NAM NGIEP 1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Quarterly Environment Monitoring Report
Third Quarter of 2020

July to September 2020

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A	20 January 2021				Final
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ABBREVIATIONS / ACRONYMS

AIP	Annual Implementation Plan
ADB	Asian Development Bank
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
EC	Electrolytic Conductivity
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
ESD	Environmental and Social Division of NNP1PC
ESMMP	Environmental and Social Monitoring and Management Plan
GOL	Government of Lao PDR
GIS	Geographic Information Systems
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
kV	kilo-Volt
LTA	Lender's Technical Advisor
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mines, Lao PDR

MOM	Minutes of Meeting
MONRE	Ministry of Natural Resource and Environment, Lao PDR
MOU	Memorandum of Understanding
NCR	Non-Compliance Report
NNP1PC	Nam Ngiep 1 Power Company Limited
OC	Obayashi Corporation
ONC	Observation of Non-Compliance
OSOV	Owners' Site Office and Village
PAFO	Provincial Department of Agriculture and Forestry
PONRE	Provincial Department of Natural Resource and Environment, MONRE
RCC	Roller Compacted Concrete
SIR	Site Inspection Report
SOP	Standard Operating Procedure
SMO	Social Management Office of ESD within NNP1PC
SS-ESMMP	Site Specific Environmental and Social Monitoring and Management Plan
TOR	Terms of Reference
TSS	Total Suspended Solids
UAE	United Analysis and Engineering Consultant Company Ltd.
WMF	Watershed Management Fund
WMP	Watershed Management Plan
WRPC	Watershed and Reservoir Protection Committee
WRPO	Watershed and Reservoir Protection Office
WWTS	Wastewater Treatment System

1 EXECUTIVE SUMMARY

The quarterly environment monitoring reports of Nam Ngiep 1 Hydropower Project provides information and analysis of compliance with the environmental and social obligations of the Project stipulated in the Concession Agreement between the Nam Ngiep 1 Power Company (NNP1PC) and the Government of Lao PDR (GOL), and as required by environmental legislation of the Lao PDR, the ADB Safeguard Policy Statement and IFC Performance Standards. The Company ensures compliance with these requirements through implementation of project specific sub-plans, programmes and activities prepared as part of the Environmental and Social Management and Monitoring Plan for the Operation Phase (ESMMP-OP).

During Q3 2020, NNP1PC invited interested entities to submit their bids for the service of the ISO Training and Certification Audit aiming at achieving compliance with the ISO14001:2015 standard for environmental management systems. The bidding, evaluation/selection and contract signing with the selected service provider is expected to be completed by the end of October 2020 and the online training for four ISO14001:2015 subjects (Requirement and Interpretation of ISO14001:2015, Organization Context and Risk Management for ISO14001, Documentation Information, and Internal Audit) will be provided to relevant staff during Q4 2020 to Q1 2021.

The Environmental Management Office (EMO) of NNP1PC received two Detailed Work Program (DWP) & Site Specific Environmental and Social Management and Monitoring Plan (SS-ESMMP), two design drawings (septic biofilm tanks replacement at OSOV1 and temporary toilet installation for security guardhouse) and two Environmental and Social Checklist for Pre-Construction for review and approval. A total of six Observations of Non-Compliance (ONCs) and two Non-Compliance (NCR) were active. Out of these, three ONCs were resolved during the reported period. Three ONCs and two NCR will be carried over to Q4 2020.

EMO continued monitoring the Wastewater Treatment Systems (WWTSs) effectiveness in OSOV1, OSOV2, Main Dam and Re-Regulation Dam and also discussed with the Consultant via VDO conference to conclude the modification and/or replacement options for NNP1PC management's consideration by early October 2020. Based on the existing treatment effectiveness of those four WWTSs, the Consultant recommended NNP1PC to maintain the WWTSs in OSOV1 and the Re-regulation Dam, for OSOV2 he recommended either to install a Sequencing Batching Reactor System or to construct 2 new wetland ponds), and finally he recommended to improve the operation of the WWTS in the Main Dam by adjusting the wastewater pumping and switching to the automatic chlorination. The draft proposal for the WWTS improvement and modification options will be proposed for NNP1PC management's consideration by early October 2020

A total of 23 construction sites and associated facilities were fully rehabilitated and the Contractors will continue with the after-care and maintenance activities until the end of the Contractors' liability period by January 2021. By Q1 2021, it is expected that all 32 sites (a total of 09 sites that were rehabilitated earlier during the construction phase in 2018 and a total of 23 sites that were rehabilitated during the operation phase from the end of 2019 to 2020) will be handed over to the GOL.

During Q3 2020, a total of 57.9 m^3 solid waste from NNP1 project sites and camps was disposed of at the NNP1 Project Landfill, an increase of 2.9 m^3 compared to Q2 2020. A total of 50.5 m^3 solid waste from Phouhomxay, Thaheua and Hat Gniun villages was disposed of at the Houay

Soup Landfill. A total of 3,192 kg recyclable waste was recorded at the Community Waste Bank and villagers collected a total of 2,028 kg of food waste from the Owner's Site Office and Village (OSOV) for feeding their animals.

The monthly site visits by the Environmental Management Unit (EMU) of Bolikhan District and a quarterly site visit by the EMU of Xaysomboun Province were not carried out during Q3 2020.

During Q3 2020, the concentration of dissolved oxygen (DO) at the surface level in the Main Reservoir (except at R05 on 18 August 2020, DO was 5.47 mg/L)], Nam Ngiep Upstream station (NNG01), Nam Chian (NCH01) and Nam Phouan (NPH01) had DO levels above 6 mg/L. In addition, the DO concentrations in Nam Xao and Nam Houay Soup were above 6 mg/L, except on 23 July 2020.

The DO concentrations at the surface level in the re-regulation reservoir (R07) were between 1.3 – 4.1 mg/L. During the remaining period of Q3 2020, the DO level fell below 6 mg/L in the downstream stations during periods with turbine discharge.

The depth profiles monitoring during the period indicates formation of oxyclines in the main reservoir at all stations, except R01, at depths between 1.5 – 9.0 m.

On 25 September 2020, NNP1 (EMO and INFRA) conducted a field investigation of the groundwater system of Somseun, Nam Pa and Thong Noy villages to identify the potential causes of bacterial contamination. The Investigation Report incorporating the possible sources of contamination and recommendations for the water supply system operation and maintenance will be finalized and shared with the NNP1 SMO by October 2020 for further actions.

The management activities as per the approved Watershed Management AIP2019 under the component of forest cover maintenance and reservoir management progressed during this reported period.

ADB provided confirmation of no objection on the Watershed Management (WM) AIP2020 for the activities from October to December 2020 on 27 August 2020. An official request for fund disbursement by DOF-MAF for the WM AIP2020 of Bolikhamxay Province was issued on 10 September 2020. The funds are expected to be available in the first week of October 2020. NNP1PC has further worked with Xaysomboun Provincial WRPO to finalize their activity progress report and financial summary of the AIP2019 in the third week of September 2020 as a condition for the acceptance of their WM AIP2020. The official letter for fund disbursement by DOF-MAF for the Xaysomboun WM AIP2020 is expected to be issued in the first week of October 2020 then the funds are expected to be available in the third week of October 2020.

The management activities as per the approved NC-NX Biodiversity Offset Management AIP2020 under the component of spatial planning, law enforcement, and conservation linked livelihood progressed during this reported period.

The five species that dominated the fish catch by weight in Q3 2020 include one species (*Channa striata*) and four species group of Hampala, Poropuntius, Barbonymus and Hypsibarbus, and Mastacembelus that are classified as Least Concern (LC) according to the IUCN Red List of Threatened Species. The recorded catch of threatened species includes one Endanger species (EN), four Vulnerable species (VU) and four Near Threatened species (NT).

2 INTRODUCTION

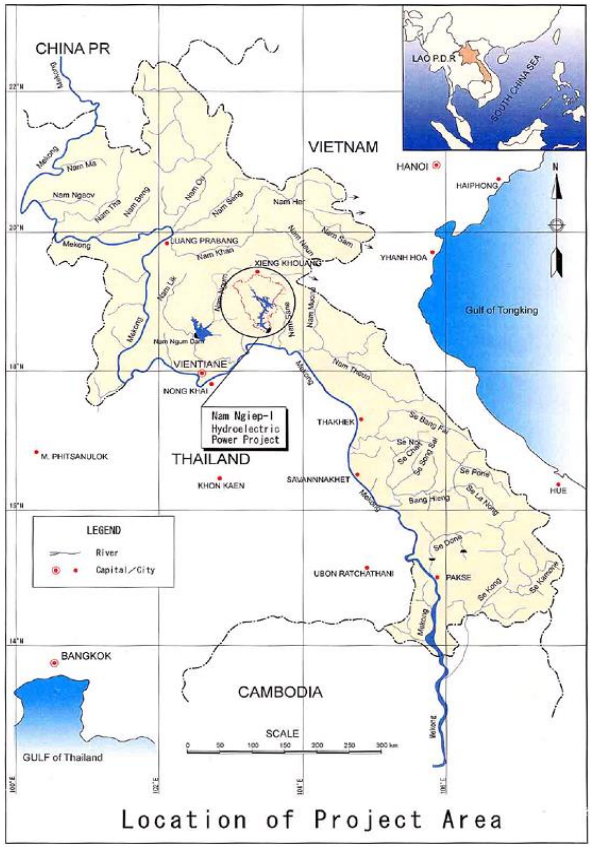
The Nam Ngiep originates in the mountains of Xieng Khouang Province, flowing through Khoun District into Thathom District of Xaysomboun Province, through Hom District and into Bolikhan District of Bolikhamxay Province. The Nam Ngiep meets the Mekong River just upstream from Paksan in Bolikhamxay Province.

Two dams and power stations were constructed along the Ngiep River in Bolikhamxay. At the main dam site, a primary power station generated around 1,546 GWh of electricity for export to Thailand and release water to a regulating pond where a second dam and power station generate around 105 GWh of electricity for local use.

The Project Commercial Operation Date was achieved on 05 September 2019.

This Quarterly Environment Report provides a summary of environmental monitoring activities and mitigation actions during **Q3 2020**. The report is published on the Company website (https://namngiep1.com/).

Related construction Site Specific Environmental and Social Monitoring and Management Plans (SS-ESMMPs) are also publicly disclosed on the Company website as required under the Concession Agreement.



Location of Project Area

3 ENVIRONMENTAL MANAGEMENT AND MONITORING

The environmental management and monitoring activities reported in this section document implementation of the relevant sub-plans and programmes of the Environmental and Social Management and Monitoring Plan for the Operation Phase during Q3 2020.

3.1 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

During the Q3 2020, NNP1PC invited interested entities to submit their bids for the service of the ISO Training and Certification Audit aiming at achieving compliance with the ISO14001:2015 standard for environmental management systems. The bidding, evaluation/selection and contract signing with the selected service provider is expected to be completed by the end of Oct 2020 and as shown in **Table 3-1**, the online training for four ISO14001:2015 subjects (Requirement and Interpretation of ISO14001:2015, Organization Context and Risk Management for ISO14001, Documentation Information, and Internal Audit) will be provided to relevant staff during Q4 2020 to Q1 2021.

TABLE 3-1: *ENVIRONMENTAL MANAGEMENT SYSTEM WORK PLAN*

Item	ISO14001:2015 Work Plan	Year 2020		Year 2021			
		Q3	Q4	Q1	Q2	Q3	Q4
1	Continue to prepare EMS documents (8 Standard Operating Procedures are completed)						
2	**NNP1PC Environmental Policy announcement**						
3	NNP1PC ISO Committee establishment						
4	Training relevant staff on: - Requirement and Interpretation of ISO14001:2015 - Organization Context and Risk Management for ISO14001 - ISO14001:2015 Document Information - ISO14001:2015 Internal Audit						
5	Implement the EMS procedures and processes						
6	ISO14001:2015 Internal Audit						
7	Implement the corrective actions and preventive actions according to the Internal Audit						
8	Management Review by NNP1PC Management						
9	ISO 14001:2015 Assessment and Certification Audit – **1st Stage** (***remote audit*** on the documentation review)						
10	Implement the corrective actions and preventive actions according to the 1st Stage Audit						
11	ISO 14001:2015 Assessment and Certification Audit – **2nd Stage** (***on-site audit***)						
12	Implement the corrective actions and preventive actions according to the 2nd Stage Audit						
13	**Certify of ISO14001:2015 upon successful completion of the audit**						

3.2 CONTRACTOR SS-ESMMPS

During Q3 2020, the Environmental Management Office (EMO) of NNP1PC received two Detailed Work Program (DWP) & Site Specific Environmental and Social Management and Monitoring Plan (SS-ESMMP), two design drawings (septic biofilm tanks replacement at OSOV1 and temporary toilet installation for security guardhouse) and two Environmental and Social Checklist for Pre-Construction for review and approval.

All these submitted documents were cleared within the document review timeframe as shown in **Table 3-2** and more details can be found in **Appendix 1**.

TABLE 3-2*: DOCUMENT REVIEWED DURING Q3 2020*

Document Name	Rev. 1	Rev. 2	Rev. 3	Approved
DWP and SS-ESMMP for the Monitoring Works on the NNP1 project	√	√		√
DWP and SS-ESMMP for the Maintenance Works on the NNP1 project	√			√
Design drawing of septic biofilm tank replacement at OSOV1	√			√

Document Name	Rev. 1	Rev. 2	Rev. 3	Approved
Design drawing of temporary toilet installation for security guardhouse	√			√
Environmental and Social Checklist for Pre-Construction for barge operation in 2UR	√			√
Environmental and Social Checklist for Pre-Construction for survey and design of water supply improvement in Ban Pou, 2UR	√			√

3.3 RESULTS OF COMPLIANCE INSPECTIONS AT CONSTRUCTION SITES

During Q3 2020, the EMO conducted bi-weekly and weekly site rotation inspections at 27 sites including rehabilitation sites, construction sites and camps. A decrease of three monitoring sites compared to Q2 2020 due to the work completion by the Infrastructure contractors at Phouhomxay resettlement village.

A total of six Observations of Non-Compliance (ONCs) and two Non-Compliance (NCR) were active (four ONCs and one NCR carried over from the Q2 of 2020, and two ONCs and one NCR were newly opened). Out of these, three ONCs were resolved during the reported period. Three ONCs and two NCRs will be carried over to Q4 2020.

The status of Non-Compliance Reports (NCRs) and ONCs are summarized in **Table 3-3**, **Figure 3-1** and **Figure 3-2**. The progress of corrective actions is presented in **Appendix 2**.

TABLE 3-3: ***STATUS OF NON-COMPLIANCE REPORT DURING Q3 2020***

Status	ONC	NCR-Level 1	NCR-Level 2	NCR-Level 3	Incident Report
Carried over ONC/NCR from the previous quarter	4	1	0	0	0
Newly opened ONC/NCR	2	1	0	0	0
Total No. of ONC/NCR	6	2	0	0	0
Resolved ONC/NCR	3	0	0	0	0
Unresolved ONC/NCR carried forward to the next quarter	3	2	0	0	0

FIGURE 3-1: *STATUS OF ONCS DURING Q3 2020*

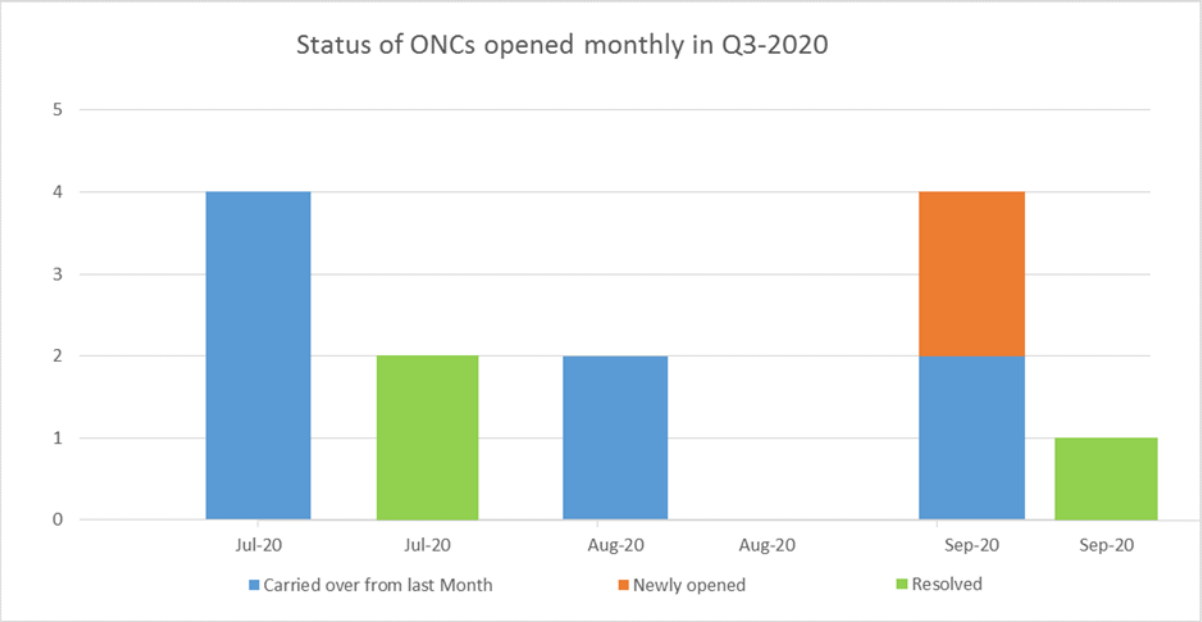
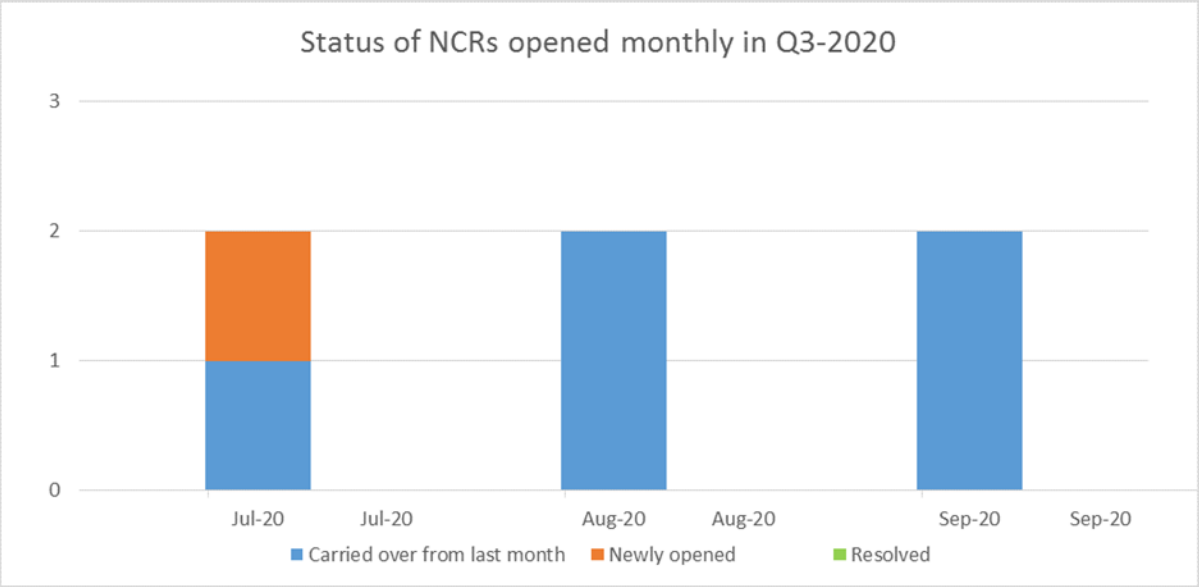


FIGURE 3-2: *STATUS OF NCRS DURING Q3 2020*



PHOTOGRAPH 1: TD-EMO AND THE CONTRACTOR -JOINT INSPECTION AT THE BARGE OPERATION SITE OF ZONE 2UR	**PHOTOGRAPH 2: TD-SAFETY-EMO AND O&M JOINT HAZARDOUS MATERIAL INVENTORY AND AUDIT AT THE MAIN POWERHOUSE**
	
PHOTOGRAPH 3: TD-EMO AND THE CONTRACTOR JOINT SITE INSPECTION AND EVALUATION OF THE REHABILITATED SITES	**PHOTOGRAPH 4:TD-EMO JOINT SITE INSPECTION AND ASSESSMENT OF THE WWTS EFFICIENCY AT THE MAIN POWERHOUSE**
	

3.4 RESULTS OF SITE DECOMMISSIONING AND REHABILITATION

During the Q3 2020, a total of 23 construction sites and associated facilities were fully rehabilitated and the Contractors will continue with the after-care and maintenance activities until the end of the Contractors' liability period by January 2021. By Q1 2021, it is expected that all 32 sites (a total of 09 sites that were rehabilitated earlier during the construction phase in 2018 and a total of 23 sites that were rehabilitated during the operation phase from the end of 2019 to 2020) will be handed over to the GOL.

On 23 September 2020, a second quarterly joint site inspection between NNP1PC (EMO and TD) and the Civil Works Contractor, OC was carried out at a total 17 sites under the Civil Works Contract to evaluate the vegetation cover percentage and site stability. EMO issued a Site Inspection Report (SIR) to the contractor for additional corrective actions. The detailed SIR is shown in **Appendix 2.**

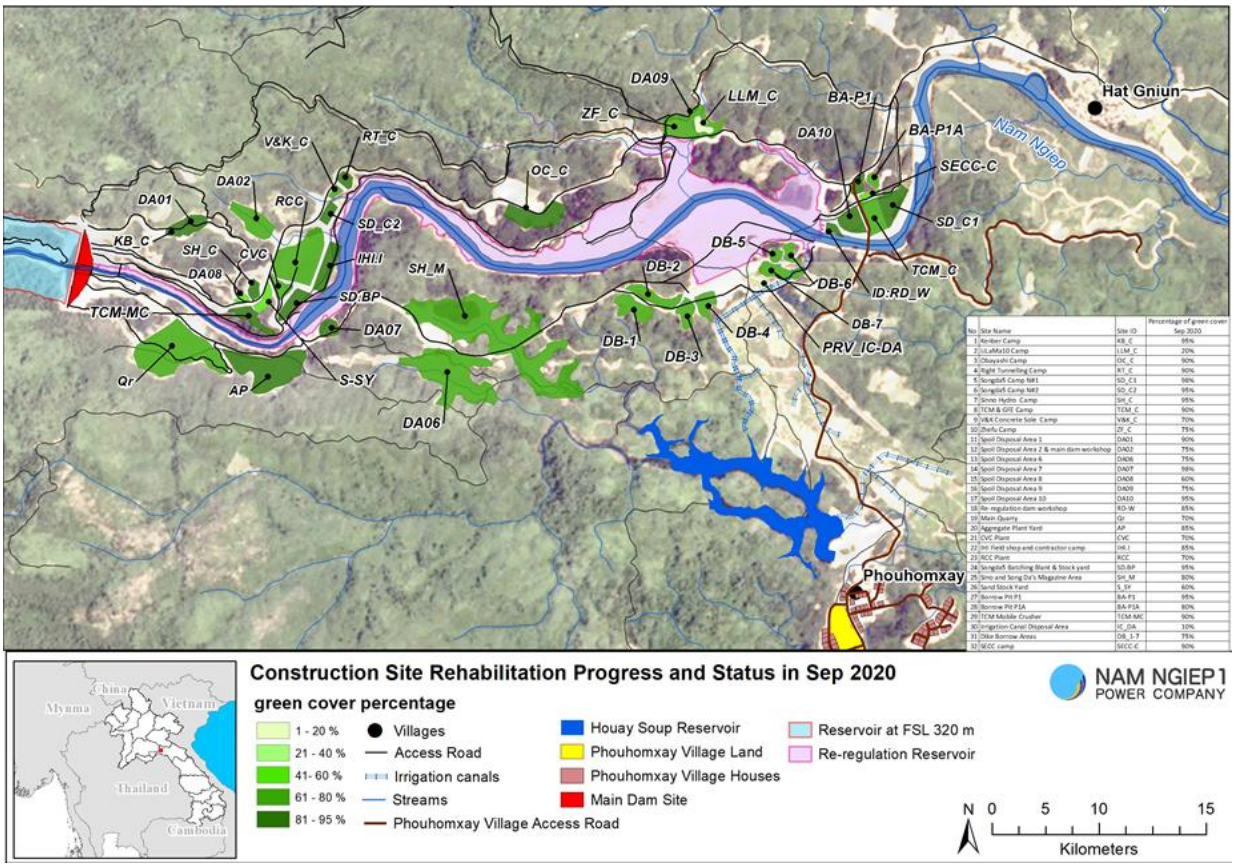
On 30 September 2020, EMO conducted inspection and evaluation at nine sites that have been decommissioned earlier during the construction phase (2018 – 2019) and other seven sites under the Electro Mechanical Work Contract (EMWC) and Hydraulic Metal Work Contract (HMWC) and took aerial photographs of those inspected sites. The status of site rehabilitation and revegetation is summarized in **Table 3-4** and the revegetated sites are shown in **Figure 3-3** with the relevant photographs.

TABLE 3-4*: SUMMARY STATUS OF CONSTRUCTION SITES REHABILITATION*

No	Site Name	Status of Decommissioning & Re-vegetation	Green cover evaluation Percentage	
			Jun-2020	Sep-2020
01	TCM & GFE Camp	Completed	70%	90%
02	Spoil Disposal Area 7	Completed	-	98%
03	Spoil Disposal Area 9	Completed	-	75%
04	Spoil Disposal Area 10	Completed	80%	95%
05	Borrow Pit P1	No need decommissioning	-	95%
06	Borrow Pit P1A	No need decommissioning	-	80%
07	TCM Mobile Crusher	Completed	-	90%
08	Dike Borrow Areas	No need decommissioning	-	75%
09	SECC camp	Completed	-	90%
10	KENBER Camp	Completed	80%	95%
11	LiLaMa10 Camp	Completed	5%	20%
12	Obayashi Camp	Completed	80%	90%
13	Right Tunnelling Camp	Completed	70%	90%
14	Songda5 Camp N#1	Completed	90%	98%
15	Songda5 Camp N#2	Completed	80%	95%
16	Sino Hydro Camp	Completed	80%	95%
17	V&K Concrete Sole Camp	Completed	50%	70%
18	Zhefu Camp	Completed	60%	75%
19	Spoil Disposal Area 1	Completed	80%	90%
20	Spoil Disposal Area 2 & main dam workshop	Completed	60%	75%
21	Spoil Disposal Area 6	Completed	70%	75%
22	Spoil Disposal Area 8	No need decommissioning	40%	60%
23	Re-regulation dam workshop	Completed	80%	85%
24	Main Quarry	Completed	50%	70%
25	Aggregate Plant Yard	Completed	80%	85%
26	CVC Plant	Completed	60%	70%
27	IHI Field shop and contractor camp	Completed	70%	85%
28	RCC Plant	Completed	50%	70%

No	Site Name	Status of Decommissioning & Re-vegetation	Green cover evaluation Percentage	
			Jun-2020	Sep-2020
29	Songda5 Batching Plant & Stock yard	Completed	80%	95%
30	Sino and Song Da's Magazine Area	Completed	70%	80%
31	Sand Stock Yard	No need decommissioning	-	60%
32	Irrigation Canal Spoil Disposal Area *Phouhomxay Village*	No need decommissioning	-	5%

FIGURE 3-3*: REVEGETATION SITES MAP DURING Q3 2020*



PHOTOGRAPH 5: AERIAL PHOTO OF THE MAIN DAM'S SUPPORTING FACILITY AREAS

PHOTOGRAPH 6: AERIAL PHOTO OF THE RE-REGULATION DAM'S SUPPORTING FACILITY AREAS

PHOTOGRAPH 7: AERIAL PHOTO OF THE SPOIL DISPOSAL NO.6

PHOTOGRAPH 8: AERIAL PHOTO OF THE MAIN QUARRY

PHOTOGRAPH 9: AERIAL PHOTO OF THE EARTH DIKE AND BORROW PITS

PHOTOGRAPH 10: AERIAL PHOTO OF OBAYASHI CAMPS

PHOTOGRAPH 11: LOCAL GRASS SOWING AT THE IRRIGATION SPOIL DISPOSAL AREA	PHOTOGRAPH 12: LOCAL GRASS PLANTING AT LILAMA10 CAMP
	

3.5 WASTE MANAGEMENT AT THE CONSTRUCTION SITES

3.5.1 General Waste Management

During Q3 2020, a total of 57.9 m^3 of solid waste from NNP1 project sites and camps was disposed at the NNP1 Project Landfill, an increase of 2.9 m^3 compared to Q2 2020.

No recyclable waste was sold during the reporting period. The amount of accumulated recyclable wastes is shown in Table 3-5.

TABLE 3-5: *AMOUNTS OF RECYCLABLE WASTE DURING Q3 2020*

Source and Type of Recyclables		Unit	Total in Q3 2020 (A)	Sold (B)	Remaining Amount (A - B)
Construction activity					
1	Scrap metal	kg	0	0	0
	Sub-Total 1	**kg**	**0**	**0**	**0**
Operation camp					
2	Plastic bottle	kg	78	0	78
3	Aluminium	kg	94	0	94
4	Paper/Cardboard	kg	63	0	63
5	Glass	kg	64	0	64
	Sub-Total 2	**kg**	**299**	**0**	**299**
	Grand Total 1+2	**kg**	**299**	**0**	**299**

3.5.2 Hazardous Waste Management

During Q3 2020, joint hazardous materials and waste inventory monitoring were carried out at the remaining operation and construction sites and camps as well as NNP1PC's warehouse and OSOV camps. The amount of hazardous waste and hazardous material that were collected, stored and disposed during Q3 2020 are shown in **Table 3-6.** The treatment and disposal of hazardous waste including used hydraulic oil and engine oil were outsourced to

Khounmixay Processing Factory**.** The remaining waste will be collected, treated and also disposed by Khounmixay Processing Factory.

TABLE 3-6*: HAZARDOUS MATERIAL AND HAZARDOUS WASTE RECORDED DURING Q3 2020*

No.	Type of Hazardous Material	Unit	Total in Q3 2020	Used/ Disposed	Remaining
01	Diesel	Litre	11,504	7,754	3,750
02	Gasoline	Litre	181	83	98
03	Lubricant (Turbine oil)	Litre	7,210	0	7,210
04	Colour paint	Litre	266	0	266
05	Tinner	Litre	12	0	12
06	Grease oil	Litre	725	0	725
07	Gear Oil	Litre	220	0	220
08	Chlorine Liquid	Litre	50	15	35
09	Chlorine Powder	Kg	65	0	65
10	Fire Extinguisher (18Kg)	Unit	8	8	0
11	Sika	Litre	7	0	7
	Type of Hazardous Waste				
12	Used Oil (Hydraulic + Engine)	Litre	197	0	197
13	Used oil mixed with water	Litre	0	0	0
14	Empty used oil drum/container (drum 200L)	Unit	3	0	3
15	Used oil filters	Uni	0	0	0
16	Contaminated soil, sawdust and textile material	M3	0.42	0	0.42
17	Used tyre	Piece	0	0	0
18	Empty used chemical drum/container (drum 20L)	Unit	0	0	0
19	Lithium-ion batteries	Unit	0	0	0
20	Lead acid batteries	Unit	0	0	0
21	Empty paint and spray cans	Can	121	0	121
22	Halogen/fluorescent bulbs	Unit	272	0	272
23	Empty cartridge (Ink)	Piece	149	0	149
24	Clinic Waste	Kg	14.6	10.9	3.7

***Note:** The unit of three material categories (Color paint, Thinner and Grease oil) were changed from drum to liter, since July (early Q3 2020) for future easier tracking, it's resulted in the quantity were changed accordingly*

3.5.3 Animal Fodder (Pig Feed) Collection Programme

During Q3 2020, local villagers collected 2,028 kg of food waste from the Owner's Site Office and Village (OSOV) for feeding their animals, a decrease of 694 kg compared to Q2 2020 due to the reduced number of residents (EGAT-I's O&M staffs) in the OSOV1.

