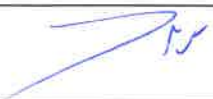
NAM NGIEP 1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Environmental Management Monthly Monitoring Report

August 2020

					
					
A	15 September 2020	Hendra WINASTU Khamsone SAYSOMPHOU	Wanidaporn RODE	Khamlar PHONSAVAT	Final
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ABBREVIATIONS / ACRONYMS

AIP	Annual Implementation Plan
ADB	Asian Development Bank
BBS	Biodiversity Baseline Survey
BAC	Biodiversity Advisory Committee
BOF	Biodiversity Offset Framework
BOMC	Biodiversity Offset Management Committee
BOMP	Biodiversity Offset Management Plan
CA	Concession Agreement between the NNP1PC and GOL,
CAP	Corrective Action Plan
COD	Commercial Operation Date
CVC	Conventional Vibrated Concrete
CWC	Civil Works Contract
CTA	Common Terms Agreement
DEB	Department of Energy Business, MEM
DEPP	Department of Energy Policy and Planning, MEM
DEQP	Department of Environment and Quality Promotion, MONRE
DESIA	Department of Environmental and Social Impact Assessment, MONRE
DFRM	Department of Forest Resources Management, MONRE
DLA	Department of Land Administration, MONRE
DSRP	Dam Safety Review Panel
EC	Electrolytic Conductivity
ECOCD	EGAT Construction Obligation Commencement Date
EDL	Electricite du Laos
EDL PPA	Power Purchase Agreement between NNP1PC and EDL
EGAT	Electricity Generating Authority of Thailand
EGATi	EGAT International Company Limited
EIA	Environmental Impact Assessment
EMMR	Environmental Management and Monitoring Reports
EMO	Environmental Management Office of ESD within NNP1PC
EMU	Environmental Monitoring Unit
EMWC	Electrical-Mechanical Works Contract
EPF	Environmental Protection Fund
ERIC	Environmental Research Institute Chulalongkhorn University

ERM	Environmental Resource Management
ESD	Environmental and Social Division of NNP1PC
ESMMP	Environmental and Social Monitoring and Management Plan
FY	Fiscal Year
GOL	Government of Lao PDR
GIS	Geographic Information Systems
HH	Household
HMWC	Hydraulic Metal Works Contract
HR	Human Resources
IEE	Initial Environmental Examination
IMA	Independent Monitoring Agency
INRMP	Integrated Natural Resources Management Plan
ISP	Intergraded Spatial Planning
km	kilometre
kV	kilo-Volt
LEPTS	Lao Electric Power Technical Standard
LHSE	Lao Holding State Enterprise
LTA	Lender's Technical Advisor
M	million
m	metre
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mines, Lao PDR
MOF	Ministry of Finance, Lao PDR
MOM	Minutes of Meeting
MONRE	Ministry of Natural Resource and Environment, Lao PDR
MOU	Memorandum of Understanding
NBCA	National Biodiversity Conservation Area
NCI	Non-Compliance Issue
NCR	Non-Compliance Report
NN2	Nam Ngum 2 Power Company Limited
NNP1PC	Nam Ngiep 1 Power Company Limited
NPF	National Protection Forest
NTFP	Non-Timber Forest Products
NT2	Nam Theun 2 Hydropower Project

OC	Obayashi Corporation
ONC	Observation of Non-Compliance
PAFO	Provincial Department of Agriculture and Forestry
PAP	Project Affected People
PD	Property Damage
PONRE	Provincial Department of Natural Resource and Environment, MONRE
PPA	Provincial Protection Area
RCC	Roller Compacted Concrete
SIR	Site Inspection Report
SLBMP	Salvage Logging Biomass Management Plan
SOP	Standard Operating Procedure
SMO	Social Management Office of ESD within NNP1PC
SS-ESMMP	Site Specific Environmental and Social Monitoring and Management Plan
TD	Technical Division of NNP1PC
TOR	Terms of Reference
TSS	Total Suspended Solids
UAE	United Analysis and Engineering Consultant Company Ltd.
UXO	Unexploded Ordinance
WMF	Watershed Management Fund
WMP	Watershed Management Plan
WRPC	Watershed and Reservoir Protection Committee
WRPO	Watershed and Reservoir Protection Office
WWTS	Waste Water Treatment System

EXECUTIVE SUMMARY

In August 2020, the Environmental Management Office (EMO) of Nam Ngiep 1 Power Company (NNP1PC) received one Detailed Work Programme (DWP) and Site Specific Environmental and Social Management and Monitoring Plan (SS-ESMMP), one Design and Specification for the septic biofilm tank replacement in the OSOV1, one Design Drawing for a temporary toilet facility of the security house at the steel bridge and one Environmental and Social Checklist for review and approval.

EMO carried out a weekly rotation monitoring of the revegetated sites for grass seed germination and green cover as well as site stability. The vegetation cover at 21 out of 23 sites have increase compared with the previous months. Other two sites (Irrigation canal-spoil disposal area and the former LILAMA10 camp) were newly revegetated in August 2020.

Two meetings via a VDO conference were held between EMO and the consultant for the Wastewater Treatment Systems (WWTSs) improvement in OSOV1, OSOV2, main dam and re-regulation dam. The treatment efficiency of all four WWTSs was checked by EMO, and the study results and recommendations from the Consultant on the WWTS operation, modification and/or replacement will be summarized for management consideration by middle of September 2020. The effluent monitoring results for August 2020 at 01 out of 03 camps still indicate non-compliances with the GoL standards for total coliform and faecal coliform.

During the month, Dissolved Oxygen (DO) levels at the surface of the main reservoir (R01, R02, R03, R04 and R05) were generally between 5 and 10 mg/L. In the re-regulation reservoir (R06 and R07), the DO levels were below 4 mg/L.

The discharge from the re-regulation dam mainly went through the turbines and occasionally went through both the turbines and the gate. The DO levels were less than 6 mg/L at the Nam Ngiep downstream stations and thus are non-compliant with the GoL Standard, except at NNG06 on 18 August 20, NNG07 on 05, 18 and 26 August 2020 and NNG08 on 05, 12, 18 and 26 August 2020. No dead fish was observed in Nam Ngiep downstream during this monitoring period. NNP1PC is in the process of collecting information to assist in the improving DO level downstream.

A total of 19.6 m3 of solid waste was disposed of at the NNP1 Project Landfill, the same amount as recorded in July 2020. A total of 55 kg of glass bottles, from the waste segregation at both landfills, was added to store in the Community Waste Bank making a new total of 3,192 kg of recyclable waste in the bank. A total of 18.1 m3 of solid waste from Phouhomxay, Thahuea and Hat Gniun Villages was disposed of at the Houay Soup Landfill.

Xaysomboun Provincial WRPO commenced the reservoir patrolling between 04-13 August 2020. Bolikhamxay Provincial WRPO did not implement any activities during this reporting period.

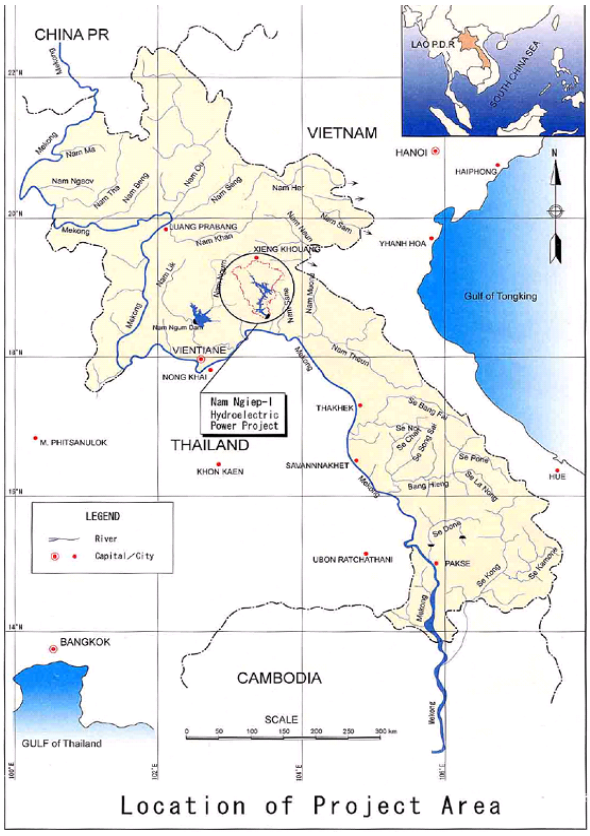
Biodiversity offset related activities under the components of law enforcement and conservation linked livelihood continued in August 2020.

The fish catch monitoring for July 2020 in Nam Ngiep watershed was dominated by Channa striata and species groups of Hampala, Poropuntius, Barbonymus and Hypsibarbus, and Mastacembelus that are classified as Least Concern (LC) according to the IUCN Red List.

1. INTRODUCTION

The Nam Ngiep originates in the mountains of Xieng Khouang Province, flowing through Khoun District into Thathom District of Xaysomboun Province, through Hom District and into Bolikhan District of Bolikhamxay Province. The Nam Ngiep meets the Mekong River just upstream from Pakxan in Bolikhamxay Province (Fig. 1-1).

FIGURE 1-1: LOCATION MAP



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 almost 150 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. With a combined capacity of 290 MW, Nam Ngiep 1 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 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.

This Environmental Monthly Monitoring Report (EMMR) provides a summary of environmental monitoring activities and mitigation actions in January 2017. The EMMR was prepared by the Project's Environmental Management Office (EMO). It has been internally reviewed and cleared by EMO senior technical staff and management prior to submitting the report to the Government of Lao PDR (GoL) related agencies.

The EMMR and other related reports including related construction Site Specific Environmental and Social Monitoring and Management Plans (SS-ESMMPs) are publicly disclosed on the Project website in line with the ADB and GoL Public Disclosure Policies. Hard copies of the final reports will also be available upon requests at the Project's main office in Vientiane Capital and field office in Pakxan, Bolikhamxay Province.

2. WORK PROGRESS OF PRINCIPAL CONTRACTORS

Construction works for the Project have been carried out through four separate main construction contracts under the supervision of the Technical Division of NNP1PC. The four contracts are the Civil Works, the Electrical and Mechanical Works, the Hydraulic Metal or Hydro-Mechanical Works and the 230 kV Transmission Line Works. Each Contract is in its Defects Notification Period all ending variously in 2020 or 2021 following the issue of Taking-over Certificates in 2018 and 2019.

2.1 Operation and Power Generation

2.1.1 Power Production

2.1.1.1 Main Power Station

Figure 2.1 and ***Figure 2.2*** shows the generation data at the main power station in August 2020. The generation was higher than the previous month.

Figure 2-1: Unit Generated Energy (Main Power Station)

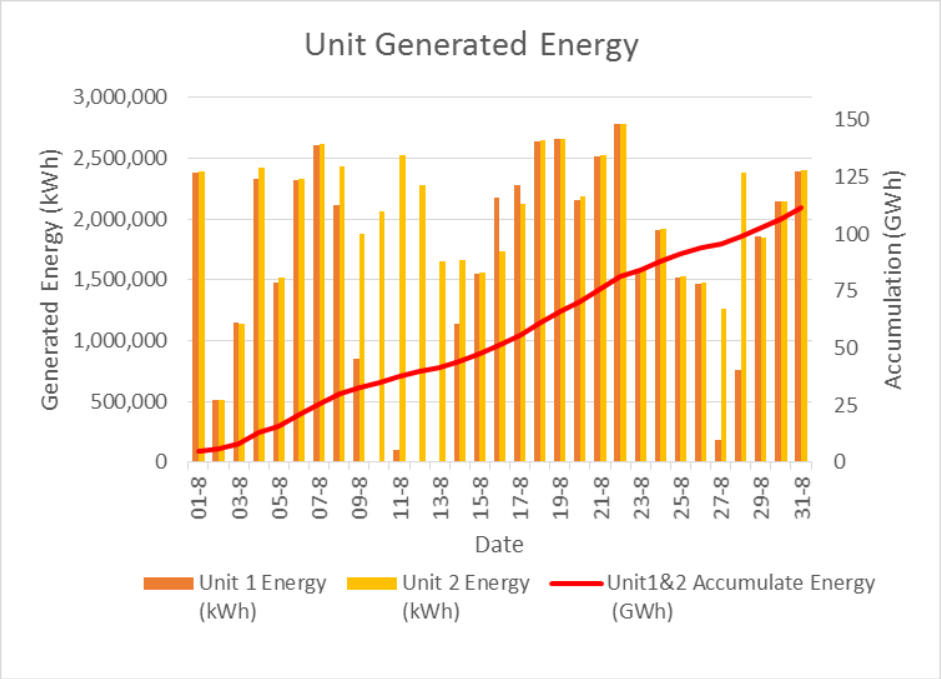


Figure 2-2: Unit Operation Hours (Main Power Station)

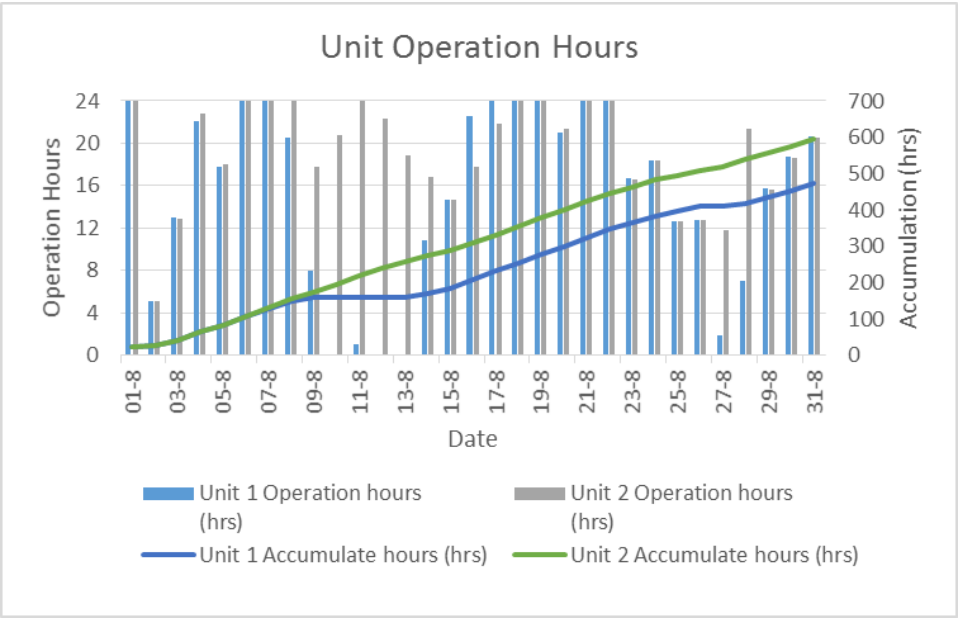


TABLE 2-1: SUMMARY OF THE MAIN DAM OPERATION IN AUGUST 2020

Dam Data	Unit	Quantity
Main dam water level at Beginning of the Month	m asl	297.04
Main dam water level at End of the Month	m asl	310.78
Effective storage at Beginning of the Month	MCM	36.7
Effective storage at End of the Month	MCM	646.4
Inflow	m^3 million	1,001.50
Turbine discharge	m^3 million	374.48
Spillage (excluding riparian release)	m^3 million	0.0

Table 2-2, 2-3 and ***2-4*** shows the generation data at the main power station. In August 2020, the Actual Generation (109.45GWh) was almost the same as Aggregate Declaration (113.21GWh).

