



## Nam Ngiep 1 Hydropower Project

# Environmental and Social Management and Monitoring Plan 2017

## Construction Phase

Volume I

General Matters

May 2017

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## Abbreviations and Acronyms

ADB	Asian Development Bank
BAC	Biodiversity Advisory Committee
CA	Concession Agreement
CVC	Conventional Vibrated Concrete
DESIA	Department of Environmental and Social Impact Assessment, MONRE
DFRM	Department of Forest Resource Management
ECC	Environmental Compliance Certificate
EGATi	Electricity Generating Authority of Thailand International Ltd.
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EL	Elevation
EMP	Environmental Management Plan
EMO	Environmental Management Office
EMU	Environmental Monitoring Unit
EMS	Environmental Management System
ESD	Environmental and Social Division of NNP1PC
ESIA	Environmental and Social Impact Assessment
ESMMP-CP	Environmental and Social Management and Monitoring Plan – Construction Phase
FSL	Full Supply Level
GOL	Government of Lao PDR
GWh	Gigawatt hour
HSRA	Houay Soup Resettlement Area
IFC	International Financial Institution
IMA	Independent Monitoring Agency
ISO	International Organization for Standardization
JSC	Joint Steering Committee
KANSAI	The Kansai Electric Power Company Incorporated
km	kilometre
kV	kilo-Volt
LHSE	Lao Holding State Enterprise
LTA	Lender's Technical Advisor
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mines
MONRE	Ministry of Natural Resource and Environment, Lao PDR
MPWT	Ministry of Public Works and Transport
MW	Megawatts
NA	National Assembly
NNP1	Nam Ngiep 1 Hydropower Project
NNP1PC	Nam Ngiep 1 Power Company Limited
PAFO	Provincial Agriculture and Forestry Office

PAP	Project Affected People
PM	Prime Minister
PMO	Prime Minister's Office
PONRE	Provincial Department of Natural Resource and Environment, MONRE
RCC	Roller Compacted Concrete
RMU	Resettlement Management Unit
SMO	Social Management Office
SS-ESMMP	Site Specific Environmental and Social Monitoring and Management Plan
WRPC	Watershed and Reservoir Protection Committee

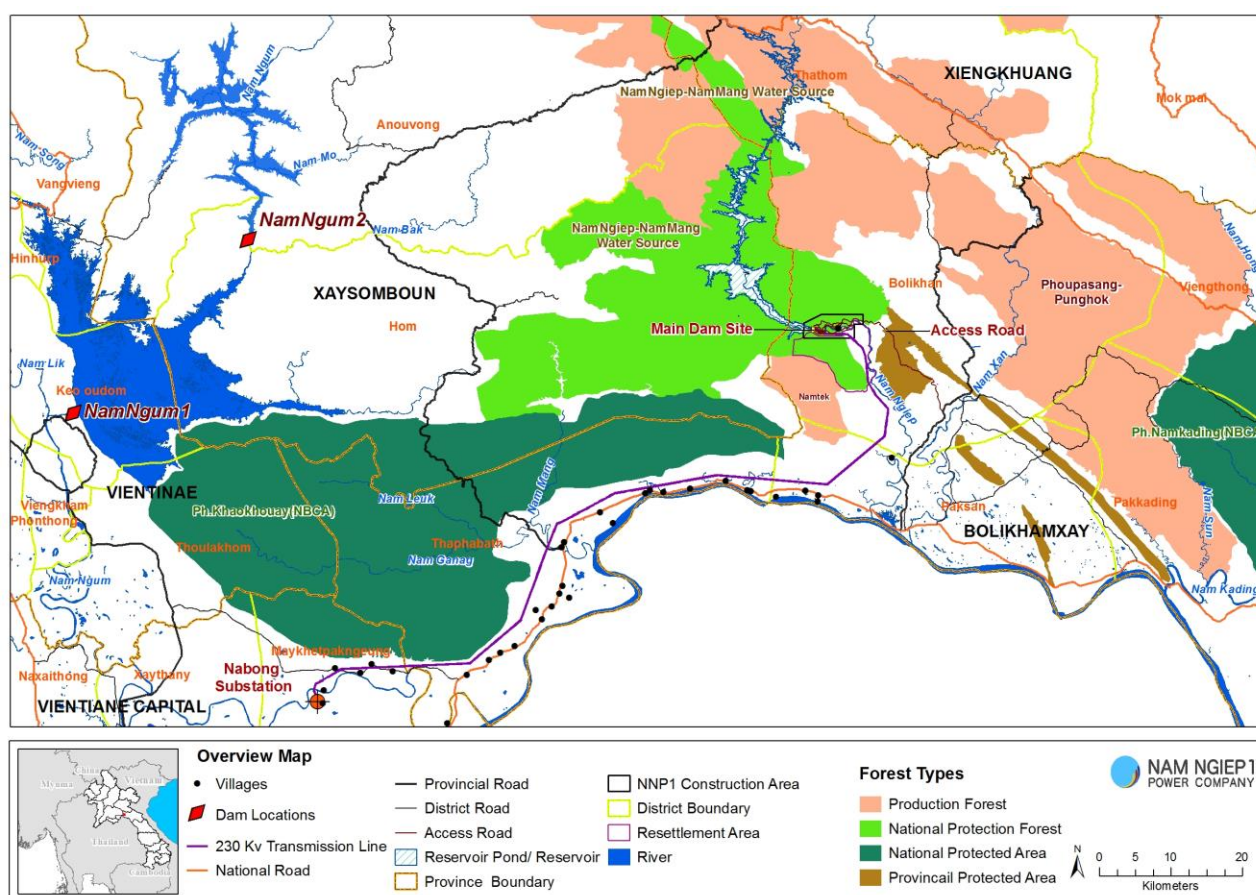
# 1 GENERAL

## 1.1 Background of the Nam Ngiep 1 Hydropower Project

Nam Ngiep 1 Power Company (NNP1PC) was formed on 12 April 2013 to develop, finance, construct, own and operate the Nam Ngiep 1 Hydropower Project. NNP1PC is a consortium between KANSAI (The Kansai Electric Power Company Incorporated Japan), Electricity Generating Authority of Thailand International Ltd. (EGATi) and Lao Holding State Enterprise (LHSE), established to produce and sell electric power.

The NNP1 is located on the Nam Ngiep River, a left bank tributary of the Mekong River, with the confluence about 7 km upstream of the town of Pakxan in Bolikhamxay Province, Lao PDR (see Figure 1-1). The source of the river is located near the town of Phonsavanh in Xieng Khuang Province. The river flows from north to south from its origin on the Tra Ninh plateau at EL 1,200 m, down to the Mekong plain at EL 160 m. The maximum altitude of the ridge surrounding the catchment area west of the Nam Ngiep River basin is 2,819 m. The river flows for nearly 160 km, and it drops a total of 1,030 m along its course. At its confluence with the Mekong, the Nam Ngiep has a total catchment area of 4,494.7 km<sup>2</sup>, and is composed of 33 tributaries (sub-catchments).

FIGURE 1-1 OVERVIEW MAP WITH THE LOCATION OF THE NAM NGIEP 1 HYDROPOWER PROJECT



The project will consist of two dams. The main dam which is located 9.0 km upstream of Hat Gnuin Village in Bolikhan District, will create a 70-km-long, narrow reservoir that extends up the Ngiep Valley as far as Thathom District. At 166 m high, the main dam will be the second largest in Lao PDR. The Power Station at this dam will generate up to 272 MW of electricity for export to Thailand. A second, smaller 20 m high labyrinth dam, is being built about 6 km downstream of the main dam. This creates a re-regulating pond upstream of the dam in order to regulate water flows, thereby minimising disturbances to the river and



people living further downstream along the Nam Ngiep. A small power station of 18 MW installed capacity located at this Re-regulating Dam will supply electricity for use in Laos.

At the end of the concession period, all plant facilities are expected to be transferred to the Government of Laos. With a combined capacity of 290 MW, Nam Ngiep 1 Hydropower Project will generate around 1,620 GWh of electricity annually. Two transmission lines will be required to transport the electricity generated by the project. From the main power station a 230 kV Transmission Line will run for 125 km to the Nabong outside Vientiane Capital. A 115-kV Transmission Line will be constructed by EDL from the Re-regulation Power Station to Pakxan substation over a distance of 40 km.

## 1.2 About the ESMMP-CP 2016

### 1.2.1 Purpose of the ESMMP-CP 2016

The objective of the ESMMP-CP is to determine the scope of the environmental and social measures that are required in order to fully comply with all environmental and social obligations during the Construction Phase of the Project. It serves as the framework for detailed design and implementation of measures to prevent, alleviate, mitigate, or minimize environmental and social adverse impacts arising from the Project in the course of the Construction Phase.

According to the Project's Concession Agreement, Annex C, Clause 64, NNP1PC is required to update its ESMMP-CP every two (2) years and submit the revised version to MONRE for review and approval not less than 60 days prior to the expiration of the 2-year validity period.

This ESMMP-CP 2017 is the first revision of the original ESMMP-CP, which was prepared in 2014 and approved by MONRE on 28 March 2014. The preparation of the ESMMP-CP 2017 started in 2016 and NNP1PC submitted a draft version to MONRE on 23 August 2016, which was then presented and discussed at a consultation workshop held in Vientiane on 14 September 2016. NNP1PC received written comments from MONRE and the Independent Monitoring Agency on 29 September 2016. NNP1PC also received comments from Lenders' Technical Adviser on 16 September 2016.

The ESMMP-CP will be strictly implemented during the construction phase of the Project.

### 1.2.2 Scope of the ESMMP-CP 2016

This updated ESMMP-CP deals solely with the environmental and social measures related to the Project Construction Works during the remaining part of the Construction Phase that is until Commercial Operation Date scheduled for 31 January 2019. Therefore, the construction works that have been completed at the time of this update are not included. These construction works were covered under the original ESMMP-CP 2014.

The main construction works and the related mitigation and monitoring measures covered by the Updated ESMMP-CP 2017 are listed in Table 1-1, and the main completed construction works covered under the ESMMP-CP 2014 are listed in Table 1-2. The completed construction works are not covered in the Updated ESMMP-CP 2017.

**TABLE 1-1 MAIN CONSTRUCTION WORKS COVERED BY THIS UPDATED ESMMP-CP 2017**

Main Construction Works Covered in the Updated ESMMP-CP
<ul style="list-style-type: none"> <li>▪ Construction of the main dam and the main powerhouse</li> <li>▪ Construction of the re-regulation Dam and powerhouse</li> <li>▪ Operation and closure of the quarry</li> <li>▪ Operation of the aggregate crushing plant</li> </ul>

**Main Construction Works Covered in the Updated ESMMP-CP**

- Operation of the roller compacted concrete batching plant
- Operation of the conventional vibrated concrete plant
- Operation of the spoil disposal areas
- Operation of main camps and workshops
- Construction and operation of landfills
- Construction of 230 kV Transmission Line
- Maintenance of the access road
- Construction of Houay Soup Resettlement Area Infrastructure
- Biomass Removal
- Impounding of the re-regulation reservoir and the main reservoir

**TABLE 1-2 MAIN COMPLETED CONSTRUCTION WORKS COVERED UNDER THE ESMMP-CP 2014 AND NOT INCLUDED IN THE ESMMP-CP 2017****Main Completed Construction Works Covered in the Original ESMMP-CP 2014**

- Construction of Access Roads and Temporary Bridge
- Construction of Main Camps and Workshops
- Construction of Spoil Disposal Area
- Construction of Diversion Tunnel
- Construction of Upstream Primary and Secondary Cofferdams
- Construction of Downstream Cofferdam

The ESMMP-CP is composed of four main parts as summarized in Table 1-3.

**TABLE 1-3 STRUCTURE AND MAIN CONTENT OF THE ESMMP-CP 2017**

<b>VOLUME</b>	<b>MAIN CONTENT</b>
<b>VOLUME I GENERAL MATTERS</b>	<ul style="list-style-type: none"> <li>▫ Project Overview</li> <li>▫ Brief description of the main construction works</li> <li>▫ Environmental and Social Policies</li> <li>▫ Legal requirements</li> <li>▫ Organization</li> </ul>
<b>VOLUME II PROCEDURES</b>	<ul style="list-style-type: none"> <li>▫ Environmental Management System</li> <li>▫ Competence, Training and Awareness</li> <li>▫ Communication and Reporting</li> <li>▫ Documentation and Control of Documents</li> <li>▫ Operational Control</li> <li>▫ Emergency Preparedness and Response</li> </ul>



VOLUME	MAIN CONTENT
	<ul style="list-style-type: none"> <li>▫ Checking, Monitoring and Auditing</li> <li>▫ Non-compliance, Corrective Action and Prevention Action</li> </ul>
<b>VOLUME III</b> <b>THEMATIC SUB-PLANS</b>	<p>Cross-cutting environmental and social mitigation and monitoring plans of general application for each of the main specific environmental aspects including:</p> <ul style="list-style-type: none"> <li>▫ SP01: Erosion and Sediment Control</li> <li>▫ SP02: Water Quality Management and Monitoring</li> <li>▫ SP03: Emission and Dust Control</li> <li>▫ SP04: Noise and Vibration</li> <li>▫ SP05: Waste Management</li> <li>▫ SP06: Hazardous Material Management</li> <li>▫ SP07: Vegetation Clearing</li> <li>▫ SP08: Decommissioning and Rehabilitation</li> <li>▫ SP09: Biodiversity Management</li> <li>▫ SP10: Spoil Disposal</li> <li>▫ SP11: Quarry and Construction Layout</li> <li>▫ SP12: Unexploded Ordnance (UXO) Survey and Disposal</li> <li>▫ SP13: Construction of Work Camps</li> <li>▫ SP14: Traffic and Access</li> <li>▫ SP15: Training and Awareness</li> <li>▫ SP16: Project Personnel Health Program</li> <li>▫ SP17: Emergency Preparedness</li> <li>▫ SP18: Physical Cultural Resources</li> <li>▫ SP19: Environmental Flows</li> <li>▫ SP20: Fisheries Monitoring Programme</li> </ul>
<b>VOLUME IV</b> <b>PROJECT COMPONENT SUB-PLANS</b>	<p>Specific environmental and social mitigation and monitoring plans for the main construction sites and Project components including:</p> <ul style="list-style-type: none"> <li>▫ Main Dam</li> <li>▫ Main Quarry</li> <li>▫ Roller Compacted Concrete (RCC) Batching Plant, Conventional Vibrated Concrete (CVC) Plant and Aggregate Crushing Plant</li> <li>▫ Spoil Disposal Areas</li> <li>▫ Re-Regulation Dam</li> <li>▫ Houay Soup Resettlement Area</li> <li>▫ 230 kV Transmission Line</li> <li>▫ Access Roads</li> <li>▫ Solid Waste Landfills</li> <li>▫ Biomass Removal</li> <li>▫ Camps and Associated Facilities</li> </ul>

## 1.3 Related Management Plans

### 1.3.1 Social Development Plan

The social and community development aspects including Project Labour Management and Occupational Health and Safety for the Project construction workers and employees are for practical reasons dealt with

in a separate standalone **Social Development Plan** with the content outlined in Table 1-4. The Social Development Plan was updated in 2016 incorporating comments from Lender's Technical Adviser and ADB. The updated plan was finalized in October 2016 and has been submitted to MONRE and published on NNP1PC website. The Social Development Plan elaborates on the issues of public health, labour and social management linked to construction and community development.

**TABLE 1-4 THE MAIN CONTENT OF THE SOCIAL DEVELOPMENT PLAN**

<b>Social Development Plan</b>	<ul style="list-style-type: none"> <li>▫ <b>Institutional Arrangements</b></li> <li>▫ <b>Labour Management Plan</b> <ul style="list-style-type: none"> <li>- <b>Compliance Framework</b></li> <li>- <b>Labour Sub-Programmes:</b> <ul style="list-style-type: none"> <li>- NNP1PC Recruitment and Employment policy</li> <li>- NNP1PC company policy on Freedom of Association</li> <li>- Policy on contractors and other providers of goods and services regarding labour standards</li> <li>- Recruitment Policy for Local Labour</li> <li>- Skills and knowledge training program for Land based skills training sessions</li> <li>- Community Management and Infrastructure Development</li> <li>- Human Trafficking Impacts and Management</li> <li>- Conflict Resolution</li> </ul> </li> <li>- <b>Employees and Workers' Health Sub-Programmes:</b> <ul style="list-style-type: none"> <li>- Health program for Construction Workers and their Followers</li> <li>- Care and Surveillance of Communicable Diseases among Workers</li> <li>- Emergency Treatment and First Aid for Major Accidents/Injuries</li> <li>- Personal Protective Equipment for Workers/Employees</li> <li>- Annual Physical Examination for Workers</li> <li>- HIV/AIDS Awareness Program for Workers/Employees</li> <li>- Campaign against Social misbehaviour</li> <li>- Prevention and Control of Sexually Transmitted diseases</li> </ul> </li> </ul> </li> <li>▫ <b>Community Development Plan</b> <ul style="list-style-type: none"> <li>- Gender Action Plan</li> <li>- Programs for Youth and Children; and,</li> <li>- Cultural Awareness/Heritage Preservation Program</li> </ul> </li> <li>▫ <b>Public Health Action Plan</b> <ul style="list-style-type: none"> <li>- Community health in resettlement areas</li> <li>- Community health - Project Impact Zone</li> <li>- Capacity building for GOL staff in project area</li> <li>- Integrated WASH and Nutrition program</li> </ul> </li> </ul>
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### 1.3.2 Watershed Management Plan

The Concession Agreement, Annex C, Clause 51 requires NNP1PC to provide financial contributions to the Government of Lao PDR (GOL) towards watershed management of the Nam Ngiep 1 Watershed. The fund contributions are capped in the amount of 6,550,020 USD of which 3,250,020 USD shall be provided to GOL before COD and the remaining 3,300,000 USD after COD. These funds shall support GOL for ensuring the effective and continuing protection of the watershed associated with the Project throughout the term of the Concession Agreement. In addition, the Company is obligated to mitigate adverse impacts on the catchment area caused by the Project.