3.5.4 Community Solid Waste Management and Recycling Programme

During Q3 2020, the Community Recycle Waste Bank collected a total of 55 kg glass bottles from the NNP1's landfill and Houay Soup landfill waste segregation as summarized in **Table 3-7** below.

TABLE 3-7: ***AMOUNT OF RECYCLABLES SOLD AT THE COMMUNITY RECYCLE WASTE BANK***

Type of Waste	Unit	Remaining in Q2 2020	Purchased in Q3 2020	Sold	Remaining in Q3 2020
Plastic bottle	kg	35.5	0	0	35.5
Aluminum	kg	0	0	0	0
Paper/Cardboard	kg	852.5	0	0	852.5
Glass	kg	2,249	55	0	2,304
Scrap metal	kg	0	0	0	0
Total	**kg**	**3,137**	**55**	**0**	**3,192**

During the Q3 2020, the local waste collection contractor continued to carried out landfill operation and maintenance which included daily and weekly waste cover, repairing the damaged perimeter fence of landfills, cutting grasses, storage cleaning and clean up sediment in the open ditches of leachate ponds.

A quarterly waste management consultation was conducted with the village authorities of Thaheua, Hatngiun and Phouhomxay villages. There was no further comment from the village authorities.

EMO has initially consulted with the EMU of Bolikhan District for handing over of the community waste bank and community involvement in the community solid waste management. The EMU confirmed to resume monthly site visit by Q4 2020 for further detailed discussion and joint consultation with the community.

3.5.5 Houay Soup Landfill

During Q3 2020, approximately 50.5 m^3 of solid waste was collected from Thaheua, Hat Gniun and Phouhomxay villages and transported to Houaysoup Landfill for disposal. The basic landfill maintenance was carried out which included fixing fence, cleaning up the open ditches and cutting grass.

As of September 2020, the remaining capacity of the Houay Soup Landfill is approximately 5,740 m^3. The landfill could serve for 22 years considering the average monthly waste disposal of 22 m^3, 30% reduction of its volume by the waste compaction, and 30% reduction of the landfill's total volume by the soil cover.

3.6 RESERVOIR OPERATIONS

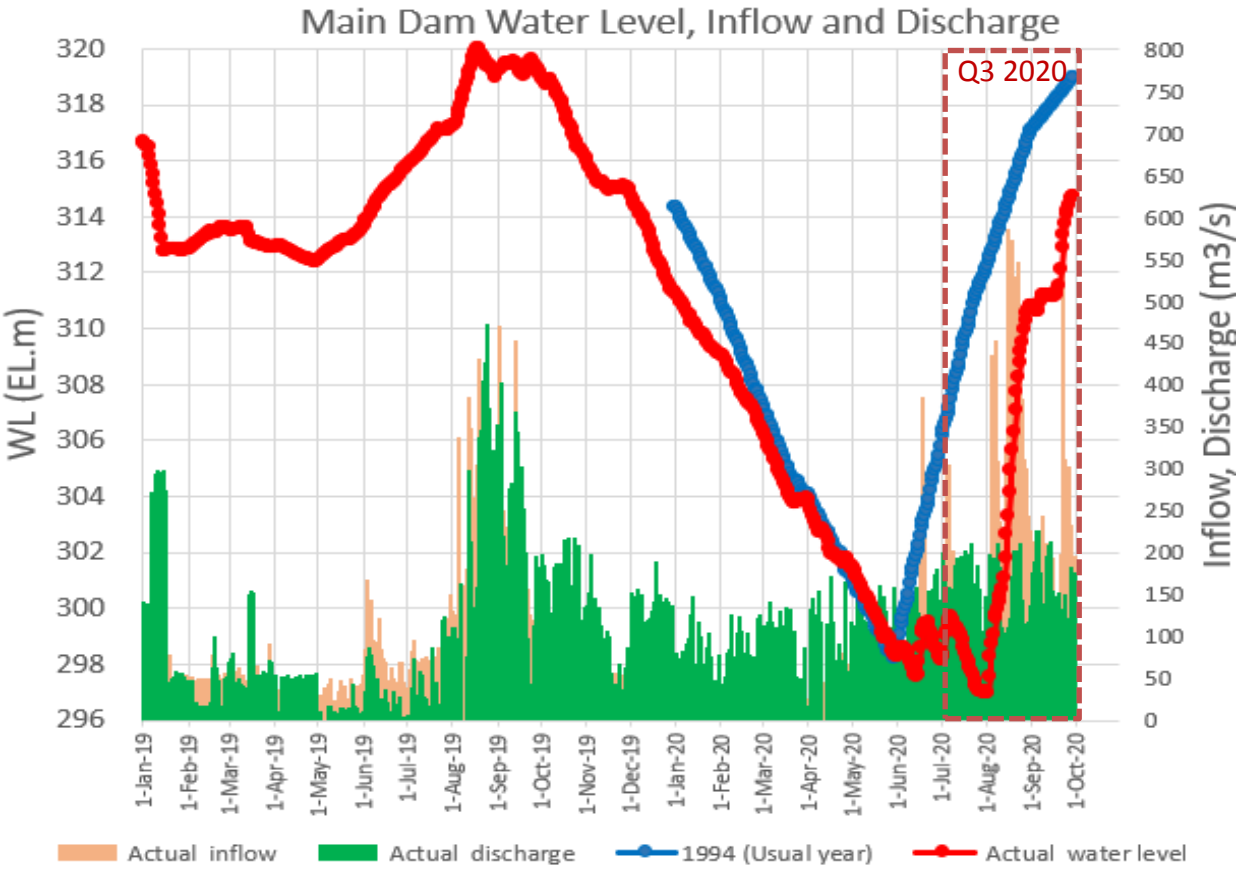
3.6.1 Main Reservoir

The water level in the main reservoir, inflow to the reservoir and discharge from the reservoir 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 Q3 2020, the mean daily inflow to the main reservoir was 231 m^3/s. The minimum daily inflow was 69 m^3/s, maximum daily inflow was recorded at 583 m^3/s, and 25th percentile of 125 m^3/s and 75th percentile of 303 m^3/s.

During Q3 2020, the water level in the main reservoir increased with 16.56 m from El. 298.14 m asl. to El. 314.70 m asl. The lowest water level was observed at El. 296.93 m asl. on 30 July 2020 and 02 August 2020, which is very close to the minimum operating level of 296 m asl.

FIGURE 3-4: *IMPOUNDING PROGRESS OF THE MAIN RESERVOIR*



3.6.2 Environmental Flow Requirements (EFRs) for the Operation Phase

NNP1PC has monitored compliance with the Environmental Flow Requirements (EFRs) stipulated in the CA, Annex C, Clause 53 (g) and as further modified in the Environmental Flow Assessment Report of July 2014 approved by MONRE. The EFRs have been monitored in accordance with the monitoring programme outlined in the ESMMP-OP 2019 (Vol. II, Part 2 on Subplan 1 on Reservoir and River Health Management).

The results of the EFR compliance monitoring during Q3 2020 are summarized in ***Table 3-8***.

TABLE 3-8: *SUMMARY OF EFRS COMPLIANCE MONITORING IN Q3 2020*

No	EFRs in the Downstream of the Re-regulation dam	EFRs compliance
1	Min flow 27 m^3/s at all times	100% of observations comply
2	Thalweg water depth at least 0.5 m in the entire reach from immediately downstream of the Re-regulation dam until 4.3 km downstream the dam (measured at cross-sections where visual observations or boat navigation indicate shallow waters)	100% of measurements comply
3	Maximum rate of change (both rise and fall, separately) in stage of 0.6 m per hour	100% of hourly fluctuations comply
4	Maximum fluctuation in stage of 1.7 m over 24-hour (this requirement is about range and determines the maximum difference in stage height over 24-hour periods)	100% of 24-hour fluctuations comply
5	Maximum fluctuation in stage of 1.7 m over 7-days (this requirement is about range and determines the maximum difference in stage height over 7-day periods)	All 7-day fluctuations comply

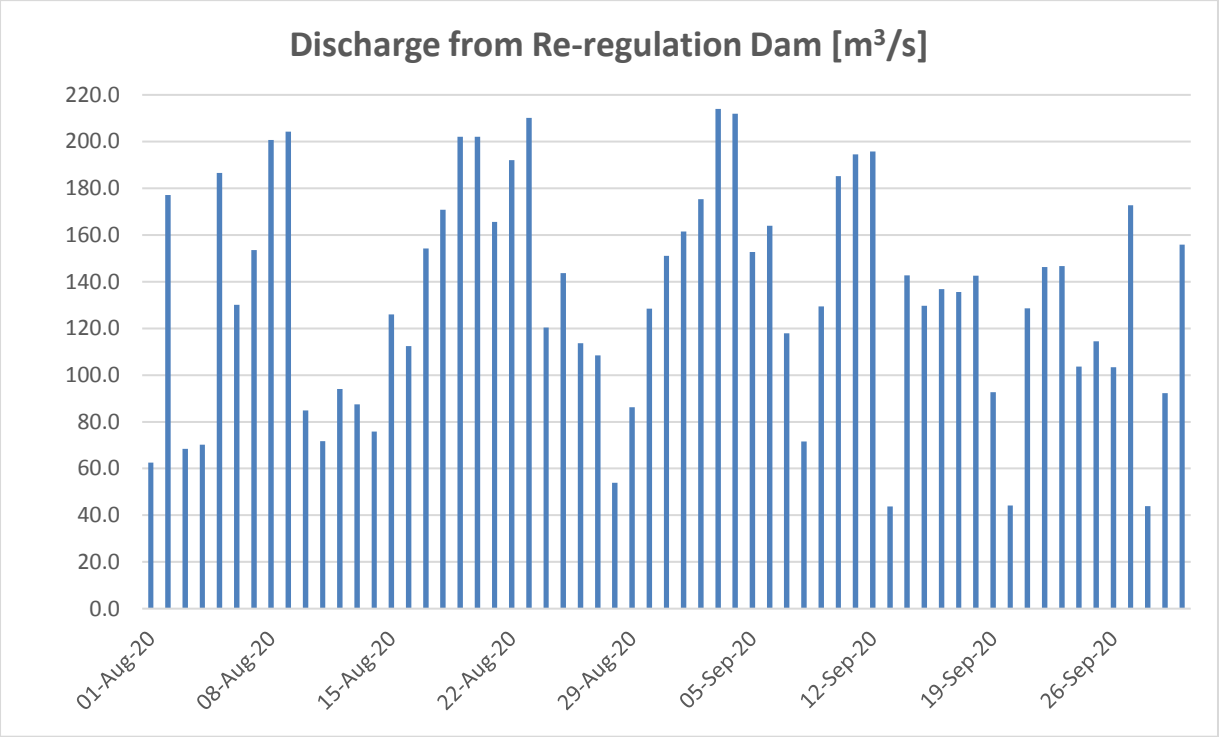
3.6.2.1 Minimum Flow Requirements

The discharge monitoring data for the re-regulation dam during Q3 2020 indicates that the minimum flow requirement of 27 m^3/s has been met at all times - as presented in ***Figure 3-5***

During Q3 2020, the mean discharge from the re-regulation dam was about 141 m^3/s in July 2020 and about 132 m^3/s to 135 m^3/s in August and September 2020 respectively.

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 FROM THE RE-REGULATION DAM DURING Q3 2020*



3.6.2.2 Minimum Water Depth

Since 18 July 2018, NNP1PC has carried out weekly monitoring of river depths at 19 locations downstream the re-regulation dam as shown on ***Figure 3-6.*** These locations represent cross-sections with possible shallow water depths at low discharge rates.

The monitoring is undertaken to confirm compliance with the water depth requirements in the Concession Agreement, Annex C, and the approved Environmental Flow Assessment (at least 0.5 m measured immediately downstream the re-regulation dam).

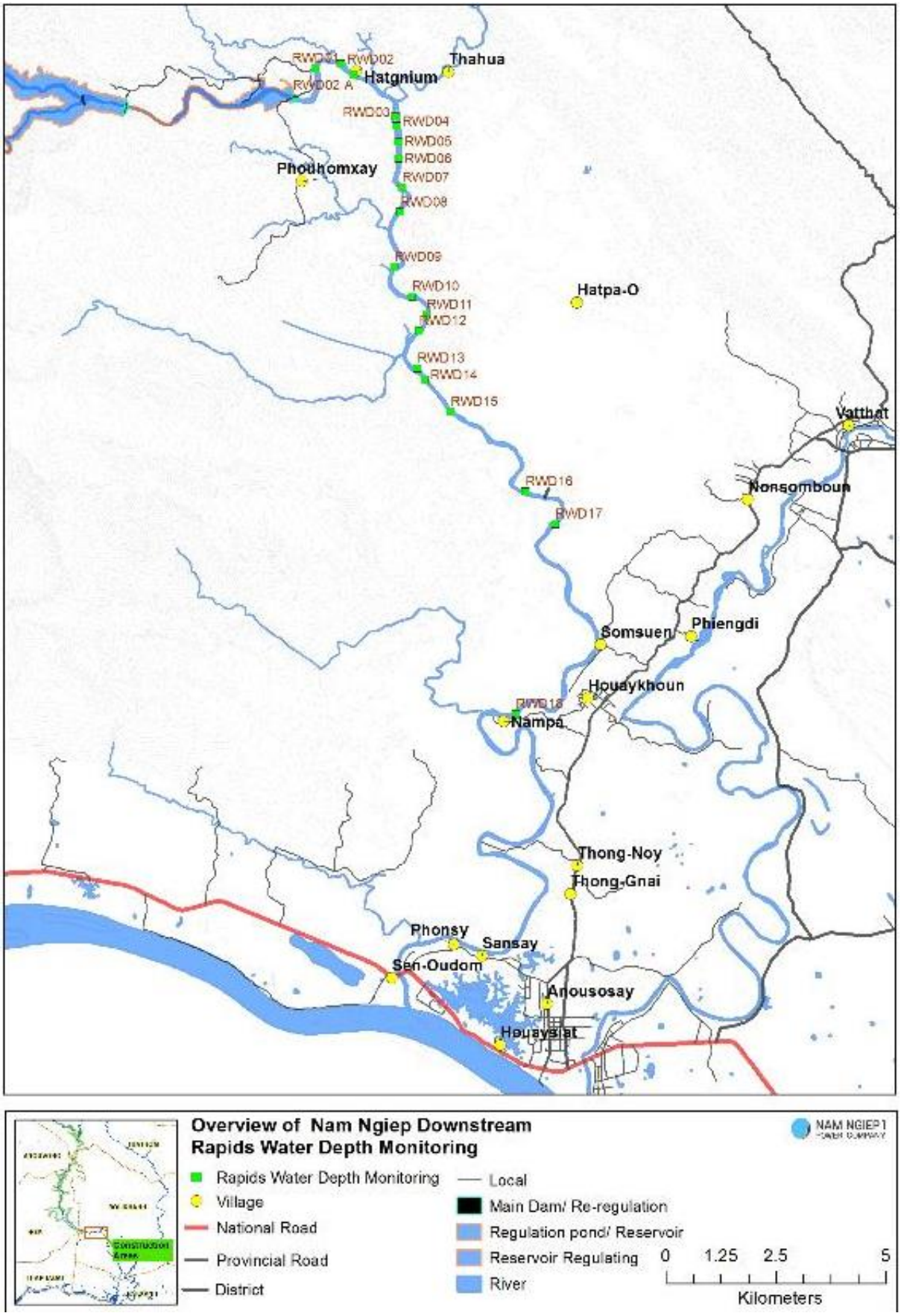
The results of the monitoring are presented in ***Table 3-9***. During Q3 2020, there was no instances of difficult navigation due to reduced water depths and no measurement observed the depth of less than 0.5 m.

It is noted that the water depths were measured at the navigation of the observed shallowest locations and it may not be the deepest points. Starting by December 2020, the water depths will be measured across the cross sections where visual observations or boat navigation indicate shallow waters to ensure that the measurements represent the deepest channel

TABLE 3-9: ***RIVER DEPTH MEASUREMENTS IN NAM NGIEP DOWNSTREAM THE RE-REGULATION DAM***

Station ID		RWD 01	RWD 02	RWD 02.a	RWD 03	RWD 04	RWD 05	RWD 06	RWD 07	RWD 08	RWD 09	RWD 10	RWD 11	RWD 12	RWD 13	RWD 14	RWD 15	RWD 16	RWD 17	RWD 18
Distance from Re-regulation Dam (Km)		1.55	2.43	2.97	4.9	5.2	5.66	6.16	7.13	8.01	9.97	11.31	12.08	12.62	14.1	14.49	15.77	19.76	21.58	30.09
Date	Discharge (m3/s)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)	Depth (m)
1-Jul-20	94	0.56	0.61	0.63	0.65	1.08	1.05	1	1.3	1.35	1.5	1.52	1.8	2.1	2.4	2.52	2.6	2.8	2.75	2.5
23-Jul-20	98	1.25	1.3	1.33	1.28	1.73	1.7	1.65	1.85	1.75	1.97	1.85	2.1	2.2	2.4	2.51	2.58	2.65	2.6	2.3
30-Jul-20	90	0.55	0.6	0.63	0.78	1.33	1.3	1.35	1.45	1.35	1.67	1.55	1.8	1.9	2.2	2.31	2.38	2.45	2.4	2.2
12-Aug-20	50	0.85	0.9	0.93	1.4	1.9	1.8	1.85	1.95	1.9	2.4	2.35	2.5	2.53	2.6	2.65	2.68	2.7	2.75	2.7
26-Aug-20	49.8	0.87	0.9	0.93	1.4	1.94	1.85	2.04	2.2	2.15	2.8	2.95	3	3.13	3.32	3.4	3.58	3.65	3.7	3.7
16-Sep-20	88	0.9	0.93	0.95	1.25	1.39	1.35	1.5	1.46	1.4	1.1	2.1	2.15	2.29	2.4	2.5	2.65	2.68	2.8	2.75
23-Sep-20	93.7	1.15	1.18	1.2	1.5	1.1.6	1.65	1.8	1.76	1.8	1.6	2.6	2.65	2.89	3.0	3.1	3.25	3.28	3.35	3.2

FIGURE 3-6: ***LOCATION MAP OF RIVER DEPTH MONITORING POINTS***



3.6.2.3 Stage Height Fluctuations

The requirements on stage height fluctuations constitute a rise or a fall in water elevation and include two aspects:

1. A requirement on the rate of change which is set at 0.6 m per hour.
2. Requirements on the range in fluctuations over 24-hour periods and 7-day periods respectively, which is set at a maximum of 1.7 m for both periods. In other words, the range requirements determine the maximum difference in stage height over 24-hour periods and 7-day periods respectively.

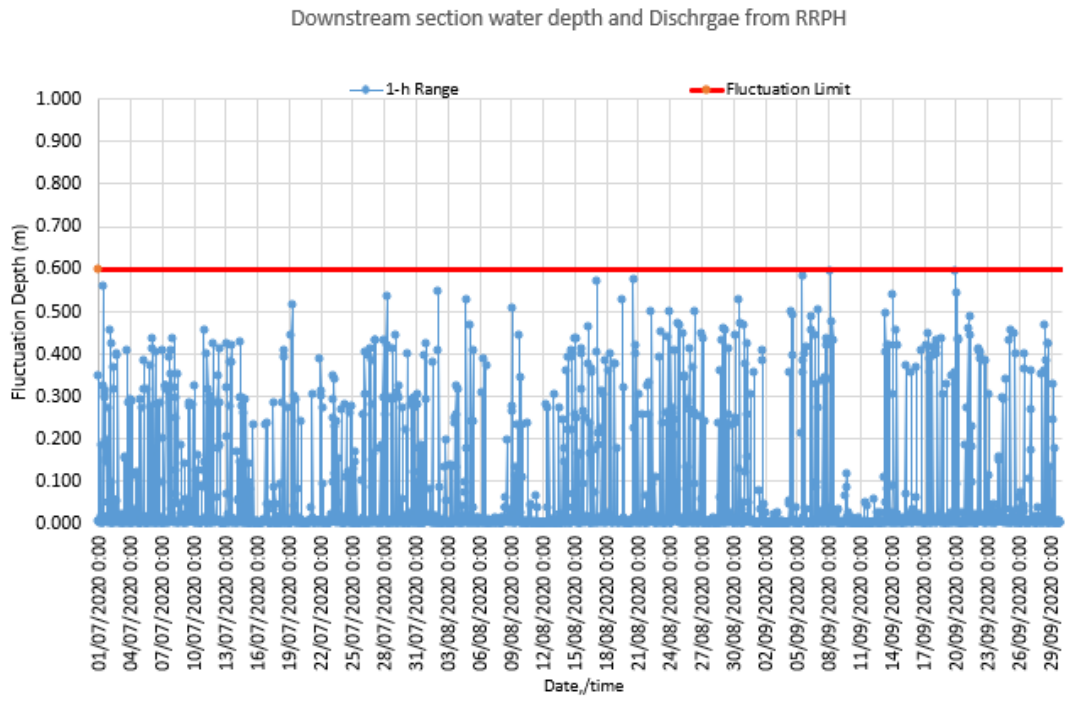
For the 0.6 m in 1-hour maximum fluctuation EFR, the cumulative rises and falls are calculated from the hourly water level recordings.

Compliance with the 24-hour maximum fluctuation EFR is determined by calculating the difference between the maximum and the minimum stage height over each 24-hour period. In the same way, the 7-day maximum fluctuation EFR, is determined by calculating the difference between the maximum and the minimum stage height over each 7-day period. There is no compulsion for the Company to meet the stage height fluctuation EFRs after a high flow event passes over the Re-regulation dam spillway.

In practice, meeting stage height fluctuation EFRs are managed through controlling the rate of change in discharge from the re-regulation dam/powerhouse. This is done using established rating relationships between stage height and discharge, as set out in the Re-regulation dam operation manual. These relationships are regularly checked and revised as necessary, as they would change whenever the channel morphology changes due to significant erosion or deposition.

During Q3 2020, the maximum rate of change of 0.6 m over 1-hour was complied with for 100% of the hourly fluctuations. The results are presented in ***FIGURE 3-7***.

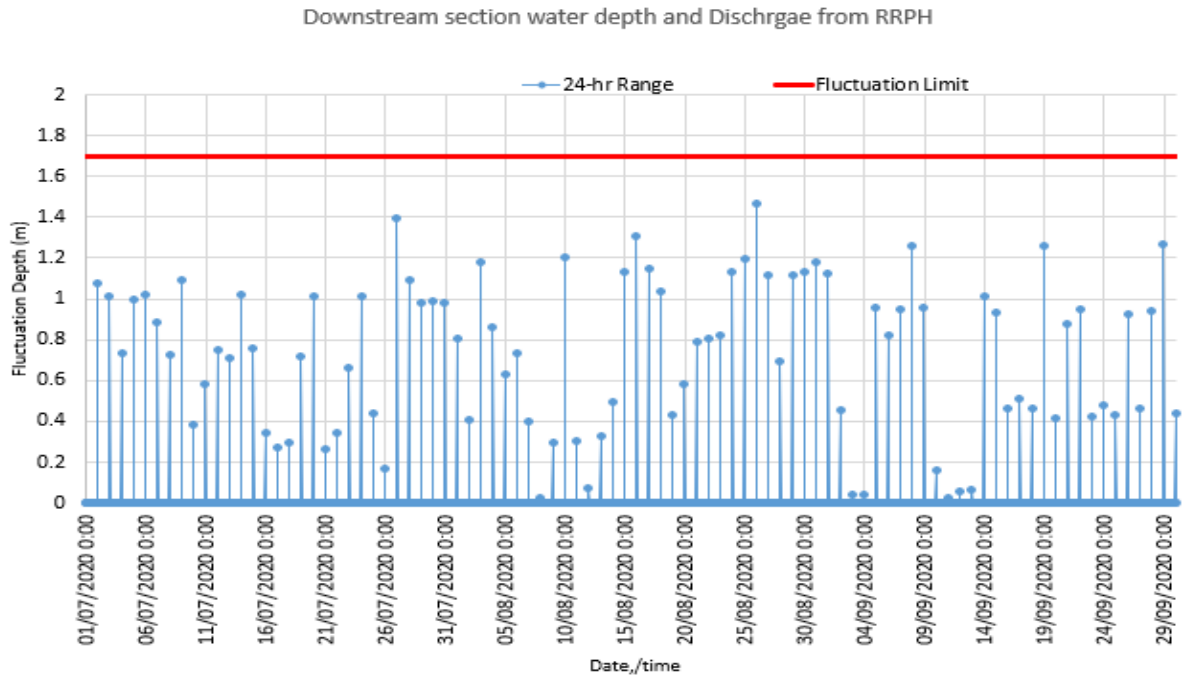
FIGURE 3-7: HOURLY STAGE HEIGHT FLUCTUATIONS DURING Q3 2020



During Q1 2020, the maximum range in stage of 1.7 m over 24-hour was complied with for all 24-hour periods (00:00 – 23:00).

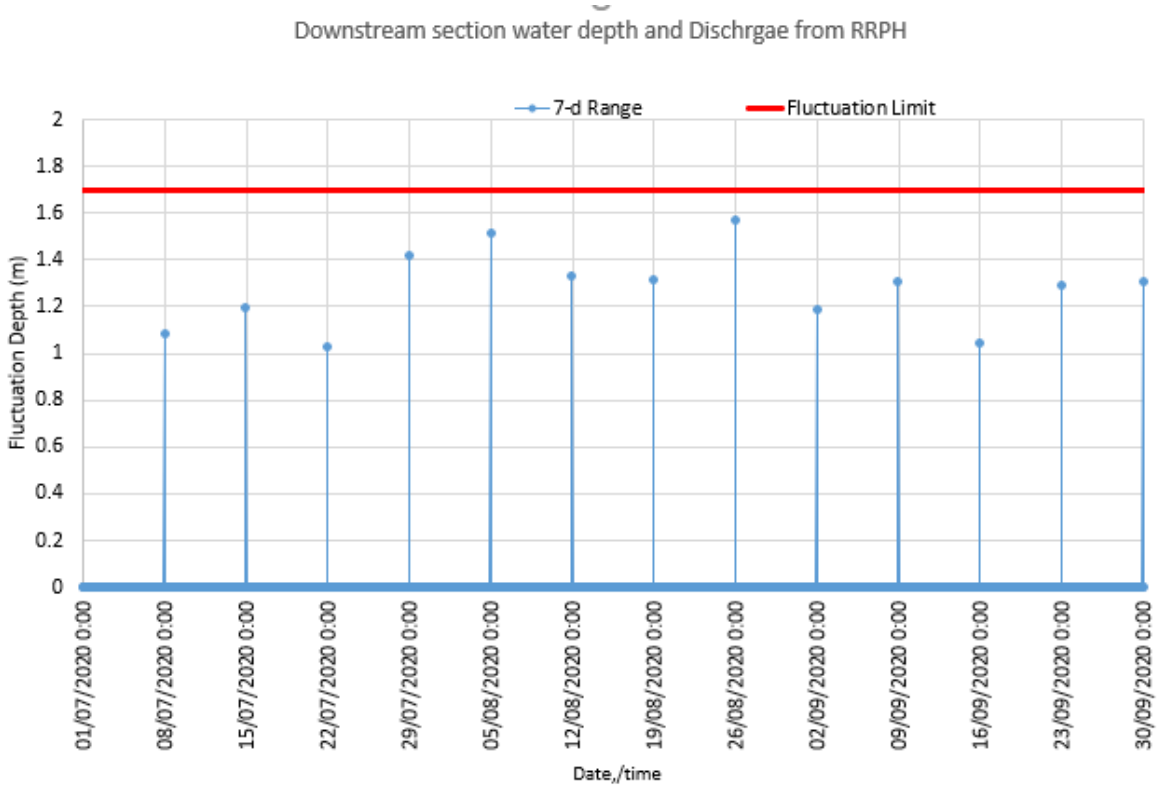
The results of the monitoring are presented in Figure 3-8.

FIGURE 3-8: 24- HOUR STAGE HEIGHT DIFFERENCE (M) DURING Q3 2020



During Q3 2020, the maximum range in stage of 1.7 m over 7-days was complied with for all 7-day periods. The results are presented in ***Figure 3-9***.

Figure 3-9: 7- day Stage Height Difference (m) during Q3 2020



3.7 Environmental Monitoring

Since the second week of August 2020, water samples shipment to UAE Laboratory in Thailand was resumed. Therefore, from then on, all water quality monitoring parameters were monitored and sampled according to the Water Quality Monitoring Program.

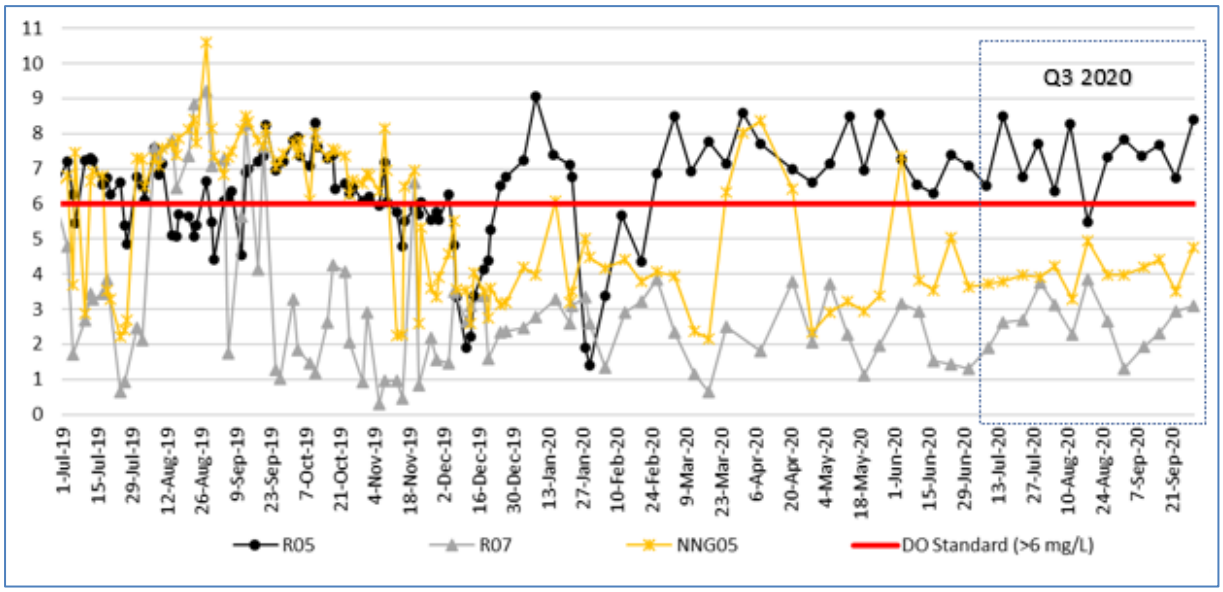
3.7.1 Surface Water (River) Quality

Descriptions of each monitoring station, surface water quality monitoring parameters and the location of sampling map can be found in ***Appendix 3*** and all surface water quality data for Q3 2020 are listed in ***Appendix 5.1***

Dissolved Oxygen (DO)

The results of DO measurements for the stations immediately upstream and downstream of the main dam are presented in ***Figure 3-10,*** and the full set of surface water quality data are shown in ***Table*** 3-10***.***

FIGURE 3-10: *DISSOLVED OXYGEN IMMEDIATELY UPSTREAM AND DOWNSTREAM OF THE MAIN DAM*



During the Q3 2020, the DO concentrations at the depth 0.2 m in R05 (Main Reservoir immediately upstream of the main dam), was more than 6 mg/L (except on 18 August 2020).