TABLE 2-2 : SUMMARY OF MAIN POWER STATION IN AUGUST 2020

Power Station Data	Unit	Quantity	
Generated Energy	GWh	111.70	
Delivery Energy at Delivery Point	GWh	109.54	
Station Service Energy	kWh	213,603	
		Unit 1	**Unit 2**
Period of Operation	Hours	473:07	595:35
Planned Outage	Hours	40:00	40:00
Unplanned Outage	Hours	139:57	2:29
Number of Unit Starts	No.	28	28

TABLE 2-3 : ENERGY AMOUNT IN AUGUST 2020 (MAIN POWER STATION)

Month	Energy amount for the month (MWh)				Imported Energy (MWh)	Station Service Energy (MWh)
	Primary Energy	Secondary Energy	Excess Energy	Total		
January	104,444.6	0	0	104,444.6	182.5	146.0
February	92,536.8	0	0	93,536.8	174.6	157.3
March	61,790.7	0	0	61,790.7	224.5	172.0
April	44,676.9	0	0	44,676.9	131.9	148.6
May	51,541.1	0	0	51,541.1	212.9	187.4
June	51,227.3	0	0	51,227.3	202.2	180.7
July	109,358.1	100.7	0	109,458.8	94.6	226.6
August	80,024.0	42,784.2	0	122,808.2	110.1	213.6

TABLE 2-4 : DECLARATION (MAIN POWER STATION)

Declaration	Unit	August 2020		September 2020 Aggregate Declaration
		Aggregate Declaration	Final Declaration	
Primary Energy	MWh	103,800	81,322	111,900
Secondary Energy	MWh	49,900	41	2,700
Total	**MWh**	**153,700**	**122,808**	**114,600**

2.1.1.2 Re-Regulation Power Station

Figures 2-3 and ***2-4*** shows the generation data at the re-regulation power station in August 2020. The generation and operation time are affected by the operations of the main power station according to EGAT PPA. So, the amount of inflow is determined by the operation resulting at the main power station. Notwithstanding, even if the main power station is stopped, the specified 27 m^3/sec water from re-regulation power station must be discharged to downstream.

FIGURE 2-3: UNIT GENERATED ENERGY (RE-REGULATION POWER STATION)

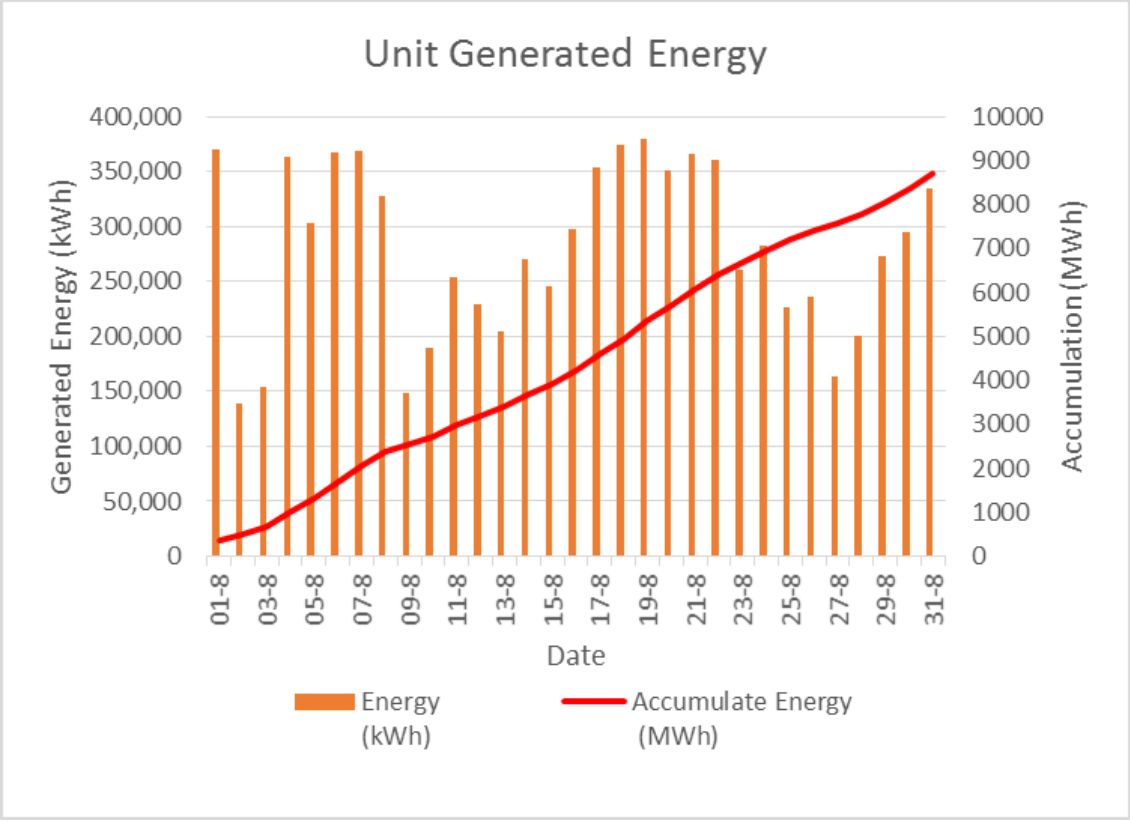


FIGURE 2-4: UNIT OPERATION HOURS (RE-REGULATION POWER STATION)

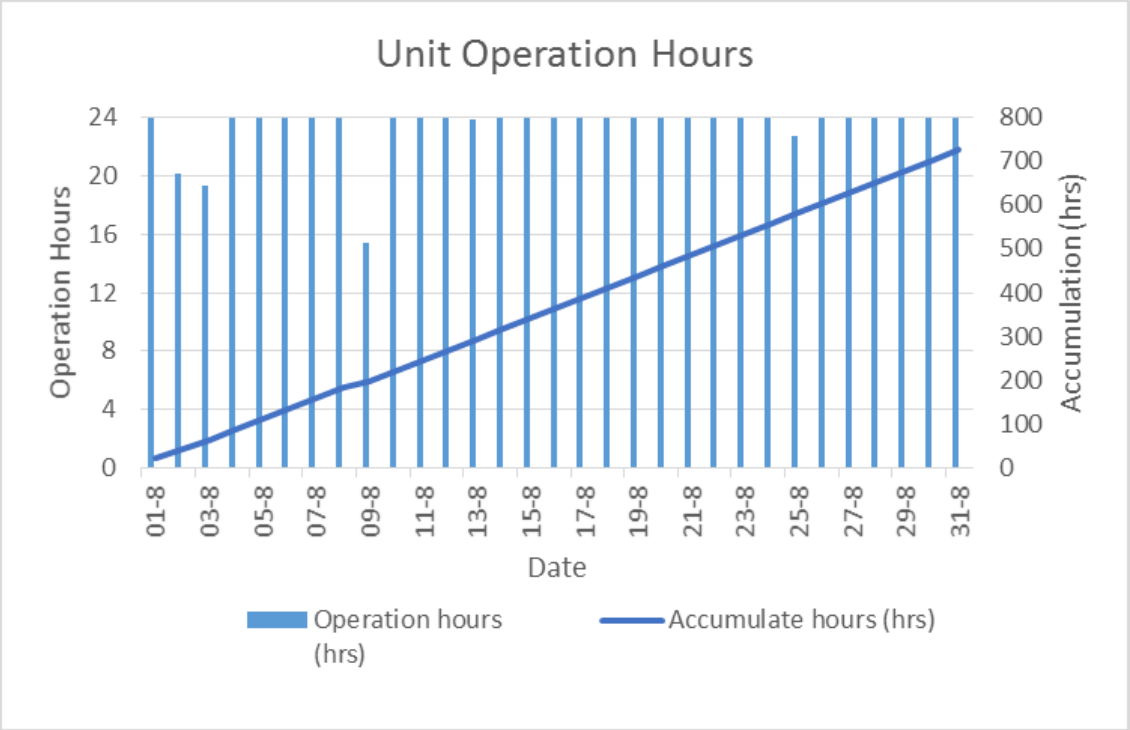


Table 2-5, 2-6 and ***2-7*** shows the dam data at the re-regulation dam and generation data at the re-regulation power station.

TABLE 2-5 : SUMMARY OF RE-REGULATION DAM IN AUGUST 2020

Dam Data	Unit	Quantity
Dam Water Level at Beginning of the Month	m asl	178.08
Dam water Level at End of the Month	m asl	178.81
Inflow	m^3 million	374.49
Turbine Discharge	m^3 million	312.02
Spillage	m^3 million	61.96

TABLE 2-6: SUMMARY OF RE-REGULATION POWER STATION IN AUGUST 2020

Power Station Data	Unit	Quantity
Generated energy	GWh	8.93
Delivery Energy at billing meter	GWh	8.68
Station service energy	kWh	77,510
Operation Hour	Hours	725:29
Planned outage	Hours	8.33
Unplanned outage	Hours	1:15
Number of unit start	No.	5

TABLE 2-7: ENERGY AMOUNT IN AUGUST 2020 (RE-REGULATION POWER STATION)

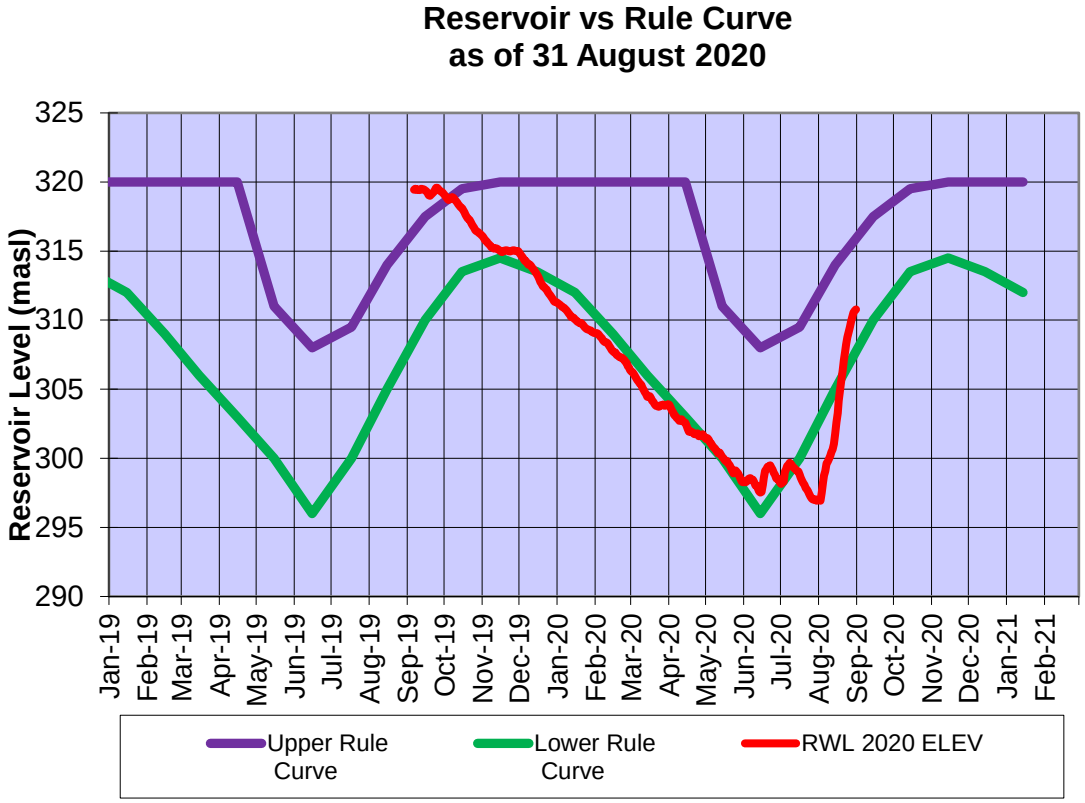
Month	Energy Amount for the Period (MWh)	Imported Energy (MWh)	Station Service Energy (MWh)
January	4,573	18.8	67.8
February	5,179	11.0	66.2
March	4,764	37.5	64.2
April	4, 801	61.1	59.8
May	6,681	10.7	75.7
June	6,497	30.5	70.7
July	9,376	2.9	77.9
August	8,684	1.7	77.5

2.1.1.3 Reservoir Operation

Figure 2-5 shows the dam water level compared with the rule curve. The dam was filled with water up to Full Supply Level at El. 320 m on 17 August 2019, but had slightly decreased because generating discharge was higher than inflow.

Actual dam water level increased from the beginning of August 2020 due to rain.

FIGURE 2-5: DAM RESERVOIR LEVEL



2.1.2 Outage, Liquidated Damages and Unavailability

TABLE 2-8: UNAVAILABILITY AND SIGNIFICANT EVENT IN AUGUST 2020 (MAIN POWER STATION)

Unit	Date/Time		Event	Outage Type	Period of Outage (Hours)
	Started	Finished			
1	02 Aug (08:00)	02 Aug (18:00)	Monthly maintenance	Planned Outage	10:00
	08 Aug (08:30)	08 Aug (12:00)	Regular cleaning of cooling water system	Short Notice Outage	3:30
	09 Aug (01:00) (19:00)	09 Aug (12:00) (24:00)	Regular cleaning of cooling water system	Short Notice Outage	16:00
	10 Aug (01:00)	10 Aug (24:00)	Flushing of cooling water system (preparation)	Short Notice Outage	23:00
	11 Aug (01:00)	11 Aug (24:00)	Flushing of cooling water system (preparation)	Short Notice Outage	23:00
	12 Aug (01:00)	12 Aug (24:00)	Flushing of cooling water system (preparation)	Short Notice Outage	23:00
	13 Aug (01:00)	13 Aug (24:00)	Flushing of cooling water system	Short Notice Outage	23:00
	25 Aug (07:00)	25 Aug (17:00)	Flushing of cooling water system (preparation)	Planned Outage	10:00
	26 Aug (00:10)	26 Aug (00:29)	Tripped because station service power was lost due to 22kV DL ground fault	Forced Outage	00:19
	26 Aug (07:00)	26 Aug (17:00)	Flushing of cooling water system (preparation)	Planned Outage	10:00
	27 Aug (01:52)	27 Aug (02:00)	Tripped due to lower guide bearing temperature high	Forced Outage	00:08
	27 Aug (02:00)	27 Aug (24:00)	Flushing of cooling water system	Short Notice Outage Planned Outage	22:00
	28 Aug (01:00)	28 Aug (17:00)	Flushing of cooling water system	Short Notice Outage	16:00
2	02 Aug (08:00)	02 Aug (18:00)	Monthly maintenance	Planned Outage	10:00
	25 Aug (07:00)	25 Aug (17:00)	Flushing of cooling water system (Air-cooler)	Planned Outage	10:00
	26 Aug (00:10)	26 Aug (00:29)	Tripped because station service power was lost due to 22kV DL ground fault	Forced Outage	00:19
	26 Aug (07:00)	26 Aug (17:00)	Flushing of cooling water system (Air-cooler)	Planned Outage	10:00
	27 Aug (07:00)	27 Aug (19:10)	Flushing of cooling water system	Planned Outage Short Notice Outage	12:10

TABLE 2-9: LIQUIDATED DAMAGE IN AUGUST 2020 (MAIN POWER STATION)

USD Portion	*Baht Portion*
19,404.00	1,515,858.60

(Estimation)

TABLE 2-10 : UNAVAILABILITY AND SIGNIFICANT EVENT IN AUGUST 2020 (RE-REGULATION POWER STATION)

Unit	Date/Time		Event	Outage Type	Period of Outage (Hours)
	Started	Finished			
1	09 Aug (07:06)	09 Aug (15:39)	Monthly Inspection	Planned Outage	8:33
	25 Aug (13:43)	25 Aug (14:03)	EGAT-OM Cleaned Oil Cooler's Flow Sensor	Forced Outage	0:20
	25 Aug (16:08)	25 Aug (17:03)	Tripped due to 115 kV T/L No Voltage	Forced Outage	0:55

2.2 MAINTENANCE WORK

Date	Activity
09-August-20	Regulation Power Station: Monthly Inspection
13-August-20	Main Power Station: Flushing of Thrust Bearing's Cooling Coil for Unit1
25-August-20	Main Power Station: Flushing of Generator's Air Coolers for Unit2
26-August-20	Main Power Station: Flushing of Generator's Air Coolers for Unit2
27-August-20	Main Power Station: Flushing of Thrust Bearing's Cooling Coil for Unit2
28-August-20	Main Power Station: Flushing of Thrust Bearing's Cooling Coil for Unit1

The temperature of thrust bearing and lower guide bearing for Unit 1 at Main Power Station gradually rose since August 2019 and the Unit was forced to manually stop due to an extremely high temperature on 08 August 2020.