NNP1PC is meeting these obligations by providing financial and technical support to the development and implementation of a Watershed Management Plan for Nam Ngiep 1 catchment area.

The Nam Ngiep 1 Watershed Management Plan is currently under preparation in close collaboration between the Company and the concerned Government Authorities. The Plan is expected to be finalised by June 2017.

The first steps in the plan preparation were initiated in July 2015 when MONRE established the Watershed and Reservoir Protection Committee (WRPC) to supervise and guide the development and implementation of the Nam Ngiep 1 Watershed Management Plan. The WRPC is supported by Watershed and Reservoir Protection Offices, which have been established in Bolikhamxay and Xaysomboun Provinces. The Watershed and Reservoir Protection Offices act as lead agencies working in close collaboration with relevant sectors at provincial, district and village level on plan preparation, consultations and subsequent implementation and monitoring.

The implementation of the Nam Ngiep 1 Watershed Management Plan will also be reinforced with Provincial Regulation issued by the Provincial Governors of Xaysomboun and Bolikhamxay Provinces to ensure the long-term protection and management of NNP1 Watershed. The provincial regulation is currently under preparation by Provincial Administration of both provinces.

The Nam Ngiep 1 Watershed Management Plan will have the following main aims:

- The important biodiversity values of the watershed will be maintained and protected;
- The rate of decline forest cover will be reduced and habitat supporting important wildlife will be protected;
- Land use practices that degrade soils leaving them exposed to erosion will be managed in a manner that reduces the threat of soil loss;
- Rivers and streams will be protected from practices that degrade water quality and habitat values for aquatic organisms;
- Fisheries will be managed for their biodiversity values whilst providing food and income to inhabitants of the watershed.
- Watershed inhabitants shall be assisted in maintaining and improving their living standards whilst having a reducing negative impact on the other values of the watershed.

The Watershed Management Plan will deal with issues on catchment scale that potentially may affect the water resources in the catchment area, the uses of the resources and the assets that depend on these resources. The plan is expected to include measures on forest protection, biodiversity management, fisheries management, erosion management and protection and management of riparian and riverine environments and habitats, and reservoir management.

However, potential impacts related to watershed management caused by the Nam Ngiep 1 construction works (e.g. sediment-laden runoff from construction sites, changes in river flows, biomass removal) are dealt with in this updated ESMMP-CP 2017.



FIGURE 1-2 NAM NGIEP 1 WATERSHED



### 1.3.3 Best Available Techniques and Best Practices

NNP1PC is committed and obligated to incorporate Best Available Techniques and Best Practices in the environmental and social measures. The technical measures and management practices presented in this updated ESMMP-CP are derived from applicable Best Available Techniques and management practices described or referenced in technical guidelines, performance standards and safeguard policies issued by international organizations such as IFC and ADB and leading environmental authorities such as the US Environmental Protection Agency, and Australian Federal and State Governments.

In order to ensure that the measures are up to date and reflect the current Best Available Techniques and Best Practices during implementation, NNP1PC regularly conducts internet searches on specific issues. In particular, this is done in connection with review of Site Specific ESMMPs prepared by the contractors.

Furthermore, the implementation of the ESMMP-CP is monitored by independent experts including the Independent Monitoring Agency, Lender's Technical Adviser and the Independent Advisory Panel. This further helps to ensure that the Project lives up to its obligation to apply applicable best available techniques and best practices.

In addition, NNP1PC is an active member of the international hydropower community and the Company shares ideas and experiences on environmental and social management with its peers.

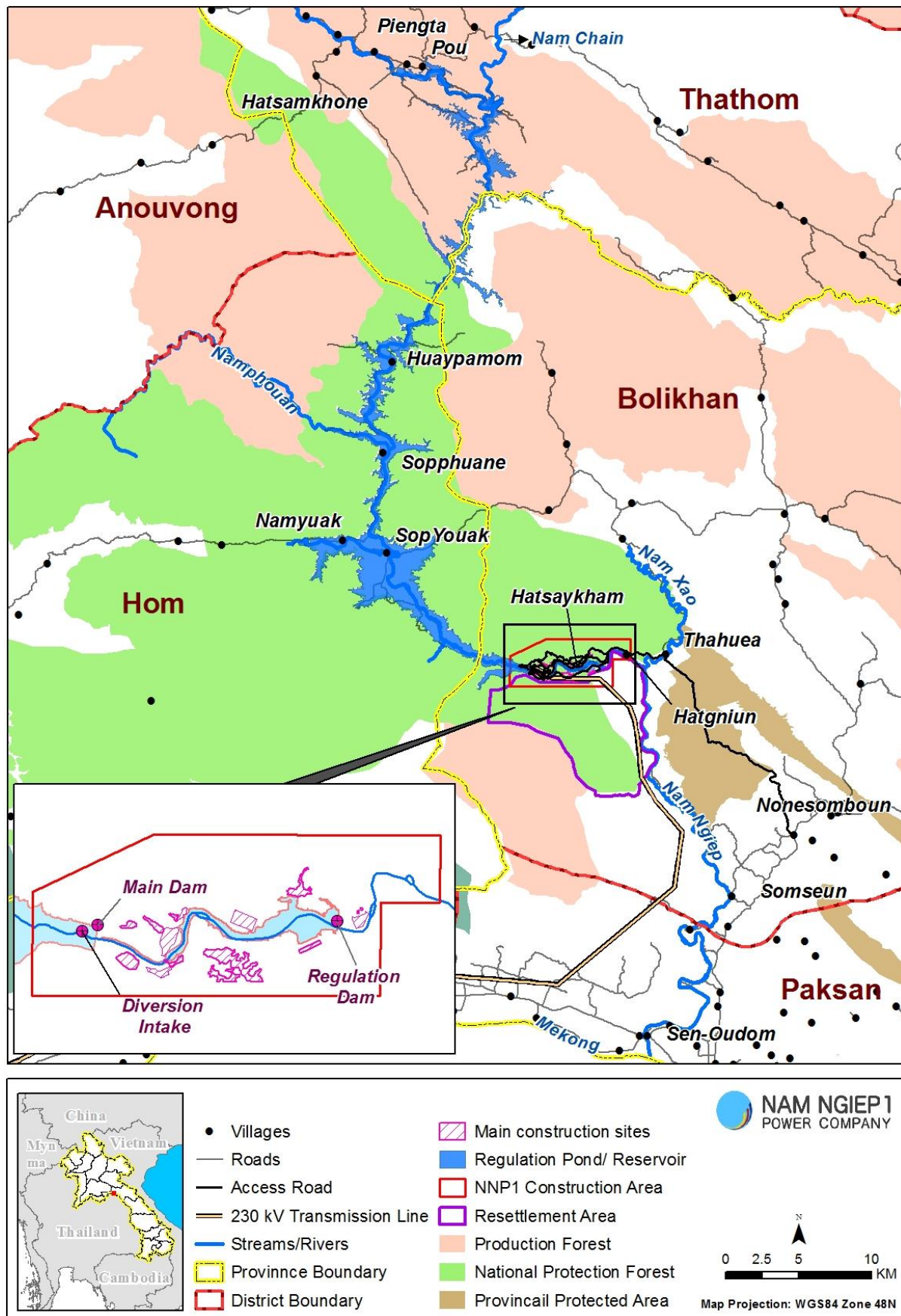
## 1.4 Project Location

The Nam Ngiep 1 Hydropower Project comprises the construction of a 166 m high concrete gravity dam and a main power station with an installed capacity of 272 MW. A re-regulation dam and 18 MW power station will be constructed 6 km downstream of the main power station. The main power station is expected to generate 1,546 GWh annually and the re-regulation dam is expected to have an annual power generation of 105 GWh.

The main facilities of the Project are to be located in Bolikhamxay Province, although the reservoir will cover parts of Xaysomboun Province, with the catchment extending into Xieng Khuang Province (see Figure 1-3).



FIGURE 1-3 LOCATION OF THE NAM NGIEP 1 HYDROPOWER PROJECT

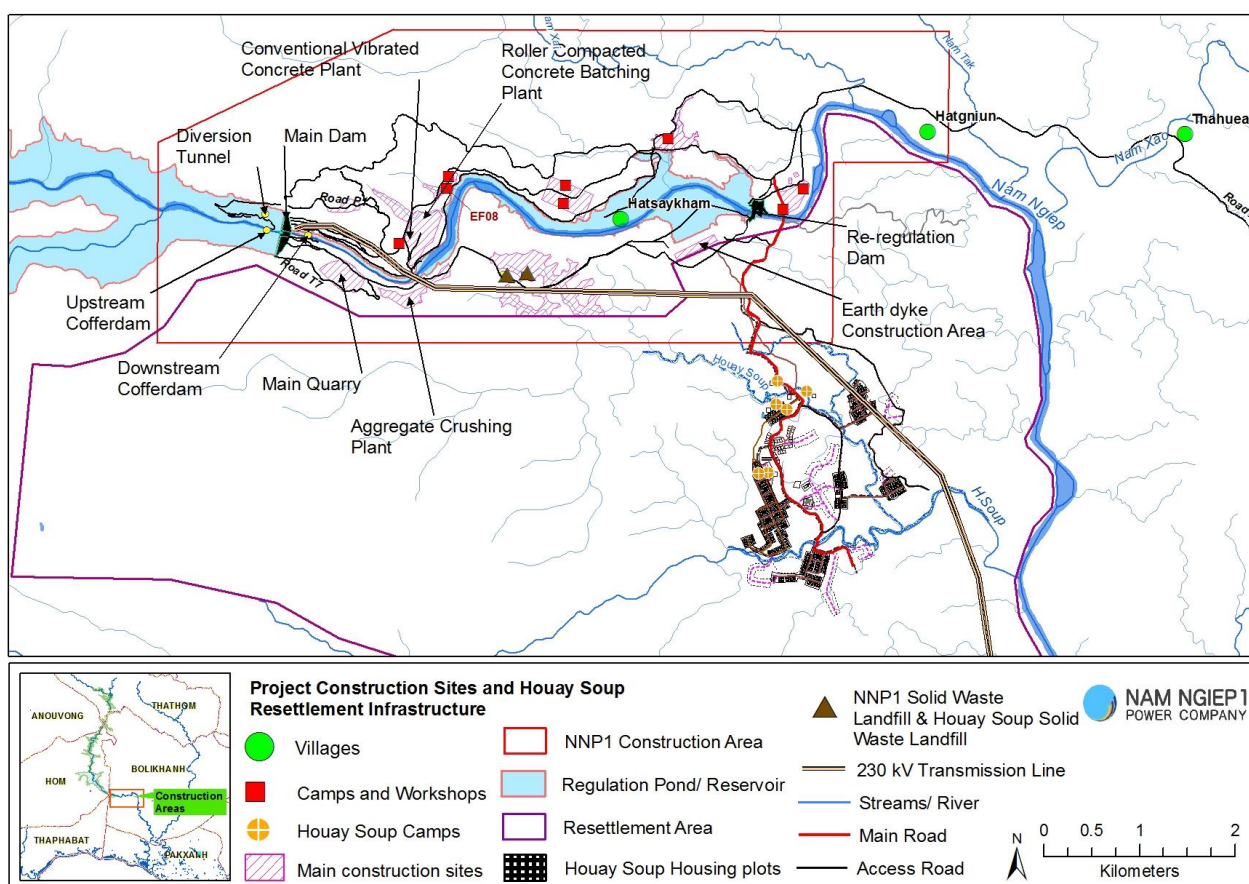


The Project Construction Sites are indicated in Figure 1-4.

The main dam will generate a reservoir with a surface area of 66.9 km<sup>2</sup> at Full Supply Level (FSL) with an EL of 320 metres above sea level (m.a.s.l.). The reservoir will have an effective storage capacity of 1,192 million m<sup>3</sup>, and is designed to drop around 130 m to the power station downstream from the main dam. Water discharged from the power station will flow into the re-regulation pond, and will then be discharged downstream daily through the 20 m high re-regulation dam.

The Houay Soup Resettlement Area will serve as the resettlement site for the Project. The area is located in Bolikhan District, Bolikhamxay Province, and abuts the Nam Ngiep River immediately south of the Project's Main Dam and Re-Regulation Dam. The closest settlements are on the opposite bank of the river and include Ban Hatsaykham, Ban Hat Gniun and Ban Thaheua. Refer to Figure 1-4 **Error! Reference source not found..**

FIGURE 1-4 THE PROJECT CONSTRUCTION SITES AND HOUAY SOUP RESETTLEMENT INFRASTRUCTURE



## 1.5 Key Technical Data

The main technical features of the Project are presented in Table 1-5.

TABLE 1-5 MAIN FEATURES OF THE PROJECT

Facility	Items	Unit	Specifications
Main Power Station			
Main Reservoir	Flood water level	EL. m	320.0
	Normal water level	EL. m	320.0
	Rated water level	EL. m	312.0



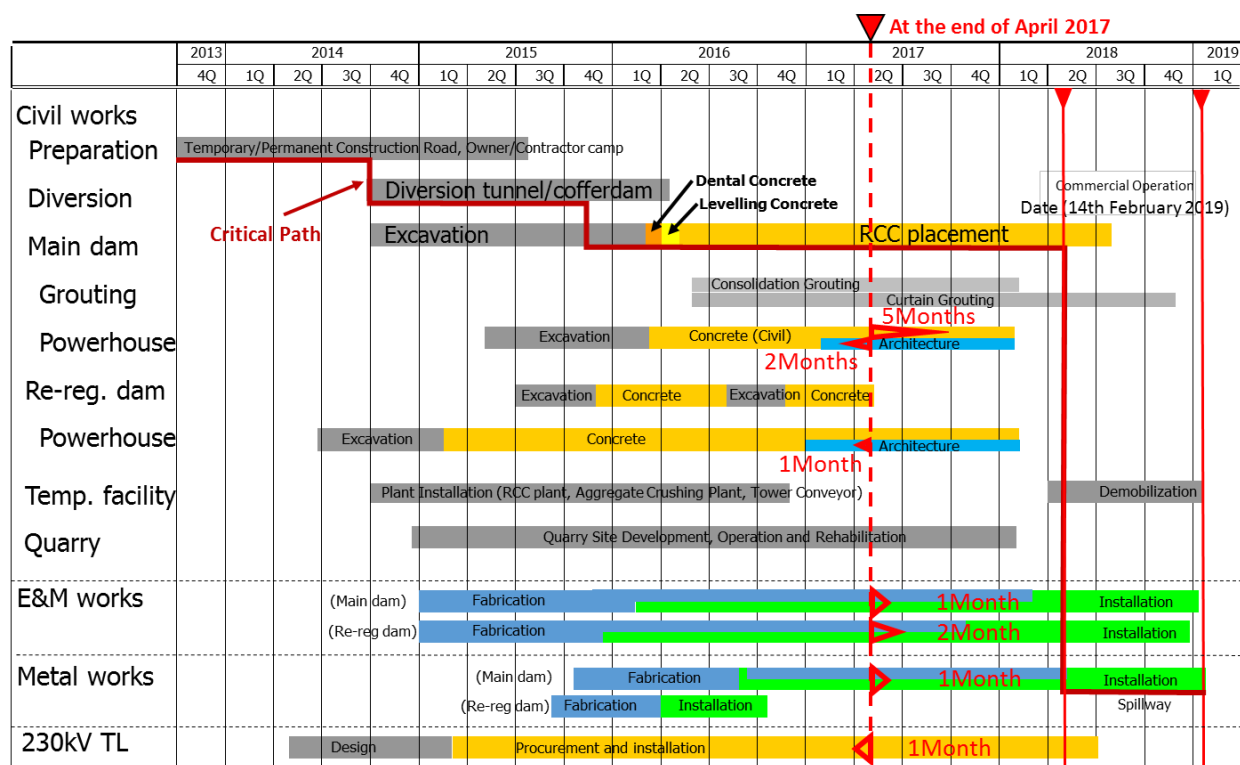
Facility	Items	Unit	Specifications
	Minimum operating level	EL. m	296.0
	Available depth	m	24.0
	Reservoir surface area	km <sup>2</sup>	66.9
	Effective storage capacity	10 <sup>6</sup> m <sup>3</sup>	1,192
	Catchment area	km <sup>2</sup>	3,700
	Average annual inflow	m <sup>3</sup> /s	148.4
		10 <sup>6</sup> m <sup>3</sup>	4,680
Main Dam	Type	-	Concrete gravity dam (Roller-Compacted Concrete)
	Dam height	m	166.0
	Crest length	m	530.0
	Dam volume	10 <sup>3</sup> m <sup>3</sup>	2,034
	Crest level	EL. m	322.0
Spillway	Gate type	-	Radial gate
	Number of gates	-	4
	Design flood	m <sup>3</sup> /s	5,210 (1,000-year)
Intake	Type	-	Bell-mouth
	Number	-	2
	Discharge capacity	m <sup>3</sup> /s	230.0
Penstock	Type	-	Embedded and concrete-lined
	Number	-	2
	Length	m	185.81
	Diameter	m	5.2
Powerhouse	Type	-	Semi-underground
	Length	m	25.0
	Width	m	62.5
	Height	m	47.2
Turbine and Generator	Maximum plant discharge	m <sup>3</sup> /s	230.0
	Maximum plant discharge (for simulation)	m <sup>3</sup> /s	34.5
	Gross head	m	132.7
	Effective head	m	130.9
	Type of turbine	-	Francis
	Rated output	MW	272 (at Substation)
	Annual power generation	GWh	1,546 (at Substation)
	Peak operation hour	hrs	16 (Monday to Saturday)
Transmission Line	Voltage	kV	230
	Distance	km	125
	Connecting point	-	Nabong Substation
	Width of right of way	m	80 (40 m each side of CL)
	Number of towers	-	262
<b>Re-Regulation Power Station</b>			
Re-Regulation	Flood water level	EL. m	185.9
Reservoir	Normal water level	EL. m	179.0
	Rated water level	EL. m	179.0
	Minimum operating level	EL. m	174.0
	Available depth	m	5.0
	Reservoir surface area	km <sup>2</sup>	1.27 at NWL
	Effective storage capacity	10 <sup>6</sup> m <sup>3</sup>	4.6
	Catchment area	km <sup>2</sup>	3,725
Re- Regulation Dam	Type	-	Concrete Gravity dam
	Dam height	m	20.6
	Crest length	m	90.0
	Dam volume	10 <sup>3</sup> m <sup>3</sup>	23.9
	Crest level	EL. m	187.0 (non-overflow section)
Re-Regulation Gate	Type	-	Fixed wheel gate
	Number	-	1
	Discharge capacity	m <sup>3</sup> /s	5,210 (1,000-year)