The DO concentrations at the depth 0.2 m in the Re-regulation Reservoir (R07) were between 1.3 – 3.8 mg/L.

Monitoring of the downstream stations during periods with turbine discharge in the remaining period of Q3 2020, showed DO levels below 6 mg/L in the stations. NNP1PC is in the process of compilating all monitoring information for the design of additional aeration system to improve the DO level at downstream.

The Nam Ngiep Upstream station (NNG01), Nam Chian (NCH01), Nam Phouan (NPH01) and Main Reservoir (R01, R02, R03 and R04) had DO levels above 6 mg/L. The concentration of DO in Nam Xao (except on 23 July 2020) and Nam Houay Soup were above 6 mg/L.

The Water Temperature and DO depth profiles in the main reservoir at R05 during Q3 2020 and Q3 2019 are presented in **Figure 3-11 to Figure 3-13**.

During Q3 2020, the oxycline in R05 was generally observed at depths between 3 and 8 m and anoxic condition fluctuated at the depth between 18 and 45 m. In addition, below 50 m to the bottom, all DO measurements were in anoxic condition.

Figure 3-13 presents the monthly average depth profiles in the Main Reservoir since September 2018 to September 2020, the graphs clearly show seasonal variations in water temperatures and a deepening of the thermocline during periods with cooler water leading to a corresponding deepening of the oxycline.

When comparing Q3 2020 with Q3 2019, the second half of Q3 2020 shows a significant deepening of the oxycline compared to the same period in Q3 2019. The filling-up of the reservoir during Q3 2020 from about El. 297 m asl. to about El. 315 m asl. was much more pronounced that during Q3 2019 when the water level only increased from El. 316 m asl. to

about El. 319 m asl. This may have contributed to a thicker epilimnion during the latter part of Q3 2020. The mean DO concentration in the upper 5 m was about 1 mg/L higher in Q3 2020 than in Q3 2019. Q3 2020, globally shows that DO in the entire water column significantly improved over the Quarter.

The depth profiles monitoring during the period indicates formation of oxyclines in the main reservoir at all stations at depths between 1.5 and 9 m, except at R01, which due to its location at the narrow upper end of the reservoir behaves like a river.

There is no indication of a thermocline at R06 and R07 in the re-regulation reservoir, because the re-regulation reservoir behaves more like a river than a lake.

Figure 3-11: Main reservoir Dissolved Oxygen at the End of Q3 2020

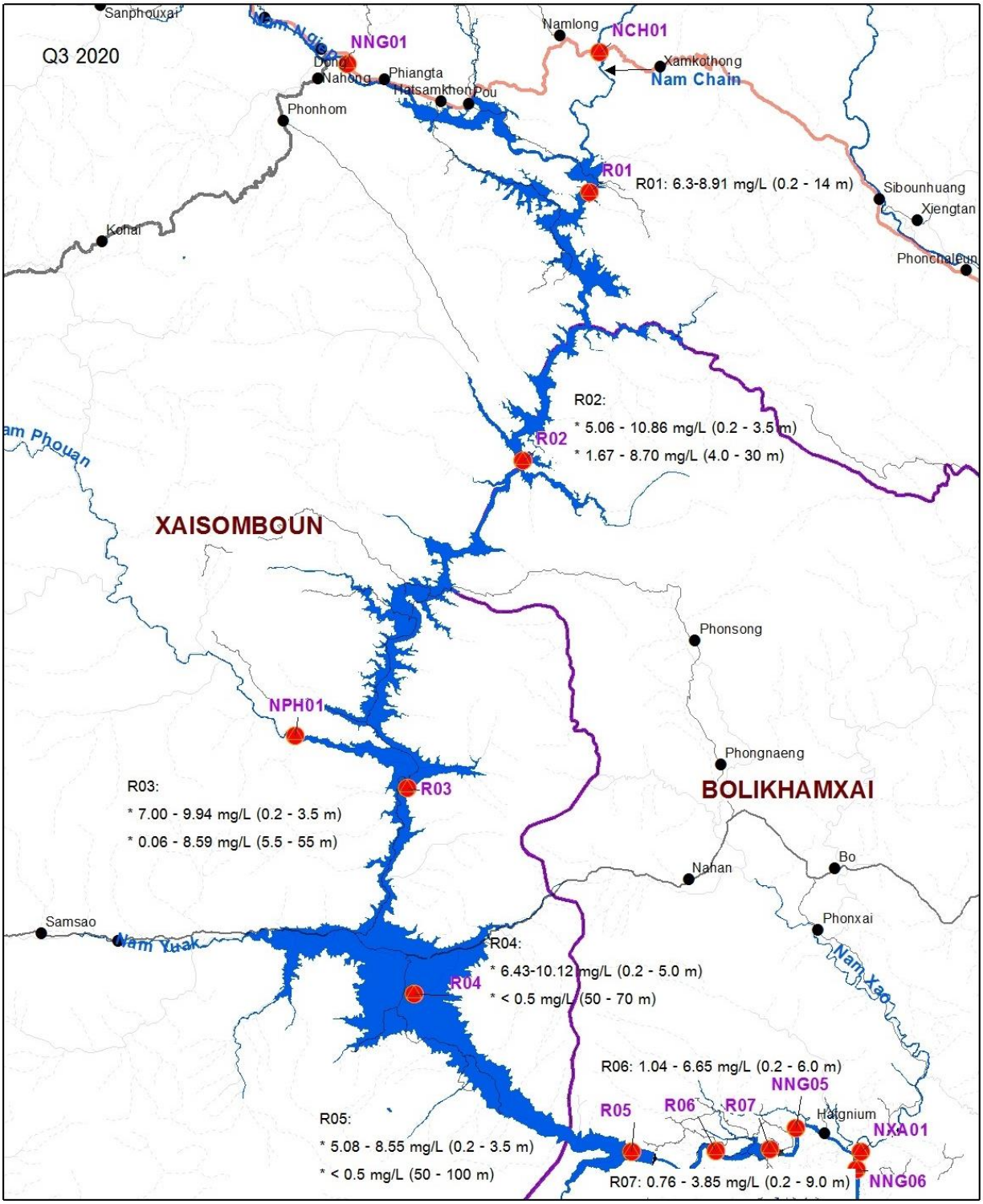
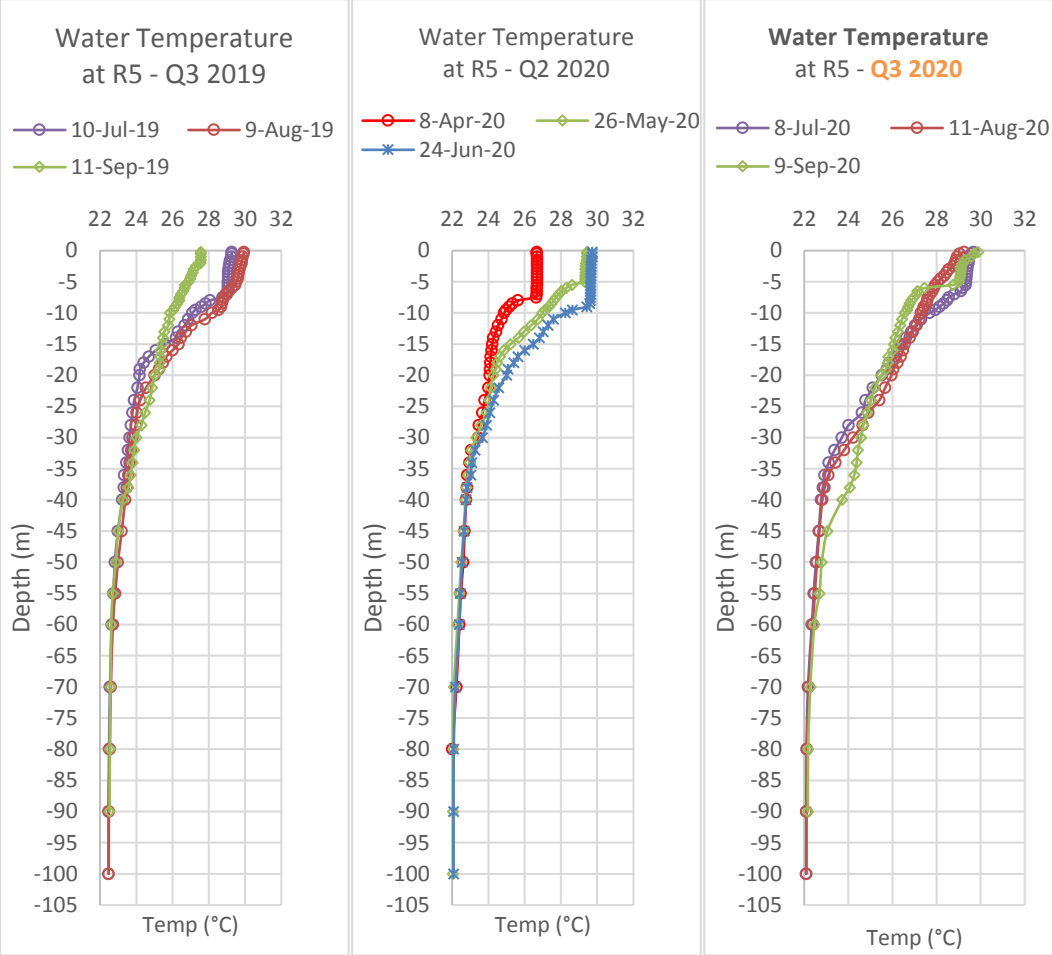


FIGURE 3-12: ***WATER TEMPERATURE AND DISSOLVED OXYGEN – DEPTH PROFILES IN THE MAIN RESERVOIR IMMEDIATELY UPSTREAM OF THE MAIN DAM (R05)***



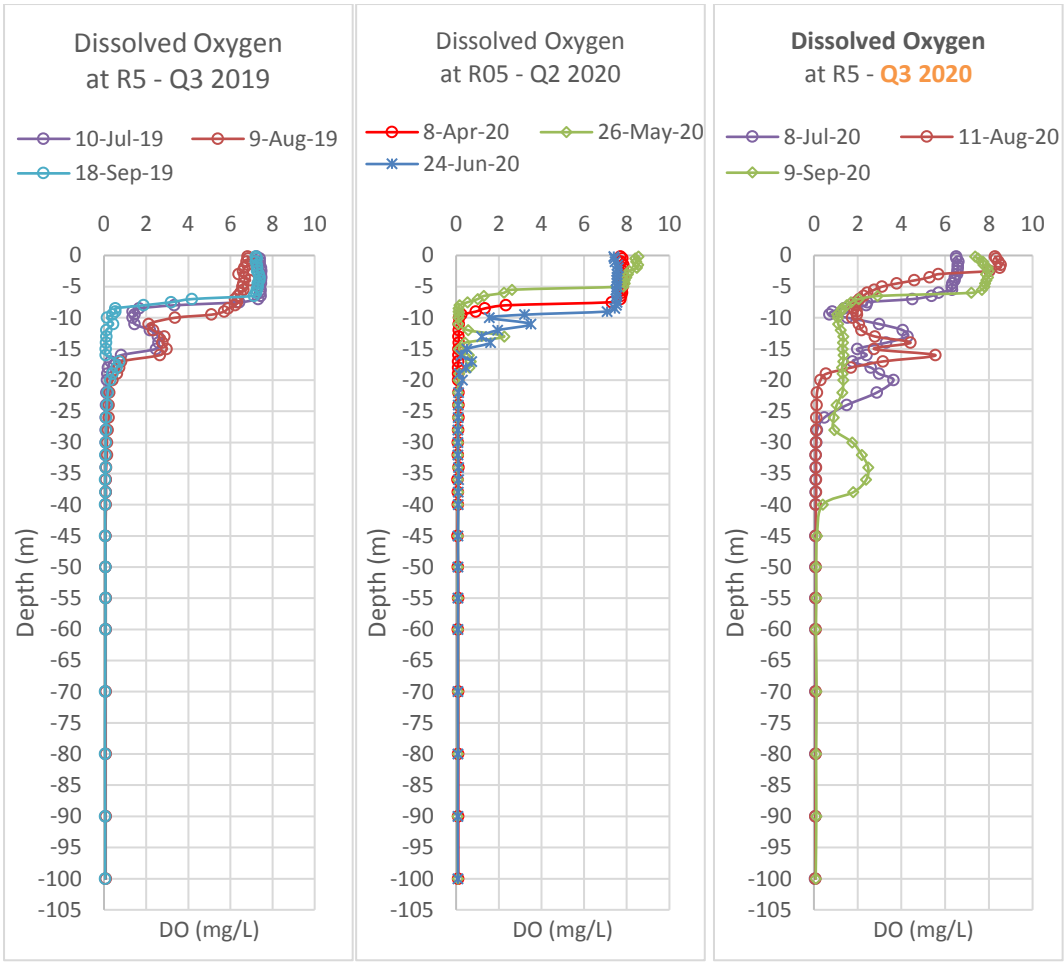

Dissolved Oxygen
at R5 - Q3 2019
10-Jul-19
9-Aug-19
18-Sep-19
Depth (m)
DO (mg/L)
Dissolved Oxygen
at R05 - Q2 2020
8-Apr-20
26-May-20
24-Jun-20
Depth (m)
DO (mg/L)
Dissolved Oxygen
at R5 - Q3 2020
8-Jul-20
11-Aug-20
9-Sep-20
Depth (m)
DO (mg/L)

FIGURE 3-13: ***MONTHLY AVERAGE OF WATER TEMPERATURE AND DO DEPTH PROFILES IN THE MAIN RESERVOIR (R01 - R05), WITH POSITION OF INTAKE AT THE ACTUAL WATER LEVEL DURING SEPTEMBER 2018 - SEPTEMBER 2020***

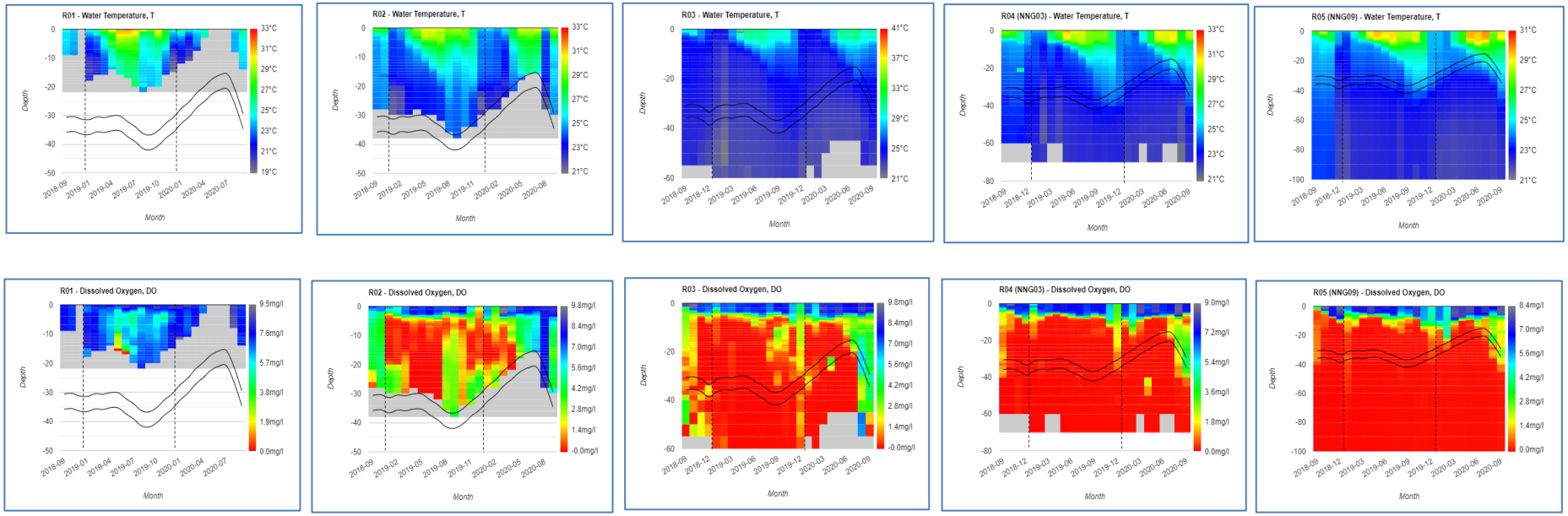


TABLE 3-10: ***DO (MG/L) RESULTS OF SURFACE WATER IN MAIN RESERVOIR, RE-REGULATION RESERVOIR, NAM NGIEP AND ITS MAIN TRIBUTARIES MONITORED IN Q3 2020***

Station Code	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
01-Jul-20						7.08	1.48	1.3	3.62	4.15	4.41	5.72			6.9	6.98
02-Jul-20		7.54	7.89	7.58	7.56									8.4		
06-Jul-20	7.13												8.11			
07-Jul-20		7.62	8.66	8.23										8.8		
08-Jul-20					6.61	6.51										
09-Jul-20							3.13	1.89	3.72	3.71	5.02	5.86			7.41	7.47
14-Jul-20		7.72	8.76	8.22	7.6									8.73		
15-Jul-20						8.49	2.36	2.63	3.78	4.05	5.43	6.43			7.11	7.51
22-Jul-20		6.72	7.06	7.25	6.6									7.54		
23-Jul-20						6.77	2.56	2.68	3.98	4.25	4.91	5.18			5.66	6.42
27-Jul-20	8.39												7.83			
28-Jul-20					7.19											
29-Jul-20		7.55	6.16	7.69		7.72								8.61		
30-Jul-20							3.71	3.76	3.92	3.9	5.03	6.09			6.05	6.75
04-Aug-20		8.59	6.06	8.23	7.6									9.79		
05-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		8.31	7.51	7.66	7.41									9.04		
24-Aug-20	8.21												8.78			
25-Aug-20		8.43	10.39	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
01-Sep-20		7.68	8.56	7	6.75									8.62		
02-Sep-20						7.84	1.34	1.3	3.97	5.65	5.71	6.03			7.05	7.14

Station Code	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
07-Sep-20	7.39												7.86			
08-Sep-20		6.53	7.86											7.79		
09-Sep-20				7.37	6.96	7.37										
10-Sep-20							1.63	1.93	4.21	4.61	5.36	5.83			6.79	6.74
15-Sep-20		6.55	8.04	7.54	6.93											
16-Sep-20						7.67	2.64	2.32	4.43	4.19	6.25	5.73			6.86	7.23
21-Sep-20	7.55												7.65			
22-Sep-20		8.3	8.87	8.8	7.78									10.01		
23-Sep-20						6.75	3.75	2.94	3.51	4.48	5.6	5.82			6.75	6.6
29-Sep-20		7.26	8.43	7.95	7.66									8.2		
30-Sep-20						8.4	4.08	3.1	4.75	5.11	6.32	6.87			7.96	7.63

Ammonia Nitrogen

Since 2014, the Ammonia Nitrogen concentration in the Nam Ngiep River and its tributaries have been below the detection limit (<0.2 mg/L). In Q3 2020, Ammonia Nitrogen complied with the National Surface Water Quality Standard (<0.2 mg/L) in all monitored stations.

TABLE 3-11: *AMMONIA NITROGEN (MG/L) RESULTS FOR THE SURFACE WATER IN NAM NGIEP AND ITS MAIN TRIBUTARIES MONITORED IN Q3 2020*

(NATIONAL SURFACE WATER QUALITY STANDARD FOR AMMONIA NITROGEN: <0.2 MG/L)

Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH0 1	NXA 01	NHS 01
11-Aug-20	<0.2			<0.2		<0.2							<0.2	<0.2		
11-Aug-20 Hypolimnion				1.39	0.79	0.5										
07-Sep-20	<0.2												<0.2			
08-Sep-20		<0.2												<0.2		
09-Sep-20				<0.2	<0.2	<0.2										
09-Sep-20 Hypolimnion				0.88	0.88	<0.2										

Biochemical Oxygen Demand (BOD_5)

Since 2014, the Biochemical Oxygen Demand (BOD_5) values in the Nam Ngiep River and its tributaries have generally been below the detection limit (< 1 mg/L) with some measurements exceed the National Surface Water Quality Standard (< 1.5 mg/L). The results for Q3 2020 indicate some exceedances and noteworthy are the elevated BOD levels in the hypolimnion in the main reservoir representing water that is transferred downstream. NNP1PC is in the process of compilating all monitoring information for the design of additional aeration system to improve the BOD level at downstream.

TABLE 3-12: *BOD_5 (MG/L) RESULTS FOR THE SURFACE WATER IN NAM NGIEP AND ITS MAIN TRIBUTARIES MONITORED IN Q3 2020*

(NATIONAL SURFACE WATER QUALITY STANDARD FOR BOD_5: <1.5 MG/L)

Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH0 1	NXA 01	NHS 01
06-Jul-20	<1												<1			
07-Jul-20		<1		<1										<1		
07-Jul-20 Hypolimnion				10.78												
08-Jul-20					<1	<1										
08-Jul-20 Hypolimnion					10.84	7.14										
09-Jul-20							8.86	7.32	3.81	<1	<1	<1			<1	<1
11-Aug-20	<1			<1	<1	<1							<1	<1		
11-Aug-20 Hypolimnion					8.12	6.01										
12-Aug-20							6.41	4.51	2.01	<1	<1	<1			<1	<1
13-Aug-20		<1														
07-Sep-20	<1												<1			
08-Sep-20		<1												<1		
09-Sep-20				<1	<1	<1										
09-Sep-20				13.14	13.6	11.86										

Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH0 1	NXA 01	NHS 01
Hypolimnion																
10-Sep-20							<1	<1	<1	<1	<1	<1			1.14	<1

Chemical Oxygen Demand (COD)

The COD measurements in Q3 2020 are presented in ***Table 3-13***.

TABLE 3-13: ***COD (MG/L) RESULTS FOR THE SURFACE WATER IN NAM NGIEP AND ITS MAIN TRIBUTARIES IN Q3 2020***

(NATIONAL SURFACE WATER QUALITY STANDARD FOR COD: < 5 MG/L)

Station Code	NNG 01	R0 1	R0 2	R0 3	R0 4	R0 5	R06	R0 7	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
11-Aug-20	6.6												8.4	6.4		
12-Aug-20							5.6	6	7.2	<5.0	9.2	6.0			13.3	12.9
07-Sep-20	20.3												<5.0			
08-Sep-20														7.2		
10-Sep-20							<5.0	<5.0	<5.0	5.2	5.2	<5.0			8.8	13.5

Faecal Coliform Bacteria (FCB)

The results of the faecal coliform analyses in Q3 2020 are presented in **Table 3-14**.

There were exceedances of the National Surface Water Quality Standard (<1,000 MPN/100 ml) for faecal coliform bacteria at NNG01 (August and September 2020), NCH01 (July and August 2020), NNG08 (August 2020) and both NXA01 and NHS01 (September 2020). These exceedances are unrelated to the Project.

TABLE 3-14: ***FAECAL COLIFORMS (MPN/100 ML) RESULTS IN NAM NGIEP AND ITS MAIN TRIBUTARIES IN Q1 2020***

(NATIONAL SURFACE WATER QUALITY STANDARD FOR TOTAL COLIFORMS: <1,000 MPN/100 ML)

Station Code	NNG 01	R0 1	R0 2	R0 3	R0 4	R0 5	R0 6	R0 7	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
06-Jul-20	540												1,600			
07-Jul-20		1,600		0										540		
07-Jul-20 Hypolimnion				4												
08-Jul-20					17	8										
08-Jul-20 Hypolimnion					0	7.8										
09-Jul-20							8	17	33	130	79	94			540	350
11-Aug-20	1,600			2	2	4							1,600	920		
12-Aug-20							24	0	33	220	220	1,600			220	280
13-Aug-20		920														
07-Sep-20	1,600												350			
08-Sep-20		1,600												540		
09-Sep-20				23	2	2										
09-Sep-20 Hypolimnion				0	0	0										
10-Sep-20							33	33	79	920	140	540			1,700	1,600

Total Coliform Bacteria (TCB)

The results of measurements for total coliform bacteria are presented in **Table 3-15.** The results indicate a similar pattern and same tendency as for faecal coliform bacteria. There were no exceedances of the National Surface Water Quality Standard (<5,000 MPN/100 ml) for total coliform bacteria except NNG01 (September 2020).

TABLE 3-15: ***TOTAL COLIFORMS (MPN/100 ML) RESULTS IN NAM NGIEP AND ITS MAIN TRIBUTARIES IN Q3 2020***

(NATIONAL SURFACE WATER QUALITY STANDARD FOR TOTAL COLIFORMS: <5,000 MPN/100 ML)

Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG0 6	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
06-Jul-20	1,600												1,600			
07-Jul-20		1,600		5										1,600		
07-Jul-20				34												
08-Jul-20					1,600	920										
08-Jul-20					17	13										
09-Jul-20							1,600	920	1,600	920	920	1,600			1,600	1,600
11-Aug-20	1,600			5	2	14							920	920		
12-Aug-20							280	130	1,600	1,600	1,600	1,600			1,600	1,600
13-Aug-20		1,600														
07-Sep-20	5,400												1,600			
08-Sep-20		1,600												920		
09-Sep-20				170	34	130										
09-Sep-20				33	170	130										
10-Sep-20							140	540	920	920	350	1,600			2,800	1,600

3.7.2 Compliance Monitoring of Effluents from Camps

A total of 03 effluent sites were in use during Q3 2020 and the effluents were monitored in 02 camps (OSOV1 and OSOV2) and at the Wastewater Treatment System of the Main Powerhouse**.** The effluent monitoring location sites can be found in **Figure 3-14.** The effluent camp EF14 was connected with EF13 and treated as EF13.

The results are described in ***Table 3-16*** and the full data set is in ***Appendix 5.2***.

The status of compliance as of 30 September 2020 can be summarized as follows:

- Non-compliance with TSS, COD, ammonia-nitrogen, total nitrogen and total phosphorus for Main Powerhouse's Wastewater Treatment System;
- The OSOV1 (EF01) and OSOV2 (EF13) have experienced varied degree of non-compliance with faecal coliform and total coliform.

FIGURE 3-14: *LOCATION OF EFFLUENT MONITORING POINTS*

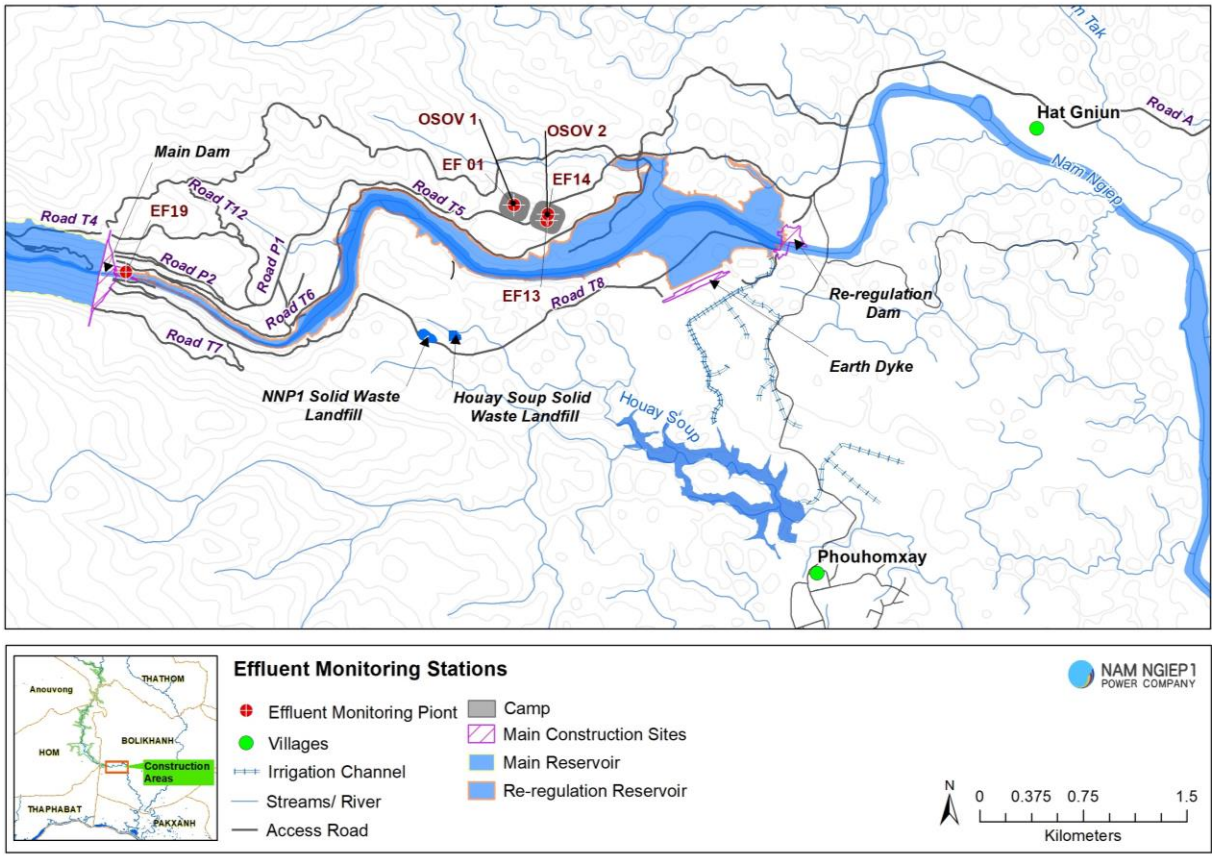


TABLE 3-16: *RESULTS OF THE EFFLUENT WATER QUALITY MONITORING OF THE CAMPS IN Q3 2020 (NON-COMPLIANCE PARAMETERS ONLY)*

		Site Name	OSOV 1	OSOV2	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
03-Jul-20	pH	6.0 - 9.0	5.99	7.45	8.13
22-Jul-20	pH	6.0 - 9.0	7.55	6.14	
03-Aug-20	pH	6.0 - 9.0	7.85	7.29	7.24
17-Aug-20	pH	6.0 - 9.0	7.18	6.26	7.93
03-Sep-20	pH	6.0 - 9.0	7.02	7.15	6.95
17-Sep-20	pH	6.0 - 9.0	7.61	7.59	
03-Jul-20	TSS (mg/L)	<50	<5	10.2	67.0
22-Jul-20	TSS (mg/L)	<50	<5	34.2	
03-Aug-20	TSS (mg/L)	<50	<5	6.1	31.2
17-Aug-20	TSS (mg/L)	<50	<5	7.3	160.9
03-Sep-20	TSS (mg/L)	<50	<5	9.8	34.6
17-Sep-20	TSS (mg/L)	<50	<5	13.7	
03-Jul-20	COD (mg/L)	<125	n/a	n/a	n/a
22-Jul-20	COD (mg/L)	<125	n/a	n/a	
03-Aug-20	COD (mg/L)	<125	n/a	n/a	n/a
17-Aug-20	COD (mg/L)	<125	<25	<25	186
03-Sep-20	COD (mg/L)	<125	<25	<25	68.6
17-Sep-20	COD (mg/L)	<125	<25	31	
03-Jul-20	NH_3-N (mg/L)	<10.0	n/a	n/a	n/a
22-Jul-20	NH_3-N (mg/L)	<10.0	n/a	n/a	
03-Aug-20	NH_3-N (mg/L)	<10.0	n/a	n/a	n/a
17-Aug-20	NH_3-N (mg/L)	<10.0	<1.5	7.0	25.6
03-Sep-20	NH_3-N (mg/L)	<10.0	8.9	<2	37.6
17-Sep-20	NH_3-N (mg/L)	<10.0	4.4	14.4	
03-Jul-20	Total Nitrogen (mg/L)	<10.0	n/a	n/a	n/a
22-Jul-20	Total Nitrogen (mg/L)	<10.0	n/a	n/a	
03-Aug-20	Total Nitrogen (mg/L)	<10.0	n/a	n/a	n/a
17-Aug-20	Total Nitrogen (mg/L)	<10.0	4.29	8.13	27.3
03-Sep-20	Total Nitrogen (mg/L)	<10.0	13.4	1.11	61.1
17-Sep-20	Total Nitrogen (mg/L)	<10.0	5.39	20.4	
03-Jul-20	Total Phosphorus (mg/L)	<2	n/a	n/a	n/a
22-Jul-20	Total Phosphorus (mg/L)	<2	n/a	n/a	
03-Aug-20	Total Phosphorus (mg/L)	<2	n/a	n/a	n/a
17-Aug-20	Total Phosphorus (mg/L)	<2	0.74	0.46	0.48
03-Sep-20	Total Phosphorus (mg/L)	<2	1	1.18	3.76
17-Sep-20	Total Phosphorus (mg/L)	<2	1	1.22	
03-Jul-20	Total coliform (MPN/100 mL)	<400	920	16,000	79
22-Jul-20	Total coliform (MPN/100 mL)	<400	350	20,000	
03-Aug-20	Total coliform (MPN/100 mL)	<400	920	0	0
17-Aug-20	Total coliform (MPN/100 mL)	<400	1,600	0	0
03-Sep-20	Total coliform (MPN/100 mL)	<400	1,600	0	0
17-Sep-20	Total coliform (MPN/100 mL)	<400	1,600	16,000	
03-Jul-20	Faecal Coliform (MPN/100 mL)	<400	540	16,000	0

		Site Name	OSOV 1	OSOV2	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
22-Jul-20	Faecal Coliform (MPN/100 mL)	<400	350	20,000	
03-Aug-20	Faecal Coliform (MPN/100 mL)	<400	540	0	0
17-Aug-20	Faecal Coliform (MPN/100 mL)	<400	540	0	0
03-Sep-20	Faecal Coliform (MPN/100 mL)	<400	1,600	0	0
17-Sep-20	Faecal Coliform (MPN/100 mL)	<400	170	16,000	

TABLE 3-17: *COMPLIANCE STATUS OF EFFLUENT DISCHARGE FROM THE CAMPS IN Q3-2020*

Site	ID	WWTS	Key Non-Compliance Issues in Q3-2020	Corrective Actions
OSOV 1 (Owner's Site Office and Village)	EF01	Septic tanks (kitchen and black water) and wetland (grey water), discharge: 70 m^3/day	- Total coliform (<400 MPN/100 mL): Non-compliance in 5 out of 6 samplings. Q3 mean 1,165 MPN/100 mL. - Faecal coliform (<400 MPN/100 mL): Non-compliance in 4 out of 6 samplings. Q3 mean 623 MPN/100 mL.	- In September 2020, NNP1 (EMO, ADM and TD) jointly checked the existing WWTS treatment capacity (septic biofilm tanks and wetland). The WWTS design was evaluated by the Consultant; - A proposal of WWTS improvement/modification options is under preparation by EMO and the Consultant and is expected to be submitted for NNP1 management decision by October 2020.
OSOV 2 (ESD Camp)	EF13	Septic tanks (kitchen and black water) and wetland with chlorination system (grey water)	- Ammonia-nitrogen (<10 mg/L): Non-compliance in 1 out of 3 samplings. Q3 mean 7.8 mg/L. - Total nitrogen (<10 mg/L): Non-compliance in 1 out of 3 samplings. Q3 mean 9.88 mg/L. - Total coliform (<400 MPN/100 mL): Non-compliance in 3 out of 6 samplings. Q3 mean 8,667 MPN/100 mL. - Faecal coliform (<400 MPN/100 mL): Non-compliance in 3 out of 6 samplings. Q3 mean 8,667 MPN/100 mL.	- As above.