Therefore, flushing mud inside cooling water pipes by high-pressure water was conducted in order to cope with the temperature rise.

2.3 CIVIL AND APPURTENANT STRUCTURE

2.3.1 Reservoir

FIGURE 2-6: RESERVOIR OF MAIN DAM

FIGURE 2-7:: RESERVOIR OF RE-REGULATION DAM

2.3.2 Dam and Power Plant

2.3.2.1 Rehabilitation works

Plant Yards

Demobilization of plant facilities for both RCC and CVC plants was completed in December 2019. The vegetation improvement for rehabilitation of those areas is ongoing.

FIGURE 2-8: RE-VEGETATION OF RCC PLANT YARD

FIGURE 2-9: RE-VEGETATION OF CVC PLANT YARD

Quarry

The final blasting was carried out 27 March 2018. GOL have acknowledged that the quarry operation is complete. After several inspections by GOL and ADB for the Lenders, the quarry site has been improved by such as partial levelling, vegetation at the berms of slopes and large rock installation at top of slopes from an environmental and a safety point of view. Fence for safety was installed at top slope at right side. The grading at the quarry bottom and spreading of top soil was completed in January 2020.

FIGURE 2-10: QUARRY AREA VIEW SHOWING RE-VEGETATION AND SAFETY FENCE INSTALLATION

2.3.2.2 Disposal Areas and Solid Waste Landfill Sites

The operation of both HSRA and Project landfills is ongoing with collection waste materials from Resettlement "Phouhomxay", neighbour villages and the Owner Site Office and Village.

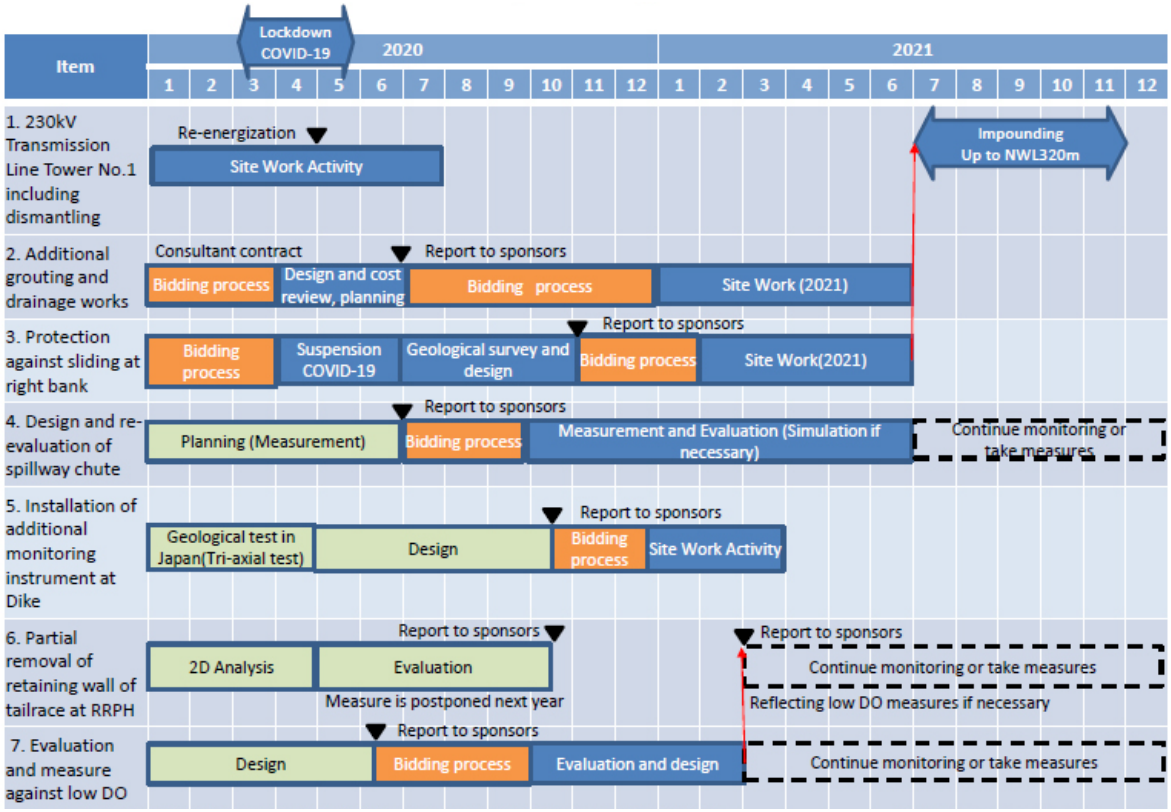
FIGURE 2-11: PHASE 2 OF PROJECT LANDFILL DEVELOPMENT ON 08 JUNE 2017

CURRENT CONDITION OF LANDFILL

2.3.2.3 Remaining Work

As shown in ***Figure 2-12***, there remain seven items of significant works. Nos. 1, 2, 3, 4 are related to the main powerhouse and Nos. 5 and 6 are related to the re-regulation powerhouse. No. 7 is related to power operation and environmental issues.

FIGURE 2-12: SCHEDULE OF SIGNIFICANT REMAINING WORKS IN 2020



2.4 TRANSMISSION SYSTEM

2.4.1 Tower No.1 of 230 kV TL Replacement and Dismantling

The Tower No.1 was damaged due to the slope failure of approximately 150 m3 volume of material above and behind Tower No.1 that occurred overnight on 17 to 18 of August 2019. Some of the structural steel members of the Tower No.1 were deformed. Tower No.1 did not move significantly but remained an unsafe structure. Movement of the upper part of the steel structure of the tower was observed.

Therefore, a Temporary Tower No.1 was constructed and the transmission line was moved to it from the damaged tower over the period of 06 to 24 September 2019. The construction of the permanent Replacement Tower No.1, disassembly of existing Tower No.1 was contracted in late December 2019. The foundation excavation of legs for new Tower No.1 started in the middle of January 2020 and was completed on February 2020; the damaged Tower No.1 was almost dismantled in January 2020. The installation of gantry structure and new Tower No.1 was completed in the beginning of April 2020. Energization test was completed on 30 April 2020. Remaining works including slope protection around the Tower will be completed by September 2020 because earth work and concrete placement could not be done due to rain. The gabion mattress was installed partly on the top part of the slope.

FIGURE 2-13: TOP VIEW OF GANTRY STRUCTURE _SLOPE PROTECTION AROUND FOUNDATION ONGOING

A contract of biding for repairing works of 230 Transmission towers or missing part (bolt and nut) is under process.

3. ENVIRONMENTAL MANAGEMENT MONITORING

3.1 COMPLIANCE MANAGEMENT

In August 2020, the Environmental Management Office (EMO) of Nam Ngiep 1 Power Company (NNP1PC) received one Detailed Work Programme (DWP) and Site Specific Environmental and Social Management and Monitoring Plans (SS-ESMMP), one Design and Specification for the septic biofilm tank replacement in the OSOV1, one Design Drawing for a temporary toilet facility of the security house at the steel bridge and one Environmental and Social Checklist for review and approval. The status is presented in *Table 3-1.*

TABLE 3-1: SS-ESMMP AND DOCUMENT REVIEW STATUS IN AUGUST 2020

Title	Date Received	Status
DWP and SS-ESMMP for the Monitoring Works on the NNP1 project.	17 August 2020 (2nd submission)	No objection with no comments on 20 August 2020.
Detailed Design and Biofilm Tank Purchase Requires for the Replacement in the OSOV1.	17 August 2020 (1st submission)	No objection with no comments on 19 August 2020.
Detail Design of Temporary Toilet at Security House at Steel Bridge.	17 August 2020 (1st submission)	No objection with comments on 19 August 2020.
Environmental and Social Checklist for Barge Operation in 2UR.	20 August 2020 (1st submission)	No objection with no comments on 20 August 2020.

There was no new Non-Compliance Report issued during August of 2020. There were some minor issues found and then immediately resolved. The status of compliance reports (Observation of Non-Compliance or ONC, Non-Compliance Report or NCR) issued by NNP1PC to the Contractors is summarized in *Table 3-2* and the status of the ONCs and NCRs that are Unsolved Exceeding Deadlines presented in *Table 3-3.*

TABLE 3-2: SUMMARY OF ONCS AND NCRS

Items	ONC	NCR-1	NCR-2	NCR-3
Carried over from July 2020	2	2	0	0
Newly Opened in August 2020	0	0	0	0
Total in August 2020	**2**	**2**	**0**	**0**
Resolved in August 2020	0	0	0	0
Carried over to September 2020	0	**0**	0	0
Unsolved Exceeding Deadlines	**2**	**2**	**0**	**0**

TABLE 3-3: SUMMARY OF THE ONCS AND NCRS THAT ARE UNSOLVED EXCEEDING DEADLINES

Document Number / Date of Issue	Subject Description	Current Status at the end of August 2020
ONC_AM-0003 / 28 Feb 2020	Issued to ADM to carry out the improvement work for the second wetland pond similarly to the first wetland pond. (Based on the LTA's recommendation made during the mission in August 2019 to improve the OSOV's WWTS)	NNP1PC has checked the treatment efficiency of the existing WWTS as well as working with the WWTS consultant. The WWTS evaluation result will be proposed for management review/consideration by September 2020.
ONC_OC-0349 / 24 Mar 2020	Issued to remind the OC Contractor to use only the approved tree species for revegetation and dead plant replacement.	Action is needed throughout the Liability Period until January 2021 The ONC will be closed by the end of the contractor's liability period by Jan 2021.
NNP1-ESD-EMO-NCR-VSP-0001 / 13 Jul 2020 (NCR Level 1)	Non-Compliance of the Site Rehabilitation for a Spoil Disposal Area at the Irrigation Canal Construction Site.	The corrective action was completed on 04 August 2020 by the VSP Contractor. This revegetated site is to be ongoing monitored by NNP1-EMO until the end of rainy season 2020. The NCR1 will be closed following the revegetation successful.
NNP1-ESD-EMO-NCR-HM-0007 / 06 Apr 2020 (NCR Level 1)	Non-Compliance of the Site Revegetation at the HM Hydro's Labour Camp No.2 (LILAMA10 Camp)	The corrective action was completed on 03 September 2020 by HM Hydro Contractor. This revegetated site is to be ongoing monitored by NNP1-EMO until the end of rainy season 2020. The NCR1 will be closed following the revegetation successful.

3.1.1 Site Inspection by Environment Management Unit

A monthly site visit by the Bolikhan District EMU (Bolikhamxay Province) and a quarterly mission of EMU Xaysomboun Province were not carried out in August 2020.

3.1.2 Site Decommissioning and Rehabilitation

In August 2020, EMO carried out a weekly rotation monitoring of the revegetated sites for grass seed germination and green cover as well as site stability. The vegetation cover at 21 out of 23

sites have increased compared with the previous months. Other two sites (Irrigation canal-spoil disposal area and the former LILAMA10 camp) were newly revegetated in August 2020.

FIGURE 3-1: ADDITIONAL COUNTER MEASURES FOR THE SITE REHABILITATION IN AUGUST 2020

OC Camp Local grass species were additionally planted	***V & K CAMP*** Local grass species were additionally planted
	
RCC PLANT (TOP VIEW)	**MAIN QUARRY (BOTTOM VIEW)**
	

3.2 ENVIRONMENTAL QUALITY MONITORING

The analyses of Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD5), Faecal Coliform, E. Coli Bacteria and Total Coliform have been carried out by NNP1PC's environmental laboratory since August 2017.

All data are reported to the Ministry of Natural Resources and Environment (MONRE) monthly, and quarterly to the ADB. The reports are also published on the Company's website at https://namngiep1.com/resources/monitoring-reports/

3.2.1 Effluent Discharge from Camps and Construction Sites

Detailed monitoring results are provided in the Annex B of this Report. The effluent camp monitoring results in August 2020 indicated non-compliances for total coliform and faecal coliform in OSOV1.

In August 2020, EMO held two meetings via a VDO conference with the Consultant for the Wastewater Treatment Systems (WWTSs) improvement in OSOV1, OSOV2, main dam and re-regulation dam. The treatment efficiency of all four WWTSs was checked, and the study results and recommendations from the Consultant on the WWTS operation, modification and/or replacement will be summarized for management consideration by middle of September 2020.

The status of implementation of the corrective actions addressing non-compliances at the camps and key project facilities that continue to have non-compliances are summarized in *Table 3-4.*

TABLE 3-4: STATUS OF CORRECTIVE ACTIONS FOR NON-COMPLIANCES AT WWTSS

Site	Sampling ID	Status	Corrective Actions
OSOV1	EF01	Non-compliance for faecal coliform and total coliform	On-going maintenance of the wetland ponds (weeding and harvesting reeds)
OSOV2 (ESD Camp)	EF13	Full compliance	-
Main Powerhouse	EF19	Non-compliance for TSS, COD, Ammonia nitrogen, total nitrogen and total phosphorus in the second fortnightly sampling	-

3.2.2 Ambient Surface Water Quality Monitoring

The ambient surface water quality monitoring programme comprises five monitoring stations in the main reservoir (R01-R05), two stations in the re-regulation reservoir (R06 and R07), five stations in the mainstream Nam Ngiep (NNG01 and NNG05 to NNG08) and four stations in the main tributaries to Nam Ngiep (Nam Chiane [NCH01], Nam Phouane [NPH01], Nam Xao [NXA01] and Nam Houay Soup [NHS01]).

In addition, weekly depth profile monitoring (pH, DO, conductivity, TDS and temperature) has been undertaken since 18 September 2018 for stations located in the re-regulation and main reservoirs. The locations of the monitoring stations are shown in *Figure 3-2*.

The monitoring results for key parameters (DO, TSS and BOD_5) during August 2020 are presented in *Table 3-5, Table 3-6 and Table 3-7*. The full set of data for August 2020 is attached in *Annex A*. In addition, the results for DO are presented as line graphs in *Figure 3-3*.

Main Reservoir

From 01 to 31 August 2020, the water level in the main reservoir increased from El. 296.9 m asl to El. 310.8 m asl.

Thermal stratification, oxycline and anoxic condition were observed in the main reservoir at some stations. The inflow during the wet season contributed to a higher DO level at the deeper layers in the main reservoir.