Facility	Items	Unit	Specifications
Saddle Dam	Type	-	RCC associate with rockfill dam
	Crest length	m	507.1
	Dam height	m	14.6
Spillway	Gate type	-	Ungated spillway (Labyrinth type)
	Design flood	m <sup>3</sup> /s	5,210 (1,000-year)
Intake	Type	-	Open
	Number	-	1
	Discharge capacity	m <sup>3</sup> /s	160.0
Powerhouse	Type	-	Semi-underground
	Length	m	46.4
	Width	m	22.05
	Height	m	49.1
Turbine and Generator	Maximum plant discharge	m <sup>3</sup> /s	160.0
	Maximum plant discharge (for simulation)	m <sup>3</sup> /s	40.0
	Gross head	m	13.1
	Effective head	m	12.7
	Type of water turbine	-	Bulb
	Rated output	MW	18 (at Substation)
	Annual power generation	GWh	105 (at Substation)
Transmission Line	Peak operation hour	hrs	24 (Monday to Sunday)
	Voltage	kV	115
	Distance	km	40
	Connecting point	-	Pakxan S/S
	Width of right of way	m	50 (25 m each side of CL)
	Number of towers	-	110
Supporting Facilities		Status	
Diversion Tunnel	Length	m	653 Completed
	Inside diameter	m	10
	Velocity	m <sup>3</sup> /s	11.5
Access Road	Ban Nonsomboun – Ban Hat Gniun Distance	km	21.2 Completed
	Ban Hat Gniun – Dam Site Distance	km	11.2 Completed
Spoil Disposal Areas	11 Disposal Areas	-	-
Quarry	Area	ha	46

## 2 CONSTRUCTION SCHEDULE

Construction Works for the Project are being carried out through four separate main construction contracts. These are the Civil Works, the Electrical and Mechanical Works, the Hydraulic Metal Works and the 230 kV Transmission Line Works. The pre-construction works started in 2013 and in October 2014 the main civil works were commenced. Actual overall cumulative work progress until the end of April 2017 was 68.4%. The overall progress and construction schedule is presented in Figure 2-1 .

FIGURE 2-1 OVERALL CONSTRUCTION AND OPERATION SCHEDULE AS OF 30 APRIL 2017



Removal of biomass from the main reservoir and the re-regulation pond will be carried out in full accordance the Biomass Removal Plan of July 2015 which was approved by MONRE on 29 July 2015. The Biomass Removal Plan strictly follows the Step-by-Step Guidelines for Biomass Removal from Hydropower Reservoirs in Lao PDR issued by MONRE in 2012.

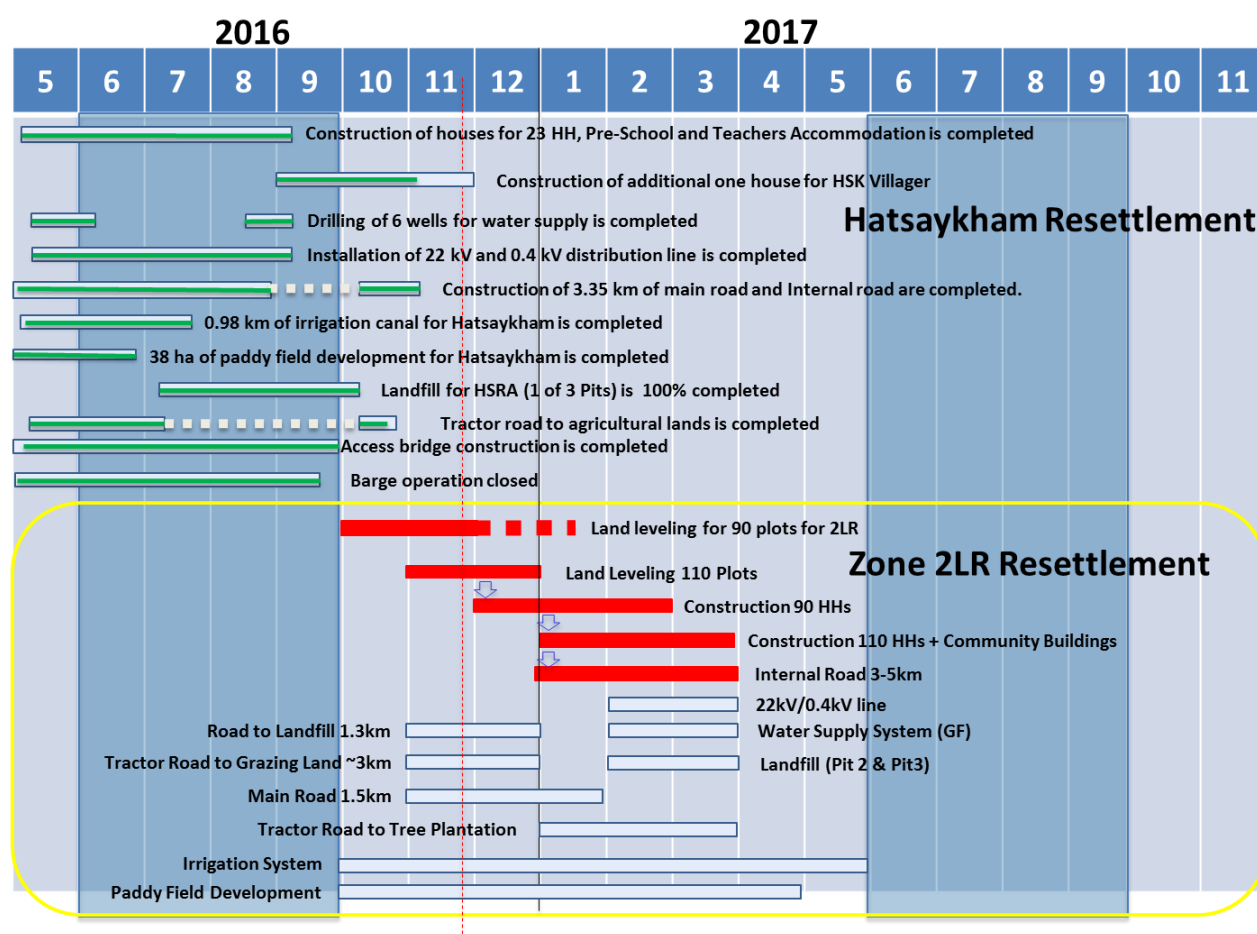
Biomass removal in the main reservoir was started in March 2016. In accordance with the Biomass Removal Plan the biomass removal target areas are divided into 18 block with a total area of 1912 ha. This area includes 271 ha of buffer zones, which means that the total area to be cleared of biomass is 1641 ha. By the end of April 2017, a total of 946 ha was cleared and the remaining biomass removal will be completed prior to commencement of impounding in July 2018.

Biomass removal below El. 176 m around the re-regulation reservoir started in January 2017 and will be completed in May 2017 immediately prior to start impounding the re-regulation reservoir. Biomass will be removed from 26.8 ha consisting of approximately 4,000 tonnes of biomass.

The cleared area excludes steeply sloped areas and areas in which new access roads are to be constructed. The current progress is show below.

The construction of the infrastructure and facilities of the Houay Soup Resettlement Area was commenced in February 2016. The work includes construction of a bridge across Nam Ngiep, roads, houses, irrigation system, water supply, electricity distribution line, and development of agricultural land. The construction schedule and progress as of 30 April 2017 for the infrastructure and land development of Houay Soup Resettlement Area are displayed in Figure 2-2.

FIGURE 2-2 OVERALL CONSTRUCTION SCHEDULE FOR HOUAY SOUP RESETTLEMENT SITE INFRASTRUCTURE



### 3 ENVIRONMENT AND SOCIAL POLICIES

The NNP1PC understands that its operations may cause adverse impacts on the environment and communities living in and around the Project area through the extraction of raw materials, utilisation of chemicals effluent and waste generation and land clearance. In this regard, the Project is committed and devoted to prevent and minimize such impacts where feasible through complying with the Annex C of a Concession Agreement that NNP1PC entered into with the Government of Lao PDR (GOL) and the Asian Development Bank (ADB) Safeguard Policy Statement 2009. The NNP1PC also commits to applying best practices in its Project development and operations to identify, assess, manage and mitigate risks pertained to the environment, communities and stakeholders in accordance to the International Finance Corporation (IFC) Performance Standards 2012 and Environmental Management Systems (ISO 14001:2015). These commitments have been translated into the NNP1PC's Environmental and Social Policies as presented in BOX 1 and BOX 2 below:

**BOX 1: Nam Ngiep 1 Power Company's Environment Policy**

- Ensure compliance with the GOL's environmental law and regulations, International and National Guidelines and Standards, as specified under Annex C of the Concession Agreement;
- Design, prepare and implement all the environmental management and mitigation measures according to a mitigation hierarchy, whereby avoiding at source is given highest preference, followed by abatement on site, abatement at receptor, repair/remedy, and compensation of the environmental impacts caused by the Project;
- Continuously and periodically conduct a self-monitoring and inspection of its performance and implementation of all the environmental and social management and mitigation measures;
- Maintain transparent process of information disclosure and consultation with relevant stakeholders on environmental management and monitoring;
- Ensure sufficient budget allocation and disbursement for the implementation and monitoring of every environmental and social management and mitigation measures;
- Promote continual improvement on environmental performance; and
- Clearly communicate and regularly train its staff and Contractors to raise their awareness on sound environmental management practices.

**BOX 2: Nam Ngiep 1 Power Company's Social Policy**

- Avoid, minimize and manage social impacts, including without limitation, nuisance to local communities and affected people;
- Comprehensively implement occupational health and safety to protect community health and safety;
- Equally respect the rights of the different ethnic groups through the implementation of Free, Prior, Informed and Consent as well as ensuring fair treatment and compensation of different gender;
- Develop and implement livelihood development programmes for Project Affected People;
- Establish and monitor the Grievance Redress Mechanism for employees and communities;
- Promote continual improvement on social performance;
- Clearly communicate and train its staff and contractors to raise their awareness on social management related issues;
- Proactively encourage transparent communication and engagement among stakeholders to arrive at mutual benefits.

The Project's senior management is responsible for overseeing the implementation and performance of all the environmental and social management and mitigation measures by the NNP1PC and reviewing these policies on annual basis to maintain their relevance, effectiveness and to make amendments if necessary.

The Project shall communicate environment and social policies to all the employees and Contractors, engaged by the NNP1PC for complying with the policies and continual performance improvements; and shall make this policy publicly available and accessible by any interested parties.

## 4 LEGAL AND OTHER REQUIREMENTS

This Section identifies the Government of Lao PDR's (GOL) laws and regulations, standards and guidelines as well as International Standards and Guidelines that are directly applicable to the Project and relevant for the environmental and social management of the Construction Works and related activities, and which lie within the scope of the ESMMP-CP.

In particular, this Section deals with legal and contractual requirements in terms of:

- Pollution control and compliance with environmental standards;
- Erosion control and sedimentation;
- Waste management;
- Waste water management;
- Hazardous materials management;
- Environmental flows;
- Biomass removal and reservoir impoundment management; and
- Land clearance and biodiversity management.

The legal requirements related to labour management and occupational health and safety are incorporated in the Labour Management Plan, which forms part of the Community Development Plan. The Community Development Plan has been prepared as a stand-alone document.

The legal requirements related to compensation and resettlement are incorporated into the Resettlement and Ethnic Development Plan and its updates, and are therefore not dealt with in the ESMMP-CP.

It should be noted that in addition to the pieces of legislation, guidelines and standards addressed here there are a number of other legal documents that contain provisions on environmental management; however, these are only marginally relevant and the requirements are in any case covered by the key provisions in the legal documents referred to in this Section.

### 4.1 Concession Agreement

The Concession Agreement (CA) for the Project was signed on 27 August 2013 by NNP1PC and GOL. The CA encompasses the overarching legal requirements for the construction and operation of the Project until 27 years after Commercial Operation Date (COD). The Annex C of the CA contains key environmental and social obligations that NNP1PC is committed and obligated to comply with and implement. This includes compliance with applicable legislation of the Lao PDR and national and international guidelines and standards as contemplated in Sections 4.2 and 4.3.

For practical reasons the obligations stipulated in Annex C of the CA are not repeated here, but where relevant - particularly in the Thematic and Project Component Sub-Plans of this ESMMP-CP, references are made to specific obligations of Annex C.

### 4.2 Applicable Laws and Regulations

#### 4.2.1 Government of Lao PDR Legal Framework

The most relevant laws, regulations related to environmental obligations are listed and summarised in Table 4-1 below.

- The Land Law dated 21 October 2003 and The Decree on the Implementation of the Land Law, No. 88/PM, dated 3 June 2008
- The Law on Environmental Protection No. 29/NA, dated 18 December 2012
- The Law on Aquatic and Wildlife Animals No. 07/NA, dated 24 December 2007
- The Forestry Law, No. 06/NA, dated 24 December 2007
- The Water and Water Resources Law, No 02/NA dated 11 October 1996

- The Fisheries Law No. 03/NA dated 9 July 2009
- The National Heritage Law No.08/NA dated 9 November 2005
- Regulation on logging and clearance after logging for a hydropower power project reservoir area, No. 0112/MAF, dated 25 November 2008
- Public Involvement Guideline 2011
- The Law on Electricity (revised) No. 03/NA dated 20 December 2012
- The Ministerial Instruction on the Environmental and Social Impact Assessment for the Investment Projects and Activities No.8030/MONRE, dated 17 December 2013
- PM Decree on the Compensation and Resettlement of Villagers by Development Projects, No. 84/GOL dated 5 April 2016
- PM Order on Enhancing the tightening in the Management and Inspection of Timber Exploitation, Removal and Business No. 15/PM dated 13 May 2016

**TABLE 4-1** LIST AND SUMMARY OF RELEVANCE OF APPLICABLE LAWS, DECREES AND REGULATIONS

APPLICABLE LAWS, DECREES, REGULATIONS.	SUMMARY OF RELEVANCE
The Law on Environmental Protection, No. 29/NA, dated 18 December 2012	<p><b>Article 7:</b> General requirement to protect the environment.</p> <p><b>Article 23, 24, 25, 26:</b> General requirements to develop and implement environmental management and monitoring plans, use clean technology and comply with the environmental standards, prevent and control pollution and clean-up and rehabilitate the environment in case of accidental release of hazardous chemicals.</p> <p><b>Articles 33, 34, 35:</b> General requirement to strictly comply with the National Environmental Quality Standards and the National Pollution Control Standards.</p> <p><b>Article 38, 39 and 40:</b> General requirements to handle, treat and dispose general waste and hazardous waste in accordance with specific regulations; and to control and monitor potential pollution.</p> <p><b>Article 43:</b> Environmental Compliance Certificate for ESMMPs is valid for 2-5 years.</p> <p><b>Article 52:</b> General obligations to use and manage natural resources in a sustainable manner, to assess potential impacts and protect natural resources, pay royalties and service fees.</p> <p><b>Article 55, 56 and 57:</b> General obligation to rehabilitate environmental damages caused by the Project.</p> <p><b>Article 64:</b> General obligation to safeguard against natural disasters and to provide information and cooperate with the relevant authorities.</p> <p><b>Article 65, 66 and 67:</b> Provisions establishing the Environmental Protection Fund which among others may be used for environmental protection and restoration.</p> <p><b>Article 68 and 70:</b> General prohibitions on emitting pollution in excess of the National Pollution Control Standards or that would cause the National Environmental Quality Standards to be exceeded; prohibition on exporting and handling hazardous waste without permission; prohibition on operating without an Environmental Compliance Certificate.</p> <p><b>Articles 78-87:</b> Provisions establishing the Ministry of Natural Resources and Environment as the competent environmental authority and regulator with right and duty to inspect projects.</p>