Site	ID	WWTS	Key Non-Compliance Issues in Q3-2020	Corrective Actions
Main Powerhouse	EF19	Septic tanks (grey and black water), biofilm tank and chlorination tank.	- TSS (<50 mg/L): Non-compliance in 2 out of 4 samplings. Q3 mean 73.4 mg/L. - COD (<125 mg/L): Non-compliance in 1 out of 2 samplings. Q3 mean 127.3 mg/L. - Total Nitrogen (<10 mg/L): Non-compliance in all 2 samplings. Q3 mean 44.2 mg/L. - Ammonia-nitrogen (<10 mg/L): Non-compliance in all 2 samplings. Q3 mean 31.6 mg/L.	As above

3.7.3 Groundwater Quality Monitoring

During the Q3 2020, a total of six boreholes at Somseun, Nam Pa, Thong Noy, Pou Villages (one borehole in each village) and Phouhomxay Village (two new boreholes – commencing in June 2020) have been monitored for the following parameters:

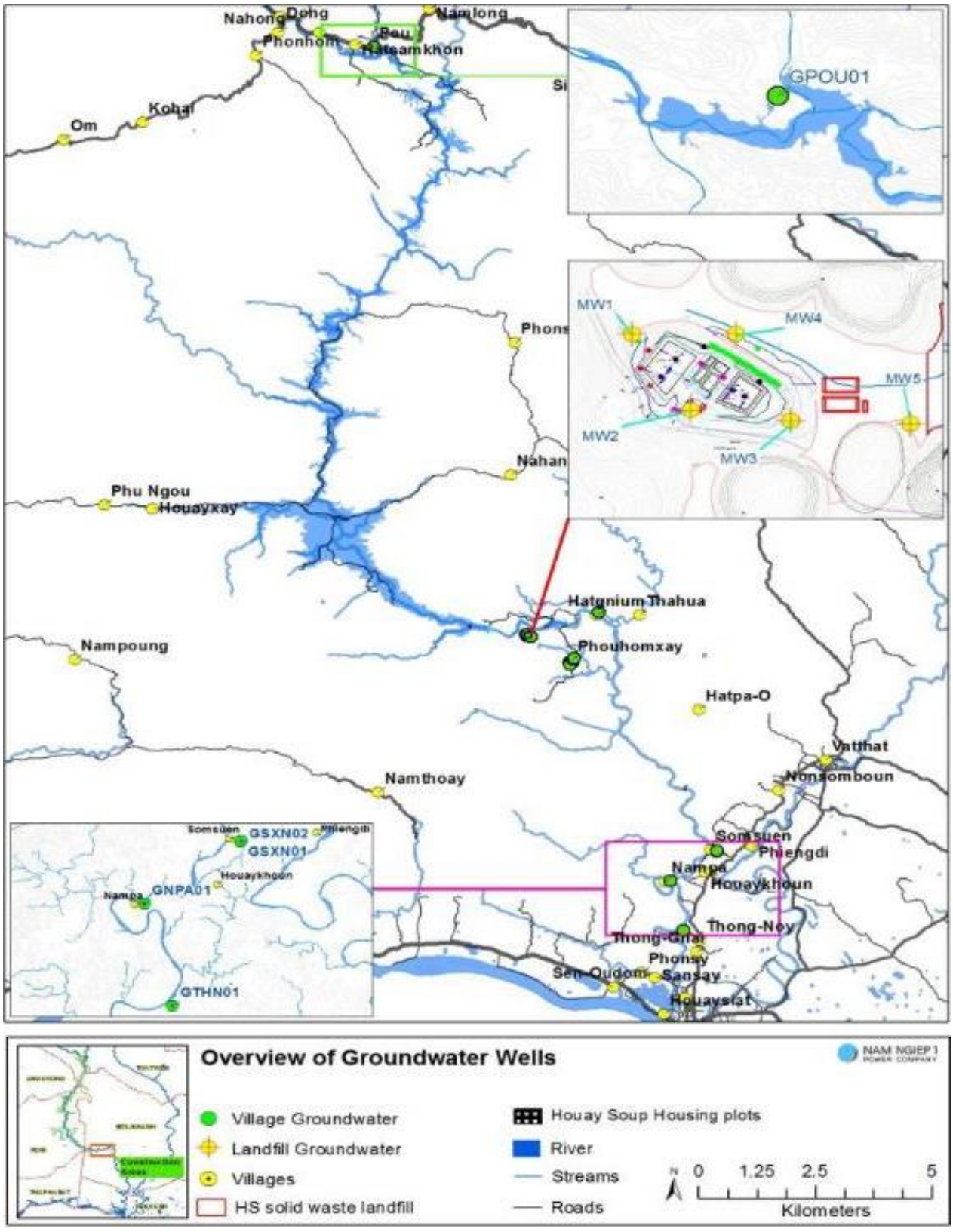
a. *Monthly:* pH, DO (%), DO (mg/L), Conductivity (µs/cm), TDS (mg/L), Temperature (°C), Turbidity (NTU), Faecal Coliform (MPN/100 mL) and E. coli (MPN/100 mL);

b. *A*nnually: Arsenic (mg/L), Total Iron (mg/L), Magnesium (mg/L), Fluoride (mg/L), Total Hardness (mg/L), Nitrate (mg/L), Nitrite (mg/L) and Lead (mg/L).

In addition, there was a biannually monitoring of landfill groundwater from three monitoring wells (MW01, MW03 and MW04) at NNP1 Landfill and one monitoring well (MW05) at Houay Soup Landfill in September 2020.

The groundwater sampling locations are displayed in ***Figure 3-15*** and the groundwater monitoring data is presented in ***Appendix 5.3.***

FIGURE 3-15*: GROUNDWATER SAMPLING LOCATIONS*



Key findings from the groundwater quality monitoring are summarized as the follows:

Somsuen Village and **Thong Noy Village:** all monitored parameters complied with the standard, except faecal coliform and E.coli bacteria in all Q3 2020 samples.

Nam Pa Village: all monitored parameters complied with the standard, except faecal coliform and E.coli bacteria in July and September 2020 samples.

On 25 September 2020, NNP1 (EMO and INFRA) conducted a filed investigation of the ground water system of Somseun, Nam Pa and Thong Noy villages to identify the potential causes of bacterial contamination. The investigation included: (i) Review of the water supply system design; (ii) Consultation with the Village Water Use Committee for the role and responsibility of water supply system operation, maintenance and clean-up; and (iii) Interview with some water consumers for their observations. On 28 Sep 2020, water sampling was carried out at the existing water sampling taps, the nearest opened water well, and the furthest water taps to investigate the issue. The Investigation Report incorporating the possible sources of contamination and recommendations for the water supply system operation and maintenance will be finalized and expected to be shared with the SMO team by October 2020 for further actions.

Pou Village: all monitored parameters complied with the standard, except faecal coliform and E.coli bacteria in all Q3 2020 samples. EMO will conduct a field investigation of this water supply system by the end of October 2020 to identify the potential root cause of bacterial contamination. The result investigation will be reported in Q4 2020.

Phouhomxay Village: all monitored parameters complied with the standard, except faecal coliform and E.coli bacteria in Q3 2020 samples and pH in September 2020 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.

During the Q3 2020, the landfill groundwater monitoring results were similar to the previous monitoring, the concentration of Lead (Pb) in the monitoring wells MW1, MW3, MW4 and MW5 exceeded the relevant groundwater quality standard. This is most likely the background (natural) level and is not attributed to the landfill. Lead has been detected in all wells from time to time both upstream and downstream the landfill. Furthermore, lead has not been detected in the leachate from the landfill treatment ponds and the waste pits. All ponds of both landfills are lined with a HDPE liner protecting the groundwater against infiltration of leachate; therefore, it is understanding that the present of Lead due to the geology of the area. These boreholes are more than 50 m deep and not used by staff or villagers.

TABLE 3-18: ***LANDFILL GROUNDWATER QUALITY MONITORING RESULTS IN NNP1 AND HOUAY SOUP LANDFILLS***

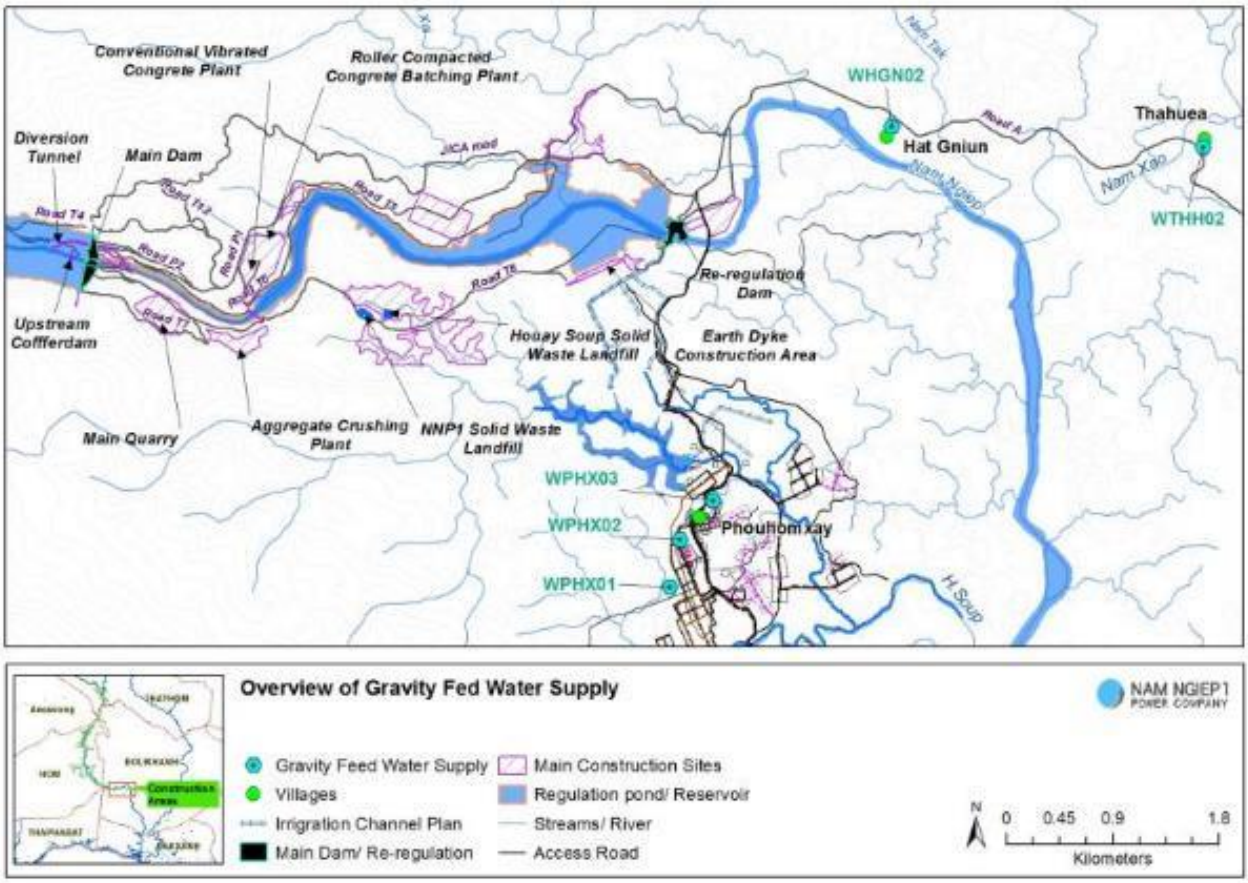
		Site Name	NNP1 Landfill			Houay Soup Landfill
		Station	MW1	MW3	MW4	MW5
Date	Parameter (Unit)	Guideline				
18-Sep-20	pH		6.25	6.13	5.66	5.87
18-Sep-20	Sat. DO (%)		60.3	26.4	23.4	30.8
18-Sep-20	DO (mg/l)		4.88	2.18	1.88	2.45
18-Sep-20	Conductivity (µS/cm)		211	260	144	141
18-Sep-20	Temperature (°C)		26.28	26	26.68	27.19
18-Sep-20	Turbidity (NTU)		3.85	3.65	3.18	3.31
18-Sep-20	Total Nitrogen (mg/l)		0.72	1.61	1.23	1.17

		Site Name	NNP1 Landfill			Houay Soup Landfill
		Station	MW1	MW3	MW4	MW5
Date	Parameter (Unit)	Guideline				
18-Sep-20	Lead (mg/l)	<0.01	0.388	0.588	0.596	0.212
18-Sep-20	Faecal Coliform (MPN/100ml)		0	70	11	0
18-Sep-20	Ecoli Bacteria (MPN/100ml)		0	4	2	0
18-Sep-20	NH_3-N (mg/l)		0.26	1.16	0.16	0.76
18-Sep-20	Copper (mg/l)	<1	<0.003	0.003	<0.003	<0.003
18-Sep-20	Total Petroleum (mg/l)		<3	<3	<3	<3
18-Sep-20	Water level (m)		22.1	20.05	17.35	7.63

3.7.4 Gravity Fed Water Supply (GFWS) Monitoring

The monitoring of the GFWS aims to assess the quality of water that is being used for bathing and washing by villagers at Hat Gniun, Thaheua and Phouhomxay villages. The gravity fed water supply system at Phouhomxay Village has been in use since December 2017.

FIGURE 3-16: *OVERVIEW OF GRAVITY FED WATER SUPPLY*



Water samples were taken from the taps for analysis during the reported period and selected results are shown in ***Table 3-19***. The full set of data is presented in ***Appendix 5.4.***

TABLE 3-19*: THE GFWS MONITORING RESULT IN Q3 2020*

Date	Parameter (Unit)	Site Name	Thaheua Village	Hat Gnuin Village	Phouhomxay Village		
		Station	WTHH02	WHGN02	WPHX01	WPHX02	WPHX03
		Guideline					
13-Jul-20	E. Coli Bacteria (MPN/100 mL)	0	1,600	170	130	79	79
21-Aug-20		0	1,600	1600	540	540	33
14-Sep-20		0	8	17	14	17	27
13-Jul-20	Faecal coliform (MPN/100 mL)	0	1,600	170	130	79	79
21-Aug-20		0	540	920	540	240	33
14-Sep-20		0	8	17	14	17	27

Thaheua Village (WTHH02): all parameters complied with the standard, except faecal coliform and E.coli.

Hat Gniun Village (WHGN02): all parameters complied with the standard, except faecal coliform and E.coli.

Phouhomxay Village (WPHX01-raw water in the head tank before filtration; **WPHX02**-tap water at primary school; and **WPHX03**-tap water at the villager's house**):** all parameters complied with the standard, except faecal coliform and E.coli.

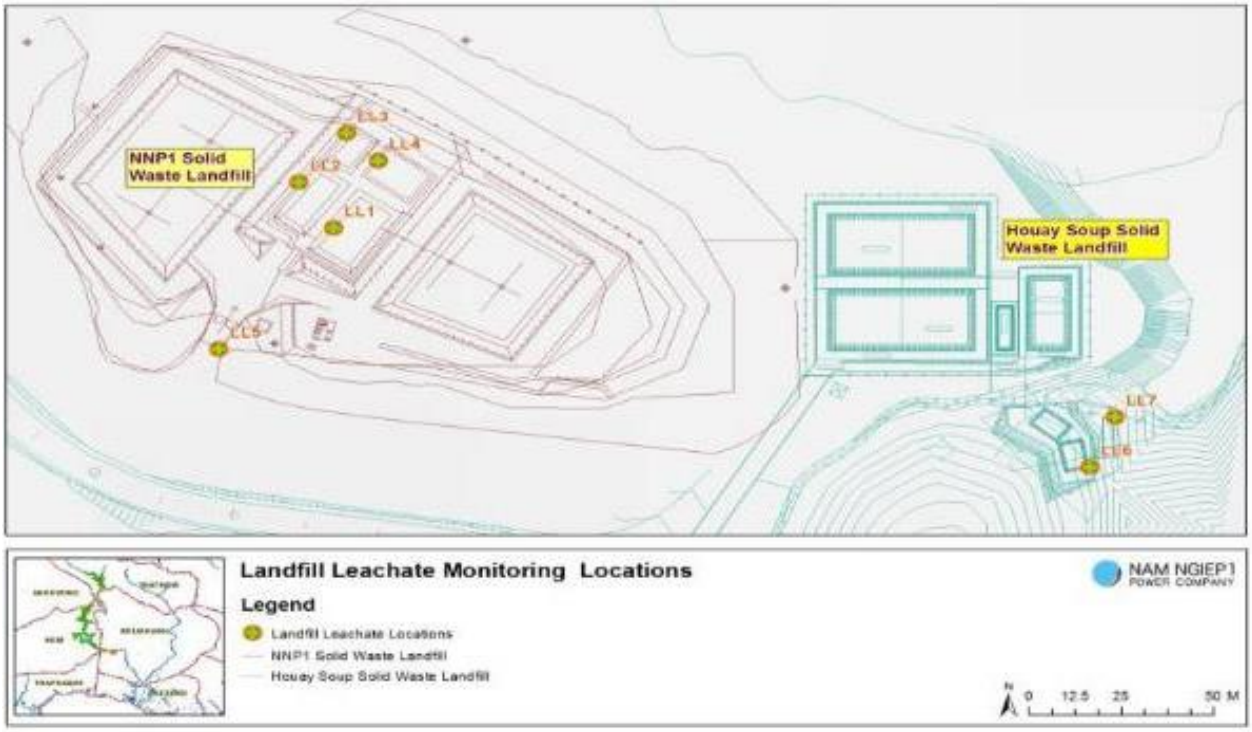
As observed in the field during water sample collection, the livestock activities in the water intake areas may have contributed to the presence of Faecal Coliform Bacteria and E.coli in GFWS samples . The villagers generally use tap water for washing and cleaning. They were informed about the monitoring results and 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.

In addition, the NNP1PC will improve the water quality of this GFWS system in Phouhomxay in Q4 2020 by using a groundwater-based system to avoid using the surface water contaminated by agricultural practices nearby the source.

3.7.5 Landfill Leachate Monitoring

The landfill leachate treatment systems at NNP1 Project landfill and Houay Soup landfill are monitored to control the functioning of the treatment process and ensure compliance with effluent standards. The monitoring locations are presented in the ***Figure 3-17***.

FIGURE 3-17: *LANDFILL LEACHATE MONITORING LOCATION*



The monitoring results in Q3 2020 indicate compliance with the applicable standards for all monitored parameters, except total coliform in the NNP1 Project Landfill (at the last pond in July 2020 and at the discharge point in September 2020) and Houay Soup Landfill in Q3 2020. The monitoring data can be found in ***Appendix 5.5.***

4 WATERSHED AND BIODIVERSITY MANAGEMENT

4.1 WATERSHED MANAGEMENT

4.1.1 Implementation of Watershed Management Plan

A working session on SMART for patrol teams of Xaysomboun and Bolikhamxay Provincial WRPO was organized on 17 and 30 July 2020 respectively. The meeting was attended by four representatives of BSP, three representatives of NNP1PC EMO, and representatives from Xaysomboun and Bolikhamxay provincial WRPO. The SMART and its database for patrolling work were presented and discussed followed by short field exercise on the use of GPS and filling up the SMART form.

The training on patrolling and SMART basic user for the ranger teams and the SMART/GIS officers of Xaysomboun and Bolikhamxay WRPO was organized during 14-30 September 2020. The training comprised classroom activities and simple field exercises on planning, execution, reporting on patrolling including the use SMART system to support the patrolling.

Bolikhamxay Provincial WRPO 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 regulations 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.

Agreement on Bolikhamxay Provincial Regulation for Forest Resource and Biodiversity Protection in the NNP1 Watershed within Bolikhamxay administrative area was issued by Provincial Governor on 17 August 2020. Bolikhamxay Provincial WRPO distributed more than 200 booklets of this agreement to nine villages adjacent to NNP1 watershed and to relevant GOL agencies at district level such as District Administration Office, DAFO, DoNRE, militaries, and police during the second and third week of September 2020.

Xaysomboun Provincial WRPO patrolled the reservoir between 04 and 13 August 2020 in the reservoir Zone 4 in Thathom District and in the reservoir Zone 2 and 3 in Hom District.

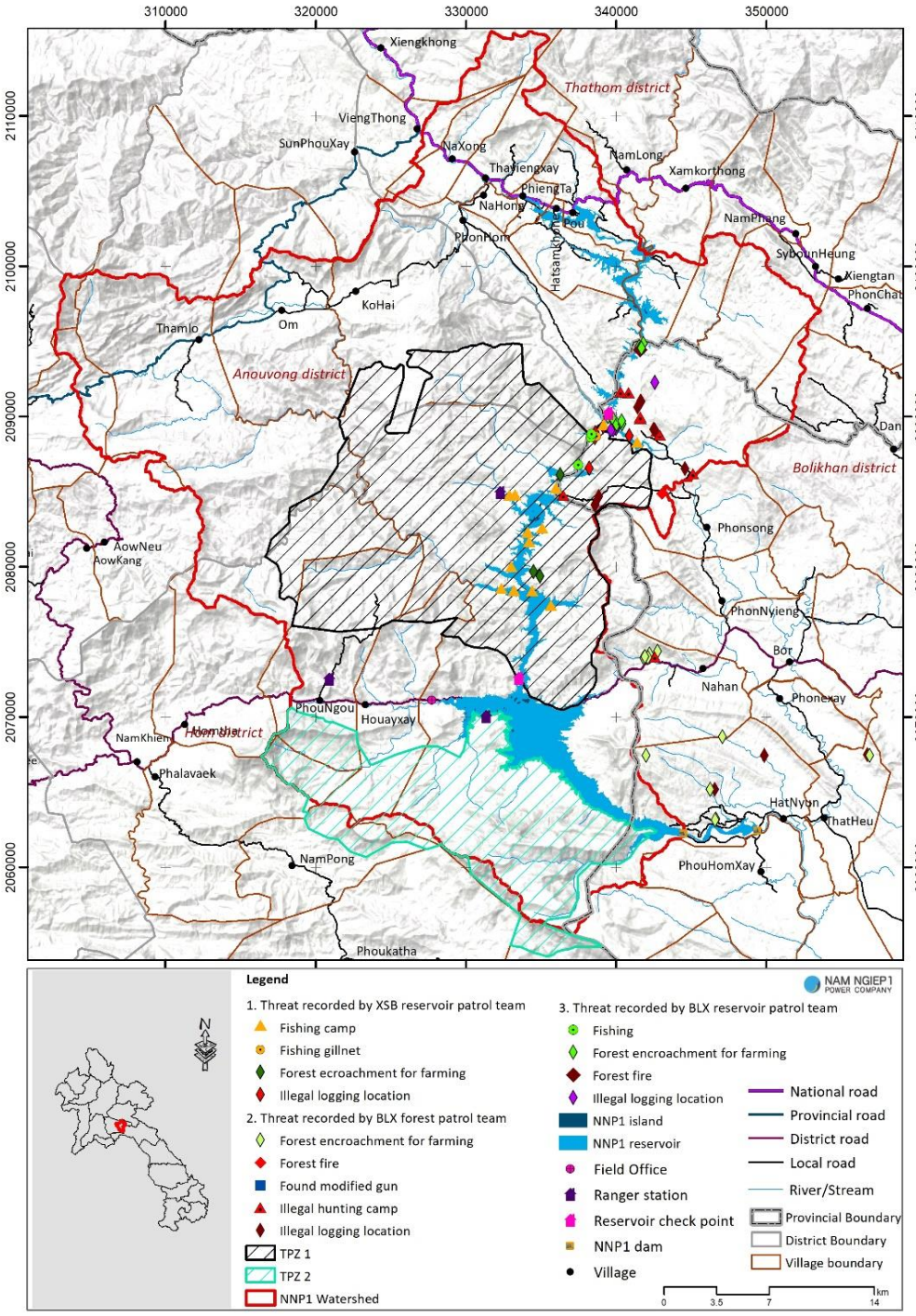
The observations and actions by reservoir patrolling in the reservoir zone 4 in Thathom District are summarized as below:

- The patrol team confiscated one homemade gun in Houay Xan, one gun in Houay Nonsoung and two gillnets around the TPZ reservoir. Warning letters were issued to the owners and the confiscated objects were handed over to DAFO of Thathom District for further process.
- The patrol team also confiscated timber collected in Soup Khai, Houay Xan and Houay Xou as well as around Houay Xou and Houay Pakhao. The team reported the situation to PAFO for further inspection and action.

The observation and action by reservoir patrolling in the reservoir zone 2 and 3 in Hom District are summarized below:

- The patrol team encountered four fishing camps in Nam Phouane and two fishing camps in Houay Phamom. The fishers informed that they were fishing for their own consumption and sale. One of the fishing camps in Nam Phouane and one of the fishing camps in Hoay Phamom are within the TPZ reservoir and so the patrol team issued warning letters, ordered them to move out from the area and educated them on fishing regulations including not to use destructive fishing gears and not to enter the TPZ reservoir area.
- The patrol team also encountered fishing in tributaries to the reservoir including four boats with 24 gillnets in Houay Nam Om and one boat with 300 fishhooks in Houay Sath. The fishers informed that they were fishing for their own consumption and sale.
- The patrol team also found two timber collection sites and two machines for cutting trees in livestock area. The first site had a total of 33 pieces of timber and five logs. The second site had a total of 41 pieces of timber. The team reported the situation to PAFO for further inspection and action.

Figure 4-1: Map of recorded threats from patrolling activity by Xaysomboun WRPO Patrol Team between 04-13 August 2020



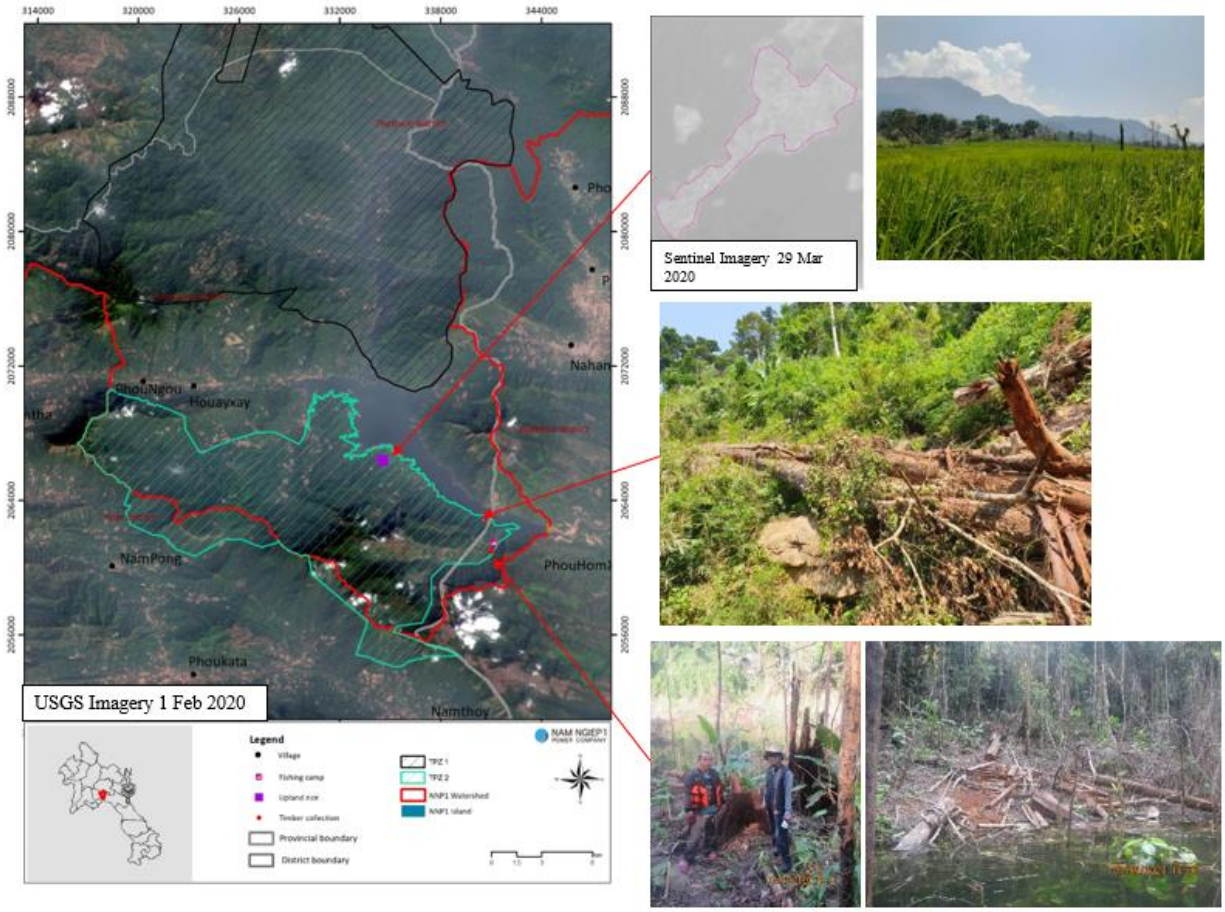
NNP1PC-EMO Team conducted reservoir monitoring on 03 September 2020 around the middle and lower reservoir areas with the summary notes as below:

- The EMO Team found new upland cultivation of rice, rubber trees, and pineapple around 35 ha. Based on information from some of the families, it appears that the cultivation started in April 2020 and is being carried out by about 20 project affected households that self-resettled. The team informed these families that the area where they are cultivating is within TPZ2 and

as per the Xaysomboun Provincial Governor regulation on watershed management farming is not allowed within the area and will be ordered to stop by GOL staff under the TPZ protection and management program.

