local people call it the Cisuru weir) and then flowed into the Cihea irrigation channel. Cisokan Weir (Cisokan Weir) approximately 3 km downstream of the lower dam location at UCPS.

[1] Ecological impacts are discussed in Section **Error! Reference source not found.**).

Figure 4 Image of Cisokan Weir (Cisuru Weir)

Cisokan river water will be flowed into the Cihea irrigation channel through this Cisokan weir (Cisuru weir). Along the Cihea irrigation canal, you will find many people who use water not only for irrigation needs but also for daily needs such as bathing and washing.

During the dry season, the Cisokan weir (Cisuru weir) operational system will completely divert the water from the Cisokan river to enter the Cihea irrigation channel so that no water is left to flow in the Cisokan river until the meeting point between the Cisokan river and the cikondang river. during the rainy season with high water discharge, the water gate to the Cihea irrigation channel will be closed to prevent sediment from entering the irrigation channel. So that the flow of the Cisokan river water will be entirely released into the Cisokan river body. These conditions are shown in the Figure below.

(a) (b)

Figure (a) flow conditions during the dry season, (b) flow conditions during the rainy season

Figure 4 Image of Cihea Weir

During construction, sediment discharge will affect water quality and poor flow patterns, erosion, sediment control systems, and control of work carried out on the plains wet river cliffs and other waste management.

During inundation, the hydrological regimes in the Cisokan and Cirumamis Rivers will be temporarily affected when water is drawn to fill the reservoir. A small stream will be discharged from both dams to keep the river flow ecosystem undisturbed. To avoid a big impact due to the filling of the reservoir, filling the reservoir will be carried out during the rainy season.

During operational activities, it is estimated that there will be only a slight change in the hydrological regime downstream of the two dams, because the Upper Cisokan Pumped Storage Hydro Power Plant will not hold the river discharge to fill the reservoir, thereby minimizing the downstream river flow. The operation of the reservoir is designed to flow the water out as much as the inflow into the reservoir.

During periods of low flow, a minimum flow of 0.2 m^3/s will be removed from their respective dams, which could lead to shortages of water in hydropower Cisokan until such time as higher inflows received.

Changes in erosion patterns and disposition may occur downstream of the Cisokan River during operations, due to reduced sediment loads.

Based on the calculation, the estimated average current required for charging is 92 days or 3 months. The exact time for filling depends on current conditions during the rainy season, and the amount of additional water discharge that flows downstream of the lower dam to provide 'runoff flow'.

7.11.4 **Avoiding or Minimizing Impacts**

The project will seek ways to minimize physical and social impacts whenever possible by minimizing pollutants entering river bodies and maintaining the downstream flow rate during inundation and operational stages to meet water needs in Cihea irrigation. Special attention will be given to avoiding environmental degradation, flow rates, and social conflicts related to water use in the Cisokan river.

7.11.5 **Local Community**

Most of the utilization of the Cisokan river in the downstream area is used for irrigation needs in the Cihea irrigation area which covers 5,484 ha. Based on its organizational structure, the water user farmer association (P3A) in the Cihea irrigation area consists of 1 (one) P3A Parent, namely IP3A Tirta Mulya Rezeki, 3 (three) Combined P3A namely Group I Titra Walatra, Group II Karya Sejahtera, and Group III Sabanda Sariksa . The total number of water user partners in Cihea is 82 partners, with details of Group I totaling 21 partners, Group II consisting of 27 partners, and Group III consisting of 24 partners. The area of the P3A Group I irrigation is 1,863 ha, Group II 1,852 h, Group III 1,769 ha. During the construction,

inundation and operational stages, it is of critical importance that PLN communicate and coordinate with the Cisokan weir manager (Cisuruh) and water user partners in order to ensure that the users of the irrigation scheme are fully aware that impacts on the water quality and flow to the scheme will be limited during construction although there may be an increase in suspended sediment but mitigation measures will be in place to minimize this. During UCPS operation PLN will ensure that flow rates requirements to the irrigation scheme are maintained.

7.11.6 **Significant Impacts and Management Procedures**

Table 3 Significant Impacts and Management Procedures

NO	SIGNIFICANT IMPACT	/ OBJECTIVE	PROCEDURE
I	**CONSTRUCTION STAGE**		
1	Increasing the rate of erosion will increase dissolved solids and suspended sediment in the waters in the Cisokan watershed and will be carried downstream and settling in water bodies and downstream areas	● Minimizing the amount of pollutants entering river bodies so that water quality and river habitat are maintained according to their quality now	● Implement construction environmental management plan procedures ● Water quality monitoring and reporting
2	Anxiety or concern of downstream users regarding subsidence	● Minimizing anxiety and worries of land / building owners / users	● Following the LARAP process
II	**INUNDATION STAGE**		
1	User anxiety or concern downstream related to flow rates in the downstream part	● Minimizing anxiety and worries of downstream river	● users Socializing downstream river users, especially P3A in the Cihea irrigation area ● Coordinating with the Cisokan weir manager (Cisuruh)
2	Changing river habitat and biodiversity	● Minimizing changes in river habitat and aquatic biodiversity	● Changes Opening the bottom outlet of the lower reservoir periodically (at least 10 - 14 days and if possible in conjunction with new flows or flooding) to increase discharge to a maximum outlet capacity of 13 m3 / s, during a period lasting

NO	SIGNIFICANT IMPACT	/ OBJECTIVE	PROCEDURE
			at least one day, to 'refresh' the river .
			• monitor water quality, fish and river habitat will be carried out before filling and during charging to determine the impact and residual flow rate setting changes if needed.
III	**OPERATION STAGE**		
1	Hydrology, River Flow Discharge, and Availability of Utilized Water Downstream UCPS	• Minimize Changes in discharge patterns and frequency of flooding in downstream UCPS	• Ensure procedures for consultation with downstream users regarding changes in flow to downstream areas are carried out
			• Coordinate with the Cisokan weir Manager (Cisuru weir) to regulate the water discharge that will be used for UCPS operations and the water needs of the Cihea irrigation area, especially during the minimum discharge.
			• Use daily water flow monitoring data to adjust the operation of bottom outlet valves at both dams so that the outflow is the same as the incoming flow, minus the water that is stored to replace evaporated water
2	Anxiety or concern of downstream users regarding flood discharge	• Mitigating flood discharge • Provide sense of safety to downstream users.	• Operate flood emergency procedures to minimize downstream flow risks.
			• Providing education to downstream users regarding the potential for reducing the amount of flood flow, flood emergency procedures,

NO	SIGNIFICANT IMPACT	/ OBJECTIVE	PROCEDURE
			and regarding low flow conditions.