APPLICABLE LAWS, DECREES, REGULATIONS.	SUMMARY OF RELEVANCE
The Law on Aquatic and Wildlife Animals No. 07/NA dated 24 December 2007	<p><b>Article 7:</b> General provision on the obligation to protect and conserve biodiversity and to take measures to prevent impacts.</p> <p><b>Article 24:</b> General provisions on prohibition and restrictions on hunting wildlife and aquatic fauna.</p> <p><b>Article 52:</b> Prohibitions on catching, hunting, trading and possession of wildlife and aquatic fauna without permission; and destruction of wildlife conservation zones, reservoir conservation areas and habitats.</p>
The Forestry Law No. 06/NA dated 24 December 2007	<p><b>Article 7:</b> General provision on the obligation to protect forest, forest resources, water resources, biodiversity and the environment.</p> <p><b>Articles 23 and 59:</b> Provisions on measure to preserve National Protection Forest including zoning and prohibition of certain activities.</p> <p><b>Articles 25 and 61:</b> Measures on management and preservation of Production Forest including zoning and harvest planning.</p> <p><b>Articles 26, 27, 28 and 29:</b> Measures to preserve water resources in forested areas, preservation of tree species and NTFPs, prevention of deceases and forest fires and restricting slash and burn and illegal logging. Measures include surveying, management planning, zoning and regulating certain activities.</p> <p><b>Articles 30-38:</b> Provisions on forest regeneration, planning and implementation and funding for protection of water resources, environment and enhancement of biodiversity.</p> <p><b>Chapter IV:</b> On utilization of forest land; lease, concession and conversion.</p> <p><b>Chapter V:</b> Preservation and development of forest land; designation and approval process, competent authorities and their rights and duties.</p> <p><b>Article 101:</b> Prohibitions on logging and harvesting of NTFPs, and forest clearance without permission.</p>
The Water and Water Resources Law No. 02/NA dated 11 October 1996	<p><b>Article 9, 14 and 17:</b> Water use for hydropower is one of the water use categories in the National Socioeconomic Development Plan, and the Project falls under large scale water use rights requiring government approval.</p> <p><b>Article 25:</b> General requirement for hydropower projects to consider preservation of water sources, forest, environment, fisheries, and water supply and to prevent flooding.</p> <p><b>Article 29:</b> General requirement to protect and preserve water resources.</p> <p><b>Article 31:</b> General Prohibition on extraction of sand and gravel from rivers without permission.</p> <p><b>Article 42:</b> Prohibition on discharge or disposal of waste or wastewater into water bodies in excess of water quality standards.</p>
The Fisheries Law No. 03/NA dated 9 July 2009	<p><b>Article 7:</b> General obligations to protect and conserve aquatic fauna and to limit negative impacts on aquatic fauna and its habitats.</p> <p><b>Articles 10, 11 and 12:</b> Rules on classification of fish species and their protection and exploitation.</p> <p><b>Article 17:</b> Surveys on aquatic fauna are the responsibility of the Ministry of Agriculture and Forestry.</p>

APPLICABLE LAWS, DECREES, REGULATIONS.	SUMMARY OF RELEVANCE
	<p><b>Article 18:</b> Scientific research on aquatic fauna must be authorized by the Government.</p> <p><b>Article 38:</b> General prohibitions on: (i) the use of certain methods to catch fish, (ii) disposal of waste and wastewater into water bodies, (iii) to damage fish conservation zones and to catch fish in protected zones identified by a Fisheries Management Committee.</p> <p><b>Articles 43-48:</b> Identifies the competent authorities relevant for collaboration and cooperation in terms of fisheries management and protection of aquatic fauna.</p> <p><b>List I, II and III:</b> Protected, Controlled and Common Aquatic Fauna</p>
The National Heritage Law No.08/NA dated 9 November 2005	<p><b>Article 33:</b> The Project is required to immediately report to the local administration and the concerned information and culture sector if any national heritage is found during the implementation of any activities. The Company shall suspend such activities until an approval to proceed is granted from the mentioned sector.</p> <p><b>Article 38:</b> Stipulates that any purchase or sale of national cultural and historical heritage by the individuals or Project need to be approved by the cultural and information sector.</p> <p><b>Article 42:</b> Provides that any socio-economic development activities including infrastructure development in the national cultural and historical heritage areas or places where it is suspected that there is any national cultural and historical heritage shall obtain prior approval from the Ministry of Information and Culture, as well as identifying necessary measures to protect such heritage from damages. The Project is prohibited from causing damages to national cultural and historical heritage such as destroying archaeological and anthropological sites and, changing the condition of the natural heritage area to other conditions.</p>
The Electricity Law (revised) No. 03/NA dated 20 December 2012	<p><b>Article 29:</b> Provides that in the event that the NNP1PC is not able to comply with the conditions and terms as determined in the memorandum of understanding (MoU) or the project development agreements, such MoU or the Project development agreements can be terminated and no any compensation shall be paid by the Government.</p> <p>The main activities, such as dam construction, power plant or water diversion tunnels, including biomass clearance from the reservoir of the development project can only be operated when the Concession Agreement is effective.</p> <p><b>Article 31:</b> Stipulates that the Project shall incorporate the following expenses in the overall Project costs:</p> <ul style="list-style-type: none"> <li>i) carrying out environmental and social impact assessments (ESIAs) and preparation of management plans to mitigate the adverse impacts;</li> <li>ii) damage and resettlement of affected people;</li> <li>iii) mitigation measures for the impacts for the downstream of the dam's reservoir;</li> </ul> <p>Beside the expenses mentioned above, the Project shall pay environmental tax in compliance with the Law.</p>

APPLICABLE LAWS, DECREES, REGULATIONS.	SUMMARY OF RELEVANCE
	<p><b>Article 35:</b> Specifies that the Project shall ensure the safety of operation and maintenance of the power facilities and power plant construction including dam, reservoir, spillway, power house, transmission lines, substation distribution lines and electrical facilities, including the user's site. In addition, safety rules for Operation and Maintenance shall be established in accordance with the Lao Electric Power Technical Standards and submit these to the energy and mines sector for consideration.</p> <p><b>Article 37:</b> specifies that the Project has obligations to comply with the labour law and other relevant laws of Lao PDR; operate the business in accordance with the Concession Agreement, technical, economical and financial feasibility.</p> <p><b>Article 40:</b> The Project shall clearly determine the boundary of the land to be used and methods of compensation during the conducts of feasibility studies and, environmental and social impact assessment.</p> <p><b>Article 47:</b> Stipulates that the Project shall contribute to the Environment Protection Fund in addition to the payment for royalties, duty and taxes within the concession and surrounding areas, protection of the catchment reservoir, project downstream areas and socio-economic infrastructure development of the local areas where the Project is located.</p>
The Ministerial Instruction on the Environmental and Social Impact Assessment for the Investment Projects and Activities No. 8030/MONRE, dated 17 December 2013	<p><b>Article 1.2:</b> Stipulates that the Project is responsible for Adverse Impacts caused by the Project and shall ensure the implementation of the ESMMP. Requirement to incorporate environmental and social measures into construction contracts</p> <p><b>Article 2.10:</b> Stipulates MONRE's right to suspend or revoke the Environmental Compliance Certificate in case of non-compliance with the conditions resulting in significant social or environmental impacts; and MONRE's right to propose to the Ministry of Planning and Investment to revoke the concession agreement in case of very serious damages to the environment</p> <p><b>Article 2.12:</b> The Project shall pay service fee for the renewal of the ESMMP-CP certificate and pay the cost of inspections carried out by MONRE.</p> <p><b>Article 2.19:</b> The Project is required to prepare monthly, quarterly and annual reports to MONRE.</p> <p><b>Article 2.10:</b> Obligation to disclose the ESMMP-CP to the public.</p>
PM Decree on the Compensation and Resettlement of Villagers by Development Projects, No. 84/GOL dated 5 April 2016	<p><b>Article 7:</b> The Project is required to formulate a Compensation Plan prior to the implementation of the Project or signing a Concession Agreement by collecting the baseline data on the affected people including the list of compensation rate for the preparation of an Environmental and Social Monitoring and Management Plan (ESMMP). The approval date of the ESMMP is the registration date of the affected people's rights.</p> <p><b>Article 17:</b> The Project is obliged to: i) develop an Environmental and Social Impact Assessment (ESIA) report and the ESMMP in Lao language that are accurate and in accordance with relevant technical guidelines for approval by the Ministry of Natural Resources and Environment (MONRE) prior to</p>

APPLICABLE LAWS, DECREES, REGULATIONS.	SUMMARY OF RELEVANCE
	commencing the construction or signing the Concession Agreement; ii) strictly follow its ESMMP as specified in the Concession Agreement, Environmental Certificate as well as ensuring that the affected people are involved in all processes related to compensation, resettlement and livelihood development; iii) be responsible for the expenses of activities that are related to the ESIA and, environmental and social monitoring including compensation, resettlement and livelihood development of affected villagers; iv) be accountable for its collected data and disclose this to the Government of Lao PDR and the public; v) regularly report the situation and progresses related to the compensation, resettlement and livelihood development to the Committee on Resettlement and Compensation and MONRE.
Agreement on Management of Industrial Chemicals No. 1041/MOIC dated 28 May 2012	Sets forth the principles, rules and basic measures for management and monitoring hazardous substances and industrial chemicals. Stipulates requirements for development and use of Safety Data Sheets for chemical substances. Defines general requirements for management of hazardous chemicals. The regulations in this agreement is directed towards processing industries and are therefore only marginally applicable to the construction phase of the Project
Agreement on Management of Waste from Processing Industries No.0555/MOIC dated 20 March 2012	Sets forth rules, restrictions and prohibitions for management of waste including hazardous waste from processing industries.
PM Order on Enhancing the Management and Inspection of Timber Exploitation Business No. 15/PM dated 13 May 2016	Article 4.3: Strictly prohibit the authorisation of any Project developer or Contractor of any infrastructure development project to harvest the timber; the GOL is directly responsible for the timber harvest and sales. Article 5: The Project is strictly not allowed to carry out any survey and timber harvesting in the Project development area without prior approval from the GOL.

#### 4.2.2 Government of Lao PDR Guidelines

According to Annex C of the Concession Agreement, NNP1PC is obligated to comply with the GOL guidelines listed in Table 4-2.

**TABLE 4-2 LIST AND SUMMARY OF RELEVANCE OF APPLICABLE GOL GUIDELINES**

APPLICABLE LAO PDR GUIDELINES	SUMMARY AND RELEVANCE
Step-by-Step Environmental Guidelines for Biomass Removal from Hydropower Reservoirs in Lao PDR, MONRE December 2012	Stipulates that all hydropower projects in Lao PDR are required to prepare a Biomass Removal Plan in accordance with the guidelines.  The purpose of the Guideline is to ensure that hydropower projects follow a step by step process to ensure that biomass removal from the reservoir areas is optimal in order to reduce the adverse impacts on water quality in the reservoir and downstream, and on aquatic life and generation of greenhouse gases.

APPLICABLE LAO PDR GUIDELINES	SUMMARY AND RELEVANCE
	<p>The Guidelines include:</p> <ul style="list-style-type: none"> <li>- Technical guidance on mapping and data requirements for the Biomass Removal Plan</li> <li>- Technical guidance and modelling tools on how to predict what and how much biomass should be removed from a future reservoir in order to safeguard water quality and to reduce greenhouse gas emissions;</li> <li>- Technical and performance guidelines on minimizing social and environmental impacts from biomass clearance, removal, and making best use of the biomass in favor of the local people; and</li> <li>- Guidelines for the formulation and monitoring of the Biomass Removal Plan.</li> </ul>
Environmental and Social Operational Manual for the Road Sector, Ministry of Public Works and Transport (MPWT), March 2009	Provides procedures, instruments and responsibilities for the environmental and social management throughout the planning and implementation of activities in the road sector as the basis for compliance with national environmental and social decrees and regulations, as well as with the safeguard requirements of international donors such as World Bank (WB), Asian Development Bank (ADB), United Nations Development Program (UNDP), and Swedish International Development Cooperation Agency (SIDA).
National Policy on Environmental and Social Sustainability of the Hydropower Sector in Lao PDR, 7 June 2006	The Policy is applicable to all large-scale hydropower projects constructed after 1990 (defined as having installed capacity of more than 50 MW or inundating more than 10,000 hectares of land at their full supply level). It stipulates that a full EIA report and Environmental Management Plan (EMP) must be produced. The EIA report must include the risk analysis covering the entire project life, an analysis on the alternatives for Project structure and location including the no project alternative and sub-basin cumulative impact assessment. The EMP will provide a strategy for avoiding and/or mitigating the impacts and risks including accidents and emergency events. A budget for implementing these activities, sources of funding, implementation schedule and monitoring/evaluation framework for both internal and external parties shall also be included.
Environmental and Social Impact Assessment Guidelines Draft Volume 1, MONRE August 2015	Contains general guidelines and descriptions on the preparation of ESIA reports and ESMMP that the Project shall follow for MONRE's review and approval.
Agreement on National Environmental Standards No. 2734/PMO.MONRE dated 7 December 2009	Defines emission limits and ambient environmental quality standards for key physical, biological and chemical parameters for soil, water and air.
Public Involvement Guideline 2011	Provides guidance on the Public Involvement that should be implemented in all stages of the Project from data collection and development of the Initial Environmental Examination report which include mitigation measures for social and environmental impact or Environmental Impact Assessment report, Environmental Management and Social Management and Monitoring Plan, as well as during the formation and implementation until the end of the project.

## 4.3 International Standards and Guidelines

### 4.3.1 Asian Development Bank (ADB) Policies

Apart from complying with the GOL's legal framework and standards described above, NNP1PC is obligated to comply with the lenders' safeguard requirements represented by the Asian Development Bank (ADB)'s Safeguard Policy Statement 2009 and Public Communication Policy 2011. Brief descriptions and the relevance of these requirements are presented below.

**TABLE 4-3 LIST AND SUMMARY OF RELEVANCE OF APPLICABLE ADB SAFEGUARDS**

APPLICABLE STANDARDS	SUMMARY AND RELEVANCE
Safeguard Policy Statement 1: Environment dated June 2009	<p>The borrower/client is required to undertake a screening process since the early stage of Project development to identify direct, indirect, cumulative and induced environmental impacts on and risks to physical, biological, socio-economic, and physical cultural resources and determine their significance and scope in consultation with relevant Project stakeholders including affected people and NGOs; carrying out environmental assessment once the potential impacts are identified. The assessment shall include potential trans-boundary and global impacts such as climate change. Strategic environmental assessment shall be used where appropriate.</p> <p>An environmental management plan (EMP) shall be prepared to addresses the potential impacts and risks identified which shall consider proposed mitigation measures, environmental monitoring and reporting requirements, emergency response procedures, related institutional or organizational arrangements, capacity development and training measures, implementation schedules, cost estimates and performance indicators.</p> <p>The borrower/client is required to prepare a meaningful consultation process with Project affected people and other concerned stakeholders including NGOs. A grievance mechanism shall be established to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Project's environmental performance.</p>
Public Communications Policy 2011	<p>The borrower/client shall provide relevant environmental, resettlement, and indigenous people's information, including information from the EIA or IEE documents and the environmental monitoring reports upon receipt by ADB, to affected people in a timely manner, in an accessible place, and in a form and language(s) understandable to them.</p>

### 4.3.2 IFC Performance Standards, January 2012

According to Annex C of the Concession Agreement, NNP1PC is obligated to comply with IFC Performance Standards as listed in Table 4-4.