- The Team also found one boat dock near Katha stream but nobody was around. The team also found logging spot around and one fishing camp about 200 meters from this spot. The team advised the fisher to move out because this is still within TPZ2 area.
- The team have prepared and submitted a detailed observation report to Xaysomboun and Bolikhamxay provincial WRPO at the end of September 2020 for further actions.

Figure 4-2: Map and pictures of recorded threats from reservoir monitoring by NNP1PC EMO team on 03 September 2020



A working session on monitoring and reporting on the Project fund was organized on 15-16 September 2020 at Xaysomboun PAFO. The meeting was attended by four representatives from Xaysomboun Provincial PAFO/WRPO, two representatives from Xaysomboun Provincial Treasury and two representatives from NNP1PC-EMO. The discussion notes can be summarized as below:

- As per the guideline from Minister of Finance (MoF), provincial departments/offices are not allowed to open project bank account with a commercial bank. The project fund shall be kept and administered through a project account under Provincial Treasury's bank account. The fund payment can be made by cash or cheque based on the approved payment request from PAFO.
- Xaysomboun Provincial Treasury can certify the monthly account statements of project fund for Xaysomboun Provincial PAFO/WRPO.

- The monthly financial report of Xaysomboun Provincial WRPO shall include the overall financial statement, monthly expenditure, to date expenditure by activities, and certified account statement.
- Xaysomboun Provincial PAFO/WRPO internal payment request for the implementation of activities shall include advance request form with the attachment of detail activity. This payment shall be recorded as advance. After completion of the activity implementation, an advance clearance form shall be prepared with the attachment of receipts, report and relevant documents and filed properly. The actual expenditure shall be recorded in the month that advance is cleared.
- Project assets and equipment shall be inventoried and recorded every time if it is borrowed by Officers/others.

ADB provided confirmation of no objection on WMP AIP2020 for the activities from October to December 2020 on 27 Aug 2020. An official request for fund disbursement by DOF-MAF for the WMP AIP2020 of Bolikhamxay Province was issued on 10 September 2020. The fund is expected to be available in the first week of October 2020 at the soonest. NNP1PC has further worked with Xaysomboun Provincial WRPO to finalize their activity progress report and financial summary of the AIP2019 in the third week of September 2020. IAP Biodiversity Specialist provided confirmation of no objection on the WMP AIP2020 of Xaysomboun Provincial WRPO on 18 September 2020. The official letter for fund disbursement by DOF-MAF is expected to be issued in the first week of October 2020 then the fund is expected to be available in the third week of October 2020 at the soonest.

The final draft of Fishery Co-Management Plan (FCMP) in English was finalized by NNP1PC- EMO at the end of September 2020 and is expected to be submitted to ADB and obtain the approval from Xaysomboun PAFO in October 2020.

The final report of assessment on sustainable livelihood opportunities for NNP1 watershed communities based on the technical workshop in May 2020 was further improved in July 2020. NNP1PC EMO conducted additional data collection and assessment in Hom and Thathom District in August 2020 in which the results were further elaborated into the final report. The report is expected to be finalized in early October 2020 for further review by NNP1PC-EMO and ESD Management.

4.2 BIODIVERSITY OFFSET MANAGEMENT

4.2.1 Engagement of Biodiversity Service Provider (BSP)

NNP1PC finalized the fourth draft of Memorandum of Understanding (MOU) to be signed between ADB, WCS and NNP1PC on 18 May 2020. The ADB and WCS (as Biodiversity Service Provider) agreed with the revised draft on 19 May 2020 and 17 June 2020 respectively. 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. At the end of September 2020, the MOU between NNP1PC, ADB and WCS was yet finalized.

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.

4.2.2 Implementation of Biodiversity Offset Management Plan

Progresses on the implementation of activities by Component are described below:

a. Component 1 - Spatial Planning and Regulation

Bolikhamxay Provincial NC-NX BOMU resumed the NC-NX boundary post demarcation and TPZ signage installation in the five remaining villages from 17 June to 02 July 2020.

The team completed 17 post demarcations and 27 TPZ sign installations in Phonmeuang, Meuangcham and Sopkhone villages of Xaychamphone District. One sign could not be installed in Meungcham Village because the villager proposed to use the area as rice paddy in the future. In addition, three posts demarcations in Sopkhone Village could not be completed due to access difficulty. The team also completed 16 post demarcations and 23 TPZ sign installations in Natan and Na Gnang village of Viengthong District but could not complete two post demarcations and one TPZ sign installation in Na Gnang Village because of heavy rain and access difficulty.

Bolikhamxay Provincial BOMU have consulted with Bolikhamxay Provincial BOMC and PAFO and noted that the Meuangcham Village should respect the agreement on TPZ boundary dated August 2019 because this agreement is based on consultations between villagers and relevant authorities. The Head of BOMU advised the team to conduct the dissemination and outreach activity in the completed villages within August 2020, to settle the remaining post demarcations and sign installations after the rainy season in October 2020, and to obtain the endorsement for district authority in November 2020.

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

b. Component 2 – Enforcement

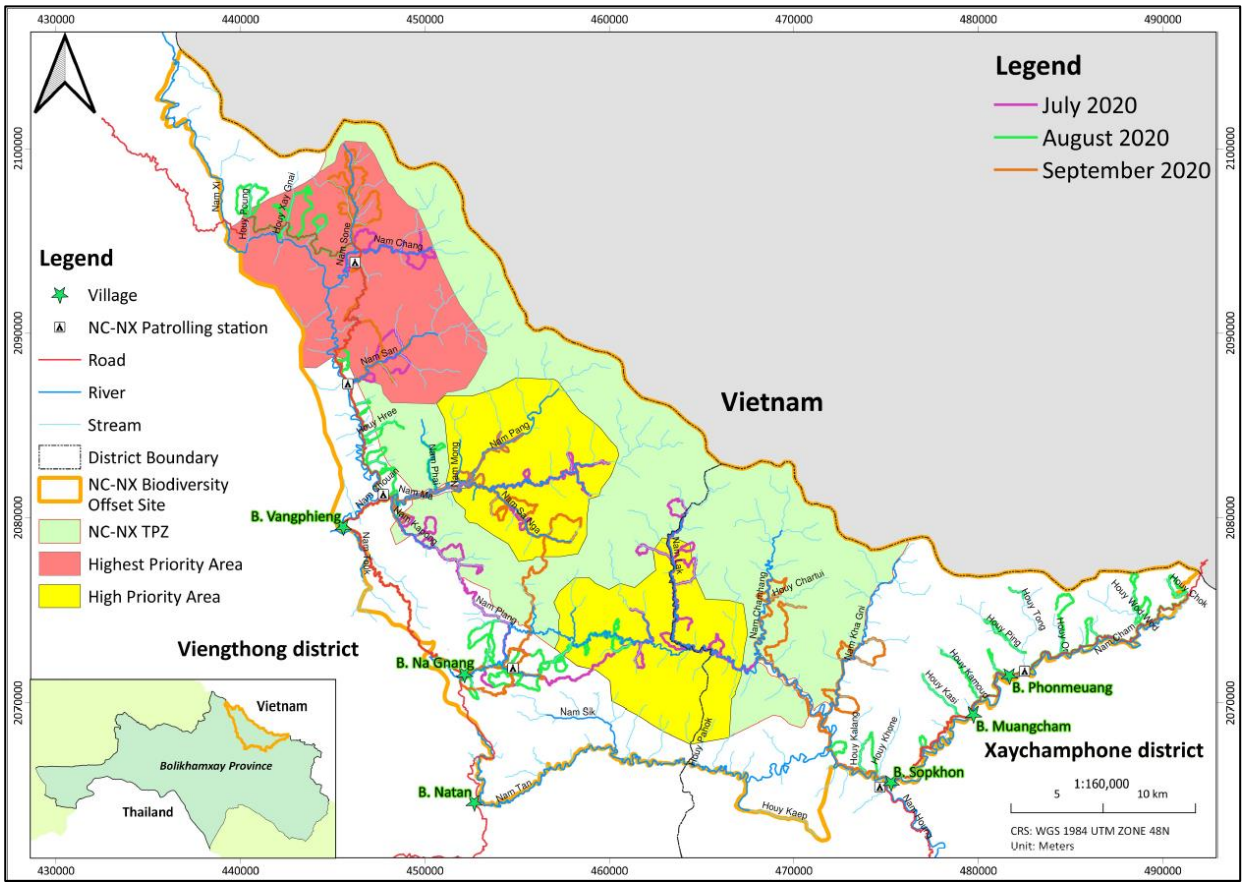
During 10-30 July 2020, four patrolling teams continued with patrolling activities. The first team carried out patrolling at TPZ highest priority area including Nam San, Nam Xi, Nam Sone, Houay Xainoy, Houay Xaiyai, Nam Chang, Houay Poung, Nam Chouane and Houay Phalai. The second team carried out patrolling at Nam Ma TPZ high priority area including Nam Ma, Nam Mong, Nam Kapong, Houay Phaphard, Houay Phalai, Houay Hree and Houay Phai. The third team carried out patrolling at Xaychamphone district area including Nam Houng, Nam Chamhang, Houay Kasae, Houay Khone and Houay Kalang. The fourth team carried out patrolling at Nam Houng TPZ high priority area including Nam Houng, Nam Sik, Nam Kha Gna and Nam Tong.

During 8-27 August 2020, four patrolling teams continued with patrolling activities. The first team carried out patrolling at Nam Ma area including Nam Ma, Nam Phai and Houay Phaphard. The second team carried out patrolling at Xaychamphone District including Houay Chok, Houay Wod-Wod, Houay Mouang, Houay Or, Houay Tong, Houay Ping, Houay Kamoud, Houay Kasi, Houay Khone and Nam Houng. The third team carried out patrolling at Nam Houng TPZ high priority area (Viengthong District) including Nam Houng and Nam Kha Gna. The fourth team carried out

patrolling at TPZ highest priority area in Nam Chang, Nam Sone, Houay Xay-Gnai and Houay Xay-Noi.

During 5-25 September 2020, four patrolling teams continued with patrolling activities. The first team carried out patrolling at Nam Ma TPZ high priority area including Nam Ma, Nam Mong and Nam Pang. The second team carried out patrolling at Xaychamphone District including Nam Kha Gni and Nam Chamhang. The third team carried out patrolling at Nam Ma TPZ high priority area and Nam Houng (Viengthong District) including Nam Sanga, Nam Kapa, Nam Kha Gna and Nam Sik. The fourth team carried out patrolling at the TPZ highest priority area in Nam San, Nam Chang and Nam Sone.

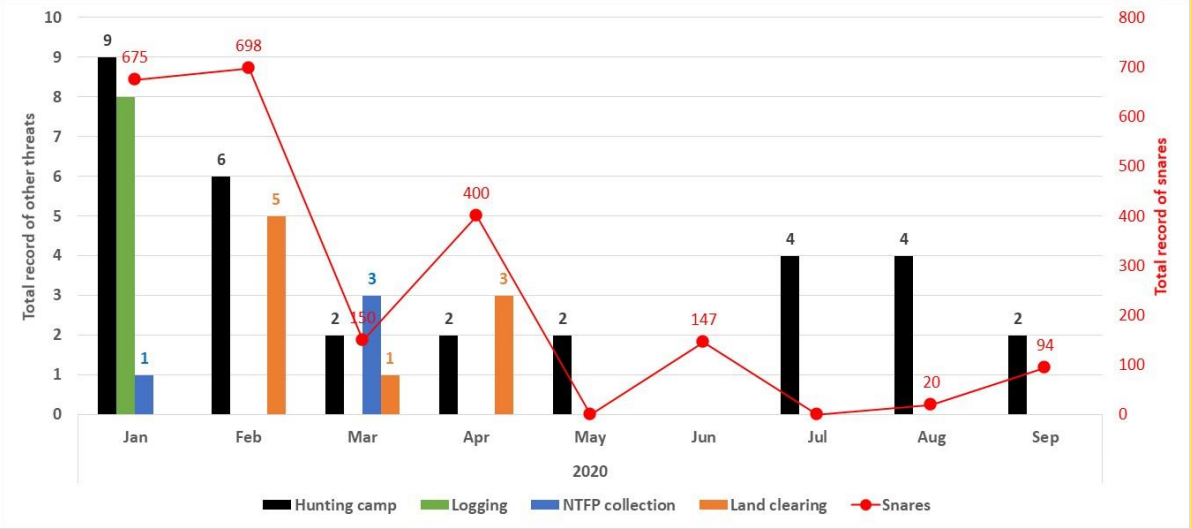
FIGURE 4-3: *MAP OF PATROLLING TRACK FROM JULY -SEPTEMBER 2020*



The record of threats from patrolling work in 2020 is presented in **Figure 4-4**. The team confiscated a total of 15 large wire snares at the south of Houay Phapard and 5 large wire snares at the south of Houay Phai in August 2020, and 94 small wire snares at Nam Kha Gni in September 2020.

The patrolling teams observed and destroyed the total of six hunting camps between July to September 2020. The hunting related activity in this quarter mostly recorded around Nam Houng TPZ high priority area, Nam Ma and Nam Kapong TPZ higher priority area, and around Houay Kasi and Houay Wod-wod at Xaychamphone District outside TPZ priority area.

FIGURE 4-4: *OVERALL RECORD OF THREATS IN NC-NX OFFSET SITES IN 2020*



The record of wildlife observed from patrolling work in Q3 2020 is presented in **Table 4-1**. There are total 520 wildlife recorded through direct observation between July-September 2020.

TABLE 4-1: *LIST OF WILDLIFE RECORDED FROM DIRECT OBSERVATION BETWEEN JULY-SEPTEMBER 2020*

Species (English Name)	Species (Scientific Name)	Total
Big-headed Turtle	*Platysternon megacephalum*	1
Black Giant Squirrel	*Ratufa bicolor*	10
Brown Hornbill	*Anorrhinus tickelli*	60
Eagle	*Aquila heliaca*	2
Great Hornbill	*Buceros bicornis*	15
Grey-Fish Eagle	*Grey-Fish Eagle*	1
Impressed Tortoise	*Manouria impressa*	1
Indochinese Serow	*Capriconis sumatraensis*	2
Macaque	*Rhesus Macaque*	246
Muntjac	*Muntiacus muntjak*	7
Otter	*Lutra*	2
Phayre's Leaf Monkey	*Silvered Langur (Semnopithecus Cristatus)*	102
Red-shanked Douc Langur	*Pygathrix nemaeus*	2
White-cheeked gibbon	*Nomascus leucogenys*	35
Wild Pig	*Sus scrofa*	34
Grand Total		**520**

FIGURE 4-5: ***FISHING CAMP FOUND BY TEAM 3 AT NAM HOUNG***

FIGURE 4-6: ***LARGE SPRING SNARE FOUND BY TEAM 4 AT SOUTH OF HOUAY PHAI***

FIGURE 4-7: ***PHAYRE'S LEAF MONKEY***

FIGURE 4-8: ***BIG-HEADED TURTLE***

FIGURE 4-9: ***WHITE-CHEEKED GIBBON***

FIGURE 4-10: ***GREY-FISH EAGLE***

c. Component 3 – Conservation Outreach

The process of outreach strategy development was presented by BSP during the monthly meeting on 09 July 2020 as it will be developed through the process of Annex 13 of BOMP: NC-NX Outreach Development. It was noted that the pre-assessment of the target audiences is necessary before the strategy and annual outreach plan can be developed.

BSP further prepared the pre-assessment questionnaires, updated the timeline and shared this with NNP1 and BOMU in August 2020. The pre-assessment of the target audiences and the timeline of activities was further discussed with NNP1 and NC-NX BOMU during the monthly meeting held on 03 September 2020. The pre-assessment survey was tentatively scheduled in October 2020.

d. Component 4 – Conservation linked livelihood

The final technical workshop on the CDP was organized on 30 June and 01 July 2020. The Consultant submitted the first draft of CDP based on the field assessment and final technical workshop on 13 July 2020. NNP1PC EMO provided comments and had further discussions with the Consultant on 16 and 23 July 2020 respectively. The Consultant submitted the improved first draft on 31 July 2020. NNP1PC EMO, the CDP Consultant, and BSP further discussed the draft of CDP in the middle of August 2020. The consultant made a series of revisions addressing the comments from NNP1PC EMO and BSP in September 2020 and so the submission to ADB is expected to be delayed to October 2020.

BSP have drafted the Community Snare Removal Plan (Lao version). The first draft was shared to NNP1PC EMO on 07 July 2020 and comments were provided on the same date. The second draft was shared on 15 July 2020 and NNP1PC EMO have provided further comments on 23 July 2020. The third draft was submitted to NNP1PC EMO on 28 July 2020 and shared to Bolikhamxay Provincial BOMU on 30 July 2020 for further comments. 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 establishment and training of a team for snare removal was further discussed during the monthly meeting on 03 September 2020. The training was tentatively scheduled in October 2020.

5 BIOMASS CLEARANCE / FLOATING DEBRIS REMOVAL

There were no field works carried out during this quarter.

6 FISHERY MONITORING

The 5 species that dominated the fish catch by weight in Q3 2020 are listed in ***Table 6-1.*** This includes one species and four species group that are classified as Least Concern (LC) according to the IUCN Red List of Threatened Species.

TABLE 6-1: *FISH SPECIES DOMINATING THE FISH CATCH IN Q3 2020*

Species	Lao Name	Fish Catch in Q3 2020 (kg)	IUCN Red List Classification
Hampala dispar, Hampala macrolepidota	ปาสูด	622.8	LC
Poropuntius normani, Poropuntius laoensis, Poropuntius carinatus	ปาจาด	459.8	LC
Barbonymus gonionotus, Hypsibarbus malcomi, Hypsibarbus vernayi, Hypsibarbus wetmorei	ปาปามา	402.2	LC
Channa striata	ปาถ่ำ	330.9	LC
Mastacembelus armatus, Mastacembelus favus	ปาหาด	280.6	LC

The recorded catch of threatened species (IUCN Red List classification) in the Q3 2020 fish catch is presented in ***Table 6-2***. The list includes one Endanger species (EN), four Vulnerable species (VU) and four Near Threatened species (NT).

TABLE 6-2: *THREATENED AND NEAR THREATENED SPECIES OF THE Q3 2020 FISH CATCH*

Species	Lao Name	Fish Catch in Q3 2020 (kg)	IUCN Red List Classification
Cirrhinus cirrhosus	ปามอมจัม/ปาแกง	31.8	VU
Cirrhinus molitorella	ปาแกง	110.2	NT
Cyprinus carpio	ปาไม	41.2	VU
Neolissochilus stracheyi	ปาสอง	10.2	NT
Onychostoma gerlachi	ปาถิง	7.5	NT
Probarbus jullieni	ปาเอิม	3	EN
Scaphognathops bandanensis	ปาอวมไฟ/ปาป่วม	49	VU
Tor sinensis	ปาแดง	175.2	VU
Wallago attu	ปาถ้าอ	7.9	NT

The occurrence of Threatened and Near Threatened species in the fish catch by Quarter since the start of species identification in Q3 2015 is displayed in *Error! Reference source not found.*.

TABLE 6-3: ***OCCURRENCE OF THREATENED AND NEAR THREATENED SPECIES IN THE FISH CATCH***

Species	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Bagarius bagarius (NT)			+	+	+	+	+	+	+	+	+	+	+	+	+						
Bagarius yarrelli (NT)	+			+					+					+							
Bangana behri (VU)	+	+	+	+	+	+	+	+	+			+	+	+	+	+					
Chitala blanci (NT)														+							
Cirrhinus cirrhosus (VU)	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+		+	+	+
Cirrhinus molitorella (NT)	+	+										+	+	+	+	+	+	+	+	+	+
Cyprinus carpio (VU)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+
Epalzeorhynchos munense (VU)												+									
Hypophthalmichthys molitrix (NT)	+				+									+		+					
Laubuca caeruleostigmata (EN)																	+				
Luciocyprinus striolatus (EN)	+	+	+	+			+	+	+	+			+	+		+					
Mekongina erythrospila (NT)	+	+	+	+	+	+	+	+	+			+	+	+			+				
Neolissochilus stracheyi (NT)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ompok bimaculatus (NT)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+						
Onychostoma gerlachi (NT)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pangasianodon hypophthalmus (EN)	+																				
Probarbus jullieni (EN)	+	+	+			+		+	+	+		+		+			+	+			+
Probarbus labeamajor (EN)				+	+			+							+	+					
Scaphognathops bandanensis (VU)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Syncrossus beauforti (NT)		+	+	+	+	+					+			+		+	+	+			
Tor sinensis (VU)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Wallago attu (NT)	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+		+	+

The total recorded monthly fish catch from July 2015 to September 2020 for the downstream, upstream and Mekong control group fishing households involved in the monitoring programme is presented in ***Figure 6-1***. 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 6-1: TOTAL MONTHLY FISH CATCH JULY 2015 – SEPTEMBER 2020

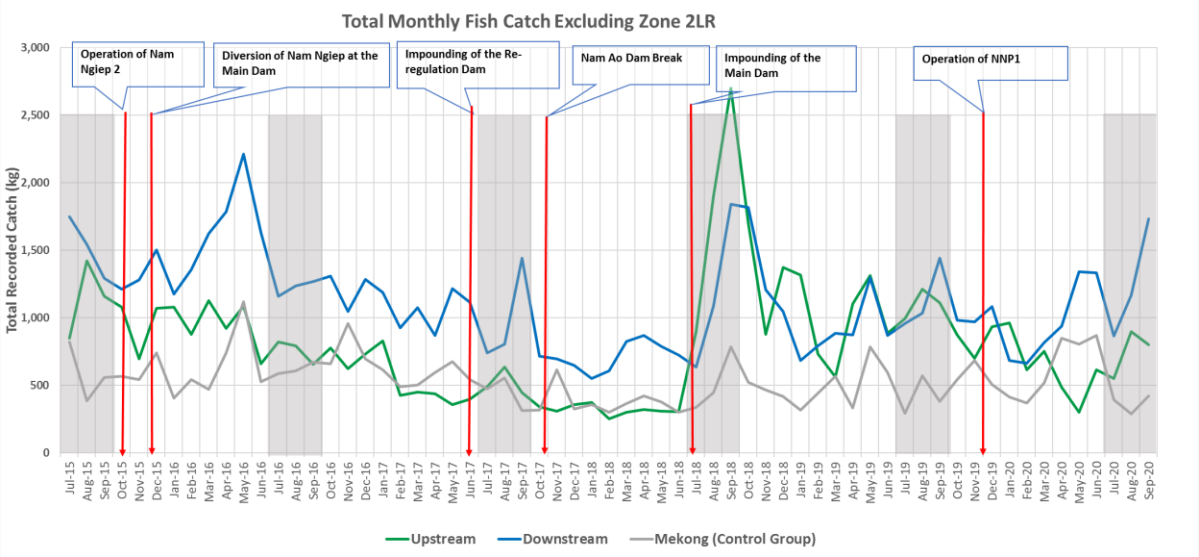


Table 6-4 and **Figure 6-2** show the total recorded fish catch for Q3 in 2015 to 2020 by the upstream (excluding Zone 2LR), downstream and the Mekong control group fishing households. Note that the recording days was reduced from 30 days/month to only seven days/month starting from February 2019 due to Company financial constraint. However, redesigning the sampling program have been carefully discussed with fishery expert and noted that NNP1PC needs to continue the monitoring and the long trend data analysis should carefully consider the different sampling programs that were implemented.

TABLE 6-4: *TOTAL FISH CATCH IN Q3 BY UPSTREAM (EXCLUDING ZONE 2LR), DOWNSTREAM AND BY THE MEKONG CONTROL GROUP FISHING HOUSEHOLDS*

Fishing Zone	Q3 2015 (kg)	Q3 2016 (kg)	Q3 2017 (kg)	Q3 2018 (kg)	Q3 2019 (kg)	Q3 2020 (kg)
Upstream	3,434.2	2,275.2	1,573.2	5,499.1	3,318.8	2,251.8
Downstream	4,584.1	3,663.7	2,989.3	3,564.1	3,434.9	3,763.8
Mekong Control Group	1,766.6	1,868.3	1,346.2	1,572.4	1,244.4	1,105.6

FIGURE 6-2: *TOTAL FISH CATCH IN Q3 BY UPSTREAM (EXCLUDING ZONE 2LR), DOWNSTREAM AND MEKONG CONTROL GROUP FISHING HOUSEHOLDS*

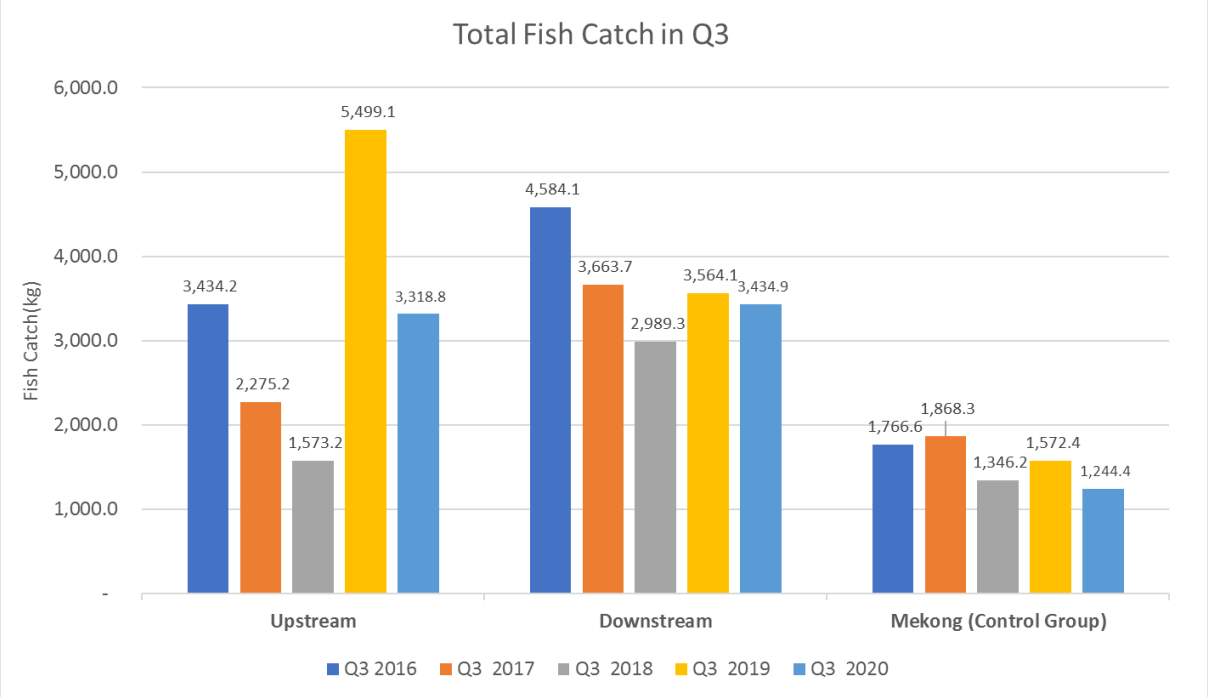
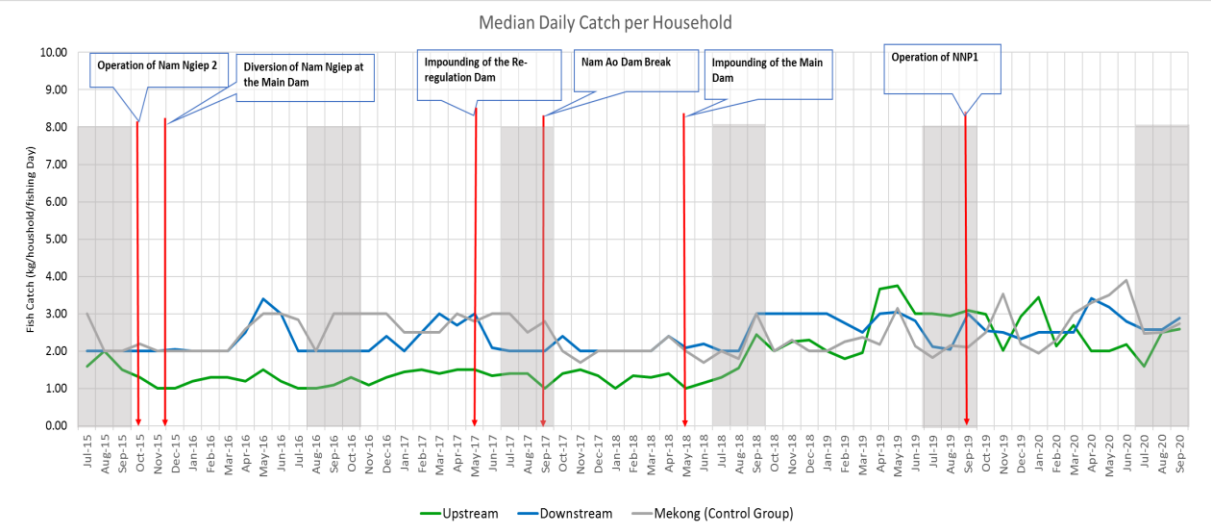


Table 6-5 presents the median household fish catch per fishing day for Q3 in 2015 to 2020 in the upstream (excluding Zone 2LR), downstream and the Mekong Control Group, and ***Figure 6-3*** shows the median monthly household fish catch per fishing day from July 2015 to September 2020.

TABLE 6-5: *MEDIAN HOUSEHOLD FISH CATCH PER FISHING DAY FOR Q3 IN 2015 TO 2020*

Fishing Zone	Q3 2015 (kg)	Q3 2016 (kg)	Q3 2017 (kg)	Q3 2018 (kg)	Q3 2019 (kg)	Q3 2020 (kg)
Upstream (Excluding Zone 2LR)	1.70	1.03	1.27	1.77	3.01	2.23
Downstream	2.00	2.00	2.00	2.33	2.39	2.68
Mekong (Control Group)	2.33	2.62	2.77	2.27	2.03	2.57

FIGURE 6-3: *MEDIAN MONTHLY HOUSEHOLD FISH CATCH PER FISHING DAY (EXCLUDING ZONE 2LR)*



7 Health and Safety

A summary of the safety incidents reported to the end of September 2020 are provided in ***Table 7-1*** and ***Figure 7-1*** below.