At R05, during August 2020, the DO level in the upper 3.5 m was generally between 5 and 8 mg/L, and an oxycline had formed at a depth between 3.0 and 13.0 m corresponding to El. 287 m asl – 297 m asl. The entire water column below 38.0 m had a DO level less than 1 mg/L (anoxic condition).

At R04, the DO level in the upper 7.0 m was generally between 6 and 10 mg/L. The entire water column below 45.0 m was in anoxic condition.

The DO level at R03 was recorded between 6 and 8 mg/L in the upper 5.0 m and generally in anoxic condition at the depth below 34.0 m.

At R02, the DO concentrations in the entire water column were generally between 5.8 and 10.8 mg/L.

At R01, the DO level was generally about 8 mg/L.

As expected, the TSS concentrations in the main reservoir have been consistently low since the start of impounding with a mean of 5 mg/L compared to high flow season means of about 100 – 250 mg/L and low flow season means of 20 - 50 mg/L, except at R01 where it is in the river condition with runoff and water turbulence.

The BOD_5 measurement at R03, R04 and R05 in the epilimnion were less than 1 mg/L, but in the hypolimnion, BOD_5 was recorded at 4.00, 8.12 and 6.01 mg/L respectively.

Re-regulation Reservoir

In August 2020, the turbine discharges from the main powerhouse varied between 42 m^3/s and 210 m^3/s and usually interrupted by night-time periods with no discharge.

The DO measurements at R06 and R07 representing turbine discharges from the main dam generally had DO concentrations below 4 mg/L in the entire water column.

The BOD_5 concentration in R06 and R07 were 6.41 and 4.51 mg/L respectively.

Downstream

During August 2020, the discharge from the re-regulation dam mainly went through the turbines and occasionally went through both the turbines and the gate. The DO levels were less than 6 mg/L at the Nam Ngiep downstream stations and thus are non-compliant with the GoL Standard, except at NNG06 on 18 August 20, NNG07 on 05, 18 and 26 August 20 and NNG08 on 05, 12, 18 and 26 August 2020. No dead fish was observed in Nam Ngiep downstream during this monitoring period. NNP1PC is in the process of collecting information to assist in the improving DO level downstream.

The BOD_5 in the downstream stations were below 1.0 mg/L.

FIGURE 3-2: SURFACE WATER AND RE-REGULATION RESERVOIR WATER QUALITY MONITORING STATIONS

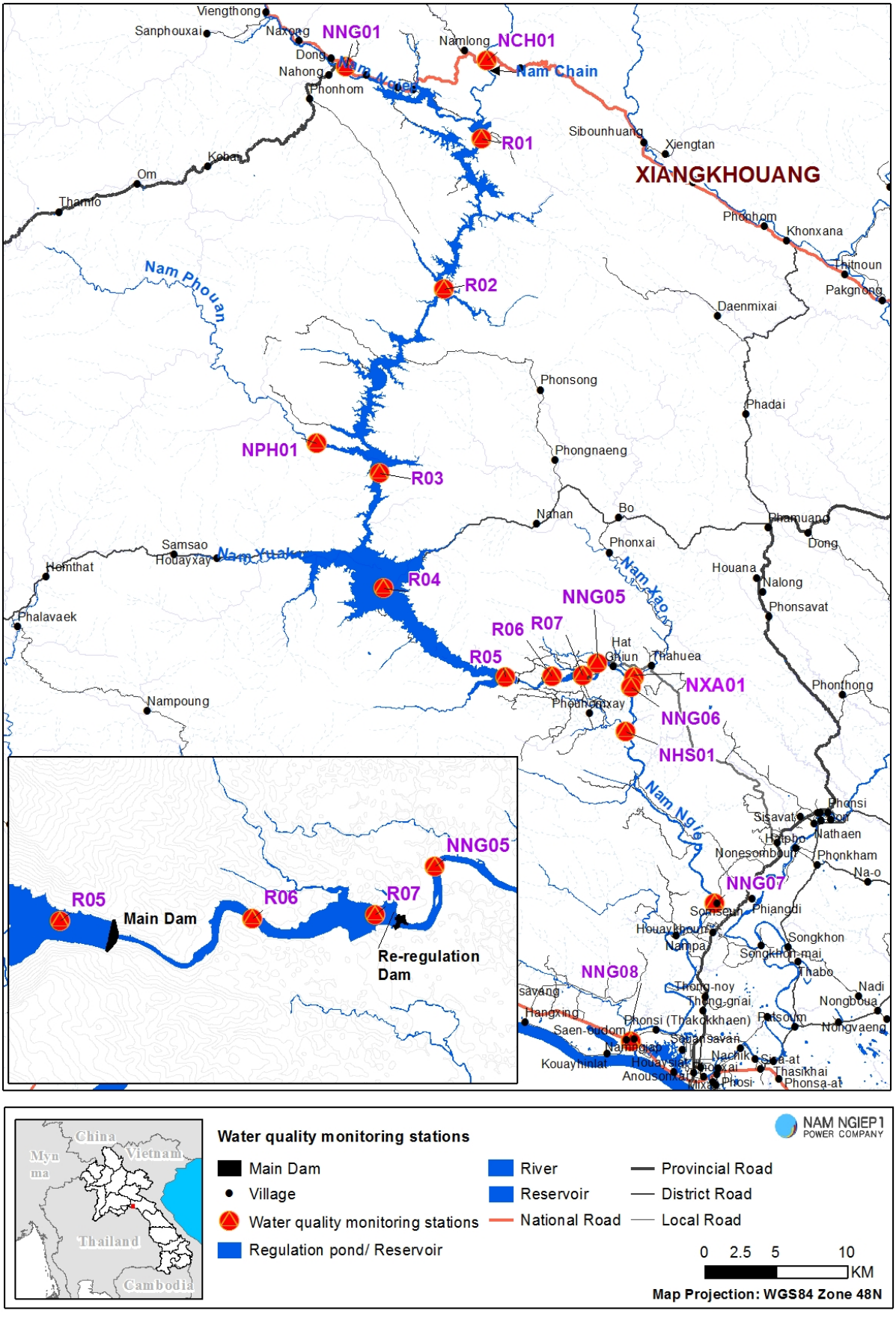


FIGURE 3-3: CONCENTRATION OF DISSOLVED OXYGEN (MG/L) IN THE UPPER 0.2 M SINCE SEPTEMBER 2019 TO AUGUST 2020

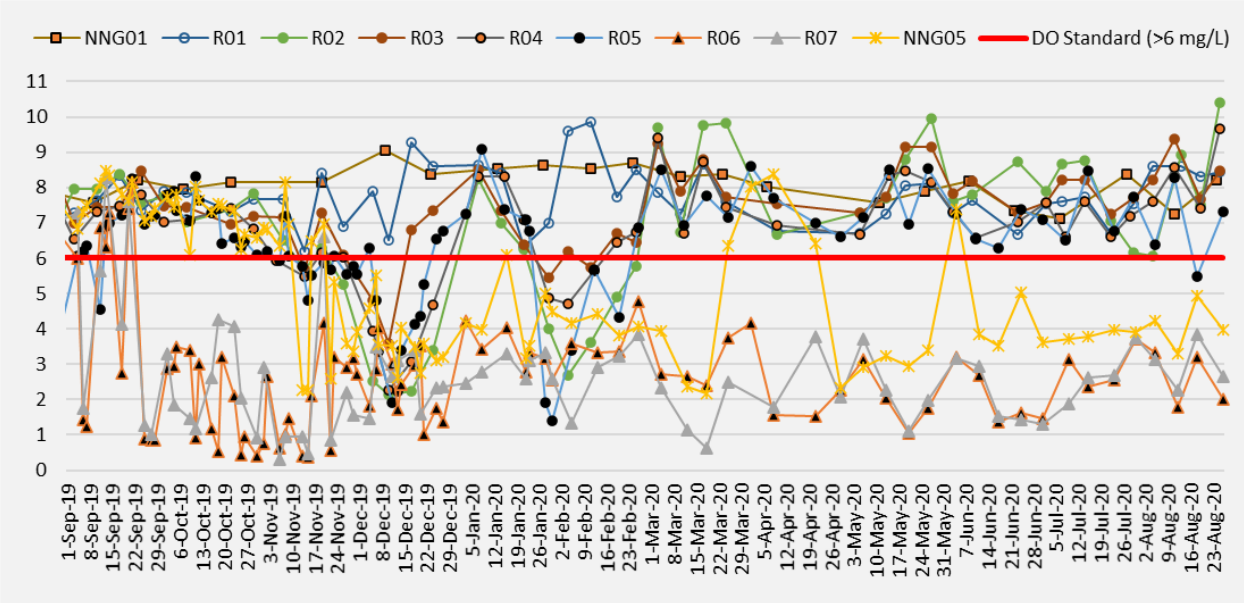


TABLE 3-5: RESULTS OF SURFACE WATER QUALITY MONITORING FOR DISSOLVED OXYGEN (MG/L) IN THE UPPER 0.2 M, NATIONAL WATER QUALITY STANDARD: >6.0 MG/L

DO (mg/L)	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
4-Aug-20		8.6	6.06	8.23	7.6									9.79		
5-Aug-20						6.37	3.34	3.13	4.23	5.48	6.24	6.62			6.85	6.8
11-Aug-20	7.24			9.36	8.58	8.29							8.43	9.95		
12-Aug-20							1.79	2.28	3.3	4.52	5.61	6.07			7.31	9.89
13-Aug-20		8.6	8.91													
18-Aug-20						5.47	3.21	3.85	4.95	6.33	6.11	6.62			7.14	6.9
19-Aug-20		8.3	7.51	7.66	7.41									9.04		
24-Aug-20	8.21												8.78			
25-Aug-20		8.4	10.4	8.47	9.66									9.14		
26-Aug-20						7.33	2.02	2.65	3.96	5.47	6.29	6.39			9.88	7.82

TABLE 3-6: RESULTS OF SURFACE WATER QUALITY MONITORING FOR TOTAL SUSPENDED SOLIDS (MG/L) - WATER QUALITY STANDARD: NO STANDARD

Total Suspended Solids (mg/L)	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
11-Aug-20	39.2			5.9	<5	<5							28.8	18.7		
11-Aug-20				30.8	15.6	4.7										

Total Suspended Solids (mg/L)	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Hypolimnion																
12-Aug-20							<5	<5	<5	8.7	19.6	16.3			30.2	6.7
13-Aug-20		276.8														

TABLE 3-7: RESULTS OF SURFACE WATER QUALITY MONITORING FOR BOD5 (MG/L) - WATER QUALITY STANDARD: < 1.5 MG/L

BOD_5 (mg/L)	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
11-Aug-20	<1			<1	<1	<1							<1	<1		
11-Aug-20 Hypolimnion				4.00	8.12	6.01										
12-Aug-20							6.41	4.51	2.01	<1	<1	<1			<1	<1
13-Aug-20		<1														

3.2.3 Groundwater Quality Monitoring

During August 2020, community groundwater quality analyses were carried out for six wells located in Somseun Village, Nam Pa Village, Thong Noy Village, Pou Village and Phouhomxay Village.

The results indicated compliance with the groundwater quality standards for water supply purposes, except for faecal coliform and E.Coli bacteria in some boreholes as presented in *Table 3-8*. In September 2020, EMO will investigate the potential sources of bacterial contamination and report the results in the MPR of September 2020.

TABLE 3-8: GROUNDWATER QUALITY MONITORING RESULTS IN SOMSUEN, NAM PA, THONGNOY AND POU VILLAGES

Parameter (Unit)	Site Name	Somseun Village	Nam Pa Village	Thong Noy Village	Pou Village	Phouhomxay Village	
	Station	GSXN01	GNPA01	GTHN01	GPOU01	GPHX01	GPHX02
	Guideline						
pH	6.5 - 9.2	8.5	8.68	8.44	8.53	7.63	8.21
Sat. DO (%)		78.5	84.2	56.3	90.7	49.2	48.6
DO (mg/L)		6.41	6.85	5.32	6.69	4.05	4.01
Conductivity (µS/cm)		314	402	450	8.6	163	421
Temperature (°C)		25.54	25.77	25.52	28.5	25.29	25.05
Turbidity (NTU)	<20	2.69	2.45	2.73	5.8	6.62	4.61
Faecal Coliform (MPN/100 mL)	0	2	0	49	79	33	0
E.coli Bacteria (MPN/100 mL)	0	2	0	49	79	23	0

3.2.4 Gravity Fed Water Supply (GFWS) Quality Monitoring

The results of the water quality analyses are presented in **Error! Reference source not found.**. All parameters complied with the GoL Drinking Water Standards except for Faecal Coliform and E. Coli that exceeded the standards in all stations (WTHH02, WHGN02, WPHX01-intake before the filtration system, WPHX02-tap water at the primary school in Phouhomxay Village, and WPHX03-tap water at a house in Phouhomxay Village).

As observed in the field during water sample collection, the livestock activities in the water intake areas may contribute to the presence of Faecal Coliform Bacteria and E.coli in GFWS samples. The villagers were advised to boil water before drinking. This advice is in accordance with the Law on Hygiene, Disease Prevention and Health Promotion No 01/NA of 10 April 2001, which states that domestic water supply for daily use is not required to be readily drinkable but would normally have to be boiled or otherwise treated before it would be suitable for drinking. The villagers generally use tap water for washing and cleaning. They were informed about the monitoring results and were encouraged to boil water before drinking.

TABLE 3-9: RESULTS OF THE GRAVITY FED WATER SUPPLY QUALITY MONITORING

		Site Name	Thaheau Village	Hat Gnuin Village	Phouhomxay Village		
		Station	WTHH02	WHGN02	WPHX01	WPHX02	WPHX03
Date	Parameter (Unit)	Guideline					
21-Aug-20	pH	6.5 - 8.6	8.15	7.96	8.01	7.83	7.4
21-Aug-20	Sat. DO (%)		92.5	91.3	97.3	87.9	92.6
21-Aug-20	DO (mg/L)		7.4	7.37	8.18	7.11	7.55
21-Aug-20	Conductivity (µS/cm)	<1,000	21	30	10	9	9
21-Aug-20	Temperature (°C)	<35	26.8	26.26	24.09	26.14	25.75
21-Aug-20	Turbidity (NTU)	<10	13.9	11.35	3.37	2.56	2.64
21-Aug-20	Faecal Coliform (MPN/100 mL)	0	1,600	1,600	540	540	33
21-Aug-20	E.coli Bacteria (MPN/100 mL)	0	540	920	540	240	33

3.2.5 Landfill Leachate Monitoring

During August 2020, the landfill leachate monitoring was conducted at NNP1 Project Landfill (Discharge Point – LL5) and at Houay Soup Solid Waste Landfill (Last pond - LL6).

The results indicate that:

- The water sampled from the Discharge Point of NNP1 Project Landfill did not comply with the total coliform standard. Immediate corrective action was carried out to re-circulate water back to the waste pitch for additional treatment and to ensure that no water was discharged through the Discharge Point.

- The water sampled from the last pond of Houay Soup Landfill did not comply with the total coliform standard, but the water will be treated in a wetland pond before it is discharged to an open ditch.

EMO will continue to monitor the leachate and report the results in the next monthly progress report. The landfill leachate monitoring results for August 2020 can be found in *Table 3-10*.