**TABLE 4-4 LIST AND SUMMARY OF RELEVANCE OF APPLICABLE IFC PERFORMANCE STANDARDS**

APPLICABLE STANDARDS	SUMMARY AND RELEVANCE
Performance Standard 1: Assessment and Management of	<p>Stipulates that a client/business entity shall undertake environmental and social assessment, establish and maintain an environmental and social management system (ESMS) that is appropriate to the scale and risks/impacts of the Project. The ESMS will encompass the following</p>



APPLICABLE STANDARDS	SUMMARY AND RELEVANCE
Environmental and Social Risks and Impacts	<p>elements: (i) policy; (ii) identification of risks and impacts; (iii) management programs; (iv) organizational capacity and competency; (v) emergency preparedness and response; (vi) stakeholder engagement; and (vii) monitoring and review. The client shall also establish an overarching policy defining the environmental and social objectives and principles that guide the Project to achieve sound environmental and social performance.</p>
Performance Standard 3: Resource Efficiency and Pollution Prevention	<p>The client will consider ambient conditions and utilise financially and technically feasible resource efficiency and pollution prevention principles and techniques that are most appropriate to avoid, or where avoidance is not feasible, minimize adverse impacts on human health and the environment during the project life-cycle.</p> <p>In addition, the client shall adhere to the Environment, Health and Safety (EHS) Guidelines or other internationally recognized entities, as appropriate, when evaluating and selecting resource efficiency, pollution prevention and control techniques for the Project. If the host country regulations vary from the levels and measures suggested in the EHS Guidelines, the client will be required to achieve whichever is more stringent. If less stringent levels or measures than those provided in the EHS Guidelines are more suitable in view of specific Project situations, the client will provide full and detailed justification for any proposed alternatives through environmental and social risks and impacts identification and assessment process.</p>
Performance Standard 4: Community Health, Safety and Security	<p>The client shall avoid or minimize the potential for community exposure to hazardous materials and substances that may be released by the Project through applying commercially reasonable efforts to control the safety of hazardous materials deliveries, and of transportation and disposal of hazardous wastes, and will implement measures to avoid or control community exposure to pesticides. Where appropriate and feasible, the client will identify risks and potential impacts associated with natural resource degradation and natural hazards on priority ecosystem services that may result in increased vulnerability and community safety-related risks and impacts.</p> <p>The client shall assist and collaborate with the affected people, local government authorities and other relevant parties, in their preparations to respond effectively to emergency circumstances. If local government authorities have weak or no capacity to effectively respond, the client shall play an active role in preparing for and responding to Project related emergencies. The client shall document its emergency preparedness and response activities, resources, and responsibilities, and disclose appropriate information to Affected Communities, relevant government authorities, or other relevant parties.</p>
Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	<p>The client shall ensure that the risks and impacts identification process include direct and indirect Project-related impacts on biodiversity and ecosystem services as well as any significant residual impacts. This process will consider relevant threats to biodiversity and ecosystem services, especially focusing on habitat loss, degradation and fragmentation, invasive alien species, overexploitation, hydrological changes, nutrient loading, and pollution. It will also take into account the differing values attached to</p>



APPLICABLE STANDARDS	SUMMARY AND RELEVANCE
	<p>biodiversity and ecosystem services by Affected Communities and, where appropriate, other stakeholders.</p> <p>For the protection and conservation of biodiversity, the mitigation hierarchy includes biodiversity offsets, which may be considered only after appropriate avoidance, minimization, and restoration measures have been applied. These should be designed and implemented to achieve measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity; however, a net gain is required in critical habitats.</p>
Performance Standard 8: Cultural Heritage	Requires that cultural heritage shall be identified and protected by ensuring that internationally recognized practices for the protection, field-based study, and documentation of cultural heritage are implemented in addition to complying with applicable laws and regulations of the host countries. As part of the ESMS, the client shall establish provisions for managing chance finds through a Chance Find Procedure which shall be applied in the event that cultural heritage is unearthed. The client shall not disturb any chance find until an assessment by competent professionals is made and actions consistent with the requirements of this Performance Standard are identified.

#### 4.3.3 IFC Environmental Health and Safety (EHS) Guidelines

According to Annex C of the Concession Agreement, NNP1PC is obligated to comply with IFC Environmental, Health and Safety Guidelines listed in

**TABLE 4-5 LIST AND SUMMARY OF RELEVANCE OF IFC EHS GUIDELINES**

APPLICABLE IFC EHS GUIDELINES	SUMMARY AND RELEVANCE
General EHS Guidelines: Air Emission and Ambient Air Quality dated 30 April, 2007	Suggests the use of dust control method such as water suppression and increasing the moisture content of open material stockpiles for preventing and controlling particulate matters (PM) generated from the unpaved roads and industrial activities that generate dusts. The emissions generated from the vehicles shall comply with the national and/or regional requirements. It also provides some recommendations on the emission and air quality monitoring program including method for analysis.
General EHS Guidelines: Water Conservation dated 30 April, 2007	Provides guidance on water monitoring and management, process water reuse and recycling and building facility operations.
General EHS Guidelines: Waste Water and Ambient Water Quality dated 30 April, 2007	Provides guidance on the management including treatment, disposal and monitoring of the waste water discharged from the Project operations, sewage from the septic system and storm water discharged on land, including wetlands. Guideline effluent discharge limits are listed. In addition, the Guideline stipulates that where land is used as part of the treatment system and the final receptor is surface water,

APPLICABLE IFC EHS GUIDELINES	SUMMARY AND RELEVANCE
	water quality guidelines for surface water discharges specific to the sector should be applied.
General EHS Guidelines: Hazardous Materials Management dated 30 April, 2007	Stipulates that the Project shall establish management programs that are appropriate with the potential risks by carrying out hazard risk assessments and integrating prevention and control measures, management actions, and procedures into day-to-day business activities. An emergency preparedness and response plan shall be prepared and, staff and Contractors are trained on emergency procedures.
General EHS Guidelines: Waste Management dated 30 April, 2007	<p>Provides that the Project shall: i) formulate priorities for waste management based on the risks and potential impacts; ii) develop a waste management hierarchy that take into account prevention, reduction, reuse, recovery, recycling, removal and disposal of wastes; iii) minimise the generation waste materials as much as possible; iv) if waste generation cannot be avoided but has been minimized, recovering and reusing waste.</p> <p>Hazardous waste shall always be segregated from non-hazardous waste. In addition, the Project shall: i) understand potential impacts and risks associated with the management of hazardous waste during its complete life cycle; ii) ensure that contractors handling, treating, and disposing of hazardous waste are reputable and legitimate enterprises and following good international industry practice for the waste being handled and; iii) comply with applicable local and international regulations.</p>
General EHS Guidelines: Noise Management dated 30 April, 2007	Provides a noise level guideline (maximum) for residential and industrial areas during the day time from 07:00-22:00 and night time from 22:00-07:00 as well as monitoring methodologies.
General EHS Guidelines: Contaminated Land dated 30 April, 2007	Provides management principles for land contamination due to man-made contamination from hazardous materials and wastes and, naturally occurring substances. When contamination of land is suspected or confirmed, the cause of the uncontrolled release shall be identified and corrected to avoid further releases and associated adverse impacts to human health and ecology.
General EHS Guidelines: Energy Conservation dated 30 April, 2007	Provides guidance on the energy management such as energy management program, energy efficiency (demand side/supply side management) and load reduction for process heating, cooling and compressed air systems.
General EHS Guidelines: Construction and Decommissioning dated 30 April, 2007	Provides general guidance on the prevention and control of environmental impacts that may occur during the initial stage of the Project establishment, at the end of the Project life-cycle, or due to expansion or modification of existing Project facilities. These include

APPLICABLE IFC EHS GUIDELINES	SUMMARY AND RELEVANCE
	noise and vibration, soil erosion, air quality, solid waste, hazardous materials, waste water discharges and contaminated land.
IFC Environmental Health and Safety Guidelines: Electric Power Transmission and Distribution dated 30 April, 2007	It provides guidance on the management of potential environmental issues during the construction of power transmission and distribution which include terrestrial habitat modifications, soil erosion and sediment control, dust and other emissions, noise and hazardous materials.

#### 4.3.4 Other International Standards and Guidelines

Other International Standards and Guidelines applicable to the Project as stipulated in the Annex C of the CA include the following:

- ISO 14001 Environmental Management System Standard, 2015;
- ISO 1996-1:2003 Acoustics - Description, measurement and assessment of environmental noise - Part 1: Basic quantities and assessment procedures;
- ISO 1996-2:2007 Acoustics - Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels;
- IEC 61672-1 Electroacoustics - Sound Level Meters - Part 1: Specifications;
- IEC 61672-2 Electroacoustics - Sound level meters - Part 2: Pattern evaluation tests;
- IEC 60942 IEC 60942 - Electroacoustics - Sound calibrators; and
- Draft Hydropower Sustainability Assessment Protocol, International Hydropower Association, August 2009.

**TABLE 4-6 LIST AND SUMMARY OF RELEVANCE OF OTHER INTERNATIONAL STANDARDS**

APPLICABLE STANDARDS AND GUIDELINES	SUMMARY OF RELEVANCE
ISO 14001 Environmental Management System Standard, 2015	Specifies the requirements for an environmental management system (EMS) that a Project can adopt to enhance its environmental performance, comply with environmental obligations and achieve environmental objectives. These requirements include: i) understanding the organisation and its context as well as the needs and expectations of relevant parties; ii) leadership and commitment; iii) planning to address risks and opportunities; iv) support in terms of resources, awareness, communications and documented information; v) operations such as emergency preparedness and response; vi) performance evaluation through carrying out internal and external audits and; vii) continual improvement.
ISO 1996-1:2003 Acoustics - Description, measurement and assessment of environmental noise - Part 1: Basic quantities and assessment procedures	Provides guidance on the methodology for measurement and assessment of environmental noise from all sources, either individual or in combination, which contribute to the total exposure at a Project site.
ISO 1996-2:2007 Acoustics - Description, measurement	Describes the methods for determining the sound pressure levels can through direct measurement, extrapolation of measurement results by

APPLICABLE STANDARDS AND GUIDELINES	SUMMARY OF RELEVANCE
and assessment of environmental noise - Part 2: Determination of environmental noise levels	means of calculation, or exclusively by calculation. Recommendations are given on preferable conditions to be applied when other regulations are not applicable.
Draft Hydropower Sustainability Assessment Protocol, International Hydropower Association, August 2009	Provides sustainability and performance assessment tools for hydropower projects against the environmental, social and economic criteria from the early stage of the planning process through operation.

## 5 APPROVALS AND PERMISSIONS OF GOL AUTHORITIES FOR THE ENTIRE CONSTRUCTION PHASE

NNP1PC has been granted permits and approvals from a number of Lao governing bodies in relation to the construction of the Project. This Section deals with the main permits and approvals directly related to the environmental and social aspects of the construction works, based on the Concession Agreement-Annex E Exemptions and Permits.

### 5.1 Ministry of Energy and Mines (MEM)

The Ministry of Energy and Mines (MEM) approves the Project's feasibility study pursuant to Articles 29 and 30 of the Electricity Law 2012 as well as issuing a business operation license to the Company pursuant to Article 24 of the Electricity Law 2012.

### 5.2 Ministry of Agriculture and Forestry (MAF)

The Ministry of Agriculture and Forestry (MAF) and its Provincial Agriculture and Forestry Office (PAFO) approve the following Project's activities:

- The importation of vehicles required for the hauling of logs and logging machinery in accordance with Article 10 of the Forestry Law;
- Logging of forests and forest products in accordance with the Articles 43, 45(4), (5) and (8) and 49 of the Forestry Law 2007 for the purposes of the Project;
- The plan and budget for logging and harvesting of forest products in accordance with the Article 6 of the Regulation on Logging and Cleaning after Logging in a Hydropower Project Reservoir Area No. 0112/MAF dated 25 November 2008.

The Watershed Management Plan and the Biomass Removal/Clearance Plan will be approved by the NNP1 Project's Watershed and Reservoir Protection Committee (WRPC).

### 5.3 Ministry of Public Works and Transport (MPWT)

The Ministry of Public Works and Transport (MPWT) issues construction authorizations for the construction activities of the Project, its Contractors and Subcontractors, contemplated under the Agreement, including the Access Roads, pursuant to the Article 25 of the Law on Construction No. 05/NA dated 26 November 2009.

MPWT also issues approval for the Project, its Contractors and its Subcontractors, to transport all dangerous materials (such as chemicals and, flammable or explosive materials) for use by the Project in accordance to Article 38 of the Law on Land Transport No. 24/NA dated 12 December 2012.

The Provincial Public Work and Transport Department approves the extraction of gravel and sand for use in the Project construction activities in accordance to the Minister of MPWT's Agreement on the Regulations for the Extraction of Gravel, Sand and Topsoil along the Mekong River and its Tributaries in Lao PDR No. 7737/MPWT dated 08 June 2010.

## 5.4 Ministry of Natural Resources and Environment (MONRE)

The Ministry of Natural Resources and Environment (MONRE) is the main government body responsible for the approval of the Project's ESIs and ESMMP in accordance to Article 2.13 of the Ministerial Instruction on the Environmental and Social Impact Assessment No. 8030/MONRE, dated 17 December 2013. It is responsible for issuing a notification of the Project to the Joint Committee of the Mekong River Commission for any intra-basin use on the tributaries of the Mekong River pursuant to Article 5 of the Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin dated 5 April 1995.

With regards to biodiversity and watershed management, the Department of Forest Resource Management (DFRM) under MONRE and its line departments in Bolikhamxay and Xaysomboun Provinces oversee and advising the GOL on the implementation of the biodiversity offset and watershed management programmes by the Project. MONRE also approves the displacement, catching or possession of endangered and protected aquatic animals and wildlife as may be strictly necessary for the purposes of the Project and Project management and mitigated in accordance to the approved EIA and EMMP in accordance to Article 41 and Article 52(3) of the Law on Aquatic and Wildlife Animals No. 07/NA dated 24 December 2007.

Transformation of Project's land use category from one category to another purpose as may be necessary for the Project requires prior approval from MONRE in pursuant to Article 19 of the Decree regarding the implementation of the Land Law.

The Provincial Office of Natural Resources and Environment (PONRE) issues a license to a Contractor or Sub-contractor for the exploitation of industrial minerals and rocks required for the Project as provided for under Article 54 of the Law on Minerals (Amended) (No. 02/NA dated 20 December 2011).

## 6 ORGANIZATION STRUCTURE, ROLES AND RESPONSIBILITIES

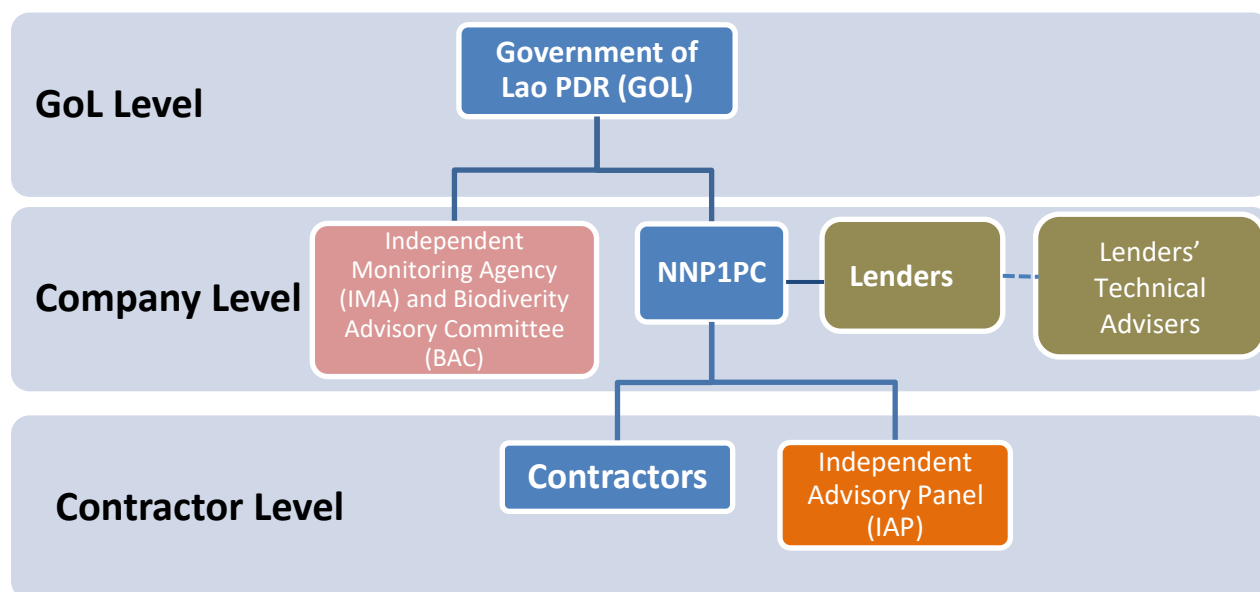
NNP1PC is the primary responsible party to prevent and/or minimize the possible adverse environmental and social impacts resulted from the Project construction activities. Contractors and Sub-Contractors engaged by NNP1PC, are responsible for the implementation of the environmental and social mitigation measures and monitoring programmes as specified in this ESMMP-CP.

This section describes the organization structure relating to the implementation and management of environmental impacts during the construction of the Project. The roles and responsibilities of key departments, teams and personnel are also provided.