TABLE 7-1: *SAFETY INCIDENTS REPORTED IN Q3 2020*

Type of Incidents	LTI	RI	NM	PD	FI	MVI	Total
No. of Incidents in Q3 2020	0	0	0	0	0	0	0
Cumulative Total Incidents to September 2020	20	18	22	23	9	62	**154**

LEGEND:
- LTI - Lost Time Incident
- RI - Recordable Injury
- NM - Near Miss
- PD - Property Damage
- FI - Fire Incident
- MVI - Motor Vehicle Incident

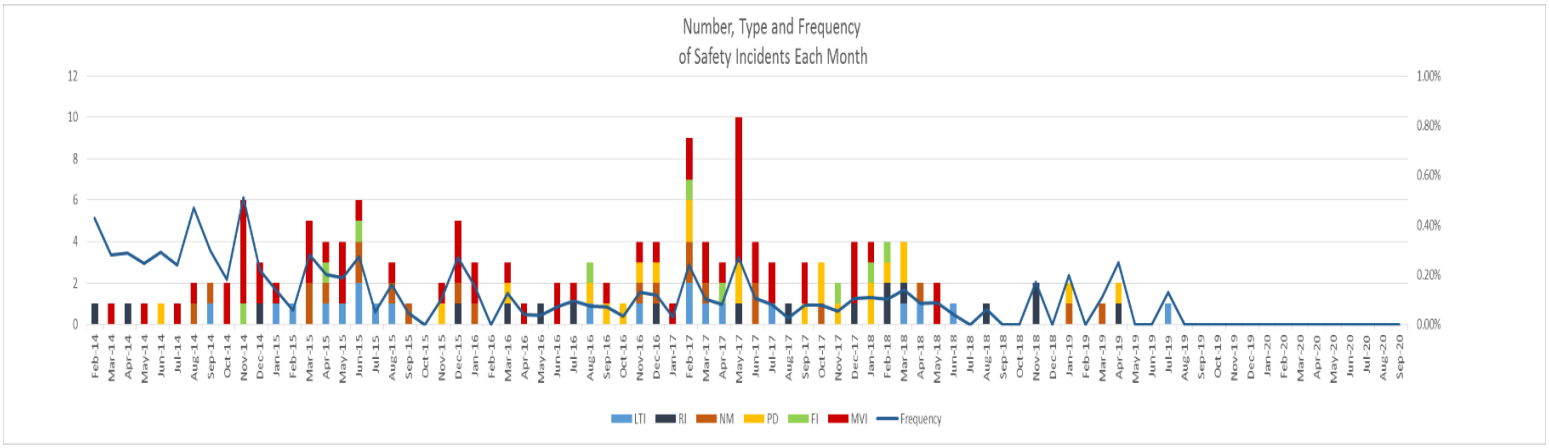
There were no incidents or accidents reported during Q3 2020.

The histogram below in ***Figure 7-1*** shows the number of reported incidents occurring in each month since the start of the Civil Works Contract with the colour indicating the type of incident including near misses. Up to the end of December 2015, all incidents related to the Civil Contractor and from 01 January 2016, those of the other three principal Contractors

have been included. The graph superimposed on the histogram shows the frequency of incidents, including reported near misses, with the number of incidents occurring each month expressed as a percentage of the total number of Project workers employed in each month being the total man-months.

All reported incidents that have involved the Owner and its Contractors and Subcontractors are included in the histogram and shown graphically below.

FIGURE 7-1: *NUMBER, TYPE AND FREQUENCY OF SAFETY INCIDENTS TO 30 SEPTEMBER 2020*



APPENDICES

APPENDIX 1: *STATUS OF DOCUMENTS REVIEW AND APPROVAL DURING Q3 2020*

No	Site name	Document Name	Contractor / Subcontractor	Approval Status by EMO/NNP1 (date)	Detailed Site Information	Monthly Construction & Operation Status as of 30 Sept 2020
1	Main Dam, Re-regulation Dam and Earth Dike	**DWP and SS-ESMMP for the Monitoring Works on the NNP1 project**	PKCC	2nd submission on 17 August 2020. No objection with No further comment on 20 August 2020		On-going
2	Main Dam, Re-regulation Dam, Earth Dike and access roads	**DWP and SS-ESMMP for the Maintenance Works on the NNP1 project**	PKCC	1st submission on 30 July 2020 No objection with comment on 04 August 2020		On-going
3	OSOV1	**Design drawing of septic biofilm tank replacement at OSOV1**	NNP1PC	1st submission on 17 August 2020 No objection with No comment on 19 August 2020		Under procurement process
4	Security gate at temporary / steel bridge	**Design drawing of temporary toilet installation at security guardhouse**	NNP1PC	1st submission on 17 August 2020 No objection with comment on 19 August 2020		Under procurement process
5	2UR	**Environmental and Social Checklist for Pre-Construction for barge operation in 2UR**	BCP Construction Co., Ltd.	1st submission on 20 August 2020 No objection with No comment on 20 August 2020		On-going

No	Site name	Document Name	Contractor / Subcontractor	Approval Status by EMO/NNP1 (date)	Detailed Site Information	Monthly Construction & Operation Status as of 30 Sept 2020
6	2UR	**Environmental and Social Checklist for Pre-Construction for survey and design of water supply improvement in Ban Pou, 2UR**	Vanh ChaleunSub Engineering Consultancy Sole., Ltd.	1st submission on 04 September 2020 No objection with comment on 09 September 2020		On-going

APPENDIX 2: *ENVIRONMENTAL MONITORING CORRECTIVE ACTIONS Q3-2020*

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
ONC_VSP-0014	28.02.2020	Rock/spoil disposal of HSRA's Irrigation Canal	On 19-Nov-19, EMO was invited to joint site inspection to check and verify the contractor's action on the spoil/rock disposal rehabilitation work. After inspection, it was noted that the rehabilitation work was not accepted due insufficient topsoil covering on the surface of the rock disposal area to enhance natural regrowth and / or revegetation. EMO, therefore, recommended the contractor for more topsoil covering work in apparel with a preparation and submission of the Site Decommissioning and Rehabilitation Plan (SDRP) for NNP1 review and	The Contractor is required to accomplish corrective action for rehabilitation work of the spoil/rock disposal area as per NNP1PC-EMO comments and environmental measures as proposed in the contractor's Site Decommissioning and Rehabilitation Plan (SDRP) by the specified deadline. **Note:** This Site Inspection Report (SIR) will be automatically escalated to the Non- Compliance Report Level 2 (NCR02) following a failure to accomplish the pending rehabilitation work.	07.03.2020	13/07/2020	Closed with NCR enforcement (see NCR VSP-0001) below)

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			approval. In Dec-19, the previous ADB & IAP mission raised the same concern on insufficient topsoil covering for this spoil/rock disposal site. On 29-Jan-20, the contractor submitted the SDRP with proposed management measures to be cover with more appropriate topsoil as well as planting some native trees/seedlings. On 19-Feb-20, EMO was invited to join the final inspection. However, there was no further action on the rehabilitation of the spoil/rock disposal area as per EMO's comments and the proposed SDRP.				
ONC_AM-0003	28.02.2020	OSOV	With reference to the LTA's recommendation made during the mission	As per the above justification, ADM shall carry out a basic improvement of the second	12.03.2020	25/09/2020	Unresolved

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			on in August 2019 to improve the OSOV's WWTS, ADM has informed that the proposed improvement cost of $ 20,000 by the INFRA was not possible and therefore asked EMO to check if simple/basic improvement of the 2nd wetland pond, similarly to what has been done for the 1st wetland pond during March 2019, is enough. - On 27 January 2020, EMO conducted water sampling at three points (influent and effluent of the first wetland pond and effluent of the second wetland pond) to verify the functioning of each wetland pond; - ADM also cleaned up vegetation from the second wetland pond.	wetland pond similarly to the first wetland pond. However, please provide a list and descriptions of necessary improvement work items for EMO's record and inspection reference.			- NNP1PC singed a one-year contract with the WWTS consultant to perform technical review and evaluation as well as assess the existing operation and maintenanc e practices of those four WWTSs and deliver a Detailed Conceptual Design and Specificatio ns for the WWTS

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			Progress: - Based on the monitoring result (See below effluent results), there was a significant reduction of BOD and Coliform after treating by the first wetland pond; - The existing second wetland pond is still doing its job, but could not bring coliform to the constant compliance level.				improvement and/or renovation - The proposal of WWTS improvement and modification options is under preparation by the consultant and EMO and it is expected to be ready for NNP1PC's management consideration and decision by October 2020

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
NCR_HM-0007	06.04.2020	LILAMA10 Camp	Decommissioning and landscaping were completed for LILAMA10 camp in December 2019 as per the approved Site Decommissioning and Rehabilitation Plan. In addition, grass seeding was carried out as per EMO's recommendations in the Site Inspection Report (SIR) Ref. NNP1-ESD-EMO-SIR-HM-0020 dated 11-Nov-19. During a Joint Site Inspection between NNP1PC (EMO, O&M and ADM) and HM Hydro Contractor on 06 December 2019, before HM Hydro left the site, there was a mutual agreement that HM Hydro would come back to assess the LILAMA10 Camp area if any further revegetation is needed	In accordance with the rehabilitation measures provided in the Construction Site Decommissioning and Rehabilitation Plan (CSDRP), the SIR Ref. NNP1-ESD-EMO-SIR-HM-0020 dated 11 November 2019 and a mutual agreement made during the Joint Site Inspection between NNP1PC (EMO, O&M and ADM) and HM Hydro Contractor on 06 December 2019, the HM Contractor is instructed to assess the LILAMA10 camp area for further revegetation during the wet season of this year (which is considerably starting since April 2020) to ensure successful site revegetation under one-year liability period.	15.07.2020	28.09.2020	Unresolved. On 08 September 2020, the contractor has completed site re-vegetation with local grass. However, this NCR will be carried over until the end of reliability period.

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			during the wet season of this year to ensure successful site revegetation under one-year liability period. On 25 March 20, EMO communicated with TD-O&M via email for further coordination with HM Hydro Contractor to implement the site revegetation for LILAMA10 Camp. Until 03 April 2020, EMO followed up, but so far, there was no response/update either TD-O&M or HM Hydro Contractor. Note: On 26 Mach 2020, EMO conducted site revegetation assessment and found that no germination from the grass seed that was manually sowed by HM Hydro Contractor during December 2019 before				

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			they left site. Without additional re-vegetation works in the next few weeks, the revegetation of LILAMA10 camp is unlikely to be successful by a one-year liability period.				
ONC_OC-0349	24.03.2020	OC camp	**Background:** On 30 January 2020, NNP1PC approved the Contractor's Site Decommissioning and Rehabilitation Plan (SDRP), the plan proposed a total of 100 local fruit trees (three species) to be planted at OC camp. Later, this revegetated area was dominated with flowers rather trees. Therefore, ESD management has suggested a jointly tree-count at OC camp and that some commercial trees need to be added if	Without an official notification (this SIR), it has a potential risk that the un-approved tree species are to be added/replaced. Therefore, the contractor was instructed to take appropriate corrective action as the following: - Commercial trees need to be added if any future replacement of the dead and weak trees; - No further flowers, fruit trees are allowed to be additional planted/replaced.	Action needed throughout the Liability Period	23/09/2020	Unresolved

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			any replacement of the dead trees. **Finding:** On 03 March 2020, NNP1PC (TD and EMO) and OC's representative conducted the jointly tree-count at OC camp. Surprisingly, a total of 120 trees/seedlings from 11 fruit trees species have planted on site (whilst, accordingly to the approved SDRP, only fruit tree species were approved). Out of these, 18 trees have died and need replacement with commercial and/or local tree species. Also, it is likely that some small and weak trees are not surviving. Corrective Action Done: On 24 March 2020, during this week joint site inspection, two				

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			commercial species (06 Mai Sack and 04 Mai Du and one local soft tree species (04 Mai samsara) have replaced the dead trees.				
ONC_AM-0005	17.06.2020	OSOV	Recycle waste was left outside the storage facility, undesignated storage of damaged equipment, tools, materials and loose logs (see below photos). This improper housekeeping potentially creates breeding ground for mosquitos and shades for poisonous reptiles and insects (snake, scorpion, etc.)	Well housekeeping of the equipment/tool storage/areas; - Manage loose logs stockpile or eliminate it; - Collect and contain the recycle waste in the recycle waste storage.	30.06.2020	16.07.2020	Resolved
NCR_VSP-0001	10.07.2020	HSRA's Irrigation Spoil and Rock Disposal Area	During the joint final site inspection for irrigation canal construction on 19 February 2020, ESD (EMO & Infra teams) instructed the VSP contractor to revise and resubmit the	Add more suitable local vegetation or local grass in some part of the areas that slow growth;	24.07.2020	25.08.2020	Unresolved. On 04 August 2020, the contractor has sown 4

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			proposed Site Decommissioning and Rehabilitation Plan and carry out rehabilitation work for a spoil disposal area at the irrigation canal construction site by early wet season of 2020. The maintenance work was to be continued until the end of the contractor's liability period of one year (attached MOM). In addition to the said MOM, on 28 February 2020, EMO issued a Site Inspection Report (SIR), Document ref no: NNP1-ESD-EMO-SIR-VSP-0012 dated 27 February 2020, to the VSP contractor as additional instruction for the required revegetation measures/actions needed for the pending site rehabilitation work				Kg of LUZI grass on site. However, this NCR will be carried over until the end of liability period.

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			(attached SIR). EMO has been routinely following up the progress of document revision and site rehabilitation status with the ESD-Infrastructure team (line supervisor of the VSP contractor). However, since the mentioned SIR was due on 07 March 2020, there was no engagement from the VSP contractor and none of any actions are implemented to complete such pending work.				
ONC_BPC-0001	04.09.2020	2UR	1. Barge Landing Areas: The space for barge landing at both right and left banks were not enough to allow proper/ safe operation of the barge. The right bank barge landing area was only prepared by using	1) Improve the barge landing areas at both river banks by using suitable rocky soil as base course material and close the gaps between the barge and the landing areas; 2) Properly set up the temporary camp facility, toilet, washing	15.09.2020	25.09.2020	Resolved

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			hand tools, it could not be constructed by using the excavator due to high water level and the excavator could not across the Nam Ngiep river (See Photo A). 2. Access Road: The access road of about 50 m connecting to the left bank barge landing was constructional / filled with rocky-sand material which is difficult for a motorbike and the hand tractor to access to the barge (See Photo B). 3. Site Facilities: The guard house, temporary toilet and temporary washing area including waste collection facility were not set up yet as per the propose work schedule provided in the approved environmental and social	facility and waste bins based on the proposed detailed design in the approved environmental and social checklist. (The mentioned facilities must be located at least 03 meters away from the river bank to avoid disturbing the riparian vegetation; 3) Provide appropriate safety measures on site for the barge operation which include: rules for barge operation and passenger safety; Safety sign to restricted zones for barge operation, passenger as well as entrance & exit; 4) Provide appropriate safety net at both sides of the barge to prevent passenger (children) falling off into the river. 5) Ensure that life jackets are sufficient for the passengers and the barge operators are required to brief safety rules to the passengers (getting-in / getting out/use of life jacket, etc.), before sealing the barge;			

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			checklist for barge operation. 4. Safety Measures: Safety rules were not in place. There were no designated zones for operators and passengers, entrance & exit restricted zone, no safety rules displayed for barge operation and passage, as well as emergency preparedness and response procedures (See Photo C).	6) Keep the site tidy and orderly by a provision of waste bins on the assembly point and a plastic bag on the barge for waste disposal. The waste shall be well segregated and general waste shall be transferred to Houay Soup landfill site for proper disposal; 7) Avoid any conflict and maintain good cooperation and relationship with local villagers and passengers by following the village' rules and social practices (Refers to the Code of Conducts provided in the contract).			
ONC_OC-0352	23.09.2020	17 Rehabilitation sites under CWC	A quarterly joint site inspection between NNP1PC (EMO and TD) and OC is ongoing for the rehabilitated sites to evaluate the vegetation cover percentage and site stability over the contractor's liability period as per the CA. Annex C, Clause 39, 40, 44	1). These partial areas (see photos) need additional countermeasures by planting more local vegetation / tall grass to close the bare ground and avoid additional comment from the upcoming LTA and GOL-EMU visits. 2). The contractor was instructed to prepare the Corrective Action	05.10.2021		Unresolved

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
			and 46 on the Site Decommissioning and Rehabilitation Requirements. - On 30-Jun-20 (mid-wet season of 2020), a total of 19 rehabilitated sites were evaluated and the Site Inspection Report (SIR-0103 dated 03-Jul-20) was issued to OC via TD. - This quarterly joint inspection on 23-Sept-20 (late-wet season of 2020), a total of 17 rehabilitated sites were evaluated as the following results:	Plan (CAP) and submit to NNP1PC for review and approval before further corrective action is carried out as the following: - Resolve/fix the eroded area; - Provide the counter measures to avoid future soil erosion (i.e. slope trimming, rock compaction and grassing …etc.) 3). A silt fence installation across the gully line as illustrated in the photos to trap the sand / silt, but allow free water runoff through the silt fence; Improve the cut-off drain to divert runoff. 4). The contractor was instructed to: - Replace the dead plants as soon as possible during this wet season to ensure that the planted trees/grass will survive until the contactor's liability period; Note: Please refer to previous SIR-0101, dated 25 March 2020, EMO's instruction: - Replacement of dead or weak			

Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow- up Date	Status
				trees will be commercial trees only; - No further flowers, fruit trees are allowed to be additional planted / replaced. - Provide adequate countermeasures to prevent cattle entering in to the revegetated site.			

APPENDIX 3: SITE CODES, LOCATIONS, MONITORING PARAMETERS AND ITS MAP OF THE SURFACE WATER QUALITY MONITORING

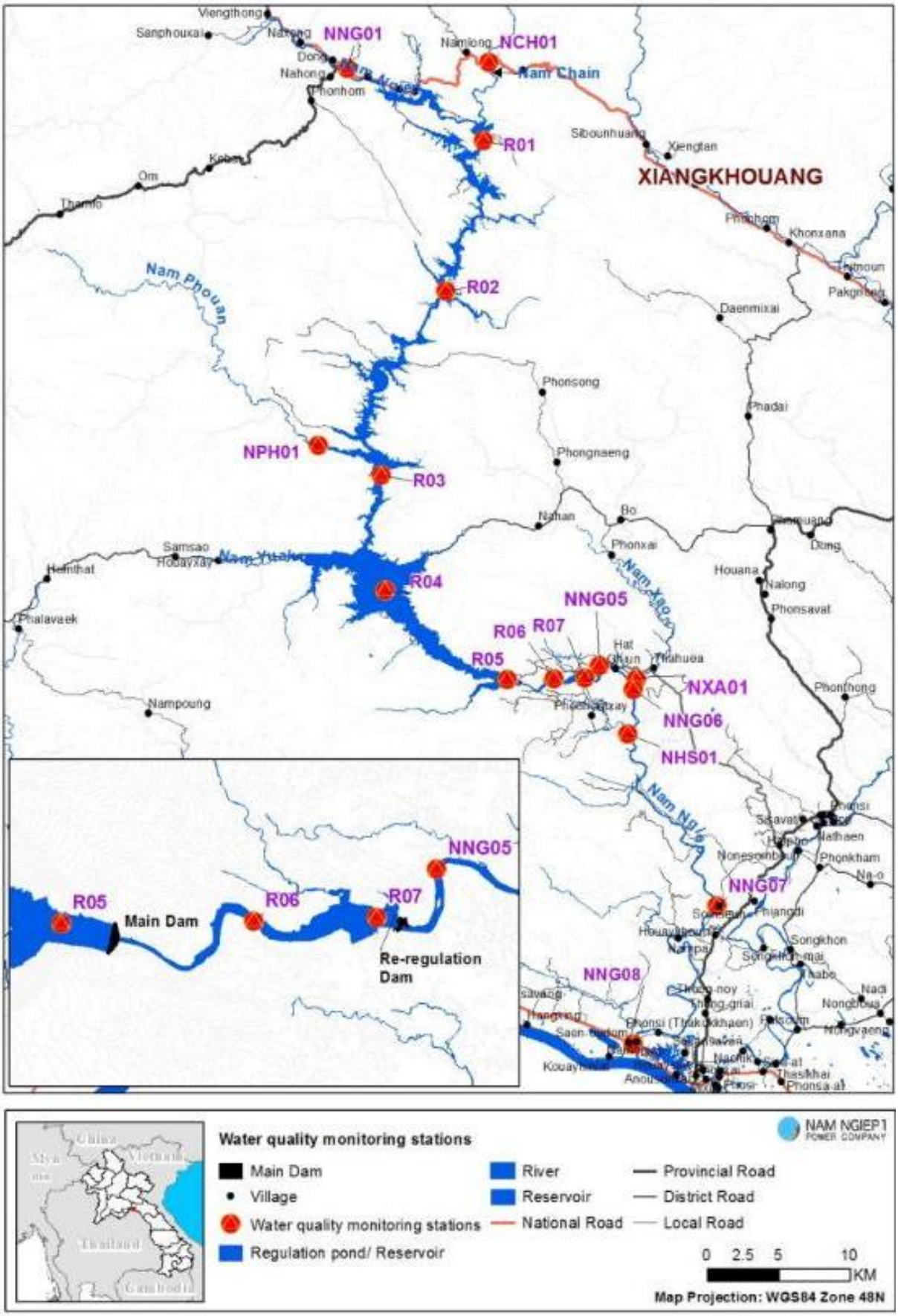
SITE CODES AND LOCATION STATION FOR SURFACE WATER QUALITY MONITORING

Site Code	Location station	Zone
NNG01	Nam Ngiep Upstream of Ban Phiengta	Upstream Project Construction Site
R01	Main reservoir upstream main dam approx. 50 Km.	
R02	Main reservoir upstream main dam approx. 35 Km.	
NNG02/R03	Nam Ngiep Upstream of Nam Phouan Confluence / Main reservoir upstream main dam approx. 21 Km.	
NNG03/R04	Nam Ngiep Downstream of Ban Sop-Yuak / Main reservoir upstream main dam approx. 13 Km.	
NNG09/R05	Nam Ngiep Upstream Main Dam / Main reservoir upstream main dam approx. 0.5 Km	
NNG04 / R06	Nam Ngiep Downstream RT Camp (Middle Re-regulation Reservoir)	Within Project Construction Site
R07	Reservoir Upstream Re-Regulation Dam	
NNG05	Nam Ngiep Upstream of Ban Hat Gniun	Downstream Project Construction Site
NNG06	Nam Ngiep Downstream of Nam Xao Confluence	
NNG07	Nam Ngiep at Ban Somsuen	
NNG08	Nam Ngiep at the Bridge of Road 13	
NCH01	Nam Chiane at the Bridge of Road 1D	Tributaries Upstream of Project Construction Site
NPH01	Nam Phouan Upstream of Nam Ngiep Confluence	
NXA01	Nam Xao Upstream of Nam Ngiep Confluence	Tributaries Downstream of Project Construction Site
NSH01	Nam Houay Soup Upstream Nam Ngiep Confluence	

MONITORING FREQUENCY FOR SURFACE WATER QUALITY PARAMETERS

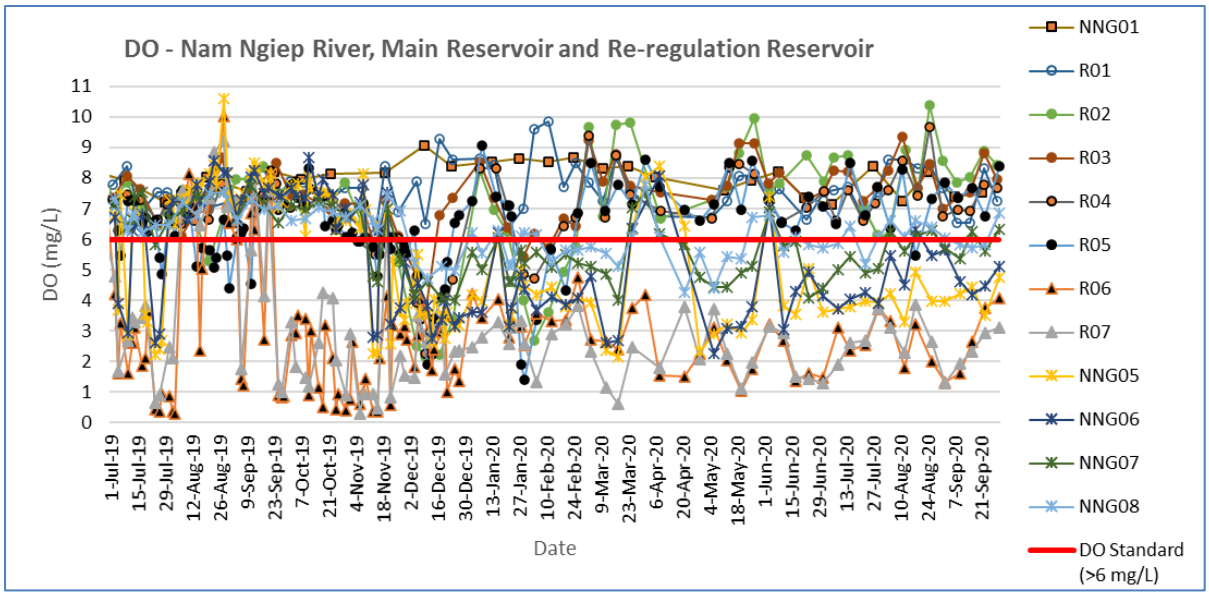
Frequency of Monitoring	Parameters (Unit)	Monitoring Sites
Weekly	pH, DO (%), DO (mg/L), Conductivity (µs/cm), TDS (mg/L), Temperature (°C), Turbidity (NTU).	- Main Reservoir: R01, R02, R03, R04, R05; - Nam Ngiep downstream: NNG05, NNG06, NNG07 and NNG08; - Tributaries: Nam Phouan [NPH01], Nam Xao [NXA01] and Nam Houay Soup [NHS01].
Fortnightly	pH, DO (%), DO (mg/L), Conductivity (µs/cm), TDS (mg/L), Temperature (°C), Turbidity (NTU)	All stations
Monthly	TSS (mg/L), BOD_5 (mg/L), COD (mg/L), NH_3-N (mg/L), NO_3-N (mg/L), total coliform (MPN/100 mL), faecal coliform (MPN/100 mL), Hydrogen sulphide (mg/L), Phytoplankton biomass, TOC and TKN.	As per ESMMP-OP.

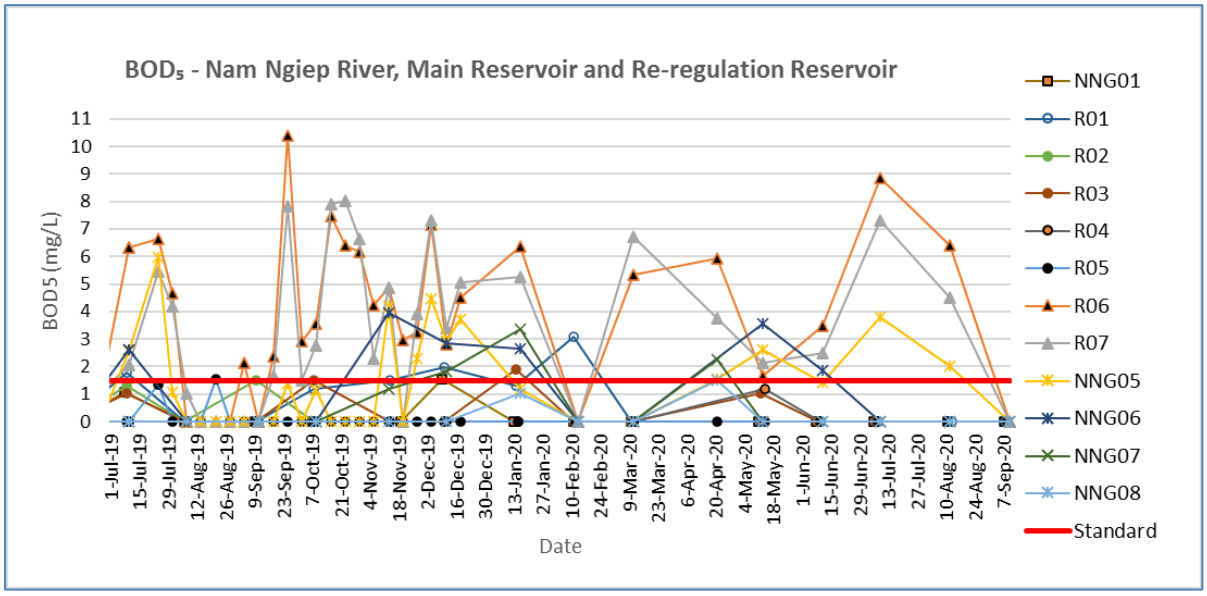
SURFACE WATER QUALITY MONITORING LOCATIONS

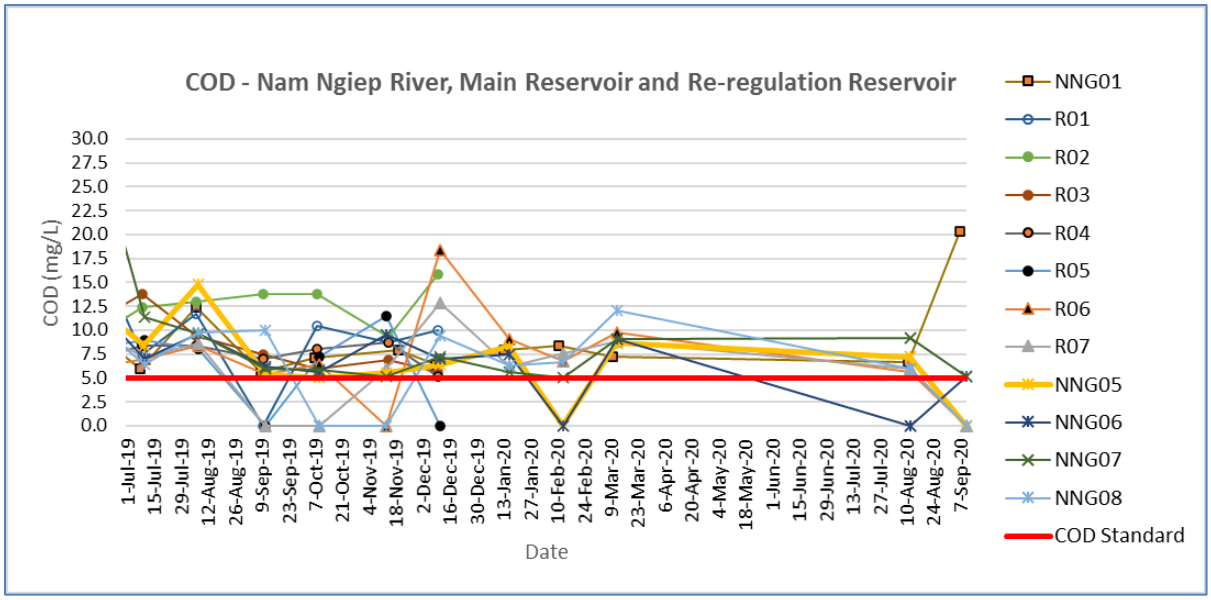


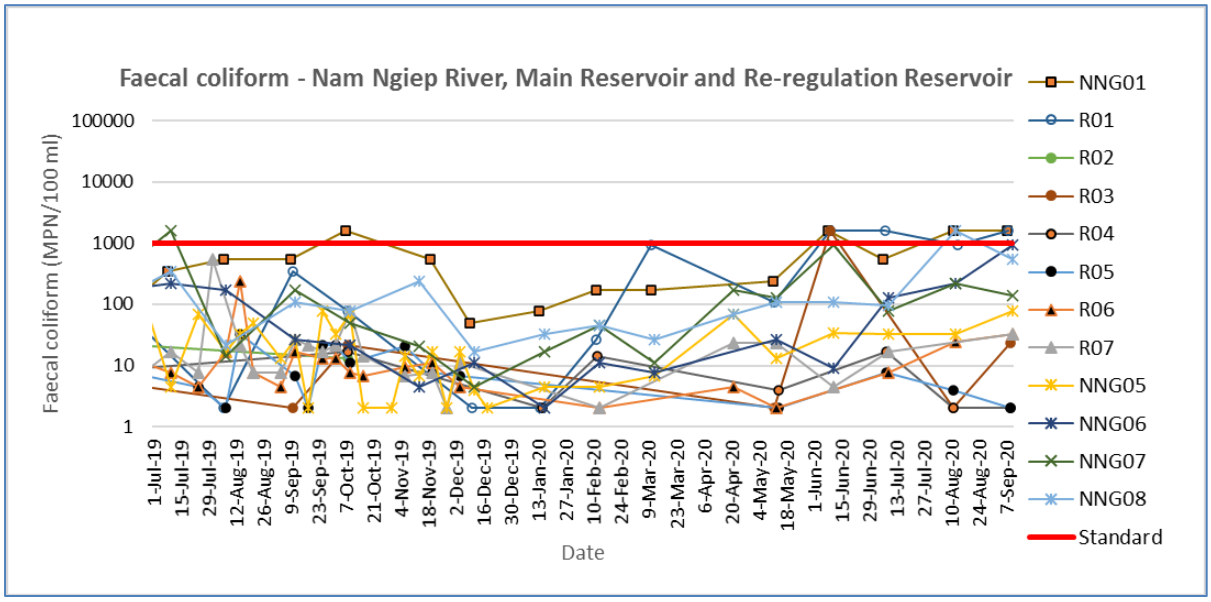
APPENDIX 4: *KEY TRENDS OF WATER QUALITY MONITORING FROM JULY 2019 TO END OF SEPTEMBER 2020 (ONLY PARAMETERS THAT EXCEEDED THE STANDARDS)*