TABLE 3-10: RESULTS OF THE LANDFILL LEACHATE MONITORING

		Site Name	NNP1 Landfill Leachate						Houay Soup Landfill
		Location	Pond No.01	Pond No.02	Pond No.03	Pond No.04	Discharge Point	Last pond	Discharge Point
		Station	LL1	LL2	LL3	LL4	LL5	LL6	LL7
Date	Parameter (Unit)	Guideline							
17-Aug-20	pH	6.0-9.0					7.95	7.46	
17-Aug-20	Sat. DO (%)						117.7	135.2	
17-Aug-20	DO (mg/L)						9.06	10.23	
17-Aug-20	Conductivity (µS/cm)						84.6	269	
17-Aug-20	Temperature (°C)						27	27.9	
17-Aug-20	Turbidity (NTU)						7.18	10.31	
17-Aug-20	BOD_5 (mg/L)	<30					<6	7.11	
17-Aug-20	COD (mg/L)	<125					<25	64.8	
17-Aug-20	Faecal Coliform (MPN/100 mL)	<400					130	33	
17-Aug-20	Total Coliform (MPN/100 mL)	<400					920	1,600	
17-Aug-20	Total nitrogen (mg/L)	<10					1.53	6.76	
17-Aug-20	Lead (mg/L)	<0.2					<0.010	<0.010	
17-Aug-20	Copper (mg/L)						<0.006	<0.006	
17-Aug-20	Iron (mg/L)						0.309	0.981	
17-Aug-20	Ammonia nitrogen (mg/L)	<10					<2.0	6.20	
17-Aug-20	Oil & Grease (mg/L)	<10					<1	<1	

3.2.6 Discharge Monitoring

3.2.6.1 Main Reservoir – Water Level, Inflow and Discharge

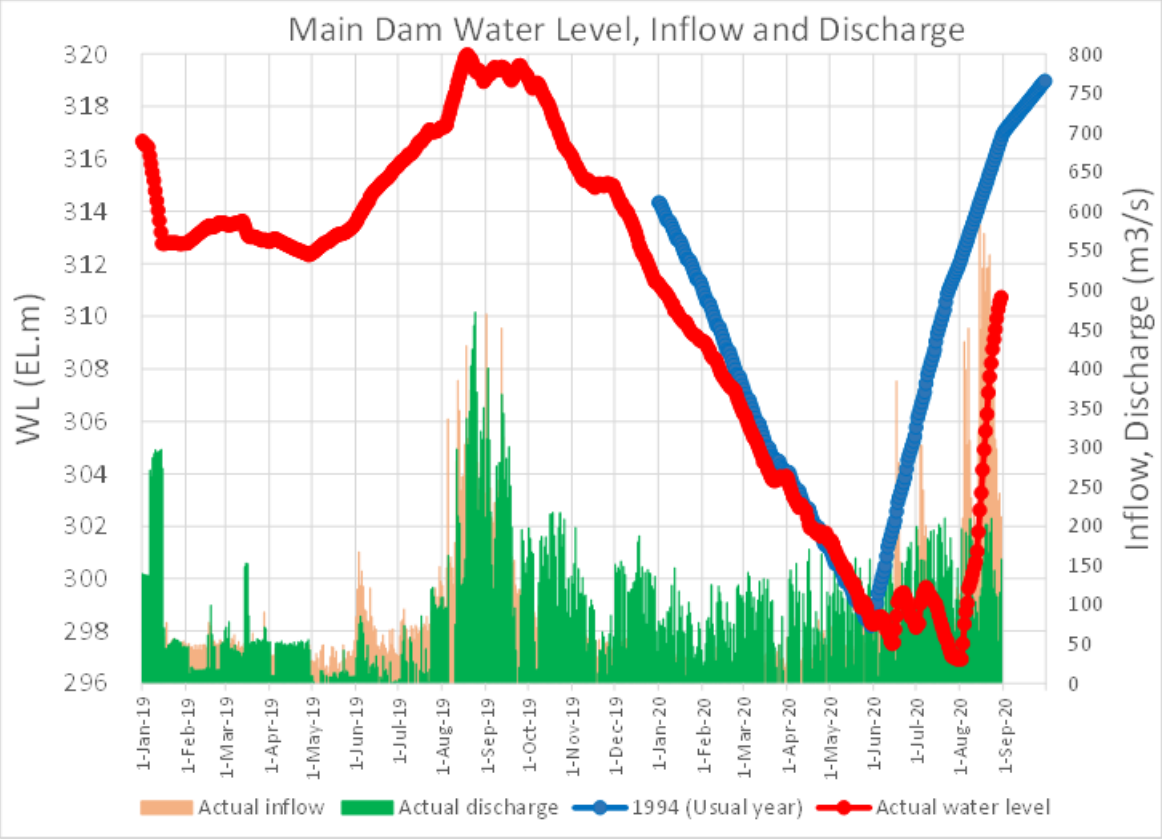
The water level in the main reservoir, inflow to the reservoir and discharge from the reservoir have been monitored since the start of the impounding on 15 May 2018. The graph in *Figure 3-4* presents the values recorded since 01 January 2019.

During August 2020, the mean inflow to the main reservoir was 285 m^3/s during the first 2 weeks where after the inflow increased to a mean of about 399 m^3/s during the remaining part of August 2020 corresponding to the peak period of the wet season. The minimum and maximum inflow were 113 (on 01 August 2020) and 583 m^3/s (on 15 August 2020) respectively.

From 01 to 31 August 2020, the main reservoir was filling-up and the water level increased from El. 297.0 m asl to El. 310.8 m asl on 31 Aug 2020, increased by 13.8 m during the month.

In August 2020, the turbine discharges from the main powerhouse varied between 13 and 231 m^3/s and usually interrupted by night-time periods with no discharge.

FIGURE 3-4: WATER LEVEL, INFLOW AND DISCHARGE FOR THE MAIN RESERVOIR



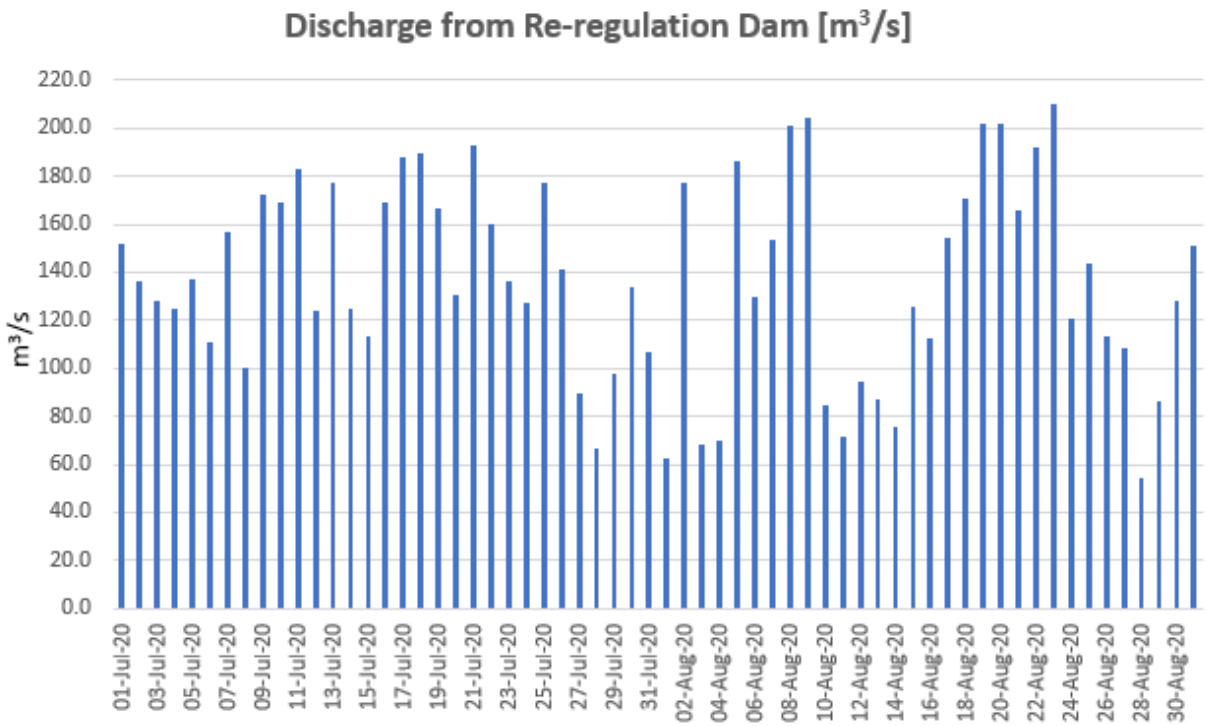
3.2.6.2 Re-regulation Reservoir – Discharge

The discharge monitoring data for the re-regulation dam during July and August 2020 is presented in *Figure 3-5*.

During August 2020, the mean discharge from the re-regulation dam was about 133 m^3/s with turbine discharges varying between 32 and 165 m^3/s, combined with gate discharge varying between 27 and 128 m^3/s. The discharge was kept above the minimum flow requirement of 27 m^3/s at all times.

The changes in the discharge from the re-regulation dam were informed in advance to the RMU and to the heads of the downstream villages, who then announced the changes to the communities over the village speaker systems.

FIGURE 3-5: DISCHARGE MONITORING AT THE RE-REGULATION DAM IN JULY AND AUGUST 2020



3.2.7 Nam Ngiep Downstream Water Depth Monitoring

In August 2020, EMO carried out four boat missions to monitor the water depth in the Nam Ngiep downstream of the re-regulation dam. A total of 19 sites have been identified with potential shallow water depths but none of them were found to be difficult to navigate.

3.3 PROJECT WASTE MANAGEMENT

3.3.1 Solid Waste Management

In August 2020, a total of 19.6 m^3 of solid waste was disposed of at the NNP1 Project Landfill, the same amount as recorded in July 2020.

During August 2020, the local waste collection contractor improved the work performance for the routine operation and maintenance activities of both landfills which included waste separation, waste covering and waste inventory, and clean-up of vegetation and scattered waste, sediment removal from the open ditches, fixing the fence of Houay Soup Landfill and repairing the access road of NNP1 Landfill.

No recyclable waste was sold this month and the cumulative amounts are presented in *Table 3-11.*

TABLE 3-11: AMOUNTS OF RECYCLABLE WASTE SOLD

Source and Type of Recycled Waste		Unit	Sold	Cumulative Total by August 2020
1	Plastic bottle	kg	0	62
2	Aluminium	kg	0	76
3	Paper/Cardboard	kg	0	58
4	Glass	kg	0	53
Total		**kg**	**0**	**249**

The villagers from Phouhomxay Village collected a total of 603 kg of food waste from the OSOV1 canteen for animal feed in August 2020, a decreased of 219 Kg compared to the previous month.

3.3.2 Hazardous Materials and Waste Management

The types and amounts of hazardous material and hazardous waste stored on site in August 2020 are shown in *Table 3-12* and *Table 3-13*.

TABLE 3-12: RECORD OF HAZARDOUS MATERIAL INVENTORY

No.	Type of Hazardous Material	Unit	Total in August 2020 (A)	Used (B)	Remaining (A – B)
1	Diesel	Litre	8,366	2,862	5,504
2	Gasoline	Litre	604	423	181
3	Lubricant (Turbine oil)	Litre	7,210	0	7,210
4	Colour Paint	Litre	266	0	266
5	Thinner	Litre	12	0	12
6	Grease Oil	Litre	725	0	725
7	Gear Oil	Litre	220	0	220
8	Chlorine Liquid	Litre	130	80	50
9	Chlorine Powder	Kg	65	0	65
10	SIKA	Litre	7	0	7

TABLE 3-13: RECORD OF HAZARDOUS WASTE INVENTORY

No.	Hazardous Waste Type	Unit	Total in August 2020 (A)	Disposed (B)	Remaining (A - B)
1	Used Oil (Hydraulic and Engine)	Litre	192	0	192
2	Empty 200L drum of used oil	Unit	3	0	3
3	Contaminated soil, sawdust and textile material	M^3	0.42	0	0.42

No.	Hazardous Waste Type	Unit	Total in August 2020 (A)	Disposed (B)	Remaining (A - B)
4	Empty paint and spray cans	Can	118	0	118
5	Halogen/fluorescent bulbs	Unit	245	0	245
6	Empty cartridge (Ink)	Unit	146	0	146
7	Clinic Waste	Kg	11.4	10.9	0.5

3.4 COMMUNITY WASTE MANAGEMENT

3.4.1 Community Recycling Programme

In August 2020, the Community Recycle Waste Bank received 55 kg of recycle waste (glass bottles) from waste separation at both landfills making the total storage of recyclable waste of 3,192 Kg at the waste bank.

TABLE 3-14: TYPES AND AMOUNTS OF RECYCLABLE WASTE TRADED AT THE COMMUNITY RECYCLE WASTE BANK

Types of Waste	Unit	Remaining in July 2020	Additional in August 2020	Sold/ dispose	Remaining in August 2020
Glass bottles	kg	2,249	55	0	2,304
Paper/cardboard	kg	852.5	0	0	852.5
Plastic bottles	kg	35.5	0	0	35.5
Aluminium cans	kg	0	0	0	0
Scrap metal	kg	0	0	0	0
Total	**kg**	**3,137**	**55**	**0**	**3,192**

3.4.2 Community Solid Waste Management

In August 2020, approximately 18.1 m^3 of solid waste was collected from the host and Phouhomxay Villages for disposal of at Houay Soup landfill, an increase of 2.8 m^3 compared to the previous month.

3.5 WATERSHED AND BIODIVERSITY MANAGEMENT

3.5.1 Watershed Management

3.5.1.1 Implementation of Annual Implementation Plan (AIP) 2019

Xaysomboun Provincial WRPO patrolled the reservoir between 04-13 August 2020 in the reservoir Zone 4 in Thathom District and in the reservoir Zone 2 and 3 in Hom District. The results will be presented in the next monthly reporting.

Bolikhamxay Provincial WRPO did not implement any activities during this reporting period. Bolikhamxay Provincial WRPO submitted their Monthly Progress Report of July 2020 and noted that they conducted awareness raising activities for the villages adjacent to NNP1 watershed between 25 June and 15 July 2020. The topics included the importance of forest resources and biodiversity protection within NNP1 watershed as well as the understanding of law and

regulation about illegal logging, wildlife hunting and trading, forest land encroachment, and deforestation. A total of 287 villagers, including 140 females, and 292 students, including 193 female students, participated in the program.

The SMART training for the ranger teams and the SMART/GIS officers of Xaysomboun and Bolikhamxay WRPO was postponed to September 2020.

The final draft of Fishery Co-Management Plan (FCMP) in English was being finalized by NNP1PC EMO at the end of August 2020 prior to submission to ADB and approval by Xaysomboun PAFO.

NNP1PC and the Livelihood Consultant were finalizing the report of assessment on sustainable livelihood opportunities for NNP1 watershed communities at the end of August 2020 after additional data collection and assessment in Hom and Thathom District.

3.5.2 Biodiversity Offset Management

3.5.2.1 Engagement of Biodiversity Service Provider (BSP)

ADB shared the final draft of MOU with NNP1PC for confirmation on 17 June 2020. NNP1PC has further improved the final draft per discussion with NNP1PC lawyer, management, and the shareholders. The improved draft was communicated to BSP and ADB on 27 July 2020. There was no feedback from BSP and ADB until the end of August 2020.

NNP1PC-EMO and the BSP continued to make progress on the preparation of a Law Enforcement Strategy (LES) document for NC-NX offset site, the overall biological monitoring program for NNP1 watershed and NC-NX offset site, community outreach program, conservation linked livelihood and the trainings on patrolling and SMART.