6.11.7 Communication and Reporting

Table 5. Report Summary (Example)

Type and Purpose of Report	Report Frequency Reports are	Reporting	sent to:
River Habitat and Water Quality monitoring data	within 1 month after receiving the monitoring report / analysis.	PLN	Government Agencies (refer to Table 1 Summary of Roles and Responsibilities)

7.12 Water Quality, Fish and River Habitat Management

The OESMP should contain in detail the methods for managing the environmental and social impacts of the operation of reservoirs and power plants on water quality, fish populations and river habitats. This section should be actively maintained and updated when new impacts are identified, after an event or after monitoring results indicate that changes to preventive action are required or when impacts are resolved and no longer require monitoring or management.

The following is a summary of the main environmental and social impacts assessed as potential in the Report ESIA (2020) specifically for water quality and river habitat, mitigation objectives and OESMP efforts.

Table 5 Mitigation of impacts Water quality, fish and river habitats and Efforts to minimize impacts.

PROBLEM	OBJECTIVES / STANDARDS PREVENTION	EFFORTS
Changes in water quality due to biomass decomposition	Waste do not inhibit the entry of water into the intake MESM Maintain water quality within the range measured in the initial environmental baseline.	See section 8.13 Environmental Monitoring Procedure Plan for water quality monitoring.

PROBLEM	OBJECTIVES / STANDARDS PREVENTION	EFFORTS
Changes to fish species	do not eliminate fish species	Monitor fish and benthic species (including macro invertebrates) according to the Environmental Monitoring Plan and Biodiversity Management Plan.
Changes in erosion and sedimentation / sediment patterns in the lower downstream areas of the Cisokan River causing soil loss or inundation.	Downstream livelihoods and access to land must be maintained. Downstream habitat is preserved.	Survey of erosion and deposition patterns in the downstream area of the river at key locations, every 4-5 years for changes in river morphology. Intended to solve problems if relevant Investigate and resolve all complaints. Regulate the flow rate, and vice versa Consider other management methods in the operation of the dam, or further research and study commissions as options for reducing changes to channels, banks etc.

7.13 Reservoir Management

The OESMP should contain detailed methods for managing environmental and social impacts of reservoir management. The preventive measures can be managed in a separate ' Reservoir Management Plan'. Plans, or alternatively, should be actively maintained and updated when new impacts are identified, after an event or after monitoring results indicate that changes to preventive action are required or when impacts are resolved and no longer require monitoring or management.

The following is a summary of the main environmental and social impacts assessed as potential in theReport ESIA (2020) specifically for dams and watershed management, mitigation objectives and OESMP efforts.

Table 6 Mitigation Dam and watershed and efforts to minimize the impact

ISSUE	OBJECTIVE / STANDARD PREVENTION	EFFORTS TO PREVENTION
Increased biomass decaying garbage and	Waste should not hamper the entry of air intake Maintaining water quality within the range measured in the initial environmental setting	Observations and waste cleanup manually done weekly. Environmental Monitoring Plan for monitoring water quality.
Increase in weeds changes the water environment and affects infrastructure	Weeds must be maintained at a level that does not affect water quality, habitat or infrastructure.	Observation and manual cleaning of weeds is carried out weekly.
Precipitation	Maximizing the lifetime of the dam	Develop Model management and monitoring of sedimentation and erosion dams to maximize the life of the dam. Manage watershed and buffer zone areas to minimize erosion.
There is no public access to the dam due to safety risks.	There are no casualties or injuries due to public access.	Signs are placed at a certain distance around each dam, and at locations such as local roads and roads, indicating that there is no public access to the dam, and that there is a danger of water fluctuation without notification. Routine patrols of the Greenbelt and dam by security personnel, and evacuation of people. Alarm Warning before starting filling or pumping, to indicate the water level is rising or falling in each dam. Regular outreach program (starting at the construction stage) to explain to local people how the reservoir will be operated, and what the safety risks are. if possible, it is necessary to fence the locations that could potentially be entered by people in the upper dam. at the outer limit of the bufferzone.

ISSUE	OBJECTIVE / STANDARD PREVENTION	EFFORTS TO PREVENTION
Land instability in the Upper Reservoir causing potential for erosion.	Maintain water quality within measurable ranges of environmental baseline monitoring. Maximizing reservoir life.	Land stability monitoring equipment. Visual monitoring of landslides and erosion sites. Repairs of potential landslides as quickly as possible.

7.14 Emergency Operations

The OESMP should contain detailed methods for managing the environmental and social impacts of emergency operations. Operational Emergencies should be documented in the Reservoir Operations Manual, although this may not be the focus of the ESMP, namely the prevention and management of environmental and social aspects of emergency procedures. This section should be actively maintained and updated when new impacts are identified, after an event or after monitoring results indicate that changes to preventive action are required or when impacts are resolved and no longer require monitoring or management.

The following is a summary of the main environmental and social impacts assessed as potential in theReport *ESIA* (2020) specifically for emergency management, mitigation purposes and OESMP efforts.

Table 7 Emergency Operations and Efforts to Minimize the Impact of

PROBLEMS	PREVENTION OBJECTIVES / STANDARDS PREVENTION	MEASURES
Flood or dam failure	Operate flood emergency procedures to avoid casualties and minimize property loss	Warning signs downstream of floods and emergencies that will operate before inundation and will be used at any time required. Downstream communities will be informed prior to inundation regarding expected changes to water flow, how the flood warning system will work and what emergency procedures they should perform when the warning alarm has been raised. All complaints will be resolved.

7.15 Biodiversity Management and Buffer Area Restoration

The ESMP for Operations should contain detailed methods for managing the environmental and social impacts of reservoirs and watersheds. These preventive measures are detailed in a separate Biodiversity Management Plan, which will be adapatively updated from the planned construction phase prior to the inundation stage. This section should be actively maintained and updated when new impacts are identified, after an event or after monitoring results indicate that changes to preventive action are required or when impacts are resolved and no longer require monitoring or management.

It is imperative that PLN should cross reference the BMP with the OESMP in this section as appropriate to ensure consistency. At minimum, OESMP and the Biodiversity Management Plan will ensure a summary of the potential environmental and social impacts as analyzed in the ESIA Report (2020). Note that problems and prevention measures may change as a result of closer examination of cultural / biological diversity values and management options during construction.