Nam Ngiep Surface Water

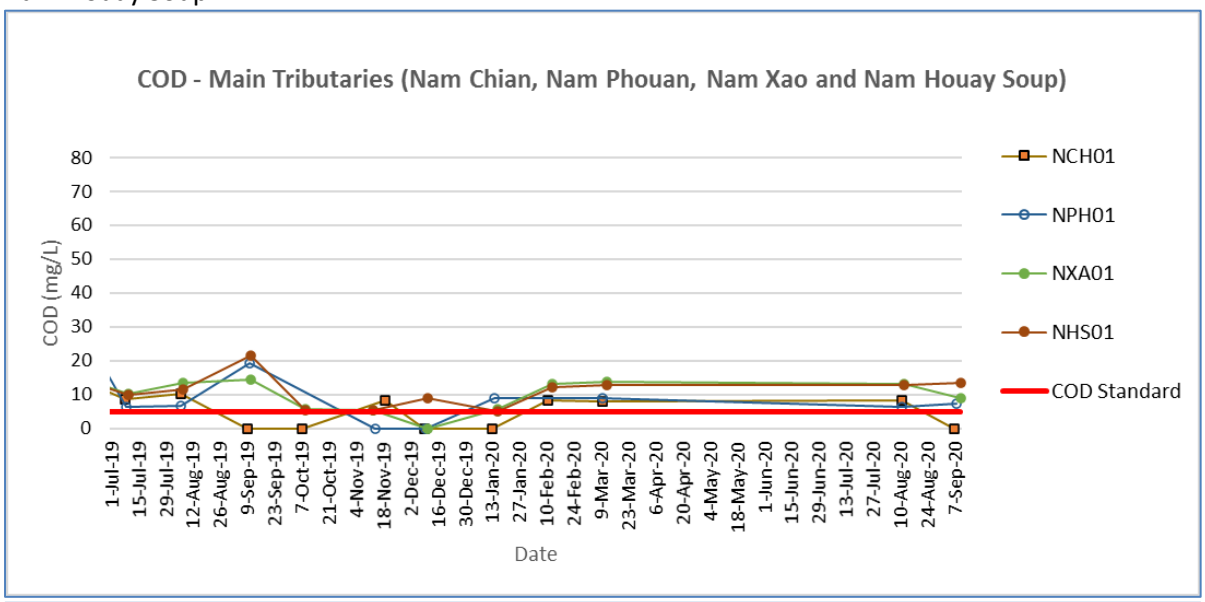


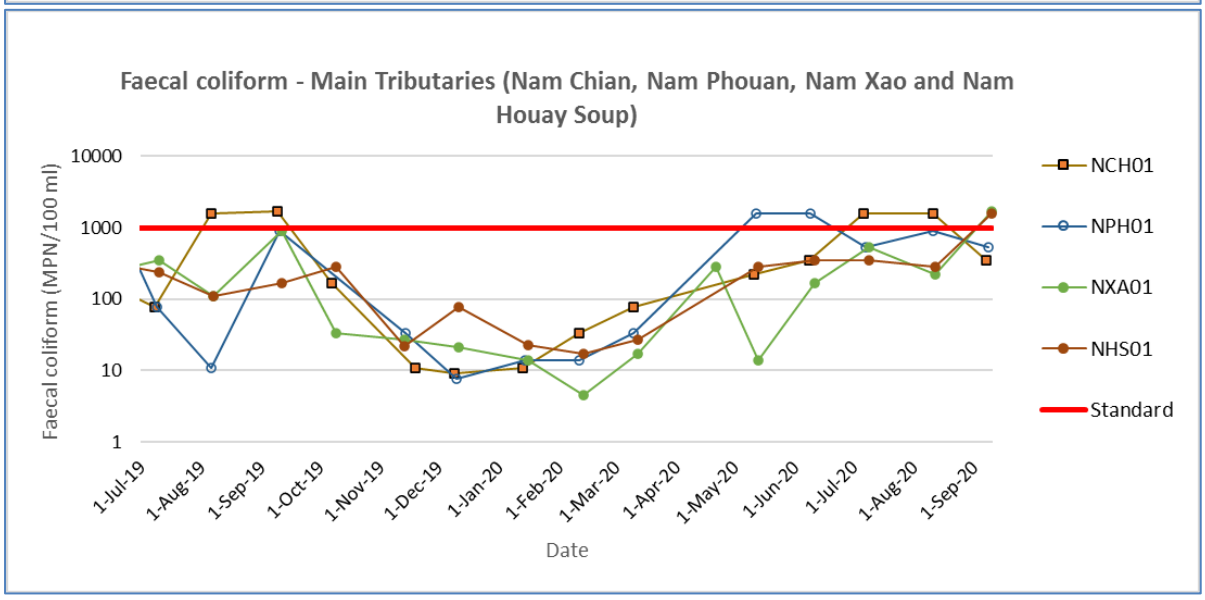



COD - Nam Ngiep River, Main Reservoir and Re-regulation Reservoir
COD (mg/L)
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1-Jul-19
15-Jul-19
29-Jul-19
12-Aug-19
26-Aug-19
9-Sep-19
23-Sep-19
7-Oct-19
21-Oct-19
4-Nov-19
18-Nov-19
2-Dec-19
16-Dec-19
30-Dec-19
13-Jan-20
27-Jan-20
10-Feb-20
24-Feb-20
9-Mar-20
23-Mar-20
6-Apr-20
20-Apr-20
4-May-20
18-May-20
1-Jun-20
15-Jun-20
29-Jun-20
13-Jul-20
27-Jul-20
10-Aug-20
24-Aug-20
7-Sep-20
Date
NNG01
R01
R02
R03
R04
R05
R06
R07
NNG05
NNG06
NNG07
NNG08
COD Standard

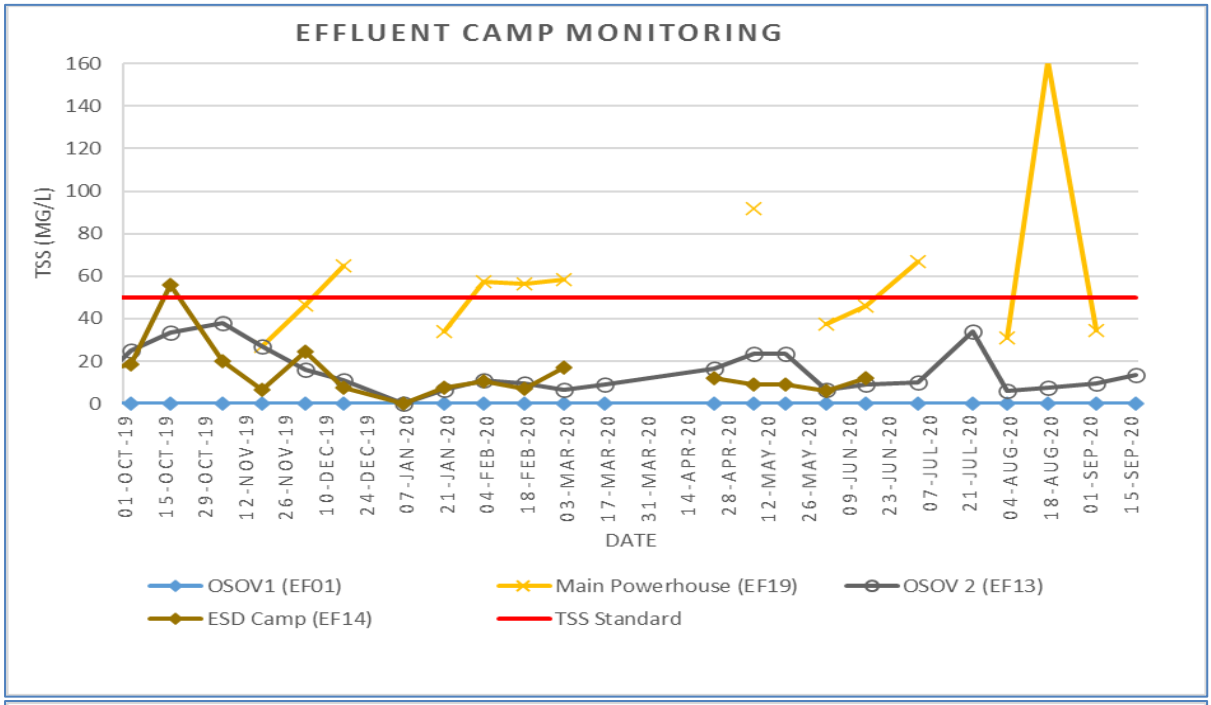

Faecal coliform - Nam Ngiep River, Main Reservoir and Re-regulation Reservoir
Faecal coliform (MPN/100 ml)
100000
10000
1000
100
10
1
1-Jul-19
15-Jul-19
29-Jul-19
12-Aug-19
26-Aug-19
9-Sep-19
23-Sep-19
7-Oct-19
21-Oct-19
4-Nov-19
18-Nov-19
2-Dec-19
16-Dec-19
30-Dec-19
13-Jan-20
27-Jan-20
10-Feb-20
24-Feb-20
9-Mar-20
23-Mar-20
6-Apr-20
20-Apr-20
4-May-20
18-May-20
1-Jun-20
15-Jun-20
29-Jun-20
13-Jul-20
27-Jul-20
10-Aug-20
24-Aug-20
7-Sep-20
Date
NNG01
R01
R02
R03
R04
R05
R06
R07
NNG05
NNG06
NNG07
NNG08
Standard

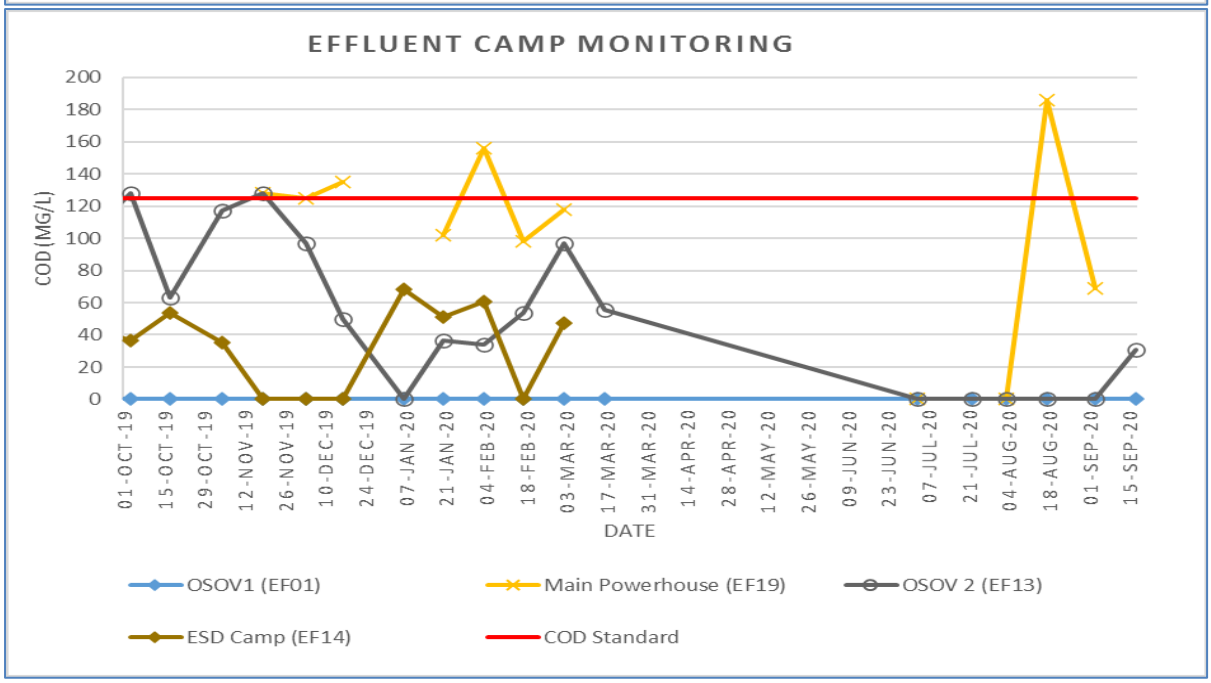
Key Water Quality Parameters for the Nam Ngiep Tributaries: Nam Chian, Nam Phouan, Nam Xao, Nam Houay Soup

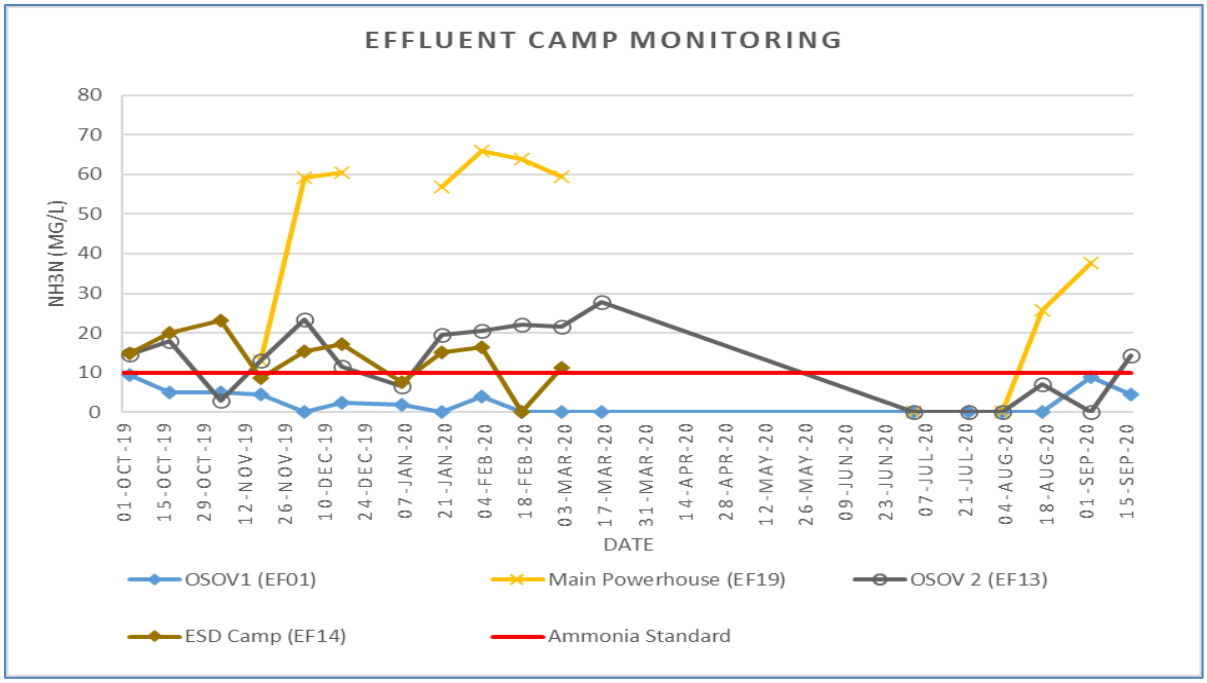


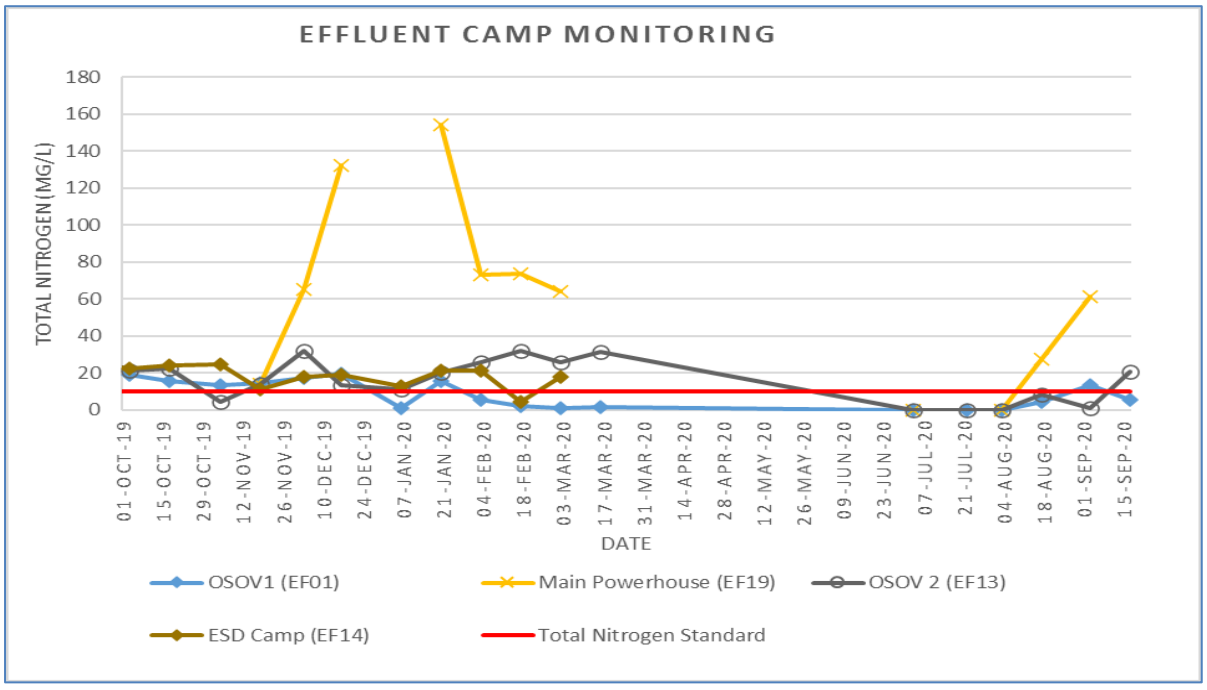


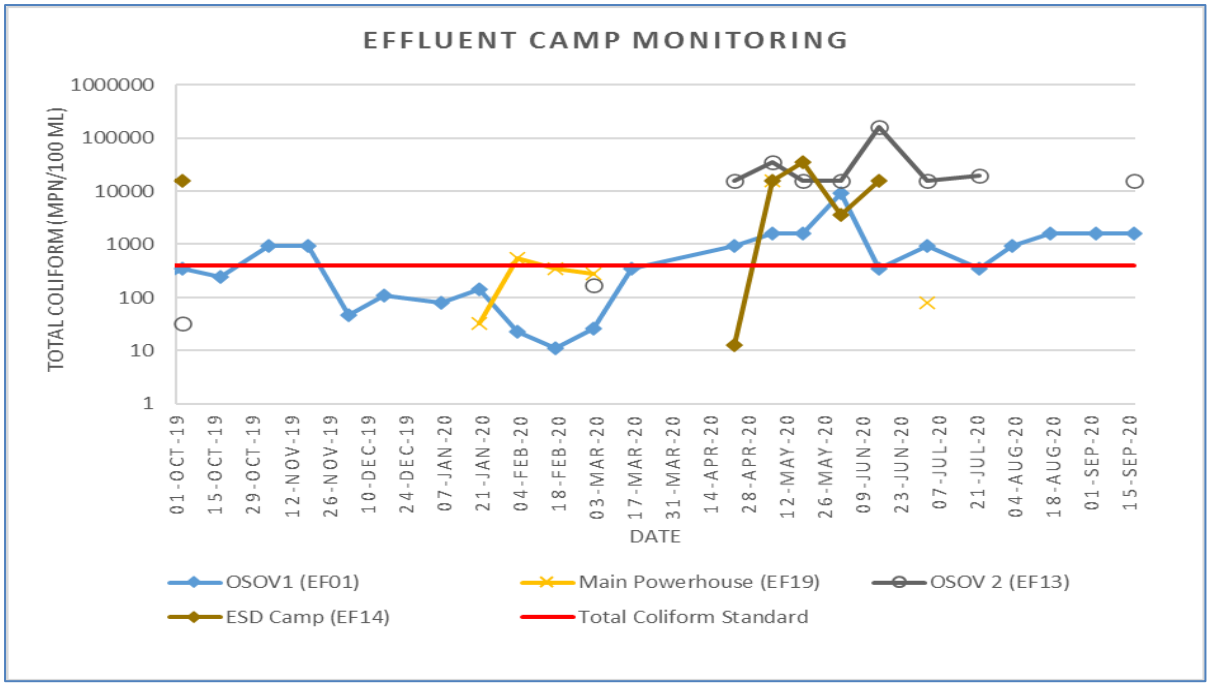
Camps' Effluent Water Quality Trends (Since December 2018 – March 2020)






EFFLUENT CAMP MONITORING
NH3N (MG/L)
80
70
60
50
40
30
20
10
0
01-OCT-19
15-OCT-19
29-OCT-19
12-NOV-19
26-NOV-19
10-DEC-19
24-DEC-19
07-JAN-20
21-JAN-20
04-FEB-20
18-FEB-20
03-MAR-20
17-MAR-20
31-MAR-20
14-APR-20
28-APR-20
12-MAY-20
26-MAY-20
09-JUN-20
23-JUN-20
07-JUL-20
21-JUL-20
04-AUG-20
18-AUG-20
01-SEP-20
15-SEP-20
DATE
OSOV1 (EF01)
Main Powerhouse (EF19)
OSOV 2 (EF13)
ESD Camp (EF14)
Ammonia Standard


EFFLUENT CAMP MONITORING
TOTAL NITROGEN (MG/L)
180
160
140
120
100
80
60
40
20
0
01-OCT-19
15-OCT-19
29-OCT-19
12-NOV-19
26-NOV-19
10-DEC-19
24-DEC-19
07-JAN-20
21-JAN-20
04-FEB-20
18-FEB-20
03-MAR-20
17-MAR-20
31-MAR-20
14-APR-20
28-APR-20
12-MAY-20
26-MAY-20
09-JUN-20
23-JUN-20
07-JUL-20
21-JUL-20
04-AUG-20
18-AUG-20
01-SEP-20
15-SEP-20
DATE
OSOV1 (EF01)
Main Powerhouse (EF19)
OSOV 2 (EF13)
ESD Camp (EF14)
Total Nitrogen Standard


EFFLUENT CAMP MONITORING
TOTAL COLIFORM (MPN/100 ML)
1000000
100000
10000
1000
100
10
1
01-OCT-19
15-OCT-19
29-OCT-19
12-NOV-19
26-NOV-19
10-DEC-19
24-DEC-19
07-JAN-20
21-JAN-20
04-FEB-20
18-FEB-20
03-MAR-20
17-MAR-20
31-MAR-20
14-APR-20
28-APR-20
12-MAY-20
26-MAY-20
09-JUN-20
23-JUN-20
07-JUL-20
21-JUL-20
04-AUG-20
18-AUG-20
01-SEP-20
15-SEP-20
DATE
OSOV1 (EF01)
Main Powerhouse (EF19)
OSOV 2 (EF13)
ESD Camp (EF14)
Total Coliform Standard

APPENDIX 5: *WATER QUALITY MONITORING DATA*

APPENDIX 5-1: *SURFACE WATER QUALITY MONITORING – Q3 2020*

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**															
1-Jul-20	pH	5.0 - 9.0						6.2	6.19	6.23	6.16	6.69	6.62	6.9			6.5	6.59
2-Jul-20	pH	5.0 - 9.0		6.97	6.95	7.3	6.89									7.03		
6-Jul-20	pH	5.0 - 9.0	7.65												7.91			
7-Jul-20	pH	5.0 - 9.0		7.22	8.01	6.56										8.03		
8-Jul-20	pH	5.0 - 9.0					6.64	7.19										
9-Jul-20	pH	5.0 - 9.0							7.05	7.07	7.13	7.62	7.41	7.36			7.55	7.52
14-Jul-20	pH	5.0 - 9.0		8.36	8.57	8.24	7.39									8.3		
15-Jul-20	pH	5.0 - 9.0						7.83	7.47	7.47	7.42	7.82	7.84	7.97			7.66	7.8
22-Jul-20	pH	5.0 - 9.0		7.66	7.87	8.43	7.28									7.68		
23-Jul-20	pH	5.0 - 9.0						6.6	7.04	7.06	6.94	7.27	7.46	7.58			7.25	7.46
27-Jul-20	pH	5.0 - 9.0	7.52												6.85			
28-Jul-20	pH	5.0 - 9.0					8.15											
29-Jul-20	pH	5.0 - 9.0		8.52	8.26	8.52		8.07								8.2		
30-Jul-20	pH	5.0 - 9.0							6.46	6.57	7.31	7.91	7.76	7.9			7.72	7.85
4-Aug-20	pH	5.0 - 9.0		8.08	7.79	7.8	7.68									7.99		
5-Aug-20	pH	5.0 - 9.0						7.99	7.93	7.94	7.99	7.87	8.09	8.37			7.92	7.85
11-Aug-20	pH	5.0 - 9.0	7.41			7.83	8.33	7.52							8.31	7.92		
12-Aug-20	pH	5.0 - 9.0							7.82	7.94	7.92	8.27	8.2	8.22			7.98	8.2
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			8.31	7.96
19-Aug-20	pH	5.0 - 9.0		8.87	8.87	8.58	8.27									8.91		

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir					Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	Parameters (Unit)	Guideline																
24-Aug-20	pH	5.0 - 9.0	6.66												6.72			
25-Aug-20	pH	5.0 - 9.0		7.78	7.53	7.69	7.02									8.58		
26-Aug-20	pH	5.0 - 9.0						7.39	7.38	7.31	7.37	7.52	7.49	7.48			7.52	7.38
1-Sep-20	pH	5.0 - 9.0		7	7.93	7.41	6.62									7.21		
2-Sep-20	pH	5.0 - 9.0						6.96	6.36	6.41	6.22	6.67	6.6	6.62			6.6	6.41
7-Sep-20	pH	5.0 - 9.0	6.86												8.69			
8-Sep-20	pH	5.0 - 9.0		6.49	7.84											7.3		
9-Sep-20	pH	5.0 - 9.0				7.89	7.22	7.26										
10-Sep-20	pH	5.0 - 9.0							7.3	7.35	7.34	7.62	7.55	7.85			7.51	7.57
15-Sep-20	pH	5.0 - 9.0		6.33	8.01	7.67	7.75											
16-Sep-20	pH	5.0 - 9.0						7.42	7.39	7.21	7.16	7.67	7.57	7.67			7.53	7.6
21-Sep-20	pH	5.0 - 9.0	7.49												8.61			
22-Sep-20	pH	5.0 - 9.0		7.54	6.86	8.43	8.53									7.83		
23-Sep-20	pH	5.0 - 9.0						6.52	7.08	7.01	6.75	7.02	6.88	7.01			6.91	7.08
29-Sep-20	pH	5.0 - 9.0		7.38	6.88	6.78	6.75									7.92		
30-Sep-20	pH	5.0 - 9.0						7.76	6.71	6.52	6.56	6.72	6.81	7.18			7.26	7.22
1-Jul-20	Sat. DO (%)							93	18.2	15.9	45.1	51.9	55.6	71.8			89.7	88.3
2-Jul-20	Sat. DO (%)			96	106	102	101.2									101		
6-Jul-20	Sat. DO (%)		99.5												105.9			
7-Jul-20	Sat. DO (%)			96	116.3	110.4										104.8		
8-Jul-20	Sat. DO (%)						88.5	85.6										
9-Jul-20	Sat. DO (%)								38.5	23.2	46.2	45.8	63.2	74			94.6	92.7
14-Jul-20	Sat. DO (%)			97.2	117.6	110.2	101.4									103.5		
15-Jul-20	Sat. DO (%)							112.1	29.2	31.9	47.5	50.8	69.2	82.3			93.3	94.4

20 January 2021

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	Parameters (Unit)	Guideline																
22-Jul-20	Sat. DO (%)			87.3	97.7	99.5	88.8									92		
23-Jul-20	Sat. DO (%)							89	31.7	32.8	50.5	53.4	62.8	66.9			75.6	81.3
27-Jul-20	Sat. DO (%)		112.9												1.3.4			
28-Jul-20	Sat. DO (%)						97.7											
29-Jul-20	Sat. DO (%)			96.1	84.2	105.1		105.7								102.6		
30-Jul-20	Sat. DO (%)								46.9	47.7	50.4	50	65.5	78.9			80.2	87.3
4-Aug-20	Sat. DO (%)			103.9	78.1	109	100.4									114.9		
5-Aug-20	Sat. DO (%)							81.6	41.4	38.9	52.7	68.2	77.5	81.6			85.5	83.5
11-Aug-20	Sat. DO (%)		97			125.2	113.5	108.3							105.2	117.8		
12-Aug-20	Sat. DO (%)								21.9	28.1	43.5	56.8					92.8	110.2
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			86.6	83.8
19-Aug-20	Sat. DO (%)			99.7	90.7	99.1	93.4									105.5		
24-Aug-20	Sat. DO (%)		98.3												103.1			
25-Aug-20	Sat. DO (%)			99.9	128.6	111.5	118.4									106.8		
26-Aug-20	Sat. DO (%)							93.3	24.2	32	48.4	67.9	77.7	78.7			112.1	98.8
1-Sep-20	Sat. DO (%)			94.6	117.2	93.8	90.1									113.9		
2-Sep-20	Sat. DO (%)							102.3	16.2	15.8	49	69.6	72.3	75.1			90.8	89.5
7-Sep-20	Sat. DO (%)		94.4												99.6			
8-Sep-20	Sat. DO (%)			78.5	106.5											94.1		
9-Sep-20	Sat. DO (%)					99.8	92.8	97.2										
10-Sep-20	Sat. DO (%)								19.5	23.2	51.1	55.7	68.5	72.1			84.8	83.4
15-Sep-20	Sat. DO (%)			85.3	110.5	102.7	93.2											
16-Sep-20	Sat. DO (%)							100.9	32	28.2	54.9	52.1	78.9	71.5			89.2	92.1