3.5.2.2 Implementation of BOMP Annual Implementation Plan (AIP) 2019 and 2020

Bolikhamxay Provincial NC-NX BOMU received the fund for the implementation of activities under the first and second quarters of AIP2020 from DOF-MAF on 08 June 2020.

Progresses on the implementation of key activities by Component in August 2020 are described below:

a. Component 1 - Spatial Planning and Regulation

The dissemination and outreach activity on the TPZ boundary were postponed to September 2020 because of the impassable access after weeks of heavy rain in Viengthong and Xaychamphone District.

b. Component 2 – Law Enforcement

The four patrol teams continued the patrolling between 08 to 27 August 2020 with the focus on the Thongnachang TPZ Highest priority area around Nam San, Thongnachang, Nam Sone and Houy Poung; Nam Ma TPZ high priority area around Nam Ma, Nam Phai, Nam Mong, Nam Sa Nga; Viengthong District around Nam Tan and Nam Houng; and Xaychamphon District around Houy Chok, Houy Wod-Wod, Houy Mouang, Houy Ka Lae, Houy Or and Houy Tong. The results of August 2020 patrolling will be presented and discussed in September 2020 Monthly Report.

The results of patrolling activity in July 2020 are as follows:

- *The first team* carried out patrolling at Nam Ma TPZ high priority area including Nam Ma and Nam Sanga. They spent 16 days covering a distance of 81 km on forest patrolling. The team made a total of eight direct and indirect observations of the following wildlife: wild pigs, reticulated python, phayre's leaf monkeys, macaques, brown hornbills, four white-cheeked gibbons, one black giant squirrel, muntjac, sambar, great hornbill, and civet. The team encountered a small inactive hunting camp and two bamboo rafts along Nam Ma. The camp was destroyed by the patrolling team.

- *The second team* carried out patrolling at Nam Houng TPZ high priority area including Nam Lak and Nam Houng in Xaychamphon District. They spent 15 days covering a distance of 81.31 km on forest patrolling and 13.69 km on road patrolling. The team made a total of eight direct observations and four indirect observations of the following wildlife: macaques, phayre's leaf monkeys, brown hornbills, muntjacs, Indochinese serow, wild pig, great hornbills, and otters. The team encountered and destroyed a small inactive fishing camp in Nam Houng area.

- *The third team* carried out patrolling Nam Houng TPZ high priority area in Viengthong District. They spent 16 days covering a distance of 83 km on forest patrolling. The team made a total of six direct observations and four indirect observations of the following wildlife: phayre's leaf monkeys, macaques, one black giant squirrel, red-shanked douc langurs, big-headed turtle, great hornbill, and muntjac. The team encountered one inactive hunting camp at Nam Kapong, two hunting camps and one fish camp at Nam Houng. The camps were destroyed by the patrolling team.

- *The fourth team* carried out patrolling at TPZ highest priority area in Nam San and Nam Chang. They spent 16 days covering a distance of 67.12 km on forest patrolling and 22.88 km on road patrolling. The team made a total of ten direct observations and five indirect observations of the following wildlife: white-cheeked gibbons, three black giant squirrels, macaques, great hornbills, muntjac, Indochinese serow, wild pig, sambar, civet, and otter. The team did not encounter any threats during the patrolling.

FIGURE 3-6: MAP OF THREATS RECORDED BY PATROLLING TEAMS IN JULY 2020

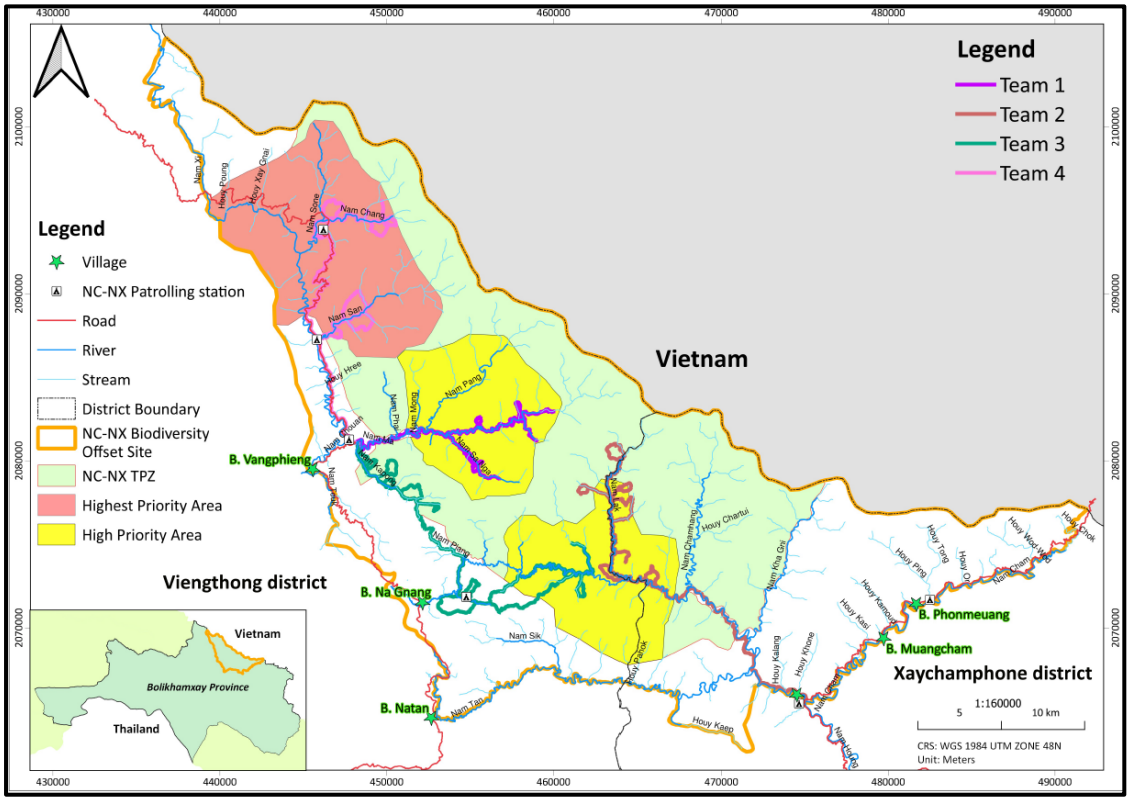


FIGURE 3-7: MAP OF WILDLIFE SIGNS RECORDED BY PATROLLING TEAMS IN JULY 2020

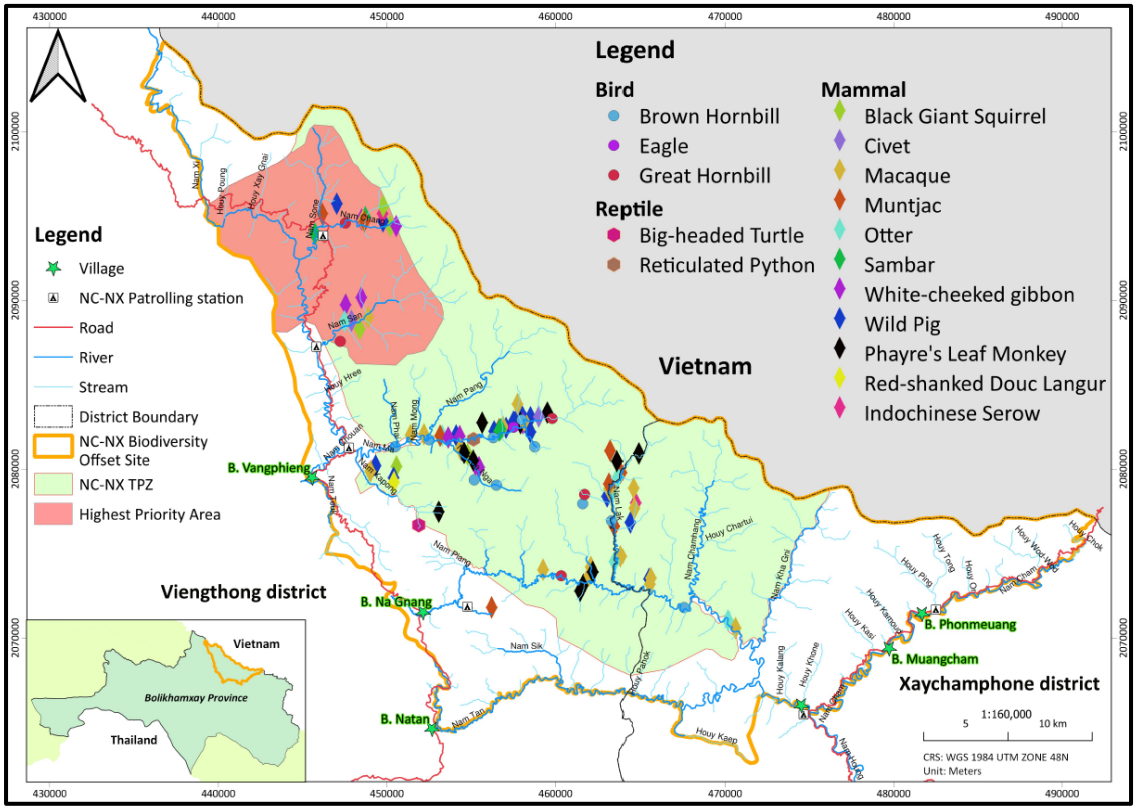


FIGURE 3-8: FISHING CAMP FOUND BY TEAM 1 IN NAM MA AREA	*FIGURE 3-9: FISHING CAMP FOUND BY TEAM 3 AT NAM HOUNG*
	
FIGURE 3-10: PHAYRE'S LEAF MONKEY	*FIGURE 3-11: RETICULATED PYTHON*

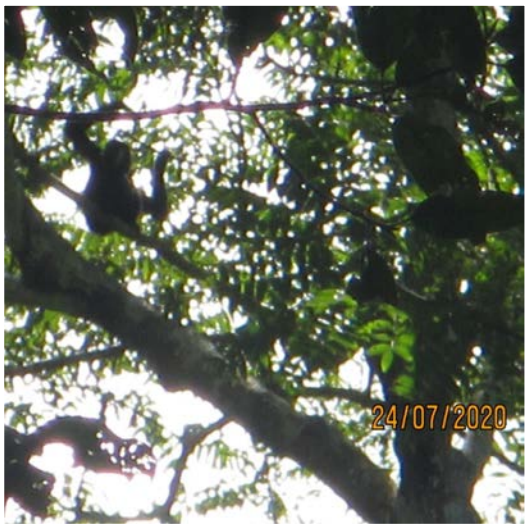
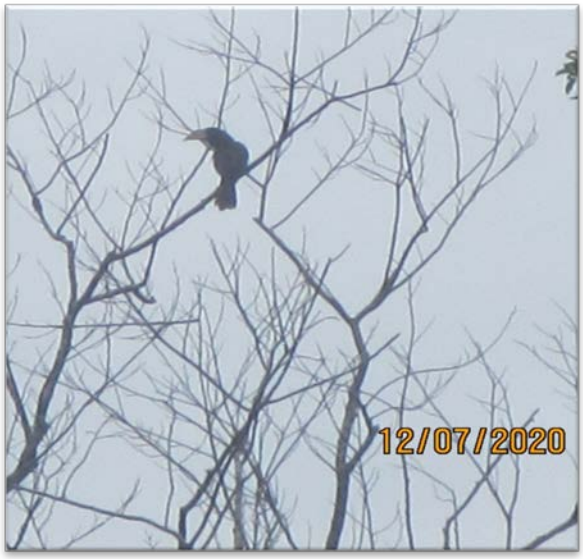



FIGURE 3-12: BIG-HEADED TURTLE	*FIGURE 3-13: BROWN HORNBILL*
	

c. Component 3 – Conservation Outreach

The BSP team continued with the progress of NC-NX Outreach Development. The pre-assessment of the target audiences and the timeline of activities will be further discussed with NNP1 and BOMU during the coming monthly meeting scheduled in the first week of September 2020.

d. Component 4 – Conservation linked livelihood development

NNP1PC EMO, the CDP Consultant, and BSP further discussed on the draft of CDP in the middle of August 2020. The draft is expected to be ready for further submission to ADB in September 2020.

BSP finalized the Community Snare Removal Plan (Lao version) per further discussion and review with NNP1PC EMO and Bolikhamxay Provincial BOMU on 14 August 2020. The agenda of team establishment and training was submitted to BOMU on 21 August 2020 and will be further discussed during the incoming monthly meeting scheduled in the first week of September 2020.

e. Component 6 – Biological Monitoring

BSP and NNP1PC EMO have further discussed on the matrix of biological monitoring on 25 August 2020. The matrix will be further improved per comments and circulated to IAP Biodiversity Expert and ADB for their comments in September 2020.

3.6 FLOATING DEBRIS REMOVAL

There was no field work carried out during this reporting period.

4. FISHERY MONITORING

Four species groups and one species dominated the fish catch by weight in July 2020 as listed in *Table 4-1*. All species are classified as Least Concern (LC) according to the IUCN Red List of Threatened Species[1].

TABLE 4-1: FISH SPECIES DOMINATING THE FISH CATCH IN JULY 2020

Species	Lao Name	Fish Catch (kg)	IUCN Red List Classification
Hampala dispar, Hampala macrolepidota	ปาสูด	353.8	LC
Barbonymus gonionotus, Hypsibarbus malcomi, Hypsibarbus vernayi, Hypsibarbus wetmorei	ปาปาฆา	216.1	LC
Poropuntius normani, Poropuntius laoensis,Poropuntius carinatus	ปาจาด	175.9	LC

[1] The IUCN Red List of Threatened Species is the world's most comprehensive inventory and classification of threatened species. The Red List classifies species into nine groups: Extinct (EX), Extinct in the wild (EW), Critically endangered (CR), Endangered (EN), Vulnerable (VU), Near threatened (NT), Least concern (LC), Data deficient (DD), and Not evaluated (NE). The term "Threatened" includes Critically Endangered, Endangered, and Vulnerable.

Species	Lao Name	Fish Catch (kg)	IUCN Red List Classification
Channa striata	ปาถ่ำ	124.8	LC
Mastacembelus armatus, Mastacembelus favus	ปาหาด	108.7	LC

The recorded catch of Threatened and Near Threatened species (IUCN Red List classification) in July 2020 is presented in *Table 4-2.* The list includes one species that are classified as Endangered (EN), four Vulnerable (VU) species and four Near Threatened (NT) species.

TABLE 4-2: THREATENED SPECIES OF JULY 2020 FISH CATCH

Species	Lao Name	Fish Catch (kg)	IUCN Red List Classification
Cirrhinus cirrhosus	ปาแกง/ปามอมจัม	31	VU
Cirrhinus molitorella	ปาแกง	22.3	NT
Cyprinus carpio	ปาไม	15.3	VU
Neolissochilus stracheyi	ปาสอง	0.7	NT
Onychostoma gerlachi	ปาถิง	1	NT
Probarbus jullieni	ปาเอิม	3	EN
Scaphognathops bandanensis	ปาอวมไฟ/ปาป่วม	15.6	VU
Tor sinensis	ปาแดง	40.1	VU
Wallago attu	ปาถ้าอ	5.9	NT

The total recorded monthly fish catch for the downstream and upstream fishing households and the Mekong control group involved in the monitoring programme from July 2015 to July 2020 is presented in *Error! Reference source not found.*. Note that the upstream fish catch excludes the fish catch from the fishing households in Zone 2LR because these households were resettled during Q4-2017.