Table 8 Mitigation Biodiversity and Impact Minimization Efforts

ISSUE	OBJECTIVE / STANDARD PREVENTION	PREVENTION EFFORTS
Public access and encroachment of buffer area for agricultural activities.	Buffer zone areas are prohibited for house building or agriculture.	Routine patrols of the buffer zone areas and reservoirs by security guards. Non-authorised people will be asked to leave the area. Fencing in the upper reservoir greenbelt.
Establishment of forest habitat for native fauna species.	Areas should be used to provide habitat for endangered species.	Revegetation of buffer areas with native species to provide forest habitat for fauna.
	The rest of the forest will be protected and developed.	Monitoring, replanting, surveying and marking to maintain and develop habitat.
Erosion of buffer areas affecting sediment to reservoir.	Maximize useful life in the reservoir	Plant buffer areas with plant species to minimize erosion.

7.16 Transmission Network Operations

Management of the 500 kV transmission environment is documented in the Transmission Environment and Social Management Plan. Minimum, OESMP and ESMP Transmission will ensure that the following problems are managed appropriately:

Table 9 Mitigation of the impact of Transmission

Problem	PURPOSE / STANDARDS PREVENTION	MEASURES
Complaints of illness, discomfort or other disturbances with respect to electric and magnetic fields (EMF).	The impact of EMF radiation on residential property and workplaces must be minimized.	EMF regular monitoring. Manage complaint services and follow up on complaints, until they are fulfilled.
Bird, mammal and reptile due to electrocution and collison causing mortality and injury.	Monitoring the effectiveness of collision and electrocution prevention and avoidance mechanisms and adapting to improve.	Implement the BMP for the Transmission Line
Induced development from opening up route through forest.	Surveying for forest degradation and deforestation along the route and evidence of hunting.	Satellite or drone imagery, with ground truthing, every 1year.

7.17 Fuel, Chemical and Solid Waste Management and Sanitation Systems

The OESMP should contain detailed methods for the management of environmental and social impacts from solid waste, collection of clean water and treatment and disposal of sewage. This section should be actively maintained and updated when new impacts are identified, after an event or after monitoring results indicate that changes to preventive action are required or when impacts are resolved and no longer require monitoring or management.

The following is a summary of the main environmental and social impacts assessed as potential in theReport ESIA (2020) specifically for emergency management, mitigation purposes and OESMP efforts.

Table 10 Mitigation of Impacts on Fuel, Solid Waste and Sanitation Systems and Efforts to Minimize Impacts

PROBLEMS	OBJECTIVES / STANDARDS PREVENTION	MEASURES
Fuel and chemical spills or waste.	It is forbidden to intentionally dump fuel or chemicals into soil or water.	Storage or use of fuels or chemicals according to Indonesian law. Spill prevention equipment must be available at the job site. Staff are trained on spill storage and cleaning. Maintain a list of fuels and chemicals on site. The area surrounding the storage must bear at least 100% of the total amount that can be stored.
Incineration of solid waste or littering.	It is prohibited to dump into the environment, or incineration of solid waste. Solid	waste collected from the site and recycled or buried in a licensed facility.
Take clean water.	Taking clean water must not affect other clean water users.	Ensure water withdrawals have no effect on other water users.
Treatment and disposal of dirty water. Dirty	water must be treated according to Indonesian regulations before being discharged into soil or water.	Install, operate and maintain sewer maintenance systems to a level of maintenance that complies with Indonesian regulations.

7.18 Social and Community Management Plan

The OESMP will contain a separate sub-plan called the Social and Community Management Plan, documenting methods, responsibilities and relationships with surrounding communities and managing real potential impacts.

At a minimum, the following should specify, or provide a breakdown of, methods for, and responsibilities for, community relations.

Table 9 Mitigation of Social and Community Impacts and Efforts to Minimize Impacts.

PROBLEM	OBJECTIVES / STANDARDS OF PREVENTION	EFFORTS

Changes in the downstream river environment and changes in river flow.	Downstream river users must not be adversely affected by inundation or the operation of the Upper Cisokan hydropower plant. Downstream landowners and riverbank settlers should not be severely affected by inundation or hydropower operation	Communication process with downstream river users, including farmers using Cihea Irrigation, regarding changes to river flow during inundation and hydropower operations. Consultations should provide opportunities for communities to raise concerns. PLN and the community should work together to find the best solution before charging, during charging and during operations. All complaints must be resolved.
Floods and Dam Failures	There were no casualties and property losses.	Educational programs and warning systems (refer to Section 8.14)
Noise.	Noise levels should not adversely affect people, livestock or wild species.	Operation of appropriate facility equipment and sound suppressors.
Road Traffic	Vehicle operations should not disturb the village community.	Maintenance of appropriate vehicles. Maintain safety equipment for access road.

7.19 Environmental Monitoring Environmental

Monitoring during inundation and operational stages which is documented in the Environmental Monitoring Plan. PLN will cross reference the Plan with the OESMP in this section as appropriate to ensure consistency. The appropriate monitoring parameters are described in Table 10.

Table 10 Summary of Monitoring Matrix

PARAMETERS	**TIME FRAMEWORKAND MONITORING TYPES**	
	Pre-Construction and Construction	**Inundation and Operations**
	Initial environmental baseline	**Impact Monitoring**
River Flow		
Meteorology		
River water quality		

Habitat of rivers and macro invertebrates		
fish		
Biota / Biodiversity		
Groundwater level		
The level of reservoir water and discharge		
Water weeds in the Reservoir		
Dam stability and landslides		

Key

	Environmental impact monitoring
	Weather monitoring or operational
	Requires no monitoring

7.20 Communication and Reporting

7.20.1 General Communication Matrix

PLN will develop a detailed communication strategy, including an understanding program for local communities. Schedule, budget, training resources and requirements to be included. The following measures have been proposed for implementation.

Table 13 Communication Matrix

RELATED PARTIES	MAIN INTEREST	CONTACT TOOLS AND MANAGEMENT PLAN RELATED
Surrounding communities.	Access to environmental resources and changes in land and river environments.	Complaint / question services by village representatives. On-site 'One-Stop Service' for villagers to discuss issues, within the complaint service mechanism
	Information on flood risk, availability of downstream water during dry season.	Early warning system training Fixed reports on downstream

RELATED PARTIES	MAIN INTEREST	CONTACT TOOLS AND MANAGEMENT PLAN RELATED
	water quality and watershed issues Regular	reports on water quality and watershed management
Public	Interest, and outreach	Information updates to the media - press releases to local and local newspapers as needed Grievance / inquiry
channels Government Agencies related	Environmental and social issues	Written reports and meetings

7.20.2 Complaint Service Process

PLN will document a detailed grievance process, whereby local communities and other individuals or organizations can approach PLN regarding these matters. The process will detail the following:

- Acceptance of Complaints
- Record keeping
- Work plan, implementation methods and results.
- Complaint resolution (until the prosecutor is satisfied)

7.20.3 Reporting

procedures should be documented in detail, including budget, resources, and training needs for specific activities. As a minimum, the following external reports are required by PLN which are depicted in Table 14.