### 6.1 ORGANIZATION

The oversight and implementation of environmental management activities and obligations during the construction phase are structured in three (3) levels: the GOL, Company and Contractors as presented in Figure 6-1 and described below:

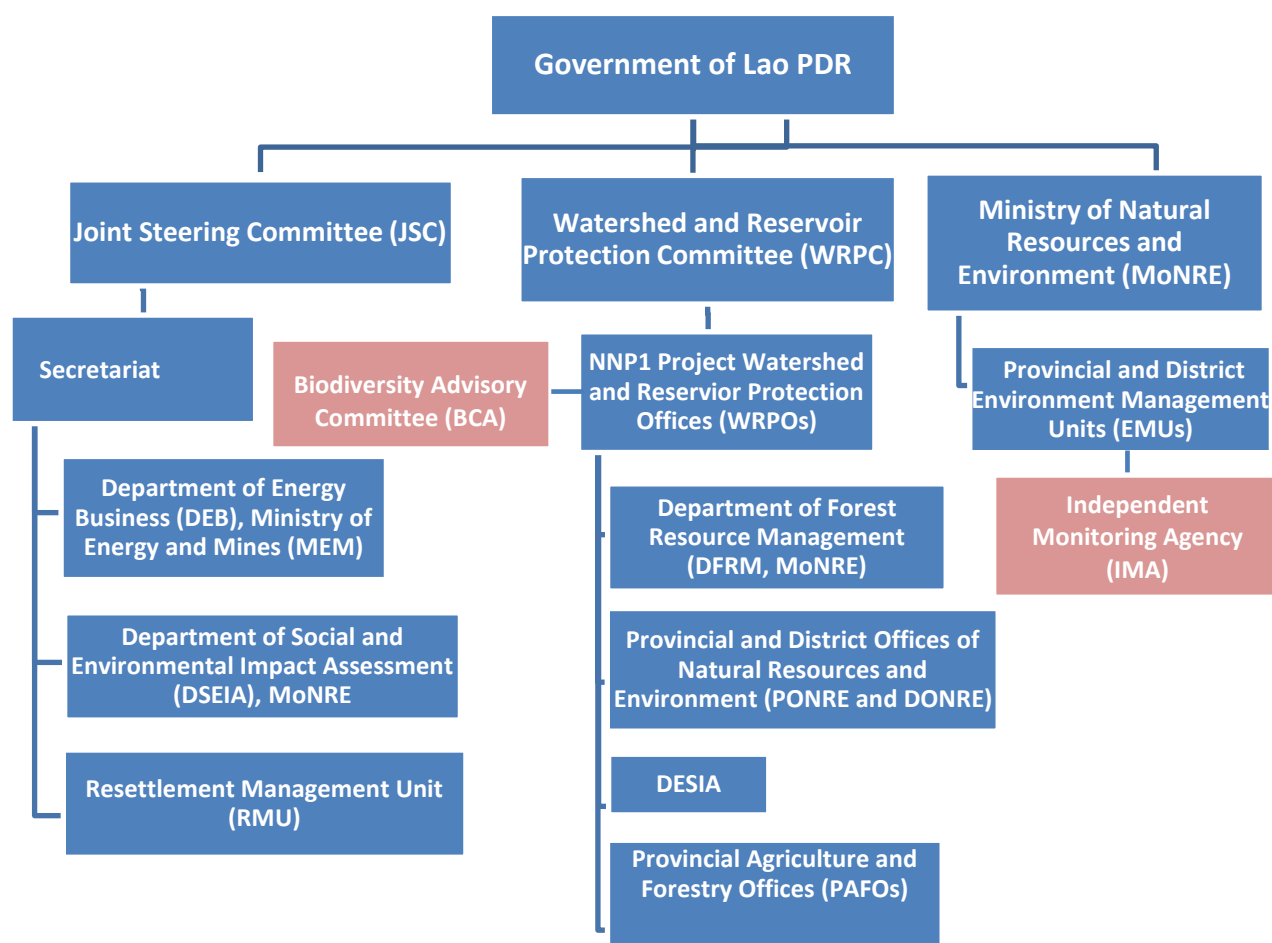
**FIGURE 6-1 ORGANISATION OF NNP1 PROJECT'S ENVIRONMENTAL MANAGEMENT AND MONITORING**



## 6.2 GOL Level Organization

The GOL Level constitutes a Joint Steering Committee (JSC), the Watershed and Reservoir Protection Committee (WRPC) and, the Ministry of Natural Resources and Environment (MONRE) (Figure 6-2). They represent the GOL and are primarily responsible for overseeing, monitoring and approving key documents related to the environmental and social managements, including biodiversity and watershed management plans submitted by NNP1PC, issue the ECC, impose and collect penalties, advise and support NNP1PC (where appropriate) with the issues related to implementing and auditing of environmental and social aspects during the Project construction phase as specified in this Concession Agreement.

FIGURE 6-2 GOL LEVEL ORGANISATION



### 6.2.1 Joint Steering Committee

The NNP1PC's Joint Steering Committee (JSC) was established by the GOL to serve as a task force (Policy Maker) for the implementation of the Project. The JSC consists of three parties- the Department of Environmental and Social Impact Assessment (DESIA) under MONRE, the Department of Energy Business (DEB) under the Ministry of Energy and Mines (MEM) and the Resettlement Management Units (RMUs) of the Project's Provinces.

The JSC is responsible for monitoring the progress of the project and reporting to the GOL regarding the Project implementation, assign GOL technical staff to advise and coordinate with the Project and various government entities at national, provincial, and district levels.

### 6.2.2 Watershed and Reservoir Protection Committee

The Watershed and Reservoir Protection Committee (WRPC) was formed in pursuant with the Minister's Agreement No. 3885/MONRE dated 6 July 2015. The Committee is chaired and co-chaired by a Vice-Governor of Xaysomboun Province and a Vice-Governor of Bolikhamxay Province respectively. A Deputy Director General (DDG) of the Department of Forest Resource Management (DFRM) under MONRE is a standing member responsible for coordinating with the Project. Other members include the DDG of DSEIA,



Vice-Governors in the five Project's Districts<sup>1</sup> and two Deputy Heads of the Provincial Agriculture and Forestry Office (PAFO) in Bolikhamxay and Xaysomboun Provinces.

The WRPC is responsible for the following:

- Preparing strategies, action plan and regulations regarding the protection of the Project's watershed and the reservoir areas for GOL's consideration and approval as well as supervising the implementation of those approved documents;
- Review and approve the Watershed and Reservoir Protection Plan;
- Receiving comments from other sectors/projects regarding the watershed management and community/social development in the Project's watershed area;
- Advise, comment and supervise Project's Watershed and Reservoir Protection Program; and
- Supervise and seek for best solution for problems in case there is impact to NNP1 watershed protection program and other related.

The WRPC is advised by the Biodiversity Advisory Committee (BAC) consisting of international and national experts on watershed and biodiversity management.

### **6.2.3 Ministry of Natural Resources and Environment**

DESIA has by means of a Ministerial Agreement established Environmental Management Units (EMUs) within MONRE, PONREs and DONREs of Xaysomboun and Bolikhamxay Provinces to monitor the environmental compliances of the Project. In addition to its monitoring activities, the EMU will provide technical assistance and advice with respect to the environmental aspects of the Project (where relevant). Their work will be conducted with the support of and in coordination with the Environmental Management Office (EMO) of the Environmental and Social Division (ESD) of NNP1PC.

The Central EMU (MONRE) will also provide direction and training to the Provincial and District EMUs in field monitoring and the implementation of environmental mitigation and prevention measures.

Primary tasks of the EMUs include:

- Review and provide recommendations on the environmental implementation;
- Monitor the implementation of the ESMMP-CP through independent and joint field monitoring and inspection;
- Monitor compliance with the environmental and social obligations of the Project;
- Monitor and coordinate with the NNP1PC concerning all environmental grievances of PAPs;
- Assist and advise (where appropriate) on the public consultation activities for environmental matters concerning of the Project;
- Coordinate with central and local government agencies regarding the implementation of the ESMMP-CP;
- Review environmental reports submitted by NNP1PC; and

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<sup>1</sup> Bolikhan and Pakxan Districts in Bolikhamxay Province; Hom, Thathom and Anouvong Districts in Xaysomboun Province

- Recommend the selection of an Independent Monitoring Agency (IMA) to advise the EMUs and MONRE regarding the progresses on environmental and social compliance implementation by the Project.

### 6.3 Company Level

NNP1PC is responsible for ensuring that the Contractors implement all construction activities in accordance with Environmental and Social Policies, Project's ESMMP-CP including all applicable laws, regulations and standards as specified in Section 3 of this document. With this regard, NNP1PC has established an Environment and Social Division (ESD) to oversee, implement, monitoring and reporting the implementation of environmental and social related requirements by other NNP1PC and Contractors in accordance with the Concession Agreement, GOL's laws and regulations as well as the ADB Safeguard Policy Statement 2009 and IFC Performance Standards (see Section 3). All the related environmental and social documents shall be reviewed by NNP1PC's ESD prior submitting to MONRE. The NNP1PC is advised by the Independent Advisory Panel (IAP) hired by the NNP1PC and reports on the progresses of environmental and social compliance implementation to the Lenders including ADB.

The ESD constitutes an Environmental Management Office (EMO) and a Social Management Office (SMO) who are leading the formulation and implementation as well as coordinating with the GOL and Lenders on environmental and social aspects of the Project. The ESD consists of a Deputy Managing Director, an EMO Manager, a SMO Manager, Deputy Managers and supporting staff including advisors/specialists. It also acts as the first point of contact for the EMUs, RMUs and other GOL authorities, NNP1PC and the Project Affected People (PAP).

The main roles and responsibilities of the ESD include:

- Preparing and updating the ESMMP-CP, ESMMP-OP and, Environmental and Social (E&S) Policies and Standard Operating Procedures and propose to NNP1PC management for approval and disclosure;
- Communicate the E&S Policies, Rules and Standards to concerned parties (i.e. NNP1PC itself and Contractors);
- Manage the environmental, social, economic and resettlement components, using consultant inputs as required;
- Monitor and report on the effectiveness of implementation of the mitigation measures, social development activities, and resettlement program;
- Report the implementation status, performance and compliance to senior management of the Project; and
- Coordinate activities during construction with relevant government agencies including the Provincial and District EMUs.

#### 6.3.1 Environmental Management Office (EMO)

The EMO acts as the primary contact for the GOL, NNP1PC and Contractors on environmental management aspects. The overall responsibility of the EMO is to oversee and monitor adherence to, implementation of ESMMP-CP by the Contractors which includes compliance with the relevant obligations and requirements.

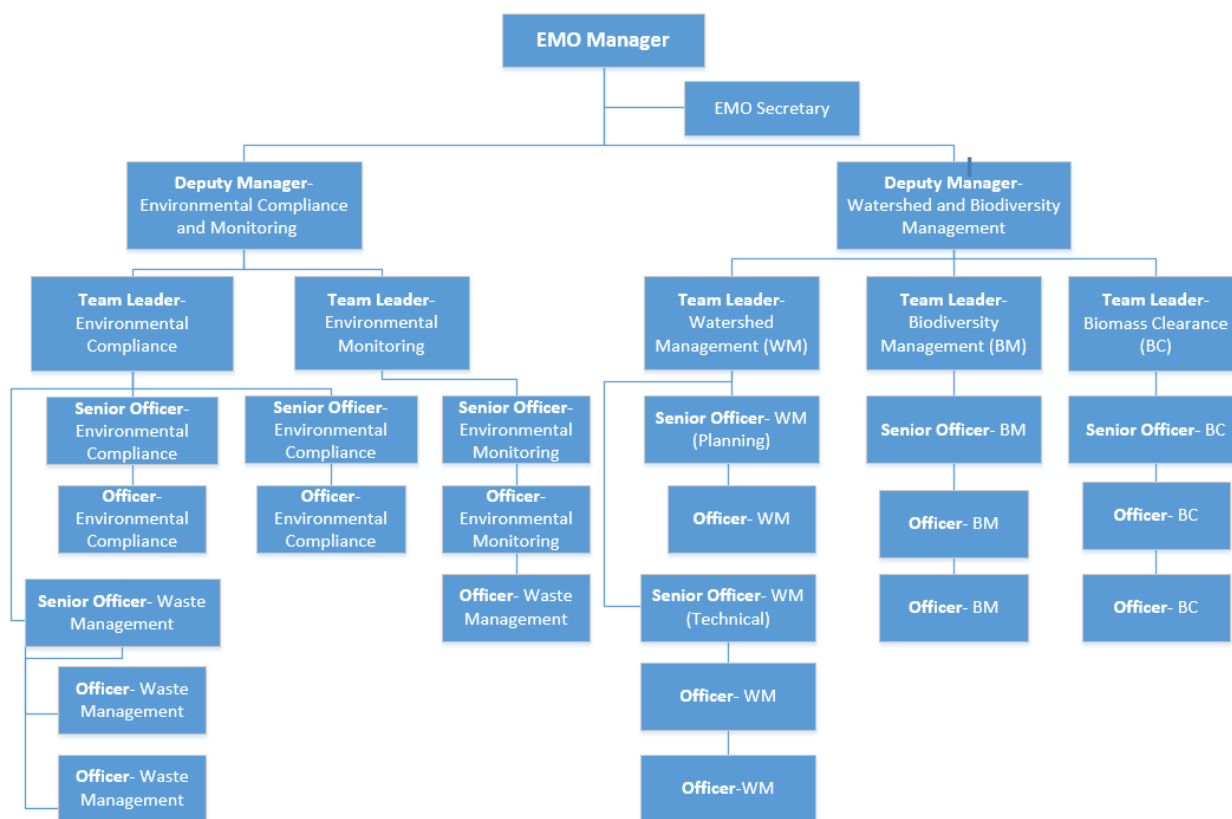
Major tasks of the EMO include:

- Collect all the baseline data and information to identify key environmental risks of the Project for the preparation of the ESIA, ESMMP-CP and conduct subsequent monitoring of the mentioned obligations; update these documents as necessary;
- Develop Plans, Strategies and Standards Operating Procedures including Code of Practices that are related to environmental management for NNP1PC management approval and disclosure;
- Coordinate with the Central, Provincial and District EMUs and other GOL agencies with regard to implementing of the mitigation measures specified in the ESMMP-CP;

- Act as a contact point for the IAP, ADB and LTA on environmental aspects of the Project; and
- Coordinate, monitor and enforce the implementation of the mitigation measures and commitments highlighted in the ESMMP-CP.

The EMO is divided into two main teams namely: i) Environmental Compliance and Monitoring and; ii) Watershed and Biodiversity Management including Biomass Clearance. The Structure of the EMO is demonstrated below:

**FIGURE 6-3 ENVIRONMENT MANAGEMENT OFFICE (EMO) ORGANISATION STRUCTURE**



### 6.3.2 Social Management Office (SMO)

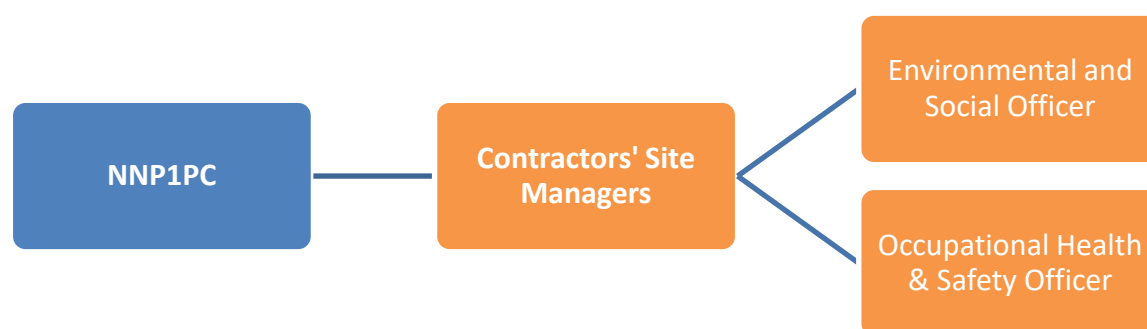
The SMO is responsible for collecting baseline data on the PAP and registering their assets for the preparation of a Compensation Plan, providing support in all infrastructure development and livelihood development programs with the RMU, as well as in the implementation and monitoring of the resettlement process for affected households in the new resettlement areas. In addition, it will coordinate with the RMU in all compensation and relocation issues related to Project Construction Lands.

The SMO has been divided into the Infrastructure & Livelihood Team and Compensation Claim Team.

## 6.4 Contractor Level

At the Contractor level, the Contractors will assign a Project or Site Manager to act as a focal person for communicating with NNP1PC on the overall implementation of the ESMMP-CP and other environmental and social policies. In addition, the Contractors will appoint an Environmental Officer and a Safety Officer to implement the environmental, social and safety issues associated with the construction activity of the Project as shown in below.

FIGURE 6-4 CONTRACTOR LEVEL ORGANISATION STRUCTURE



The objectives of environmental and social responsibility by Contractors include:

- To inform and formally address environmental, health and safety issues and take appropriate actions to achieve Project site objectives;
- To promote active participation and consultation of workers and subcontractors in matters that affects the environment and the health and safety of the workplace; and
- To create a channel for communicating and imparting knowledge and best practices to all personnel.

The Contractors will ensure that their sub-contractors are implementing and abiding by the Owner's social and environmental obligations and policies.

## 7 AUTHORITIES AND OTHER STAKEHOLDERS RELATED TO ENVIRONMENTAL ASPECTS

### 7.1 INTERNAL STAKEHOLDERS AND GOL AUTHORITIES

NNP1PC had undertaken rigorous scoping and revision of findings to identify authorities and stakeholders in relation to the design, construction and operation of the construction works. The finding indicates 5 main types of internal stakeholders and authorities in relation to environmental aspects prescribed in Table 7-1.

TABLE 7-1 KEY STAKEHOLDERS IN RELATION TO CONSTRUCTION WORKS

Stakeholder	Relationship	Roles
<b>EGATi</b>	Shareholder	Review and approve the Project budget, work plans and progress reports
<b>KANSAI Electric Power Co., Inc.</b>	Shareholder	Review and approve the Project budget, work plans and progress reports
<b>Lao Holding State Enterprises</b>	Shareholder	Review and approve the Project budget, work plans and progress reports
<b>ADB</b>	Lender	Monitor compliance with ADB safeguards Approve environmental and social safeguard documents

Stakeholder	Relationship	Roles
<b>JBIC</b>	Lender	Monitor the Project progress
<b>Thailand Bank Consortium</b>	Lender	Monitor the Project progress
<b>Provincial Department of Natural Resources and the Environment</b>	Environmental authority	Inspect and enforce compliance with environmental and social obligations
<b>Ministry of Natural Resources and the Environment (MONRE)</b>	Environmental authority	Inspect and enforce compliance with environmental and social obligations
<b>Independent Advisory Panel (IAP)</b>	External monitor	Provide independent advice to the Project on the implementation of environmental and social obligations
<b>Lenders Technical Advisors (LTA)</b>	External monitor	Provide technical advice to the lenders on the implementation of environmental and social obligations
<b>Independent Monitoring Agency (IMA)</b>	External monitor	Review the implementation progresses of the Project's environmental and social obligations and provide recommendations to the Project and GOL
<b>Biodiversity Advisory Committee (BAC)</b>	Biodiversity Adviser	Provide technical advice on biodiversity offset management and biodiversity mitigation measures Monitoring the implementation of biodiversity management plans

## 7.2 AUTHORITIES OTHER STAKEHOLDERS

Moreover, NNP1PC had identified other important stakeholders, importantly, the people who will be both directly and indirectly affected from the design and construction of the Project. These groups of stakeholders are described in Table 7-2.