FIGURE 4-1: TOTAL MONTHLY FISH CATCH JULY 2015 – JULY 2020

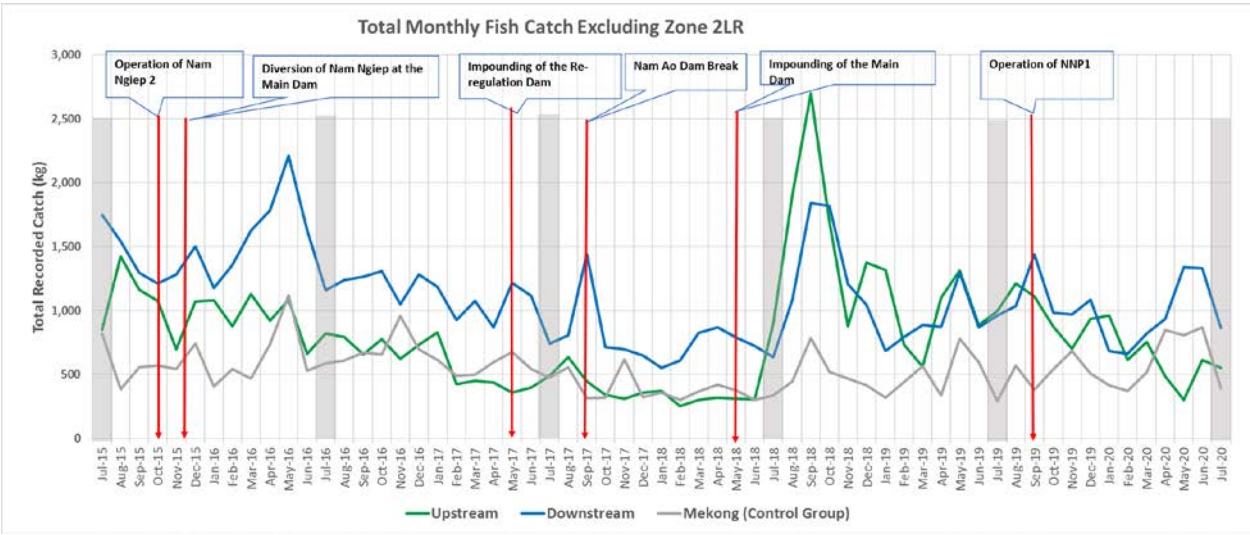
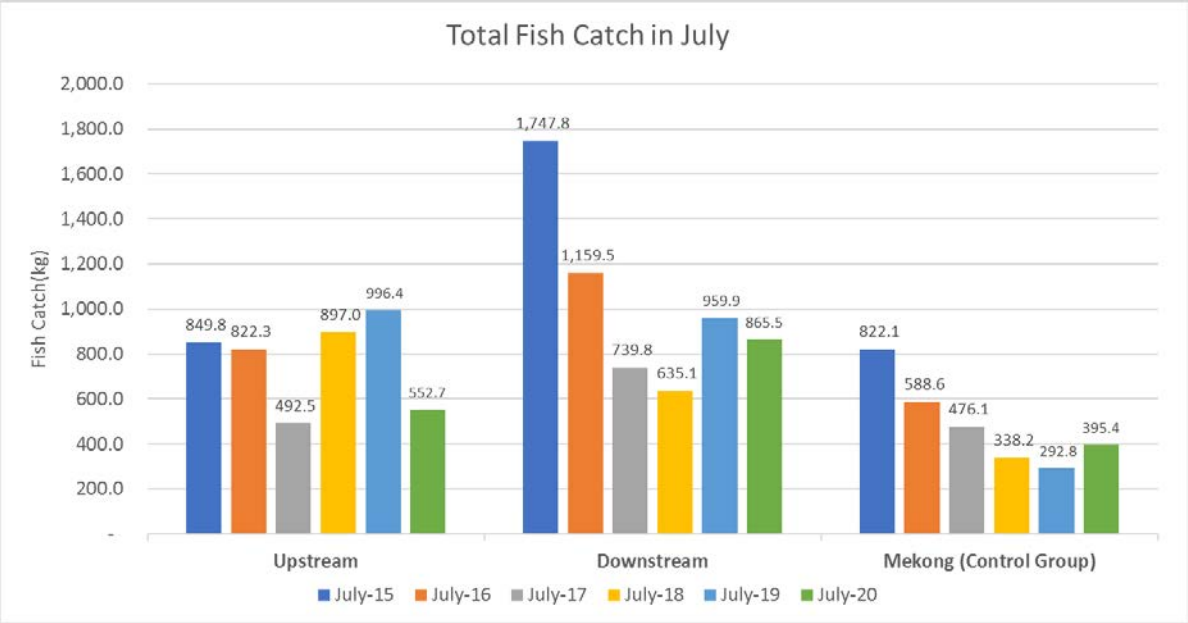


Table 4-3 and *Figure 4-2* show the total recorded fish catch for the month of July from 2015 to 2020 in the upstream (excluding Zone 2LR) and downstream communities and the Mekong control group. The total fish catch data represents the total fish supply provided by the involved fishing households.

TABLE 4-3: TOTAL FISH CATCH BY UPSTREAM (EXCLUDING ZONE 2LR), DOWNSTREAM AND MEKONG CONTROL GROUP FISHING HOUSEHOLDS FOR THE MONTH OF JULY FROM 2015 TO 2020

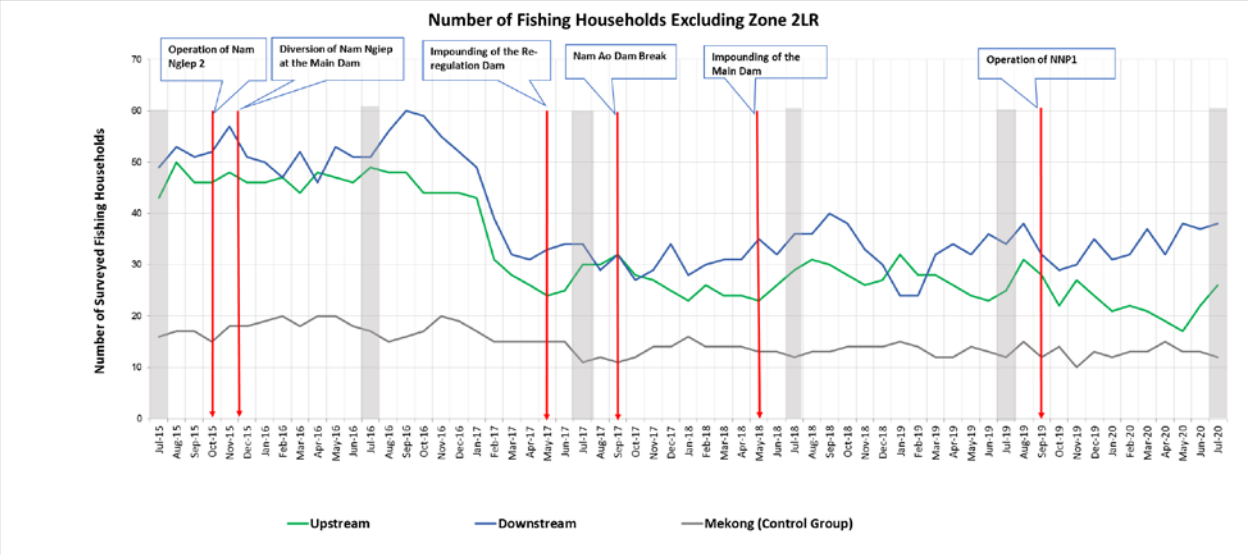
Fishing Zone	July 2015 (kg)	July 2016 (kg)	July 2017 (kg)	July 2018 (kg)	July 2019 (kg)
Upstream	849.8	822.3	492.5	897.0	996.4
Downstream	1,747.8	1,159.5	739.8	635.1	959.9
Mekong Control Group	822.1	588.6	476.1	338.2	292.8

FIGURE 4-2: TOTAL FISH CATCH BY UPSTREAM (EXCLUDING ZONE 2LR), DOWNSTREAM AND MEKONG CONTROL GROUP FISHING HOUSEHOLDS FOR THE MONTH OF JULY FROM 2015 TO 2020



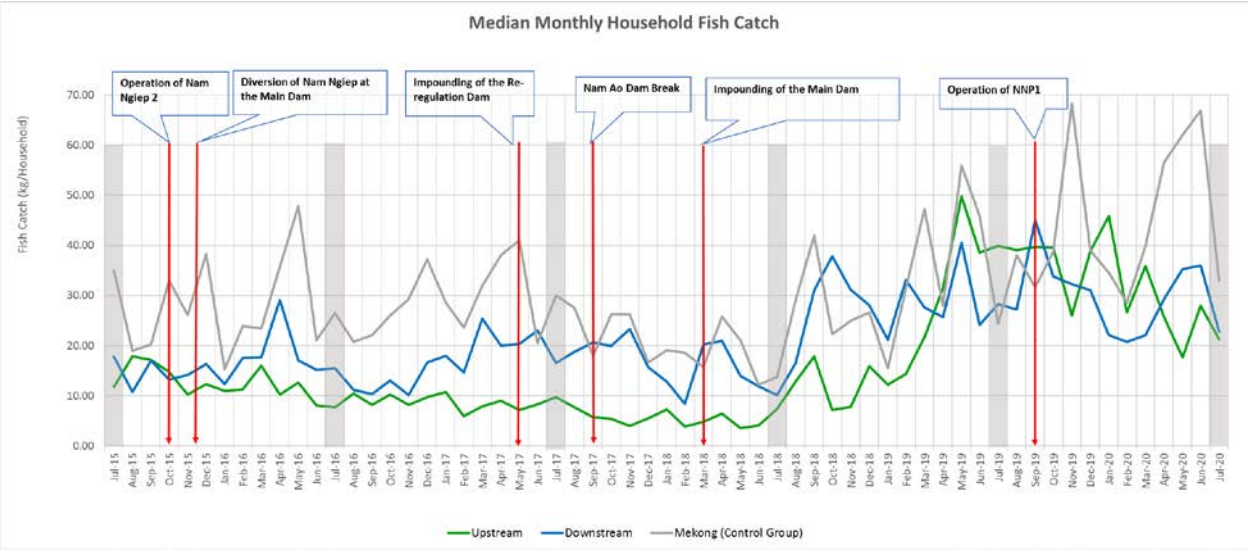
The numbers of fishing households involved in the fish catch monitoring programme are displayed in *Figure 4-3.*

FIGURE 4-3: NUMBER OF FISHING HOUSEHOLDS INVOLVED IN THE FISH CATCH MONITORING PROGRAMME



The median monthly household fish catch from July 2015 to July 2020 for the upstream (excluding Zone 2LR) and downstream communities, and the Mekong control group are presented in *Error! Reference source not found.*.

FIGURE 4-4: MEDIAN MONTHLY HOUSEHOLD FISH CATCH WITHOUT ZONE 2LR



The median household fish catch for the month of July from 2015 to 2020 in the upstream (excluding Zone 2LR) and downstream communities and the Mekong control group are displayed in *Error! Reference source not found.*.

Table 4-4: Median Monthly Household Fish Catch in the Upstream and Downstream Communities Excluding Zone 2LR for the month of July from 2015 to 2020Error! Reference source not found.

The median daily fish catch per household are displayed in *Figure 4-5,* and the median fish catch per household per fishing day for the month of July from 2015 to 2020 are shown in *Table 4-5.*

FIGURE 4-5: MEDIAN DAILY FISH CATCH PER HOUSEHOLD

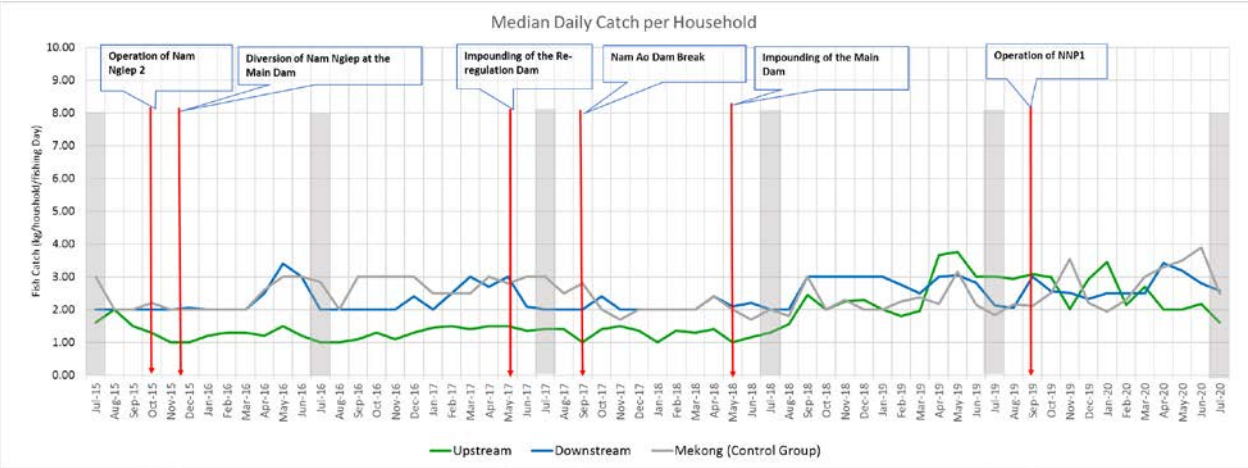


TABLE 4-5: MEDIAN DAILY FISH CATCH PER HOUSEHOLD FOR THE MONTH OF JULY FROM 2015 TO 2020

Fishing Zone	July 2015 (kg)	July 2016 (kg)	July 2017 (kg)	July 2018 (kg)	July 2019 (kg)	July 2020 (kg)
Upstream	1.60	1.00	1.40	1.30	3.00	1.60
Downstream	2.00	2.00	2.00	2.00	2.13	2.57
Mekong Control Group	3.00	2.85	3.00	2.00	1.84	2.48