Table 14 Reports and Reporting Needs

REPORT TYPE AND OBJECTIVES:	SUBMISSION FREQUENCY	REPORTREPORT SUBMITTED TO
OESMP and sub-plans prepared under OESMP For approval before implementation	If required, prior to implementation	• Directorate General of Electricity and Energy Utilization (Ditjen LPE) • West Java Province BPLHD • Environmental Services for Cianjur and West Bandung Districts

REPORT TYPE AND OBJECTIVES:	SUBMISSION FREQUENCY	REPORTREPORT SUBMITTED TO
OESMP updates (including changes in management and monitoring procedures) For approval before implementation	If needed, prior to implementation	• Directorate General of Electricity and Energy Utilization (Ditjen LPE) • West Java Province BPLHD • Environmental Agency of Cianjur and West Bandung Districts
Important operational changes that may affect Environmental Approval	If required, prior to implementation	• Directorate General of Electricity and Energy Utilization (Ditjen LPE) • West Java Province BPLHD • Environment Agency Cianjur and West Bandung
report emergency incidents (including the work plan if	required),if required within 24 hours of the incident (in accordance with the procedure incident, which underscores the severity of the incident that requires reporting)	• Directorate General of Electricity and Energy Utilization (Ditjen LPE) • West Java Province BPLHD • Environmental Agency of Cianjur and West Bandung Regencies Non-
reports	conformanceWhen required (according to incident procedures, which underline the severity of incidents requiring reporting) Either within 24 hours of an emergency, within 1 week of an important event, or annually for corrected minor violations)	• Directorate General of Electricity and Energy Utilization (Ditjen LPE) • West Java Province BPLHD • Environmental Office of Cianjur and West Bandung Regencies
Environmental monitoring reports	annually	• Directorate General of Electricity and Energy Utilization (Ditjen LPE) • West Java Province BPLHD • Environmental Agency of Cianjur and West Bandung
Other monitoring data as	Regencies needed	• Directorate General of Electricity and Energy Utilization (Ditjen LPE) • West Java Province BPLHD • Environmental Service of Cianjur and West Bandung Regencies

7.21 Capacity and Training

The OESMP will be implemented into the ISO14001 Environmental Management System. The management system will provide systems and structures for the implementation of plans, monitoring, reporting and delegation to third parties. Specific capacity building is required in the following sections: (Table 15):

Table 15 Capacity Building

MAIN SECTION	OFCAPACITY DEVELOPMENT REQUIREMENTS	BUDGET
Biota / Biodiversity Management	Training for the PLN Environmental Unit by ecologists on theory and implementation for primate habitat management and implementation Biota / Biodiversity Management Plan.	To be complemented by
Greenbelt Reservoir Management	Training for the PLN Environmental Unit by ecologists on the theory and implementation of the establishment of rare habitats in greenbelt areas, and protection of greenbelt areas and reservoirs from work, for safety reasons	
River habitat management	Training for PLN Environmental Units by ecologists and hydrologists regarding river ecology and habitat, and changes in habitat due to sediment and changes in river flow to downstream reservoirs. Training in methods for monitoring habitat conditions and changes to the downstream reservoir.	

7.22 Training

PLN will document in detail the training requirements and procedures for managing training, for environmental management and community relations. The OESMP document will contain the training schedule, procedures for record keeping. Records of training attendance and training program should be kept and will be used for inspection / audit purposes.

As a minimum, the training section will detail:

7.22.1 Management and operation of the ESMP

All parties responsible for managing and operating aspects of the OESMP will be trained according to their roles. Evidence of training must be kept on site, for inspection / audit purposes.

PLN will ensure that the PLN Environmental Unit has an OESMP compliant. External training, and / or the use of third-party contractors or consultants may be required to developcapacity *in-house*.

7.22.2 River Environmental Monitoring and Interpretation of Results

Monitoring and interpretation will be carried out by suitably qualified staff. If PLN does not have this expertise, PLN can subcontract the work.

7.22.3 Hazardous Substances Management and Emergency Procedures

All staff involved in the handling and use of chemicals, fuels and explosives will be provided with training in scatter handling and emergency procedures. Evidence of training must be kept on site, for inspection / audit purposes.

7.22.4 Operational Procedures for Managing Downstream Water Flow

All staff involved in operating the hydropower plant should be trained according to the procedures for effort and maintaining the downstream flow at each dam. Evidence of training must be kept on site, for inspection / audit purposes.

7.23 Monitoring and Review Plans

Environmental Unit PLN will keep in OESMP regular monitoring to regularly and audit the effectiveness and implementation of the OESMP. Audit programs and procedures must cover the full scale, frequency and method as well as the responsibilities and requirements for conducting audits and reporting the results.

As a minimum, the OESMP will cover:

7.23.1 OESMP Review

OESMP will be reviewed periodically to evaluate environmental controls and procedures to ensure that the OESMP can still be applied to activities. *The review* will be conducted by PLN, as follows:

- The entire OESMP will be*reviewed* at least once a year.
- The relevant sections of the OESMP should be*reviewed* following an incident report.
- The relevant sections of the OESMP should be*reviewed* following acceptance of the updated sub-plans.
- The relevant parts of the OESMP should be*reviewed* prior to the introduction of new operational procedures or activities.
- Relevant sections of the OESMP should be*reviewed* where new environmental and social impacts are identified.
- If there is a request from related parties, including government agencies and the surrounding community.

Thereview OESMP will include analysis of data collection and results, monitoring reports, incident reports, complaints, stakeholder feedback, government agency reports, consultation meeting minutes and training records, to evaluate the

effectiveness of the procedure. Site visits, interviews and other audit methods can also be used.

Updating the ESMP, following a *review*, will follow the following procedure below.

7.23.2 OESMP Control and Update

The ESMP will be published as a 'controlled document' to all staff, departments and internal organizations. This procedure will be followed to control documents, provide a review of their effectiveness and provide updates as follows:

1. The ESMP that is circulated will be numbered by the PLN Environmental Unit.
2. The PLN Environmental Unit will initiate a review of the relevant section after a modification to the Environmental Agreement, new approval issues, or changes to internal procedures based on corrective actions or improvements in methodology.
3. The PLN Environmental Unit will ensure that the documents are reviewed and all sections are up to date.
4. Any part of the OESMP that requires Government Agency approval must be coordinated with the relevant agencies and may not be implemented until approval has been issued.
5. All ESMPs in circulation must be updated and after changes are made, which is coordinated by the Environment Unit.
6. All improvements to the sub-plan are sent to the Environment Unit to update the attachments related to this plan,
7. Updates will be communicated to all interested parties and affected by the project.
8. Updates will be noted in Section 1.5.