**TABLE 7-2 OTHER STAKEHOLDERS IN RELATION TO THE CONSTRUCTION WORKS**

Stakeholder	Relationship	Roles
<b>Nam Ngiep 2 Hydropower Project</b>	Watershed management, environmental monitoring	Share the information and coordination under the Watershed Management Committee

# ANNEXES



## **ANNEX 1: OVERVIEW OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

Environmental Aspect	Impacts, Causes and Locations of Impacts	Overview of Measures	Residual Impacts	Compliance: (reference to applicable standards, Sub-Plans)	Implementing Unit	Monitoring Unit
<b>PHYSICAL RESOURCE</b>						
Atmosphere	Local winds will distribute dust from the construction site. After vegetative covering has been removed at the construction sites, the large bare areas will create dust that is dispersed downwind.	Dust suppression is needed during construction, to control the dispersion of dust created by clearing lands at the construction sites.	Low magnitude and level of impacts	SP03: Emission and dust control SP07: Vegetation clearing SP08: Decommissioning and Rehabilitation	Contractors and their sub-contractors	NNP1PC-EMO
Topography, Landscaping, rehabilitation and re-vegetation	Landform and landscaping around the Project area may be affected significantly such as affected village areas, slope area, borrow areas spoil disposal areas and stock pile areas.	The project shall implement the landscaping and re-vegetation after completion.	Low magnitude and level of impacts	SP01: Erosion and sediment control SP08: Decommissioning and Rehabilitation SP12: Unexploded Ordnance (UXO) Survey and Disposal	Contractors and their sub-contractors	NNP1PC-EMO
Surface water quality	<ul style="list-style-type: none"> <li>The changes of the existing environmental condition due to construction especially cut and fill activities could consequently affect water quality parameters in the downstream water.</li> </ul>	<ul style="list-style-type: none"> <li>Engineering works will be designed to comply with the agreed water quality standards.</li> <li>Water quality monitoring will begin as soon as possible after the project begins, in order to control the quality of discharge of water to the Nam Ngiep River.</li> </ul>	<ul style="list-style-type: none"> <li>The soil erosion during rainy season that naturally cause sedimentation in downstream could occur for the whole access road construction period.</li> </ul>	SP02: Water Quality and Management Monitoring	Contractors and their sub-contractors	NNP1PC-EMO

Environmental Aspect	Impacts, Causes and Locations of Impacts	Overview of Measures	Residual Impacts	Compliance: (reference to applicable standards, Sub-Plans)	Implementing Unit	Monitoring Unit
Geology	Landslide and rock movement may be induced, particularly along steep slopes around the construction site along riverbank, borrow areas, spoil disposal areas and quarry.	<ul style="list-style-type: none"> <li>- The potential for and monitoring of landslides and rock movements around the project site should be investigated during construction.</li> <li>- Routine inspections during construction phase are recommended.</li> </ul>	After construction completion, some impacts may occur particularly in wet season.	SP01: Erosion and sediment control SP08: Decommissioning and Rehabilitation	Contractors and their sub-contractors	NNP1PC-EMO
Hydrology	Since the flood flow is fast and high volume, loose materials and equipment might get swept downstream and potentially cause some damage to structures and harm local people and workers in the potential sites e.g. dam and diversion tunnel.	<ul style="list-style-type: none"> <li>- During construction, at least the normal flow in the stream must be considered and controlled. In case of flood period, the construction contractor must prepare the emergency programs such as increased waterway capacity in order to release the excess volume of water.</li> <li>- Flash floods during the rainy season should be including in safety plans provided for the construction site.</li> <li>- Construction materials and chemicals must be secured and locked down during flooding season.</li> <li>- Working above water requires special attention to reduce the risk of pollution.</li> <li>- In- stream works will be carried out in low-flow conditions where possible. Maintain stabilisation</li> </ul>	Low magnitude and level of impacts	SP17: Emergency preparedness	Contractors and their sub-contractors	NNP1PC-EMO

Environmental Aspect	Impacts, Causes and Locations of Impacts	Overview of Measures	Residual Impacts	Compliance: (reference to applicable standards, Sub-Plans)	Implementing Unit	Monitoring Unit
		measures (e.g. matting, sheet piles). - The local people must be warned of changes to the river which could affect water transport and navigation.				
<b>BIOLOGICAL RESOURCES</b>						
Biodiversity (Terrestrial)	Disturbance of wildlife caused by temporary and permanent construction through the forest areas.	<ul style="list-style-type: none"> <li>- Strict rules against logging outside the approved construction areas and against wildlife hunting and poaching will be imposed on project staff, workers, and all contractors and personnel engaged in or associated with the Project, with penalties levied for anyone caught carrying and using fire arms, or using animal snares and traps, including fines and dismissal, and prosecution under the laws of the Lao PDR.</li> <li>- The design and plan will be prepared to minimize tree cutting and protected areas disturbing.</li> <li>- Hunting wild animals will be strictly prohibited to apply for all staffs.</li> <li>- The project owner shall be directly responsible for dissemination to its staff and</li> </ul>	Low magnitude and level of impacts	SP03: Emission and dust control SP04: Noise and vibration SP07: Vegetation clearing SP08: Decommissioning and Rehabilitation SP09: Biodiversity management SP11: Quarry and construction layout SP15: Training and awareness	Contractors and their sub-contractors	NNP1PC-EMO/EMU

Environmental Aspect	Impacts, Causes and Locations of Impacts	Overview of Measures	Residual Impacts	Compliance: (reference to applicable standards, Sub-Plans)	Implementing Unit	Monitoring Unit
		<p>workers of all rules, regulations and information concerning these restrictions, as well as the punishment that can be expected if any staff or worker or other person associated with the project violate rules and regulations.</p> <ul style="list-style-type: none"> <li>- The planned clearance area for the construction works shall be clearly identified and marked. Construction Contractor to establish biological resource management program presenting management plan to assure that the construction activities to be conducted in compliance with relevant permits and environmental regulations in order to prevent potential impacts to terrestrial ecology, in particular, vegetation and wildlife.</li> </ul>				
Biodiversity (Aquatic)	Earth works that may produce sediment adding to water turbidity along the river and natural stream, in particular downstream area.	<ul style="list-style-type: none"> <li>- To avoid/minimize releasing sediment load into the river, e.g. using silt fence and temporary re-vegetation to minimize sediment from steep slope releasing to the river.</li> </ul>	Low magnitude and level of impacts	<p>SP01: Erosion and sediment control</p> <p>SP02: Water Quality Management and Monitoring</p>	Contractors and their sub-contractors	NNP1PC-EMO

Environmental Aspect	Impacts, Causes and Locations of Impacts	Overview of Measures	Residual Impacts	Compliance: (reference to applicable standards, Sub-Plans)	Implementing Unit	Monitoring Unit
		<ul style="list-style-type: none"> <li>- Sediment pond or traps will be installed at the end of water drainage way.</li> <li>- Ensure no activities pollute the aquatic environment.</li> <li>- Fishing and using of illegal fishing gear anywhere along the river should be prohibited.</li> </ul>		SP08: Decommissioning and Rehabilitation  SP09: Biodiversity management  SP15: Training and awareness		
<b>SOCIAL, HEALTH AND SAFETY</b>						
UXO	Any UXO events result in injury or death, and causes serious loss and destruction of property to all-around construction site.	<ul style="list-style-type: none"> <li>- UXO clearance and certificate shall be implemented for the whole construction area.</li> <li>- All construction activities shall be commenced within the UXO clearance boundary.</li> </ul>	Moderate level of impacts	UXO Survey Report  SP12: UXO Clearance	NNP1PC	EMU
Health and safety program	Health risks due to lack of proper health and sanitation conditions in worker camp, workplace, and communities nearby which may cause water borne diseases, infection, accident, mosquito nuisance, etc. Chances of spread of sexually Transmittable diseases like AIDS.	<ul style="list-style-type: none"> <li>- Construction of toilet facilities and sewage collection system for treatment.</li> <li>- Provision of treatment for sewage before its disposal, meeting the effluent standard.</li> <li>- On-site First aid equipment or facilities.</li> <li>- Awareness programs on AIDS etc.</li> </ul>	Moderate level of impact due to break out of infection outside Project's construction control.	SP15: Training and awareness SP16: Project personnel health program SDP of NNP1, Chapter 6 Community Development Plan	Contractors and their sub-contractors	NNP1PC-EMO



Environmental Aspect	Impacts, Causes and Locations of Impacts	Overview of Measures	Residual Impacts	Compliance: (reference to applicable standards, Sub-Plans)	Implementing Unit	Monitoring Unit
		<ul style="list-style-type: none"> <li>- Mosquito wire screen and net will applied for important places such as office, canteen, bed room etc.</li> <li>- Provide hygienic drinking water.</li> <li>- Construction worker and communities nearby will be trained in the health and safety issue relating to specific job, camp management, etc.</li> </ul>				
Traffic and access	Hazards associated with the traffic movement during construction phase leading to property/equipment damage and injury to workers or nearby villagers.	<ul style="list-style-type: none"> <li>- Arrangement of transportation schedules to avoid peak hours of road usage.</li> <li>- Management of heavy equipment transportation through sensitive areas or communities.</li> <li>- Provision of traffic signs for all roads throughout construction areas.</li> </ul> <p>Implementation of the relevant traffic regulations throughout construction areas.</p>	Moderate level of impact due to accident	SP14: Traffic and access	Contractors and their sub-contractors	NNP1PC-EMO
Waste/Hazardous Material	Products, hazardous material/substances and waste generated from the worker activities could cause impact on the environment.	<ul style="list-style-type: none"> <li>- Waste generated from workers and construction activities should be managed with the requirements of SP05 and NNP1PC Waste Management Plan.</li> </ul>	Low to moderate level of impact due to contamination hazardous waste	SP05: Waste management SP06: Hazardous material management SP10: Spoil disposal	Contractors and their sub-contractors	NNP1PC-EMO/EMU

Environmental Aspect	Impacts, Causes and Locations of Impacts	Overview of Measures	Residual Impacts	Compliance: (reference to applicable standards, Sub-Plans)	Implementing Unit	Monitoring Unit
		<ul style="list-style-type: none"> <li>- Hazardous material used in construction activities shall be kept and managed with the requirement of SP06 and Hazardous Substances Management.</li> </ul>		SP13: Construction and work camps SP17: Emergency Preparedness		
Environment Flows	The structure of construction will be obstructed the river flows which could effect to the functions of downstream.	<ul style="list-style-type: none"> <li>- The minimum downstream flow rate shall be controlled to maintain ecological system of Nam Ngiep River and usage of the river by local resident downstream from dam site.</li> </ul>	Low level of impacts	SP09: Biodiversity management		NNP1PC-EMO
Environmental emergency plan and incident	Incident caused by construction activities, transportation, accident, spillage, and illness could happen on-site and off-site area.	<ul style="list-style-type: none"> <li>- Emergency Management and Planning/response procedures shall be prepared for all scenes i.e. accident, fire, chemical and hazardous material spillage, illness.</li> <li>- Emergency organization, team, and resources shall be established.</li> <li>- Emergency drill shall be organized and maintained periodically.</li> </ul>	Low level of impact	SP15: Training and awareness SP17: Emergency preparedness	Contractors and their sub-contractors	NNP1PC
Labor management program	Large number of workforces from both local laborers and laborers from outside the project area are required during construction phase which may cause problem of	<ul style="list-style-type: none"> <li>- Labour management plan shall be provided and implemented.</li> <li>- Recruitment policy, employment policy, employment contract and code of conduct for workers to be established in</li> </ul>	Low level of impact	SP15: Training and awareness SP18: Culture resources SDP of NNP1, Chapter 5, Labour Management Plan	Contractors and their sub-contractors/NNP1PC	NNP1PC

Environmental Aspect	Impacts, Causes and Locations of Impacts	Overview of Measures	Residual Impacts	Compliance: (reference to applicable standards, Sub-Plans)	Implementing Unit	Monitoring Unit
	cultural, social, and health issues	<p>consistent with Lao's Labour Law and Labour and Personnel Management Plan</p> <ul style="list-style-type: none"> <li>- Good infrastructure within the construction area and the workers camps shall be provided in good practice and good welfare for the workers.</li> </ul>				

**Site Specific Overview of Adverse Impacts**

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
MAIN STRUCTURE FACILITIES AND ITS COMPONENTS						
Effluent	<ul style="list-style-type: none"> <li>Deterioration in surface water quality when discharged untreated.</li> </ul>	<ul style="list-style-type: none"> <li>Treatment system for wastewater generated from workshop and domestic wastewater generated from mobile office.</li> <li>To avoid water pollution caused by the rubbish and waste, regular waste collection should be provided.</li> <li>Separate wastewater from runoff water drainage.</li> <li>Sediment or retentions ponds will be installed to receive drainage water and runoff water from construction site before being discharge off-site.</li> <li>Effluent water monitoring program will be routinely conducted and sampling locations, parameters specified in applicable standards will be identifies.</li> </ul>	Low level of impacts with ensuring that effectiveness of wastewater treatment before discharge to be conducted and maintained.	SP01: Erosion and sediment control  SP02: Water Quality Management and Monitoring	Contractors and their sub-contractors	NNP1PC-EMO
Erosion and sedimentation	Increase in potential soil erosion due to activities related to excavation which cause change in physical properties of soil and sediment transport.	<ul style="list-style-type: none"> <li>Works in sensitive erosion areas will be restricted to the dry season. (if possible)</li> <li>The location of works in sensitive erosion area will be minimized.</li> <li>Land clearing and slope stabilization activities should be conducted in their proper sequence and disturbed area are to be suitably</li> </ul>	Moderate level of impact due to soil erosion during rainy season that cause sedimentation in downstream could occur not only from construction.	SP01: Erosion and sediment control	Contractor and their sub-contractors	NNP1PC-EMO

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
		<p>protected and maintained until permanent protection is established.</p> <ul style="list-style-type: none"> <li>- Area should not be prematurely exposed prior to the ability to temporarily or permanently protect such area against erosion.</li> <li>- Sediment trap will be installed in between the stream and the stockpile to control runoff where necessary.</li> <li>- Re-vegetation to provide dense ground cover to reduce soil erosion from disturbed sites as much as practicable.</li> <li>- The risk of slope instability and failure will be stabilized using the appropriate method such as implementation of slope drainage measures, benching of slopes and de-scaling of excess material.</li> </ul>				
Cultural and archaeological site	Increase in adverse impacts on cultural heritage and archaeological sites found in areas where dam and diversion tunnel is under construction.	<ul style="list-style-type: none"> <li>- Construction activities will be undertaken in such manner as to avoid any physical effect on known sites of cultural or religious significance.</li> <li>- The archaeological evidences were found in the construction site will be provided to the relevant authority to handle correctly.</li> <li>- The site that met the archaeological evidences should be protected from damage or disturbance.</li> </ul>	Migration of archaeological evidences and religious important places might be created psychological effects. The project should be provided a suitable new location and follow the religious	SP18: Cultural resource	Contractors and their sub-contractors	NNP1PC-EMO/EMU

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
			activities of the villagers requirement.			
Waste	Products and waste generated from the worker activities could cause impact on the environment.	- Waste generated from workers and construction activities should be managed with the requirements of SP05.	Low to moderate level of impact due to contamination hazardous waste	SP05: Waste management	Contractors and their sub- contractors	NNP1PC-EMO/EMU
Dust emission	Elevated dust in ambient air from material transportation, material loading/ unloading and stockpiling, construction activities; and health impacts of construction workforce (e.g. respiratory illness).	<ul style="list-style-type: none"> <li>- Sprinkle water on unpaved roads to reduce incidence of dust in air.</li> <li>- Impose an appropriate speed limit around site.</li> <li>- All vehicles should be washed or cleaned before leaving the site, when appropriate. .</li> <li>- All vehicles should switch off engine when stopped, and should not be left idling.</li> <li>- Inspect and maintain all of trucked and heavy equipment routinely as required to minimize pollution level from diesel fuel combustion.</li> <li>- Dust suspension measures will be implemented on exposed areas during windy conditions, or when Visual observation indicates excessive dust generation.</li> <li>- Choose the appropriate location of stockpiles to place under the wind direction. Blasting activities nearby the villages or worker camps will be carried out in day time only.</li> </ul>	Low level of impact	SP03: Emission and dust control  SP11: Quarry and construction layout	Contractors and their sub- contractors	NNP1PC-EMO



Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
		<ul style="list-style-type: none"> <li>- Avoid blasting on windy day.</li> <li>- Provide PPE for emission protection to workers working in activities generating emission or any workers who requests PPE.</li> </ul>				
Noise and vibration	Potential of noise nuisance and vibration to local communities and wildlife in the project area, construction workforce, and other sensitive areas due to use of heavy construction machines and equipment, blasting activities.	<ul style="list-style-type: none"> <li>- All noise-generating construction equipment shall be operated with sound control mechanisms by using proper sound dampening devices and good maintenance.</li> <li>- Maintain all construction vehicles and heavy equipment in good mechanical condition.</li> <li>- The movement of vehicles to and from the Quarry, Crushing Plant, Batching Plant to site will be performed on the working day time only.</li> <li>- Limit the speed of all vehicles to 30 km/hr. in community areas.</li> <li>- All vehicles should switch off engine when parking.</li> <li>- Blasting activities nearby the villages or worker camps will be carried out in day time only.</li> <li>- Provide PPE for workers working in activities generating noise above 80 dB or any workers who requests PPE.</li> <li>- Noise and vibration monitoring program will be routinely conducted and sampling locations, parameters specified in applicable standards will be identified.</li> </ul>	Low level of impact	SP04: Noise and vibration	Contractors and their sub-contractors	NNP1PC-EMO