ANNEXES

ANNEX A: RESULTS OF WATER QUALITY MONITORING

TABLE A- 1: RESULTS OF MAIN RESERVOIR, RE-REGULATION RESERVOIR AND SURFACE WATER (NAM NGIEP RIVER) QUALITY MONITORING

		River Name	Nam Ngiep											
		Zone	Location Refer to Construction Sites											
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08
Date	Parameters (Unit)	Guideline												
4-Aug-20	pH	5.0 - 9.0		8.08	7.79	7.8	7.68							
5-Aug-20	pH	5.0 - 9.0						7.99	7.93	7.94	7.99	7.87	8.09	8.37
11-Aug-20	pH	5.0 - 9.0	7.41			7.83	8.33	7.52						
12-Aug-20	pH	5.0 - 9.0							7.82	7.94	7.92	8.27	8.2	8.22
13-Aug-20	pH	5.0 - 9.0												
18-Aug-20	pH	5.0 - 9.0						7.92	8.2	8.2	8.14	8.3	8.23	8.36
19-Aug-20	pH	5.0 - 9.0		8.87	8.87	8.58	8.27							
24-Aug-20	pH	5.0 - 9.0	6.66											
25-Aug-20	pH	5.0 - 9.0		7.78	7.53	7.69	7.02							
26-Aug-20	pH	5.0 - 9.0						7.39	7.38	7.31	7.37	7.52	7.49	7.48
4-Aug-20	Sat. DO (%)			103.9	78.1	109	100.4							
5-Aug-20	Sat. DO (%)							81.6	41.4	38.9	52.7	68.2	77.5	81.6
11-Aug-20	Sat. DO (%)		97			125.2	113.5	108.3						
12-Aug-20	Sat. DO (%)								21.9	28.1	43.5	56.8		
13-Aug-20	Sat. DO (%)			104	113.9									
18-Aug-20	Sat. DO (%)							68.7	38.7	46.4	60.2	77	72.9	78.8
19-Aug-20	Sat. DO (%)			99.7	90.7	99.1	93.4							
24-Aug-20	Sat. DO (%)		98.3											
25-Aug-20	Sat. DO (%)			99.9	128.6	111.5	118.4							
26-Aug-20	Sat. DO (%)							93.3	24.2	32	48.4	67.9	77.7	78.7
4-Aug-20	DO (mg/L)	>6.0		8.59	6.06	8.23	7.6							
5-Aug-20	DO (mg/L)	>6.0						6.37	3.34	3.13	4.23	5.48	6.24	6.62
11-Aug-20	DO (mg/L)	>6.0	7.24			9.36	8.58	8.29						
12-Aug-20	DO (mg/L)	>6.0							1.79	2.28	3.3	4.52	5.61	6.07
13-Aug-20	DO (mg/L)	>6.0		8.6	8.91									
18-Aug-20	DO (mg/L)	>6.0						5.47	3.21	3.85	4.95	6.33	6.11	6.62
19-Aug-20	DO (mg/L)	>6.0		8.31	7.51	7.66	7.41							
24-Aug-20	DO (mg/L)	>6.0	8.21											
25-Aug-20	DO (mg/L)	>6.0		8.43	10.39	8.47	9.66							
26-Aug-20	DO (mg/L)	>6.0						7.33	2.02	2.65	3.96	5.47	6.29	6.39
4-Aug-20	Conductivity (µs/cm)			75	87	76	67							
5-Aug-20	Conductivity (µs/cm)							65	63	64	54	53	34	23
11-Aug-20	Conductivity (µs/cm)		55.8			70	67	66						
12-Aug-20	Conductivity (µs/cm)								74	70	69	71	56	39
13-Aug-20	Conductivity (µs/cm)			82	68									
18-Aug-20	Conductivity (µs/cm)							67	60	58	58	55	51	45
19-Aug-20	Conductivity (µs/cm)			79	64	71	69							

		River Name	Nam Ngiep											
		Zone	Location Refer to Construction Sites											
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08
Date	Parameters (Unit)	Guideline												
24-Aug-20	Conductivity (µs/cm)		82											
25-Aug-20	Conductivity (µs/cm)			67	78	67	69							
26-Aug-20	Conductivity (µs/cm)							63	72	68	66	62	56	41
4-Aug-20	Temperature (°C)			24.88	28.44	30.07	29.95							
5-Aug-20	Temperature (°C)							28.2	26.33	26.62	26.8	26.69	26.32	26
11-Aug-20	Temperature (°C)		27.8			30.5	29.91	29.25						
12-Aug-20	Temperature (°C)								25.72	27.29	26.26	27.04	27.71	27.23
13-Aug-20	Temperature (°C)			24.9	27.8									
18-Aug-20	Temperature (°C)							27.18	25.55	25.23	25.43	25.38	24.2	24.06
19-Aug-20	Temperature (°C)			24.61	24.9	28.74	27.39							
24-Aug-20	Temperature (°C)		24											
25-Aug-20	Temperature (°C)			23.9	26.15	29.44	25.51							
26-Aug-20	Temperature (°C)							27.63	25.44	25.83	25.04	26.41	26.12	26.09
4-Aug-20	Turbidity (NTU)			97.23	8.86	2.49	1.95							
5-Aug-20	Turbidity (NTU)							2.42	7.34	4.46	7.9	15.64	25.16	27.66
11-Aug-20	Turbidity (NTU)		19.79			2.01	2.24	2.72						
12-Aug-20	Turbidity (NTU)								3.05	2.85	3.81	5.66	8.85	10.31
13-Aug-20	Turbidity (NTU)			120	6.76									
18-Aug-20	Turbidity (NTU)							2.61	4.02	3.37	4.75	11.57	9.73	11.98
19-Aug-20	Turbidity (NTU)			31.97	14.24	2.19	2.79							
24-Aug-20	Turbidity (NTU)		24.2											
25-Aug-20	Turbidity (NTU)			13.73	2.74	2.85	3.8							
26-Aug-20	Turbidity (NTU)							3.3	7.34	10.38	7.01	14.1	7.75	7.96\
11-Aug-20	TSS (mg/L)-Hypolimnion					30.8	15.6	4.7						
11-Aug-20	TSS (mg/L)		39.2			5.9	<5	<5						
12-Aug-20	TSS (mg/L)								<5	<5	<5	8.7	19.6	16.3
13-Aug-20	TSS (mg/L)			276.8										
11-Aug-20	BOD_5 (mg/L)-Hypolimnion					4.00	8.12	6.01						
11-Aug-20	BOD_5 (mg/L)	<1.5	<1			<1	<1	<1						
12-Aug-20	BOD_5 (mg/L)	<1.5							6.41	4.51	2.01	<1	<1	<1
13-Aug-20	BOD_5 (mg/L)	<1.5		<1										
11-Aug-20	COD (mg/L)	<5.0	6.6											
12-Aug-20	COD (mg/L)	<5.0							5.6	6	7.2	<5.0	9.2	6
11-Aug-20	NH_3-N (mg/L)	<0.2	<0.2			<0.2	<0.2	<0.2						
12-Aug-20	NH_3-N (mg/L)	<0.2												
13-Aug-20	NH_3-N (mg/L)	<0.2		<0.2										
11-Aug-20	NH_3-N (mg/L)-Hypolimnion					1.39	0.79	0.5						
11-Aug-20	NO_3-N (mg/L)	<5.0		<0.02		<0.02	<0.02	<0.02						
11-Aug-20	NO_3-N (mg/L)-Hypolimnion					<0.02	<0.02	<0.02						
11-Aug-20	Faecal coliform (MPN/100 mL)	<1,000	1,600			2	2	4						

		River Name	Nam Ngiep											
		Zone	Location Refer to Construction Sites											
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08
Date	Parameters (Unit)	Guideline												
12-Aug-20	Faecal coliform (MPN/100 mL)	<1,000							24	0	33	220	220	1,600
13-Aug-20	Faecal coliform (MPN/100 mL)	<1,000		920										
11-Aug-20	Total Coliform (MPN/100 mL)	<5,000	1,600			5	2	14						
12-Aug-20	Total Coliform (MPN/100 mL)	<5,000							280	130	1,600	1,600	1,600	1,600
13-Aug-20	Total Coliform (MPN/100 mL)	<5,000		1,600										
11-Aug-20	TKN		<1.5			<1.5	<1.5	<1.5						
13-Aug-20	TKN			<1.5										
11-Aug-20	TKN-Hypolimnion			<.5		<1.5	<1.5	<1.5						
11-Aug-20	TOC (mg/L)		1.72											
12-Aug-20	TOC (mg/L)								1.62	1.53	1.51	1.64	1.89	2.3
11-Aug-20	Phytoplankton Biomass (g dry wt/m³)					2.4	1.8	1						
13-Aug-20	Phytoplankton Biomass (g dry wt/m³)			269										
11-Aug-20	Phytoplankton Biomass (g dry wt/m³)-Hypolimnion			269		32.6	13.2	6.4						
11-Aug-20	Total Phosphorus (mg/L)		0.01			<0.01	<0.01	<0.01						
13-Aug-20	Total Phosphorus (mg/L)			0.01										
11-Aug-20	Total Phosphorus (mg/L)-Hypolimnion					<0.01	<0.01	0.01						
11-Aug-20	Total Dissolved Phosphorus (mg/L)		0.01			<0.01	<0.01	<0.01						
13-Aug-20	Total Dissolved Phosphorus (mg/L)			<0.01										
11-Aug-20	Total Dissolved Phosphorus (mg/L)-Hypolimnion					<0.01	<0.01	<0.01						
11-Aug-20	Hydrogen Sulfide (mg/L)					<0.02	<0.02	<0.02						
13-Aug-20	Hydrogen Sulfide (mg/L)			0.07										
11-Aug-20	Hydrogen Sulfide (mg/L)-Hypolimnion					<0.02	<0.02	<0.02						

TABLE A- 2: RESULTS OF SURFACE WATER QUALITY MONITORING IN NAM CHIAN, NAM PHOUAN, NAM XAO AND NAM HOUAY SOUP

		River Name	Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites			
			Tributaries Upstream		Tributaries Downstream	
		Station Code	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline				
4-Aug-20	pH	5.0 - 9.0		7.99		
5-Aug-20	pH	5.0 - 9.0			7.92	7.85
11-Aug-20	pH	5.0 - 9.0	8.31	7.92		
12-Aug-20	pH	5.0 - 9.0			7.98	8.2
18-Aug-20	pH	5.0 - 9.0			8.31	7.96
19-Aug-20	pH	5.0 - 9.0		8.91		
24-Aug-20	pH	5.0 - 9.0	6.72			
25-Aug-20	pH	5.0 - 9.0		8.58		
26-Aug-20	pH	5.0 - 9.0			7.52	7.38
4-Aug-20	Sat. DO (%)			114.9		
5-Aug-20	Sat. DO (%)				85.5	83.5
11-Aug-20	Sat. DO (%)		105.2	117.8		
12-Aug-20	Sat. DO (%)				92.8	110.2
18-Aug-20	Sat. DO (%)				86.6	83.8
19-Aug-20	Sat. DO (%)			105.5		
24-Aug-20	Sat. DO (%)		103.1			
25-Aug-20	Sat. DO (%)			106.8		
26-Aug-20	Sat. DO (%)				112.1	98.8
4-Aug-20	DO (mg/L)	>6.0		9.79		
5-Aug-20	DO (mg/L)	>6.0			6.85	6.8
11-Aug-20	DO (mg/L)	>6.0	8.43	9.95		
12-Aug-20	DO (mg/L)	>6.0			7.31	9.89
18-Aug-20	DO (mg/L)	>6.0			7.14	6.9
19-Aug-20	DO (mg/L)	>6.0		9.04		
24-Aug-20	DO (mg/L)	>6.0	8.78			
25-Aug-20	DO (mg/L)	>6.0		9.14		
26-Aug-20	DO (mg/L)	>6.0			9.88	7.82
4-Aug-20	Conductivity (µs/cm)			75		
5-Aug-20	Conductivity (µs/cm)				50	13
11-Aug-20	Conductivity (µs/cm)		15.6	83		
12-Aug-20	Conductivity (µs/cm)				79	17
18-Aug-20	Conductivity (µs/cm)				56	14
19-Aug-20	Conductivity (µs/cm)			68		
24-Aug-20	Conductivity (µs/cm)		25			
25-Aug-20	Conductivity (µs/cm)			69		
26-Aug-20	Conductivity (µs/cm)				64	14
4-Aug-20	Temperature (°C)			23.44		
5-Aug-20	Temperature (°C)				26.48	25.77
11-Aug-20	Temperature (°C)		23.8	24.06		
12-Aug-20	Temperature (°C)				27.38	20.21

		River Name	Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites			
			Tributaries Upstream		Tributaries Downstream	
		Station Code	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline				
18-Aug-20	Temperature (°C)				25.11	25.16
19-Aug-20	Temperature (°C)			23.07		
24-Aug-20	Temperature (°C)		23.36			
25-Aug-20	Temperature (°C)			24.12		
26-Aug-20	Temperature (°C)				21.54	26.26
4-Aug-20	Turbidity (NTU)			43.34		
5-Aug-20	Turbidity (NTU)				30.93	10.34
11-Aug-20	Turbidity (NTU)		24.74	8.77		
12-Aug-20	Turbidity (NTU)				15.81	4.96
18-Aug-20	Turbidity (NTU)				17.77	5.84
19-Aug-20	Turbidity (NTU)			26.31		
24-Aug-20	Turbidity (NTU)		7.56			
25-Aug-20	Turbidity (NTU)			20.1		
26-Aug-20	Turbidity (NTU)				18.08	11.13
11-Aug-20	TSS (mg/L)		28.8	18.7		
12-Aug-20	TSS (mg/L)				30.2	6.7
11-Aug-20	BOD_5 (mg/L)	<1.5	<1	<1		
12-Aug-20	BOD_5 (mg/L)	<1.5			<1	<1
11-Aug-20	COD (mg/L)	<5.0	8.4	6.4		
12-Aug-20	COD (mg/L)	<5.0			13.3	12.9
11-Aug-20	NH_3-N (mg/L)	<0.2	<0.2	<0.2		
12-Aug-20	NH_3-N (mg/L)	<0.2				
11-Aug-20	NO_3-N (mg/L)	<5.0	<0.02	<0.02		
11-Aug-20	Faecal coliform (MPN/100 mL)	<1,000	1,600	920		
12-Aug-20	Faecal coliform (MPN/100 mL)	<1,000			220	280
11-Aug-20	Total Coliform (MPN/100 mL)	<5,000	920	920		
12-Aug-20	Total Coliform (MPN/100 mL)	<5,000			1,600	1,600
11-Aug-20	TKN		<1.5	<1.5		
11-Aug-20	TOC (mg/L)		1.9	1.03		
12-Aug-20	TOC (mg/L)				3.09	1.96
11-Aug-20	Total Phosphorus (mg/L)		<0.01	<0.01		
11-Aug-20	Total Dissolved Phosphorus (mg/L)		<0.01	<0.01		

ANNEX B: RESULTS OF EFFLUENT ANALYSES

TABLE B-1: RESULTS OF CAMP EFFLUENTS IN AUGUST 2020

	Site Name	OSOV1 (Owner's Site Office and Village)		OSOV2 (ESD Camp)		Main Powerhouse	
	Station Code	EF01		EF13		EF19	
	Date	03-Aug-20	17-Aug-20	03-Aug-20	17-Aug-20	03-Aug-20	17-Aug-20
Parameters (Unit)	**Guideline**						
pH	6.0 - 9.0	7.85	7.18	7.29	6.26	7.24	7.93
Sat. DO (%)		82.7	43.1	48.1	67.4	23	22.4
DO (mg/L)		6.2	3.71	3.62	5.21	1.78	1.69
Conductivity (µs/cm)		230	210	228	260	766	573
TDS (mg/L)		165	105	114	130	383	286.5
Temperature (°C)		28.1	26.6	28.1	26.8	26.4	28
Turbidity (NTU)		2.41	2.72	2.41	6.95	10.51	26.59
TSS (mg/L)	<50	<5	<5	6.1	7.3	31.2	160.9
BOD_5 (mg/L)	<30	<6	<6	<6	<6	<6	<6
COD (mg/L)	<125	n/a	<25	n/a	<25	n/a	186
NH_3-N (mg/L)	<10.0	n/a	<1.5	n/a	7	n/a	25.6
Total Nitrogen (mg/L)	<10.0	n/a	4.29	n/a	8.13	n/a	27.3
Total Phosphorus (mg/L)	<2	n/a	0.74	n/a	0.46	n/a	0.48
Oil & Grease (mg/L)	<10.0	n/a	<1	n/a	<1	n/a	<1
Total coliform (MPN/100 mL)	<400	920	1,600	0	0	0	0
Faecal Coliform (MPN/100 mL)	<400	540	540	0	0	0	0
Effluent Discharge Volume (L/mn)		6	6	12	12	1450	2000
Chlorination Dosing Rate (mL/mn)		n/a	n/a	30	26	135	500
Residual Chlorine (mg/L)	<1.0	n/a	n/a	0.3	0.6	0.96	0.71