7.24 Review of Government Agencies

All reports, records and monitoring results will be made available to government agencies upon request from them. Government agencies should have the capacity to review results and make similar monitoring or checks to ensure compliance with the ESMP and any agreements circulated.

If a government agency does not have the capacity to inspect, PLN will ensure that an independent audit body is carried out at the request of the agency and according to their own will.

8 APPENDIX 8: ENVIRONMENTAL MONITORING PLAN

8.1 Overview

Monitoring is a key tool in analyzing the environmental and social impacts of the Upper Cisokan Pumped Storage Hydro Power Plant, and a tool for providing information to PLN and related parties on adaptive management responses that may be needed to avoid, improve, or reduce these impacts. Environmental monitoring is also important for the management of floods and other emergencies, and for maximizing the operational results of the UCPS.

Environmental monitoring is required throughout the Upper Cisokan Pumped Storage Hydropower Project, from pre-construction to operational. Environmental Monitoring Planning must obtain details of parameters, location, frequency, methods, reports, analysis, actions resulting from the analysis, and monitoring and reports of the duties and responsibilities of each of the following stages:

- Pre-construction baseline environmental monitoring
- Monitoring the Construction Period
- Inundation Period Monitoring
- Operational Monitoring

The objectives of the Environmental Monitoring Plan are:

- To ensure compliance with Indonesian laws and regulations;
- To continue monitoring of the initial environmental baseline;
- To measure the success of proposed preventive measures in minimizing and / or reducing potential environmental impacts;
- To monitor the effectiveness of the Upper Cisokan Pumped Storage Hydropower Environmental Management Plan and all parts of it;
- To provide data / facts / analysis to assist the implementation of corrective actions or management program, as needed, if the proposed preventive measures do not reduce and / or eliminate potential project impacts, or reach standard levels of implementation / previous fulfillment.

8.2 Program

Monitoring planning will be completed by the PLN Environmental Unit, and operational, no later than one year prior to construction.

8.3 ESMP Framework

The Environmental Monitoring Plan will contain all monitoring needs for each stage of the Upper Cisokan Pumped Storage Hydro Power Plant, and how the results, analyzes, work plans and reports contribute to the management of environmental impacts.

The Monitoring Plan is shown in the Construction Stage ESMP Framework and Operations Stage ESMP in the diagram below. The Monitoring Plan is part of Quality Assurance, and includes monitoring of the effectiveness of the ESMP and monitoring of actual and potential environmental and social impacts.

The Monitoring Plan must coordinate the monitoring of the various sub-plans, but detailed documentation of procedures and responsibilities will remain part of the sub-plans.

The Monitoring Plan does not include dam safety procedures, flood warning systems, emergencies, monitoring of structural features and other monitoring tools as part of the operation of the Upper Cisokan hydropower plant. These procedures are the responsibility of the Upper Cisokan Hydro Power Plant operator, and will only be cross-referenced in this Plan where there are environmental problems or there are consequences resulting in impacts, or where the environmental team will be responsible for carrying out the monitoring.

All Upper Cisokan Pumped Storage hydropower plant ESMP procedures remain in line with the plan, and must be followed. Other management plans within the framework of the ESMP project that relate to the development and implementation of this plan, are:

- Biodiversity Management Plan/ Tranmsission Line Biodiversity Management Plan
- Cultural Heritage Management Plan
- Construction ESMP • Reservoir Preparation Plan
- Quarry Management Plan
- Operational Environmental and Social Management Plan
- Social and Community Management Plan

Transmission Line Environmental and Social Management Plan

- C-ESMP Package 1 for Management of Civil works that including the Access Road and Quarry works
- C-ESMP Package 2 for Management of Generator Turbine works
- C-ESMP Package 3 for Management of Transmission works
- C-ESMP Package 3 for Management of Metal Works

The monitoring plan should also be consistent with, and add to, the design report detailing the following: Newjec Inc. 2002. Detailed Design for Upper Cisokan Pumped Storage Hydro Power Plant Project. Part VII: Monitoring and Telemetering System.

8.4 Content of the Monitoring Plan

The Environmental Monitoring Plan is the responsibility of the PLN Environmental Unit, and should specify:

- Roles and responsibilities;
- Detailed methods and procedures for each part of the monitoring program, including monitoring parameters, location, frequency, methods, requirements for compliance, reporting, analysis and actions resulting from the analysis;
- Program detailing / schedule;
- Reporting requirements;
- Capacity, training and budget, and;
- Plan review procedures - specifically how the Plan will be updated as to the current state for each stage of the project, and how PLN will be integrated into the PLN Environmental Management System when the Upper Cisokan Pumped Stored Hydro Power Plant operates.

8.5 Roles and Responsibilities

The environmental unit of PLN PHJ is responsible for the environmental monitoring plan throughout the entire project. Responsibilities can be delegated to Supervision Engineers when they are involved, and this delegation can continue throughout the contract period - that is, during pre-construction, construction and inundation. If

responsibility has been delegated, the PLN PHJ Environment Unit maintains a supervisory role over the actions and outcomes of the Supervision Engineers. During operation, PLN PHJ Environmental Unit will be responsible for reviewing, updating and implementing the Monitoring Plan.

The Supervision Contractor and Consultant must contribute to their Monitoring Plan responsibilities following various other plans under the Environmental Management Plan, including the Cultural Resources Management Plan, Biota / Biodiversity Management Plan and Construction Management Plan and Workers' Barracks / Basecamp.

It is hoped that the monitoring results will be reported periodically to relevant external parties and Government Agencies. These parties have a review role, and contribute to feedback to PLN to assist in the adaptive management process of environmental and social risks and impacts.

The Monitoring Plan should detail the roles and responsibilities of the following parties:

- PLN Environmental Unit
- Supervision Engineer
- Contractor
- Government Agencies
- Related external parties

8.6 Monitoring Program

Monitoring Plan should include a detailed monitoring program. Table 1 provides a matrix of minimum monitoring requirements. This includes the parameters to be monitored, which stages of the project require monitoring, and the type / purpose of monitoring.