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
<b>MAIN RESERVOIR AND RE-REGULATION RESERVOIR (refer to Table 6.1)</b>						
Biodiversity (Terrestrial/Aquatic)	Disturbance of wildlife and wildlife habitat caused by biomass removal.  Interruption by the facilities barrier to movement and habitat fragmentation	<ul style="list-style-type: none"> <li>- Avoid disturbing IUCN red list both of flora and fauna species in reservoir area.</li> <li>- Implement landscaping and re-vegetation after completion of construction in suitable areas, including margins of the reservoir to establish a suitable riparian corridor.</li> <li>- The design and layout plan will be prepared to minimise tree cutting and protected area disturbance where possible.</li> <li>- Responsible for dissemination to its staff and workers of all rules, regulations and information concerning these restrictions, as well as the punishment that can be expected if any staff or worker or other person associated with the Project violate rules and regulations;</li> <li>- The planned clearance area for the construction works shall be clearly identified and marked to avoid accidental clearing;</li> <li>- Construction Contractor, in association with the Forest Guard, will schedule and implement routine inspection program throughout construction period to monitor clearing extent;</li> </ul>	Moderate level of impact	SP07: Vegetation clearing SP08: Decommissioning and Rehabilitation SP09: Biodiversity management SP15: Training and awareness	NNP1PC/GOL/ Contractors and their sub-contractors	NNP1PC-EMO/GOL

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
		<ul style="list-style-type: none"> <li>- Construction Contractor will establish biological resource management program and management plan to manage the construction activities to be conducted and monitor compliance with relevant permits and environmental regulations in order to prevent potential impacts to terrestrial ecology, in particular, vegetation and wildlife.</li> </ul>				
Hydrology Changes	Interruption of river and tributary flows for filling of the reservoir	<ul style="list-style-type: none"> <li>- At least normal flow in the river will be maintained through diversion.</li> <li>- During construction, at least the normal flow in the river will be maintained through diversion. In case of flood period, the construction contractor must prepare the emergency programs such as increased waterway capacity in order to release the excess volume of water if required;</li> <li>- Flash floods during the rainy season should be including in safety plans provided for the construction site;</li> <li>- In-stream works for water crossings will be carried out in low-flow conditions where possible. Stabilisation measures will be used as appropriate (e.g. matting, sheet piles);</li> <li>- The local people will be made aware of changes to the river which could affect water transport and navigation locally; and</li> </ul>	Low level of impact	SP17: Emergency preparedness	Contractors/NNP1 PC	GOL

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
		- Water quality monitoring will be undertaken to inform adaptive management altering the regulated release program.				
<b>WORKER CAMP, INCLUDING OFFICE AND WORKSHOP</b>						
Effluent	<ul style="list-style-type: none"> <li>Deterioration in surface water quality when discharge untreated.</li> </ul>	<ul style="list-style-type: none"> <li>Treatment system for wastewater generated from workshop and domestic wastewater generated from camp.</li> <li>To avoid water pollution caused by the rubbish and waste, regular waste collection should be provided.</li> <li>Separate wastewater from runoff water drainage.</li> <li>Sediment or retentions ponds will be installed to receive drainage water and runoff water from worker camp before being discharge off-site.</li> <li>Effluent water monitoring program will be routinely conducted and sampling locations, parameters specified in applicable standards will be identifies.</li> </ul>	Low level of impacts with ensuring that effectiveness of wastewater treatment before discharge to be conducted and maintained.	SP01: Erosion and sediment control SP02: Water quality management and monitoring SP13: Construction of work camps	Contractors and their sub-contractors	NNP1PC-EMO/EMU
Waste	Products and waste generated from the worker activities could cause impact on the environment.	- Waste generated from workers and construction activities should be managed with the requirements of SP05.	Low to moderate level of impact due to contamination hazardous waste	SP05: Waste management SP13: Construction of work camps	Construction Contractor/EMO	EMO/EMU

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
Hazardous material	Storage of materials including hazardous materials may risk due to improper management.	<ul style="list-style-type: none"> <li>- Hazardous waste will be disposed of according to the most appropriate and practical best practices.</li> <li>- Hazardous materials should be stored in the suitable storage location such as close area, bund, water trap with open-close valve.</li> <li>- Clean up any spillage as soon as practicable applied.</li> </ul>	Low to moderate level of impact, in particular hazardous materials and wastes which could not be disposed in Lao PDR will need to stored appropriately until there is properly supported to disposed.	SP17: Emergency preparedness  SP06: Hazardous material management	Contractors and their sub-contractors	NNP1PC-EMO
Training and personnel health programs for workers	Project workers work inappropriately due to lack of understanding and competencies in environmental skills and awareness.	<ul style="list-style-type: none"> <li>- Provision of induction and regular training for all workers.</li> <li>- A training register containing details and name of training session; date of training session; list of attendees; and signatures and name of trainer will be properly maintained.</li> <li>- The key messages of each training session will be communicated to workers via poster and leaflet form in proper language. In addition, posters will be displayed prominently in construction work camps and construction areas and leaflets will be distributed to staff on a regular basis.</li> </ul>	Low level of impacts	SP13: Construction of work camps  SP15: Training and awareness  SP16: Project personnel health program	Contractors/NNP1 PC-EMO	NNP1PC-EMO
<b>QUARRY, CRUSHING PLANT, BATCHING PLANT (refer to Table 6.1)</b>						

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
Dust emission	Elevated dust in ambient air from material transportation, material loading/ unloading and stockpiling, construction activities; and health impacts of construction workforce (e.g. respiratory illness).	<ul style="list-style-type: none"> <li>- Sprinkle water on unpaved roads to reduce incidence of dust in air.</li> <li>- Impose an appropriate speed limit around site.</li> <li>- All vehicles should be washed or cleaned before leaving the site, when appropriate.</li> <li>- All vehicles should switch off engine when stopped, and should not be left idling.</li> <li>- Inspect and maintain all of trucked and heavy equipment routinely as required to minimize pollution level from diesel fuel combustion.</li> <li>- Monitor emission in sensitive areas.</li> <li>- Dust suspension measures will be implemented on exposed areas during windy conditions, or when visual observation indicates excessive dust generation.</li> <li>- Watering of exposed surfaces and crusher operation.</li> <li>- Choose the appropriate location of stockpiles to place under the wind direction. Blasting activities nearby the villages or worker camps will be carried out in day time only.</li> <li>- Avoid blasting on windy day.</li> <li>- Provide PPE for emission protection to workers working in activities generating emission or any workers who requests PPE.</li> </ul> <p>Air monitoring program will be routinely conducted and sampling locations, parameters specified in</p>	Low level of impact	<p>SP03: Emission and dust control</p> <p>SP11: Quarry and construction layout</p>	Construction Contractor and their sub-contractors	NNP1PC-EMO



Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
		applicable standards will be identifies.				
Noise and vibration	Potential of noise nuisance and vibration to local communities and wildlife in the project area, construction workforce, and other sensitive areas due to use of heavy construction machines and equipment, blasting activities.	<ul style="list-style-type: none"> <li>- All noise-generating construction equipment shall be operated with sound control mechanisms by using proper sound dampening devices and good maintenance.</li> <li>- Maintain all construction vehicles and heavy equipment in good mechanical condition.</li> <li>- The movement of vehicles to and from the Quarry, Crushing Plant, Batching Plant, and Bitumen Plant will be performed on the working day time only (if plant located nearby villages or workers camp).</li> <li>- Limit the speed of all vehicles to 30 km/hr. in community areas.</li> <li>- All vehicles should switch off engine when parking.</li> <li>- Monitor noise and vibrations in sensitive areas.</li> <li>- Blasting activities nearby the villages or worker camps will be carried out in day time only.</li> <li>- Provide PPE for workers working in activities generating noise above 80 dB or any workers who requests PPE.</li> <li>- Noise and vibration monitoring program will be routinely conducted and sampling locations, parameters specified in applicable standards will be identified.</li> </ul>	Moderate level of impacts, necessary to ensure that mitigation measures for noise and vibration to be conducted and monitored complying with standard.	SP04: Noise and vibration SP11: Quarry and construction layout	Construction Contractor	EMO

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
Erosion and sedimentation	Increase in potential soil erosion due to activities related to material excavation which cause change in physical properties of soil and sediment transport.	<ul style="list-style-type: none"> <li>- Works in sensitive erosion areas will be restricted to the dry season. (if possible)</li> <li>- The location of works in sensitive erosion area will be minimized.</li> <li>- Land clearing and slope stabilization activities should be conducted in their proper sequence and disturbed area are to be suitably protected and maintained until permanent protection is established.</li> <li>- Area should not be prematurely exposed prior to the ability to temporarily or permanently protect such area against erosion.</li> <li>- Sediment trap will be installed in between the stream and the stockpile to control runoff where necessary.</li> <li>- Re-vegetation to provide dense ground cover to reduce soil erosion from disturbed sites as much as practicable.</li> <li>- The risk of quarry face instability and failure will be stabilized using the appropriate method such as implementation of slope drainage measures, benching of slopes and de-scaling of excess material.</li> </ul>	Moderate level of impact due to soil erosion during rainy season that cause sedimentation in downstream could occur not only from construction.	SP01: Erosion and sediment control  SP11: Quarry and construction layout	Construction Contractor	EMO

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
Effluent	<ul style="list-style-type: none"> <li>Deterioration in surface water quality, when discharged untreated.</li> </ul>	<ul style="list-style-type: none"> <li>Sediment trap or other measure should be established to prevent erosion and control pollution at the source.</li> <li>Minimise vegetation clearance especially in the slope area.</li> <li>Site may have both temporary and permanent measures to control erosion and manage storm water.</li> <li>Wastewater from site activities such as concrete or bitumen cutting, drilling or excavation shall not be discharged directly to natural water sources.</li> <li>Sediment or retention ponds will be installed to receive drainage water and runoff water from plant before discharging off-site.</li> <li>Discharge will be immediately stopped if the quality is not compliant with requirements.</li> <li>Spill respond kit will be provided when has the refuel to prevent spilling and contaminate to the effluent.</li> </ul>	<ul style="list-style-type: none"> <li>Low level of impacts with ensuring that effectiveness of wastewater treatment before discharge to be conducted and maintained.</li> </ul>	SP02: Water quality management and monitoring  SP11: Quarry and construction layout management	Contractors and their sub-contractors	NNP1PC
Waste	Products and waste generated from the worker activities could cause impact on the environment.	<ul style="list-style-type: none"> <li>Waste generated from workers and construction activities should be managed with the requirements of SP12.</li> </ul>	Low to moderate level of impact due to contamination hazardous waste	SP05: Waste management	Contractors and their sub-contractors /NNP1PC	NNP1PC-EMO/EMU
Hazardous material	Storage of materials including hazardous	<ul style="list-style-type: none"> <li>Hazardous waste will be disposed of according to the most appropriate and practical best practices.</li> </ul>	Low to moderate level of impact, in particular hazardous	SP06: Hazardous material management plan	Contractors and their sub-	NNP1PC

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
	materials may risk due to improper management.	<ul style="list-style-type: none"> <li>- Hazardous materials should be stored in the suitable storage location such as close area, bund, water trap with open-close valve.</li> <li>- Clean up any spillage as soon as practicable applied.</li> </ul>	materials and wastes which could not be disposed in Lao PDR will need to be stored appropriately until there is properly supported to be disposed.	SP17: Emergency preparedness	contractors/NNP1 PC	
<b>TRANSMISSION LINE CONSTRUCTION (refer to Table 6.1)</b>						
Noise and vibration	Potential of noise nuisance and vibration to local communities and other sensitive areas due to use of heavy construction machines and equipment.	<ul style="list-style-type: none"> <li>- All noise-generating construction equipment shall be operated with sound control mechanisms by using proper sound dampening devices and good maintenance.</li> <li>- Maintain all construction vehicles and heavy equipment in good mechanical condition.</li> <li>- All vehicles should switch off engine when parking.</li> <li>- Provide PPE for workers working in activities generated noise above 80 dB or any workers who requests PPE.</li> </ul>	Low level of impact	SP04: Noise and vibration	Contractors and their sub-contractors	NNP1PC
Cultural heritage and archaeology	Increase in adverse impacts on cultural heritage and archaeological sites found in areas where transmission line is under construction.	<ul style="list-style-type: none"> <li>- Construction activities in area and ROW will be undertaken in such manner as to avoid any physical effect on known sites of cultural or religious significance.</li> <li>- The archaeological evidences when found in the site will be provided to the relevant authority to handle correctly.</li> </ul>	Migration of archaeological evidences and religious important places might be created psychological effects. The Project shall provide a suitable new	SP18: Cultural resource	Contractors and their sub-contractors	NNP1PC-EMO

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
		<ul style="list-style-type: none"> <li>- The site that met the archaeological evidences should be protected from damage or disturbance.</li> </ul>	location and follow the religious activities of the villager's requirement.			
Waste	Waste from the construction activities and mobile worker camp could cause impact on the site areas.	<ul style="list-style-type: none"> <li>- Waste generated at the plant areas should be managed with the requirements of SP12.</li> <li>- Separate waste for recycling and reused.</li> </ul>	Low level of impact	SP05: Waste management	Contractors and their sub-contractors/NNP1 PC	NNP1PC-EMO
Training and personnel health programs for workers	Project workers work inappropriately due to lack of understanding and competencies in environmental skills and awareness.	<ul style="list-style-type: none"> <li>- Development and provision of environmental induction and regular training for all workers.</li> <li>- A training register containing details and name of training session; date of training session; list of attendees; and signatures and name of trainer will be properly maintained. The key messages of each training session will be communicated to workers in proper language.</li> </ul>	Low level of impacts	SP15: Training and awareness SP16: Project personnel health program	Contractors and their sub-contractors /NNP1PC-ESD	NNP1PC-EMO
<b>SPOIL DISPOSAL AND BORROW AREA (refer to Table 6.1)</b>						
Dust emission	Dust will be produced when transporting spoil in construction sites which may affect some residents nearby.	<ul style="list-style-type: none"> <li>- Sprinkle water on stockpile area to reduce incidence of dust in air, if necessary.</li> <li>- Impose an appropriate speed limit around site.</li> </ul>	Low level of impacts	Applicable air quality standard SP03: Emission and dust control SP10: Spoil Disposal	Contractors and their sub-contractors	NNP1PC-EMO

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
Noise and vibration	Transportation between construction site and spoil and borrow area which may affect some residents nearby.	<ul style="list-style-type: none"> <li>- Working limited to day time only.</li> <li>- Maintain all construction vehicles in good mechanical condition.</li> <li>- Limit the speed of all vehicles.</li> <li>- All vehicles should switch off engine when parking.</li> </ul>	Low level of impacts	SP04: Noise and vibration	Contractors and their sub-contractors/NNP1 PC	NNP1PC-EMO
Erosion and sedimentation	Increase in potential soil erosion due to activities related to material excavation at the spoil and borrow areas which cause change in physical properties of soil and sediment transport	<ul style="list-style-type: none"> <li>- Soil and spoil removed during the construction process will be stockpiled separately and stabilization measures implemented. The stockpiles will be constructed with smooth slopes and free drainage patterns.</li> <li>- Drainage and erosion from the stockpiles will be controlled by locating them in areas away from drainage lines.</li> <li>- Ridges maybe created on topsoil stockpiles to provide for the moisture retention to assist re-growth and slow runoff.</li> <li>- Soil and spoil piles will be placed in such a manner that will be avoid areas of drainage lines in order to control drainage and reduce erosion discharge from the stockpiles. Such piles shall be placed in a manner that does not interfere with temporary surface flows or established watercourse.</li> <li>- Sediment trap or other measure should be established to prevent erosion and control pollution at the source.</li> </ul>	Moderate level of impact due to soil erosion during rainy season that cause sedimentation in downstream could occur not only from construction.	SP01: Erosion and sediment control SP02: Water Quality Management and Monitoring SP10: Spoil Disposal	Contractors and their sub-contractors	NNP1PC

Site or Area/ Environmental Aspect	Impacts and causes of impacts	Measures to avoid, prevent, remedy or compensate the impacts	Residual Impacts <sup>(2)</sup>	Compliance: (reference to applicable standards, Sub-Plan)	Implementing Unit	Monitoring Unit
		<ul style="list-style-type: none"> <li>- Sediment or retention ponds will be installed to receive leaching from the spoil at the end of the drainage lines prior to discharge to the watercourse.</li> </ul>				
Effluent	Leaching from the spoil will possibly affect water quality.	<ul style="list-style-type: none"> <li>- Build drainage ditches around the spoil and borrow area site to collect the storm water.</li> <li>- Sediment or retention ponds will be installed to receive leaching from the spoil at the end of the drainage lines prior to discharge to the watercourse.</li> </ul>	Low level of impacts with ensuring that effectiveness of wastewater treatment before discharge to be conducted and maintained.	SP02: Water Quality and Management Monitoring	Contractors and their sub-contractors	NNP1PC-EMO