Table 1 Monitoring Matrix Summary

PARAMETER	TIME FRAMEWORK AND TYPES OF MONITORING				
	Pre-Construction	Construction		Inundation and Operations	
	Compared to Environment Baseline	Impact related to Construction	Compared to pre-operational data	Impacts related to Inundation	Impact related to Operations
River flow					
Meteorology					
River water quality					
Habitat of rivers and macro inverte brates					
Fish					

PARAMETER	TIME FRAMEWORK AND TYPES OF MONITORING				
	Pre-Construction	Construction		Inundation and Operations	
	Compared to Environment Baseline	Impact related to Construction	Compared to pre -operational data	Impacts related to Inundation	Impact related to Operations
Diversity Biota / Conservation					
Groundwater level					
Noise					
Dust					
Cultural Objects					
Reservoir and discharge levels					
Water weeds in the Reservoir					
Dam and soil stability					
Impacts related to construc tion					

Information

	Environment Impact Monitoring
	Weather or operational Monitoring

8.6.1 Weather

The monitoring plan should contain, at a minimum, in the following, or provide further details on methods and responsibilities for monitoring the weather.

Purpose: To provide timely warning data for flood forecasts and ensure proper gate operation to avoid downstream flooding and vice versa to activate a flood warning system in the community.

Provide data for managing reservoir levels and dam discharge, for power generation and provision of environmental flows downstream of both dams.

Parameters: Wind speed, temperature, rainfall and humidity.

Method: Automatic meteorological logging observation equipment will be permanently installed in switchyards and upper and lower dams. Continuous rainfall measurement tools will be located in the catchment center of the Cisokan River.

Frequency: Continuous

Project Monitoring Program Stages: Monitoring must be carried out continuously at all stages of the project. Monitoring was started as soon as possible to provide as many rainfall records as possible. This data contributed to the creation of a watershed model.

Implementation Standards: Not applicable

8.6.2 River flow

The Monitoring Plan should contain the following minimum information, and should instead provide further details on methods, responsibilities and flow monitoring.

Objective: Provide more evidence on the quality of existing aquatic habitats and flow regimes that support existing fauna populations.

Provide more evidence on daily, monthly and annual flow patterns, the nature of flooding, and the rate of response to rainfall in the catchment, and the nature and period of low flow.

Providing flood disaster warning data to ensure proper gate operations to avoid downstream flooding, and in addition to activating a flood warning system in the community.

Provides data to regulate reservoir levels and dam discharges, for electricity generation and provision of environmental flows downstream of both dams.

Parameters: River flow (cubic meters per second).

Method: Automatic logging for measuring river flow at the following locations:
- Upper Cisokan River, lower reservoir
- Lower dam of the Cisokan River
- Upper Cirumamis River, the upper reservoir
- Upper Cirumanis River downstream and upstream lower reservoir

Frequency: Continuous

Project Monitoring Program Stages: Monitoring must be carried out continuously at all stages of the project. Monitoring was started as soon as possible to allow obtaining as much river flow data as possible. This data will contribute to modeling flooding and low flow conditions.

Implementation Standards: Not applicable.

8.6.3 River Water Quality

The monitoring plan should contain the minimum plan as follows and otherwise provide further details on methods and responsibilities for monitoring river water quality.

Purpose: provide further evidence of the quality of the habitats present in water and the stresses on water quality.

To provide data on development and operational impacts on water quality, against baseline data, and possible impacts on rivers and other reservoir habitats and fauna.

Provide data for adaptive management of the Upper Cisokan hydropower plant to improve water quality if needed.

Parameters: pH, temperature, electrical conductivity, turbidity, suspended density, clarity, dissolved oxygen, BOD (Biological Oxygen Demand), COD (Chemical Oxygen Demand), dissolved reactive phosphorus, Total nitrogen, Ammonia Nitrogen, iron, manganese, zinc, copper , mercury, bacteria (MPN total coliform and fecal coliform).

Methods: According to international standards for sampling, sampling preservation and laboratory analysis for each parameter. Unstable parameters, especially temperature, dissolved oxygen, pH and electrical conductivity, are determined in the field using portable equipment. Samples for analysis of other parameters are collected in clean glass or polypropylene bottles to be transported to the laboratory in a cool container. Samples for bacteriological analysis should be collected in sterile bottles and analyzed within 24 hours.

Site surveillance must be confirmed, however the recommended locations are:

Before inundation:

1. Control in the upstream, upstream areas of reservoir inundation (Cilengkong, Cisokan, Cirumanis)
2. Impact downstream, downstream of the dam (Cisokan, Cirumanis)
3. Control on site (adjacent catchment areas, eg Cijambu, upstream of access road development)

During inundation and operation:

1. Control upstream, as above
2. Downstream impacts, as above
3. Control at locations as above

4. Upper Reservoir - Middle Reservoir, will be taken three samples at this point, to determine the water quality in the vertical profile; one on the surface, one in the middle slightly deep, and one near the bottom.
5. Lower Reservoir - Middle reservoir. Three samples will be taken at this point, to determine the water quality on a vertical profile; one at the surface, one in the middle slightly deep, and one near the bottom.

Frequency: quarterly, at least 4 sample activities before construction, quarterly monitoring to continue until at least five years after inundation.

Project Monitoring Program Stages

TIME FRAMEWORK AND TYPES OF MONITORING				
Pre construction	**Construction**		**Inundation and Operations**	
Compared to Environment Baseline	**Impact related to Construction**	**Compared to pre-operational data**	**Impacts related to Inundation**	**Impact related to Operations**
√	√	√	√	√

Compliance Standards: West Java Governor Decree No. 39 of 2000. This standard is given by sampling and refers to the following water uses:
B: water suitable for drinking water but must be managed
C: water suitable for aquaculture and livestock / drinking water.
D: water suitable for irrigation for urban, industrial and hydropower activities.

8.6.4 River Habitats and Macro Invertebrates

The monitoring plan should contain the following minimum details and should provide further details on methods and responsibilities, monitoring of habitat and river water quality.

Purpose: to provide further evidence of the quality of existing aquatic habitats.

Describe the basic environmental conditions of the river downstream of the lower dam, and changes after inundation and operation.

To provide data on development impacts on river habitats and macro invertebrate populations, including sedimentation and other changes to habitat.

To provide data on operational impacts on the downstream habitat and population of macro invertebrates from the bottom.

Provide data for the adaptive management of the Upper Cisokan hydropower plant and / or prevention methods to maintain downstream habitat.

Parameters: river flow intersections, riparian land use / cover, substrate material type, macro-invertebrates, periphyton (algae), visual assessment of bed and riverbank erosion.

Method:

All sampling should take place at the same location, such as water quality monitoring except for the mid-reservoir location, and include the following additional sites:

• Cisokan River, at least 500m downstream from the lower dam but downstream where it meets other large tributaries.

• Cisokan River, at least 1km upstream from the Cihea irrigation diversion.

Substrate material, macro invertebrates and periphyton were collected using international methods.

The intersection portion of the river flow should be measured using survey equipment to provide a transect profile of the entire downstream area (dry and wet areas), and the river depth profile.

Riparian land use / cover should be delineated by observation, including the types of plant and fauna species present.

Manual river flow measurements must be carried out at the same location during the sampling activity.

Visual analysis of bank and riverbed erosion in the Lower Dam should be made and recorded using photographs, aerial photographs and / or videos.

Frequency: Quarterly. At least four sampling activities prior to construction. At least one survey per year for a long period of time after low flow. monitoring frequency and timing should continue until at least five years after inundation.

Monitoring program through the stages of the Project:

TIME FRAMEWORK AND TYPES OF MONITORING				
Pre Construction	**Construction**		**Inundation and Operations**	
Compared to Environment Baseline	**Impact related to Construction**	**Compared to pre-operational data**	**Impacts related to Inundation**	**Impact related to Operations**
√	√	√	√	√

Compliance Standard: To be determined.

8.6.5 Fish

The Monitoring Plan should contain the following details at a minimum, or provide further details on methods, and responsibilities, of monitoring fish in reservoir and river systems.

Objective: To understand the nature and health of existing fish populations prior to changes in inundation.

To provide data on operational impacts on numbers and types of fish species and fish populations.

Provide data for adaptive management of the Upper Cisokan Pumped Storage (UCPS) hydropower plant to protect native fish species and fish species that provide livelihoods for local communities.

Parameters: The number and type of fish caught.

Changes in fishing.

Method: Fish counts will be carried out at the same location as water quality monitoring.

Fish should be caught and released using international methods for seine net and / or electric fishing.

Changes in fishing efforts that will be monitored by local fishermen.

Frequency:

Basic: - quarterly.

Operational impact monitoring: semi-monthly for at least the following four years after sealing.

Monitoring program through the stages of the Project:

TIME FRAMEWORK AND TYPES OF MONITORING				
Pre Construction	**Construction**		**Inundation and Operations**	
Compared Environment Baseline	**Impact related to Construction**	**Compared to pre-operational data**	**Impacts related to Inundation**	**Impact related to Operations**
√	**NA**	√	**NA**	√

Standard of Compliance: To maintain base type and number of species, and fish population.

8.6.6 Noise

The Monitoring Plan should contain the following details as a minimum, or provide further details on methods, and responsibilities for, of monitoring noise in local communities.

Purpose: To measure the baseline ambient noise and to measure the impact of construction noise ambient on the local community.

To provide data for construction management and noise-related matters.

Parameters: dBA more than 10 minutes.

Methods: Monitoring sites to be identified, but recommended sites are settlements close to:

- Quarry Gunung Karang
- Access Road
- The construction site of the upper dam
- Lower dam construction site

Monitoring (including location of noise measuring equipment and measurement duration) and interpretation of results must be according to Indonesian and international standards.

Frequency: Basic-six months for one year.

Construction impact monitoring: Quarterly during construction, or more frequently responding to complaints or specific noise issues.

Monitoring program through the stages of the Project:

TIME FRAMEWORK AND TYPES OF MONITORING				
Pre Construction	**Construction**		**Inundation and Operations**	
Compared to Environment Baseline	**Impact related to Construction**	**Compared to pre-operational data**	**Impacts related to Inundation**	**Impact related to Operations**
√	√	**NA**	**NA**	**NA**

Compliance Standard: 50 dB (A) for daylight noise (Kept.48 / MENLH / II / 96)

8.6.7 Dust

The Monitoring Plan should contain the following details as a minimum, or provide further details on methods, and responsibilities for, of monitoring dust disturbance in the local community.

Purpose: To measure baseline ambient noise and to measure the impact of the construction of ambient noise on the local community.

To provide data for the management of construction and dust related matters.

Parameters: Suspended particulate (g / m3).

Methods: Monitoring sites to be identified, but recommended sites are settlements close to:

- Quarry Gunung Karang
- Access Road
- The construction site of the upper dam
- Lower dam construction site

Monitoring (including location of noise measuring equipment and measurement duration) and interpretation of results must be according to Indonesian and international standards.

Frequency: Operational impact monitoring: Quarterly during construction, or more frequently responding to complaints or specific noise issues.

Monitoring program through the stages of the Project:

TIME FRAMEWORK AND TYPES OF MONITORING				
Pre Construction	**Construction**		**Inundation and Operations**	
Compared to Environment Baseline	**Impact related to Construction**	**Compared to pre-operational data**	**Impacts related to Inundation**	**Impact related to Operations**
NA	√	**NA**	**NA**	**NA**

Compliance Standard: 0.26 mg / m3 (Governor of West Java No. 660.31 / SK / 684-BKPMD / 1982)

8.6.8 Groundwater Level

The monitoring plan should contain the following details as a minimum, or provide further details on methods, and responsibilities, of groundwater level monitoring.

Objective: to determine the impact of construction and operation on groundwater levels, so as to estimate or regulate the potential impacts on water supplies, septic tanks, development stability, and land use boundaries for the scheme.

Parameters: groundwater level.

Method: measuring the distance for groundwater from the bottom surface.

Monitoring the location to be identified, following the records taken:

• At least two domestic groundwater wells located near the excavation work, area borrowing, and / or main excavation. At least two domestic groundwater wells located near the lower reservoir.

Frequency: Quarter.

Monitoring program through the stages of the Project:

TIME FRAME AND TYPE OF MONITORING				
Pre Construction	**Construction**		**Inundation and Operations**	
Compared Environment Baseline	**Impact related to Construction**	**Compared to pre-operational data**	**Impacts related to Inundation**	**Impact related to Operations**
√	√	√	√	√

8.6.9 Cultural Heritage

This chapter should be cross-referenced and provide all necessary details of the Cultural Heritage Management Plan and the Construction Management Plan and Workers' Barracks / Basecamp. The plan must contain at a minimum:

1. Routine monitoring of the significance and / or vulnerability of Cultural Objects and tombs.
2. Discovery Incidents

8.6.10 Reservoir and Dam Discharge Level Monitoring

The Monitoring Plan should contain the following details at a minimum, or provide further details on the methods, and responsibilities for, of monitoring water levels in reservoirs and discharge from individual dams.

Purpose: to assist flood risk analysis to ensure proper gate operation to avoid downstream flooding, or to activate a flood warning system.

Provides data to regulate reservoir and dam discharge rates for power generation and environmental flow provisions downstream of both dams.

Parameters: Water level (m) discharge flow (meter cubic per second).

Method: hydraulic measuring device consists of:

a) an electronic measuring device is placed in a monitoring well in the upper reservoir to measure the water level in the upper reservoir at the dam.

b) an electronic gauge is placed in a monitoring well in the lower reservoir to measure the water level in the lower reservoir in the dam.

c) automatic recording of the lower valve orifice and / or gate, which is adjusted according to the flow.

Frequency: Continuously

Monitoring program through the stages of the Project:

TIME FRAME AND TYPE OF MONITORING				
Pre-Construction	**Construction**		**Inundation and Operations**	
Compared to Environment Baseline	**Impact related to Construction**	**Compared to pre-operational data**	**Impacts related to Inundation**	**Impact related to Operations**
NA	**NA**	**NA**		√

Compliance standards: dam discharge must reach the flow requirements of the ESIA, ANDAL or other agreement. From the ESIA: the minimum discharge from the lower dam is 0.2m3 / s; Upper dam should always be removed when the inflow is minimum during low flow conditions

8.6.11 Water weeds in the Reservoir

The Monitoring Plan should contain the following details at a minimum, or provide further details on the methods, and responsibilities, of monitoring aquatic weeds in both reservoirs.

Purpose: to prevent water weeds from growing.

Parameters: cover with aquatic weeds and species (species, percentage of cover).

Methods: visual analysis of the growth of aquatic weeds in each reservoir. Observations are made by boat at at least four different places in each reservoir.

Frequency: monthly for the first two years of operation. Frequency for review after two years.

Monitoring program through the stages of the Project:

TIME FRAME AND TYPE OF MONITORING				
Pre Construction	**Construction**		**Inundation and Operations**	
Compared to Environment Baseline	**Impact related to Construction**	**Compared to pre-operational data**	**Impacts related to Inundation**	**Impact related to Operations**
NA	**NA**	**NA**	**NA**	√

Compliance standards: to be established.

8.6.12 Dam Stability and Soil Stability

Monitoring methods related to the technique of the dam structure and soil stabilization works (in the upper reservoir) should be documented in the operational manual of the Upper Cisokan Pumped Storage Hydro Power Plant. Cross references required by the PLN Environmental Unit, or cause consequences for environmental monitoring programs or management methods, should be documented in the monitoring plan.

8.6.13 Effects related to Construction

Detailed impacts related to the construction and monitoring program will be documented in the CESMP and the Workers' Barracks / Basecamp. This chapter should be cross-referenced and provide the necessary details of the Construction Management Plan and the Workers' Barracks / Basecamp, specifically relating to:

1. Discharge streams and other discharges, and water bodies upstream and downstream from the point of discharge:
    - Tunnels / excavation dumps
    - Concrete and asphalt manufacturing waste
    - Treatment of pond sediment and other devices
    - Water discharge from work sites, including dam construction sites
2. Traffic incidents
3. Incidents of pollution
4. Water supply in the barracks / basecamp
5. Waste water discharge management facilities
6. Appropriate river diversion

7. Visual analysis of erosion and erosion control measures

8.6.14 Incident Monitoring

During an incident occurs, this will require the short-term intensive implementation monitoring until the cause of the incident is detected and appropriate corrective action is taken.

An Incident can (but is not limited to) one of the following:
1. Complaints from the community
2. Results that exceed compliance standards
3. Unexpected monitoring results
4. Discovery of graves and cultural objects
5. Accidents, spills, landslides, or other unplanned events
6. Issues highlighted by government agencies

The monitoring plan should specify the type of incident due to the nature and nature of the intensive monitoring that may be carried out as a result.

8.7 Analysis, Action Plan, Reporting

Monitoring plans should detail the methods for interpreting and analyzing the results and how the results of monitoring, analysis and reporting plan that will be reported.

The Monitoring Plan should also documenting how the results of environmental monitoring and inspection or learning from other Environmental Management Plans will be incorporated into the process

The minimum reporting requirements include:

Report Type and Purpose	Delivery Frequency	Report Submitted On
All environmental reports : • The whole result • All interpretation / analysis • All incident monitoring • The whole action were purposed and the results	Everyyear	• Directorate General of Electricity and Energy Utilization (DG LPE) • BPLHDs province of Jawa Barat • Office of the Department of Environment of Life Regency Cianjur and Bandung Barat

The results of the monitoring report will provide the information required to review and update the Environmental Management Plan, the Environmental Operational Management Plan and various sub-plans. The monitoring plan should document how

the reporting and review process will be carried out, including timeframes and responsibilities.

8.8 Capacity and Training

8.8.1 Capacity

The monitoring plan should list the capacity requirements for all involved in monitoring, including staff and consultants. This plan will also contain a budget.

8.8.2 Training

The monitoring plan includes a list of training requirements and processes the instructions to record the terms of the training and the training is done. Contains the minimum ESMP requirements for:

8.9 Management and Operational Monitoring Plan

All parties are responsible for the management and operation of any aspect of the monitoring plan given training appropriate to their role. Evidence of training must be kept in the field, for inspection / audit purposes. Attendance in the training and the training program must be stored and always available when the inspection / audit purposes.

8.10 Field Expert Work

All parties responsible for collecting samples or other data in the field should be trained in accordance with their roles, including staff and consultants. This includes:
- River measurement
- Water quality samples
- River bed sedimentation samples
- Macrovertebrate samples
- Biodiversity Surveys
- Fish Monitoring
- Noise Monitoring
- Water Quality Monitoring
- Cultural / archaeological objects survey

Evidence of training must be kept in the field, for inspection / audit purposes. Records of attendance in training and training programs must be kept and always available for inspection / audit purposes.

8.11 Monitoring Analysis and Report

All parties responsible for interpreting field data and reporting of results should receive training appropriate to their role, including staff and consultants. This includes:

- Water quality science
- Water Ecology
- Terrestrial ecology
- Noise
- Air quality science
- Hydrology
- Archeology

Evidence of training must be kept in the field, for inspection / audit purposes.
Records of attendance in training and training programs must be kept and always available for inspection / audit purposes.

8.12 Environmental Monitoring Plan Review

Environmental monitoring plan will contain the process of review and renewal, matched with the Environmental Management Plan review process Upper Cisokan Pumped Storage. This plan should also document how the monitoring plan incorporated into the Environmental Management System Upper Cisokan PLN currently operational.