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		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	Parameters (Unit)	Guideline																
21-Sep-20	Sat. DO (%)		95.3												97.5			
22-Sep-20	Sat. DO (%)			99.6	116.3	116.4	101.5									116.2		
23-Sep-20	Sat. DO (%)							87.1	45.4	35.7	45.4	54.9	69.6	72.4			84.1	82.6
29-Sep-20	Sat. DO (%)			92.7	111.4	105.4	101									97.9		
30-Sep-20	Sat. DO (%)							109.1	49.4	37.4	58.9	63.4	79.1	85.5			100.2	96.1
1-Jul-20	DO (mg/L)	>6.0						7.08	1.48	1.3	3.62	4.15	4.41	5.72			6.9	6.98
2-Jul-20	DO (mg/L)	>6.0		7.54	7.89	7.58	7.56									8.4		
6-Jul-20	DO (mg/L)	>6.0	7.13												8.11			
7-Jul-20	DO (mg/L)	>6.0		7.62	8.66	8.23										8.8		
8-Jul-20	DO (mg/L)	>6.0					6.61	6.51										
9-Jul-20	DO (mg/L)	>6.0							3.13	1.89	3.72	3.71	5.02	5.86			7.41	7.47
14-Jul-20	DO (mg/L)	>6.0		7.72	8.76	8.22	7.6									8.73		
15-Jul-20	DO (mg/L)	>6.0						8.49	2.36	2.63	3.78	4.05	5.43	6.43			7.11	7.51
22-Jul-20	DO (mg/L)	>6.0		6.72	7.06	7.25	6.6									7.54		
23-Jul-20	DO (mg/L)	>6.0						6.77	2.56	2.68	3.98	4.25	4.91	5.18			5.66	6.42
27-Jul-20	DO (mg/L)	>6.0	8.39												7.83			
28-Jul-20	DO (mg/L)	>6.0					7.19											
29-Jul-20	DO (mg/L)	>6.0		7.55	6.16	7.69		7.72								8.61		
30-Jul-20	DO (mg/L)	>6.0							3.71	3.76	3.92	3.9	5.03	6.09			6.05	6.75
4-Aug-20	DO (mg/L)	>6.0		8.59	6.06	8.23	7.6									9.79		
5-Aug-20	DO (mg/L)	>6.0						6.37	3.34	3.13	4.23	5.48	6.24	6.62			6.85	6.8
11-Aug-20	DO (mg/L)	>6.0	7.24			9.36	8.58	8.29							8.43	9.95		
12-Aug-20	DO (mg/L)	>6.0							1.79	2.28	3.3	4.52	5.61	6.07			7.31	9.89
13-Aug-20	DO (mg/L)	>6.0		8.6	8.91													

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		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir					Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	Parameters (Unit)	Guideline															
18-Aug-20	DO (mg/L)	>6.0						5.47	3.21	3.85	4.95	6.33	6.11	6.62			7.14	6.9
19-Aug-20	DO (mg/L)	>6.0		8.31	7.51	7.66	7.41									9.04		
24-Aug-20	DO (mg/L)	>6.0	8.21												8.78			
25-Aug-20	DO (mg/L)	>6.0		8.43	10.39	8.47	9.66									9.14		
26-Aug-20	DO (mg/L)	>6.0						7.33	2.02	2.65	3.96	5.47	6.29	6.39			9.88	7.82
1-Sep-20	DO (mg/L)	>6.0		7.68	8.56	7	6.75									8.62		
2-Sep-20	DO (mg/L)	>6.0						7.84	1.34	1.3	3.97	5.65	5.71	6.03			7.05	7.14
7-Sep-20	DO (mg/L)	>6.0	7.39												7.86			
8-Sep-20	DO (mg/L)	>6.0		6.53	7.86											7.79		
9-Sep-20	DO (mg/L)	>6.0				7.37	6.96	7.37										
10-Sep-20	DO (mg/L)	>6.0							1.63	1.93	4.21	4.61	5.36	5.83			6.79	6.74
15-Sep-20	DO (mg/L)	>6.0		6.55	8.04	7.54	6.93											
16-Sep-20	DO (mg/L)	>6.0						7.67	2.64	2.32	4.43	4.19	6.25	5.73			6.86	7.23
21-Sep-20	DO (mg/L)	>6.0	7.55												7.65			
22-Sep-20	DO (mg/L)	>6.0		8.3	8.87	8.8	7.78									10.01		
23-Sep-20	DO (mg/L)	>6.0						6.75	3.75	2.94	3.51	4.48	5.6	5.82			6.75	6.6
29-Sep-20	DO (mg/L)	>6.0		7.26	8.43	7.95	7.66									8.2		
30-Sep-20	DO (mg/L)	>6.0						8.4	4.08	3.1	4.75	5.11	6.32	6.87			7.96	7.63
1-Jul-20	Conductivity (µs/cm)							71	90	89	86	88	78	70			98	21
2-Jul-20	Conductivity (µs/cm)			83	92	76	74									76		
6-Jul-20	Conductivity (µs/cm)		70.8												22.5			
7-Jul-20	Conductivity (µs/cm)			73	87	78										77		

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		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	Parameters (Unit)	Guideline																
8-Jul-20	Conductivity (µs/cm)						73	69										
9-Jul-20	Conductivity (µs/cm)								81	78	77	78	68	59			82	17
14-Jul-20	Conductivity (µs/cm)			85	82	75	73									75		
15-Jul-20	Conductivity (µs/cm)							70	86	84	84	84	76	70			96	19
22-Jul-20	Conductivity (µs/cm)			78	81	70	67									69		
23-Jul-20	Conductivity (µs/cm)							64	76	76	77	75	71	60			100	19
27-Jul-20	Conductivity (µs/cm)		100.7												119.5			
28-Jul-20	Conductivity (µs/cm)						68											
29-Jul-20	Conductivity (µs/cm)			77	85	71		65								67		
30-Jul-20	Conductivity (µs/cm)								74	76	76	78	71	62			112	25
4-Aug-20	Conductivity (µs/cm)			75	87	76	67									75		
5-Aug-20	Conductivity (µs/cm)							65	63	64	54	53	34	23			50	13
11-Aug-20	Conductivity (µs/cm)		55.8			70	67	66							15.6	83		
12-Aug-20	Conductivity (µs/cm)								74	70	69	71	56	39			79	17
13-Aug-20	Conductivity (µs/cm)			82	68													

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		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	Parameters (Unit)	Guideline																
18-Aug-20	Conductivity (µs/cm)							67	60	58	58	55	51	45			56	14
19-Aug-20	Conductivity (µs/cm)			79	64	71	69									68		
24-Aug-20	Conductivity (µs/cm)		82												25			
25-Aug-20	Conductivity (µs/cm)			67	78	67	69									69		
26-Aug-20	Conductivity (µs/cm)							63	72	68	66	62	56	41			64	14
1-Sep-20	Conductivity (µs/cm)			74	71	66	65									68		
2-Sep-20	Conductivity (µs/cm)							63	72	71	71	71	69	63			74	20
7-Sep-20	Conductivity (µs/cm)		52.5												18.32			
8-Sep-20	Conductivity (µs/cm)			67	68											78		
9-Sep-20	Conductivity (µs/cm)					64	63	61										
10-Sep-20	Conductivity (µs/cm)								69	67	67	66	59	50			57	12
15-Sep-20	Conductivity (µs/cm)			95	67	64	63											
16-Sep-20	Conductivity (µs/cm)							61	66	64	66	67	63	58			82	19
21-Sep-20	Conductivity (µs/cm)		58.4												15.89			
22-Sep-20	Conductivity (µs/cm)			77	65	62	61									72		

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir					Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**															
23-Sep-20	Conductivity (µs/cm)							60	57	56	61	54	49	41			57	13
29-Sep-20	Conductivity (µs/cm)			86	65	62	60									65		
30-Sep-20	Conductivity (µs/cm)							59	64	62	76	65	69	64			73	20
1-Jul-20	Temperature (°C)							29.71	25.67	25.66	26.6	27.2	27.11	27.2			28.97	27.47
2-Jul-20	Temperature (°C)			27.85	30.94	31.14	30.67									24.86		
6-Jul-20	Temperature (°C)		30.1												26.2			
7-Jul-20	Temperature (°C)			27.27	30.76	30.86										24.15		
8-Jul-20	Temperature (°C)						30.73	29.68										
9-Jul-20	Temperature (°C)								25.82	26.03	26.55	26.44	27.02	27.42			27.88	26.25
14-Jul-20	Temperature (°C)			27.75	30.75	30.72	30.42									24.01		
15-Jul-20	Temperature (°C)							29.79	26.1	26.04	26.98	27.07	27.91	28.24			29.38	26.98
22-Jul-20	Temperature (°C)			28.9	32.14	32.03	31.09									25.31		
23-Jul-20	Temperature (°C)							29.69	26.31	26.32	27.34	27.36	28.08	28.7			30.34	27.38
27-Jul-20	Temperature (°C)		28												26.8			
28-Jul-20	Temperature (°C)						31.22											

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**																
29-Jul-20	Temperature (°C)			27.67	31.9	31.77		31.85								24.29		
30-Jul-20	Temperature (°C)								27.47	27.59	28.26	28.25	29.04	28.88			30.13	28.65
4-Aug-20	Temperature (°C)			24.88	28.44	30.07	29.95									23.44		
5-Aug-20	Temperature (°C)							28.2	26.33	26.62	26.8	26.69	26.32	26			26.48	25.77
11-Aug-20	Temperature (°C)		27.8			30.5	29.91	29.25							23.8	24.06		
12-Aug-20	Temperature (°C)								25.72	27.29	26.26	27.04	27.71	27.23			27.38	20.21
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			25.11	25.16
19-Aug-20	Temperature (°C)			24.61	24.9	28.74	27.39									23.07		
24-Aug-20	Temperature (°C)		24												23.36			
25-Aug-20	Temperature (°C)			23.9	26.15	29.44	25.51									24.12		
26-Aug-20	Temperature (°C)							27.63	25.44	25.83	25.04	26.41	26.12	26.09			21.54	26.26
1-Sep-20	Temperature (°C)			25.84	31.65	30.71	30.19									23.52		
2-Sep-20	Temperature (°C)							29.22	24.79	24.84	25.92	26.03	26.82	26.49			28.39	27.58
7-Sep-20	Temperature (°C)		25.4												24.7			

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		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream					Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	Parameters (Unit)	Guideline																
8-Sep-20	Temperature (°C)			24.99	31.3											24.9		
9-Sep-20	Temperature (°C)					31.33	30.44	29.93										
10-Sep-20	Temperature (°C)								24.79	24.86	25.19	25.34	26.08	26.23			26.57	25.83
15-Sep-20	Temperature (°C)			29.23	32.23	31.63	30.64											
16-Sep-20	Temperature (°C)							29.86	25.01	25.21	26.41	26.45	27.35	26.8			29.15	27.82
21-Sep-20	Temperature (°C)		24.8												25.1			
22-Sep-20	Temperature (°C)			24.43	30.13	29.99	29.25									23.1		
23-Sep-20	Temperature (°C)							28.55	25.02	25.55	25.91	26	26.59	26.31			26.59	26.4
29-Sep-20	Temperature (°C)			27.89	30.14	29.89	29.68									23.32		
30-Sep-20	Temperature (°C)							28.94	25.07	25.2	26.27	26.07	26.72	26.4			27.31	27.1
1-Jul-20	Turbidity (NTU)							1.96	2.33	3.65	4.7	22.4	7.36	10.59			71.37	8.05
2-Jul-20	Turbidity (NTU)			133	8.34	1.97	1.92									44.18		
6-Jul-20	Turbidity (NTU)		32.9												12.56			
7-Jul-20	Turbidity (NTU)			44.28	3.1	3.59										12.29		

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**																
7-Jul-20	Turbidity (NTU) - hypolimnion					2.41												
8-Jul-20	Turbidity (NTU)						2.39	2.39										
8-Jul-20	Turbidity (NTU) - hypolimnion						2.63	4.54										
9-Jul-20	Turbidity (NTU)								3.17	3.43	3.55	6.3	7.07	10.09			28.83	5.48
14-Jul-20	Turbidity (NTU)			29.79	2.95	2.09	2.26									9.98		
15-Jul-20	Turbidity (NTU)							2.57	2.22	2.88	2.82	3.88	5.14	6.47			16.18	3.77
22-Jul-20	Turbidity (NTU)			30.8	5.08	2.97	2.36									948		
23-Jul-20	Turbidity (NTU)							2.36	4.16	2.64	2.94	5.97	12.46	7.11			19.56	10.69
27-Jul-20	Turbidity (NTU)		6.73												4.69			
28-Jul-20	Turbidity (NTU)						2.21											
29-Jul-20	Turbidity (NTU)			171	6.19	2.6		2.23								114		
30-Jul-20	Turbidity (NTU)								2.75	2.75	3.01	3.89	4.96	8.3			9.84	4.03
4-Aug-20	Turbidity (NTU)			97.23	8.86	2.49	1.95									43.34		
5-Aug-20	Turbidity (NTU)							2.42	7.34	4.46	7.9	15.64	25.16	27.66			30.93	10.34

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**																
11-Aug-20	Turbidity (NTU)		19.79			2.01	2.24	2.72							24.74	8.77		
11-Aug-20	Turbidity (NTU) - hypolimnion					3.87	2.41	2.85										
12-Aug-20	Turbidity (NTU)								3.05	2.85	3.81	5.66	8.85	10.31			15.81	4.96
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			17.77	5.84
19-Aug-20	Turbidity (NTU)			31.97	14.24	2.19	2.79									26.31		
24-Aug-20	Turbidity (NTU)		24.2												7.56			
25-Aug-20	Turbidity (NTU)			13.73	2.74	2.85	3.8									20.1		
26-Aug-20	Turbidity (NTU)							3.3	7.34	10.38	7.01	14.1	7.75	7.96\			18.08	11.13
1-Sep-20	Turbidity (NTU)			6.59	2.46	2.13	2.55									8.35		
2-Sep-20	Turbidity (NTU)								4.06	8.64	4.66	7.68	6.23	6.39			9.88	7.32
7-Sep-20	Turbidity (NTU)		1988												14.22			
8-Sep-20	Turbidity (NTU)			26.04	2.28											9.05		
9-Sep-20	Turbidity (NTU)					1.89	2.57	1.6										

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**																
9-Sep-20	Turbidity (NTU) - hypolimnion					2.72	3.87	1.81										
10-Sep-20	Turbidity (NTU)								2.98	4.47	6.56	52.11	12.44	10.37			115	6.8
15-Sep-20	Turbidity (NTU)			6.5	2.83	2.57	2.46											
16-Sep-20	Turbidity (NTU)							2.56	4.05	3.75	3.85	7.4	5.77	6.58			12.56	6.6
21-Sep-20	Turbidity (NTU)		36.37												11.59			
22-Sep-20	Turbidity (NTU)			12.38	2.98	2.4	3.02									16.1		
23-Sep-20	Turbidity (NTU)							2.7	4.57	5.08	5.64	16.43	17.44	7.51			34.66	4.31
29-Sep-20	Turbidity (NTU)			4.57	2.71	3.17	2.76									6.55		
30-Sep-20	Turbidity (NTU)							2.69	3.99	3.44	4.2	8.73	6.31	5.5			11.01	9.51
6-Jul-20	TSS (mg/L)		71.75												17.36			
7-Jul-20	TSS (mg/L)			139.07		<5										22.65		
7-Jul-20	TSS (mg/L) - hypolimnion					25.14												
8-Jul-20	TSS (mg/L)						<5	<5										
8-Jul-20	TSS (mg/L) - hypolimnion						11.01	9.48										
9-Jul-20	TSS (mg/L)								<5	<5	<5	6.35	11.59	16.29			38.29	6.55
11-Aug-20	TSS (mg/L)		39.2			5.9	<5	<5							28.8	18.7		

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	Parameters (Unit)	Guideline																
11-Aug-20	TSS (mg/L) - hypolimnion					30.8	15.6	4.7										
12-Aug-20	TSS (mg/L)								<5	<5	<5	8.7	19.6	16.3			30.2	6.7
13-Aug-20	TSS (mg/L)			276.8														
7-Sep-20	TSS (mg/L)		1,485												18.12			
8-Sep-20	TSS (mg/L)			42.25												23.91		
9-Sep-20	TSS (mg/L)					<5	<5	<5										
9-Sep-20	TSS (mg/L) - hypolimnion					17.39	20.78	9.76										
10-Sep-20	TSS (mg/L)								<5	<5	7.2	30.24	32.68	38.27			197.22	13.28
6-Jul-20	BOD_5 (mg/L)	<1.5	<1												<1			
7-Jul-20	BOD_5 (mg/L)	<1.5		<1		<1										<1		
7-Jul-20	BOD_5 (mg/L) - hypolimnion	<1.5				10.78												
8-Jul-20	BOD_5 (mg/L)	<1.5					<1	<1										
8-Jul-20	BOD_5 (mg/L) - hypolimnion	<1.5					10.84	7.14										
9-Jul-20	BOD_5 (mg/L)	<1.5							8.86	7.32	3.81	<1	<1	<1			<1	<1
11-Aug-20	BOD_5 (mg/L)	<1.5	<1			<1	<1	<1							<1	<1		
11-Aug-20	BOD_5 (mg/L) - hypolimnion	<1.5					8.12	6.01										
12-Aug-20	BOD_5 (mg/L)	<1.5							6.41	4.51	2.01	<1	<1	<1			<1	<1
13-Aug-20	BOD_5 (mg/L)	<1.5		<1														
7-Sep-20	BOD_5 (mg/L)	<1.5	<1												<1			

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	Parameters (Unit)	Guideline																
8-Sep-20	BOD_5 (mg/L)	<1.5		<1												<1		
9-Sep-20	BOD_5 (mg/L)	<1.5				<1	<1	<1										
9-Sep-20	BOD_5 (mg/L) - hypolimnion	<1.5				13.14	13.6	11.86										
10-Sep-20	BOD_5 (mg/L)	<1.5							<1	<1	<1	<1	<1	<1			1.14	<1
11-Aug-20	COD (mg/L)	<5.0	6.6												8.4	6.4		
12-Aug-20	COD (mg/L)	<5.0							5.6	6	7.2	<5.0	9.2	6.0			13.3	12.9
7-Sep-20	COD (mg/L)	<5.0	20.3												<5.0			
8-Sep-20	COD (mg/L)	<5.0														7.2		
10-Sep-20	COD (mg/L)	<5.0							<5.0	<5.0	<5.0	5.2	5.2	<5.0			8.8	13.5
11-Aug-20	NH_3-N (mg/L)	<0.2	<0.2			<0.2									<0.2	<0.2		
11-Aug-20	NH_3-N (mg/L) - hypolimnion	<0.2				1.39	0.79	0.5										
7-Sep-20	NH_3-N (mg/L)	<0.2	<0.2												<0.2			
8-Sep-20	NH_3-N (mg/L)	<0.2		<2												<0.2		
9-Sep-20	NH_3-N (mg/L)	<0.2				<0.2	<0.2	<0.2										
9-Sep-20	NH_3-N (mg/L) - hypolimnion	<0.2				0.88	0.88	<0.2										
11-Aug-20	NO_3-N (mg/L)	<5.0		<0.02		<0.02	<0.02	<0.02							<0.02	<0.02		

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**															
11-Aug-20	NO_3-N (mg/L) - hypolimnion	<5.0				<0.02	<0.02	<0.02									
7-Sep-20	NO_3-N (mg/L)	<5.0	0.1												0.11			
8-Sep-20	NO_3-N (mg/L)	<5.0		<0.02												<0.02		
9-Sep-20	NO_3-N (mg/L)	<5.0				<0.02	<0.02	<0.02										
9-Sep-20	NO_3-N (mg/L) - hypolimnion	<5.0				<0.02	<0.02	<0.02										
6-Jul-20	Faecal coliform (MPN/100 mL)	<1,000	540												1,600			
7-Jul-20	Faecal coliform (MPN/100 mL)	<1,000		1,600		0										540		
7-Jul-20	Faecal coliform (MPN/100 mL) - hypolimnion	<1,000				4												
8-Jul-20	Faecal coliform (MPN/100 mL)	<1,000					17	8										

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	Parameters (Unit)	Guideline																
8-Jul-20	Faecal coliform (MPN/100 mL) - hypolimnion	<1,000					0	7.8										
9-Jul-20	Faecal coliform (MPN/100 mL)	<1,000							8	17	33	130	79	94			540	350
11-Aug-20	Faecal coliform (MPN/100 mL)	<1,000	1,600			2	2	4							1,600	920		
12-Aug-20	Faecal coliform (MPN/100 mL)	<1,000							24	0	33	220	220	1,600			220	280
13-Aug-20	Faecal coliform (MPN/100 mL)	<1,000		920														
7-Sep-20	Faecal coliform (MPN/100 mL)	<1,000	1,600												350			
8-Sep-20	Faecal coliform (MPN/100 mL)	<1,000		1,600												540		

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**															
9-Sep-20	Faecal coliform (MPN/100 mL)	<1,000				23	2	2									
9-Sep-20	Faecal coliform (MPN/100 mL) - hypolimnion	<1,000				0	0	0									
10-Sep-20	Faecal coliform (MPN/100 mL)	<1,000							33	33	79	920	140	540			1,700	1,600
6-Jul-20	Total Coliform (MPN/100 mL)	<5,000	1,600												1,600			
7-Jul-20	Total Coliform (MPN/100 mL)	<5,000		1,600		5										1,600		
7-Jul-20	Total Coliform (MPN/100 mL) - hypolimnion	<5,000				34												
8-Jul-20	Total Coliform (MPN/100 mL)	<5,000					1,600	920										

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**																
8-Jul-20	Total Coliform (MPN/100 mL) - hypolimnion	<5,000					17	13										
9-Jul-20	Total Coliform (MPN/100 mL)	<5,000							1,600	920	1,600	920	920	1,600			1,600	1,600
11-Aug-20	Total Coliform (MPN/100 mL)	<5,000	1,600			5	2	14							920	920		
12-Aug-20	Total Coliform (MPN/100 mL)	<5,000							280	130	1,600	1,600	1,600	1,600			1,600	1,600
13-Aug-20	Total Coliform (MPN/100 mL)	<5,000		1,600														
7-Sep-20	Total Coliform (MPN/100 mL)	<5,000	5,400												1,600			
8-Sep-20	Total Coliform (MPN/100 mL)	<5,000		1,600												920		

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream					Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**																
9-Sep-20	Total Coliform (MPN/100 mL)	<5,000				170	34	130										
9-Sep-20	Total Coliform (MPN/100 mL) - hypolimnion	<5,000				33	170	130										
10-Sep-20	Total Coliform (MPN/100 mL)	<5,000							140	540	920	920	350	1,600			2,800	1,600
11-Aug-20	TKN (mg/L)		<1.5			<1.5	<1.5	<1.5										
11-Aug-20	TKN (mg/L) - hypolimnion			<.5		<1.5	<1.5	<1.5										
13-Aug-20	TKN (mg/L)			<1.5														
7-Sep-20	TKN (mg/L)		<1.5												<1.5			
8-Sep-20	TKN (mg/L)			<1.5												<1.5		
9-Sep-20	TKN (mg/L)					<1.5	<1.5	<1.5										
9-Sep-20	TKN (mg/L) - hypolimnion					<1.5	<1.5	<1.5										
11-Aug-20	TOC (mg/L)		1.72												1.9	1.03		
12-Aug-20	TOC (mg/L)								1.62	1.53	1.51	1.64	1.89	2.3			3.09	1.96
7-Sep-20	TOC (mg/L)		1.68												11.76			
8-Sep-20	TOC (mg/L)															5.08		
10-Sep-20	TOC (mg/L)								1.1	1.18	1.84	1.98	2.35	2.38			5.46	6.02

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**															
11-Aug-20	Phytoplankton Biomass (g dry wt/m³)					2.4	1.8	1									
11-Aug-20	Phytoplankton Biomass (g dry wt/m³) - hypolimnion			269		32.6	13.2	6.4									
13-Aug-20	Phytoplankton Biomass (g dry wt/m³)			269													
8-Sep-20	Phytoplankton Biomass (g dry wt/m³)			44.4													
9-Sep-20	Phytoplankton Biomass (g dry wt/m³)					2.2	2	2.2									
9-Sep-20	Phytoplankton Biomass (g dry wt/m³) - hypolimnion					19.8	20.6	8									
11-Aug-20	Total Phosphorus (mg/L)		0.01			<0.01	<0.01	<0.01									

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**															
11-Aug-20	Total Phosphorus (mg/L) - hypolimnion					<0.01	<0.01	0.01									
13-Aug-20	Total Phosphorus (mg/L)			0.01													
7-Sep-20	Total Phosphorus (mg/L)		0.19											0.08			
8-Sep-20	Total Phosphorus (mg/L)			0.13											0.04		
9-Sep-20	Total Phosphorus (mg/L)					0.04	0.08	0.04									
9-Sep-20	Total Phosphorus (mg/L) - hypolimnion					0.71	0.07	0.24									
11-Aug-20	Total Dissolved Phosphorus (mg/L)		0.01			<0.01	<0.01	<0.01									
11-Aug-20	Total Dissolved Phosphorus (mg/L) - hypolimnion					<0.01	<0.01	<0.01									

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**															
13-Aug-20	Total Dissolved Phosphorus (mg/L)			<0.01													
7-Sep-20	Total Dissolved Phosphorus (mg/L)		0.18												0.07			
8-Sep-20	Total Dissolved Phosphorus (mg/L)			0.12												0.04		
9-Sep-20	Total Dissolved Phosphorus (mg/L)					0.04	0.07	0.05										
9-Sep-20	Total Dissolved Phosphorus (mg/L) - hypolimnion					0.7	0.07	0.24										
11-Aug-20	Hydrogen Sulfide (mg/L)					<0.02	<0.02	<0.02										
11-Aug-20	Hydrogen Sulfide (mg/L) - hypolimnion					<0.02	<0.02	<0.02										
13-Aug-20	Hydrogen Sulfide (mg/L)			0.07														

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream			Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
Date	**Parameters (Unit)**	**Guideline**															
8-Sep-20	Hydrogen Sulfide (mg/L)			0.04													
9-Sep-20	Hydrogen Sulfide (mg/L)					<0.02	<0.02	<0.02									

APPENDIX 5-2: *EFFLUENT CAMP MONITORING RESULTS – Q3 2020*

		Site Name	OSOV 1	OSOV 2 (ESD Camp)	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
03-Jul	pH	6.0 - 9.0	5.99	7.45	8.13
22-Jul	pH	6.0 - 9.0	7.55	6.14	
03-Aug	pH	6.0 - 9.0	7.85	7.29	7.24
17-Aug	pH	6.0 - 9.0	7.18	6.26	7.93
03-Sep	pH	6.0 - 9.0	7.02	7.15	6.95
17-Sep	pH	6.0 - 9.0	7.61	7.59	
03-Jul	Sat. DO (%)		36.5	22	82.9
22-Jul	Sat. DO (%)		50	58.7	
03-Aug	Sat. DO (%)		82.7	48.1	23
17-Aug	Sat. DO (%)		43.1	67.4	22.4
03-Sep	Sat. DO (%)		57.6	35.2	31.9
17-Sep	Sat. DO (%)		51.8	31.7	
03-Jul	DO (mg/L)		2.73	1.71	6.55
22-Jul	DO (mg/L)		5	4.1	
03-Aug	DO (mg/L)		6.2	3.62	1.78
17-Aug	DO (mg/L)		3.71	5.21	1.69
03-Sep	DO (mg/L)		4.19	2.51	2.26
17-Sep	DO (mg/L)		3.91	2.39	
03-Jul	Conductivity (µs/cm)		225	291	571
22-Jul	Conductivity (µs/cm)		273	314	
03-Aug	Conductivity (µs/cm)		230	228	766
17-Aug	Conductivity (µs/cm)		210	260	573
03-Sep	Conductivity (µs/cm)		318	386	781
17-Sep	Conductivity (µs/cm)		423	383	
03-Jul	TDS (mg/L)		112.5	146	286
22-Jul	TDS (mg/L)		137	157	
03-Aug	TDS (mg/L)		165	114	383
17-Aug	TDS (mg/L)		105	130	286.5
03-Sep	TDS (mg/L)		159	193	390.5
17-Sep	TDS (mg/L)		211.5	191.5	
03-Jul	Temperature (°C)		28.3	26.6	29.57
22-Jul	Temperature (°C)		29.8	31.6	
03-Aug	Temperature (°C)		28.1	28.1	26.4
17-Aug	Temperature (°C)		26.6	26.8	28
03-Sep	Temperature (°C)		30.1	31.2	31.8
17-Sep	Temperature (°C)		30.59	30.27	
03-Jul	Turbidity (NTU)		2.12	9.36	7.58
22-Jul	Turbidity (NTU)		2.54	13.9	

20 January 2021

		Site Name	OSOV 1	OSOV 2 (ESD Camp)	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
03-Aug	Turbidity (NTU)		2.41	2.41	10.51
17-Aug	Turbidity (NTU)		2.72	6.95	26.59
03-Sep	Turbidity (NTU)		4.19	6.45	10.03
17-Sep	Turbidity (NTU)		4.19	8.23	
03-Jul	TSS (mg/L)	<50	<5	10.2	67.0
22-Jul	TSS (mg/L)	<50	<5	34.2	
03-Aug	TSS (mg/L)	<50	<5	6.1	31.2
17-Aug	TSS (mg/L)	<50	<5	7.3	160.9
03-Sep	TSS (mg/L)	<50	<5	9.8	34.6
17-Sep	TSS (mg/L)	<50	<5	13.7	
03-Jul	BOD_5 (mg/L)	<30	<6	14.04	<6
22-Jul	BOD_5 (mg/L)	<30	<6	20	
03-Aug	BOD_5 (mg/L)	<30	<6	<6	<6
17-Aug	BOD_5 (mg/L)	<30	<6	<6	<6
03-Sep	BOD_5 (mg/L)	<30	<6	<6	<6
17-Sep	BOD_5 (mg/L)	<30	8.28	<6	
03-Jul	COD (mg/L)	<125	n/a	n/a	n/a
22-Jul	COD (mg/L)	<125	n/a	n/a	
03-Aug	COD (mg/L)	<125	n/a	n/a	n/a
17-Aug	COD (mg/L)	<125	<25	<25	186
03-Sep	COD (mg/L)	<125	<25	<25	68.6
17-Sep	COD (mg/L)	<125	<25	31	
03-Jul	NH_3-N (mg/L)	<10.0	n/a	n/a	n/a
22-Jul	NH_3-N (mg/L)	<10.0	n/a	n/a	
03-Aug	NH_3-N (mg/L)	<10.0	n/a	n/a	n/a
17-Aug	NH_3-N (mg/L)	<10.0	<1.5	7.0	25.6
03-Sep	NH_3-N (mg/L)	<10.0	8.9	<2	37.6
17-Sep	NH_3-N (mg/L)	<10.0	4.4	14.4	
03-Jul	Total Nitrogen (mg/L)	<10.0	n/a	n/a	n/a
22-Jul	Total Nitrogen (mg/L)	<10.0	n/a	n/a	
03-Aug	Total Nitrogen (mg/L)	<10.0	n/a	n/a	n/a
17-Aug	Total Nitrogen (mg/L)	<10.0	4.29	8.13	27.3
03-Sep	Total Nitrogen (mg/L)	<10.0	13.4	1.11	61.1
17-Sep	Total Nitrogen (mg/L)	<10.0	5.39	20.4	
03-Jul	Total Phosphorus (mg/L)	<2	n/a	n/a	n/a
22-Jul	Total Phosphorus (mg/L)	<2	n/a	n/a	
03-Aug	Total Phosphorus (mg/L)	<2	n/a	n/a	n/a
17-Aug	Total Phosphorus (mg/L)	<2	0.74	0.46	0.48
03-Sep	Total Phosphorus (mg/L)	<2	1	1.18	3.76
17-Sep	Total Phosphorus (mg/L)	<2	1	1.22	

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		Site Name	OSOV 1	OSOV 2 (ESD Camp)	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
03-Jul	Oil & Grease (mg/L)	<10.0	n/a	n/a	n/a
22-Jul	Oil & Grease (mg/L)	<10.0	n/a	n/a	
03-Aug	Oil & Grease (mg/L)	<10.0	n/a	n/a	n/a
17-Aug	Oil & Grease (mg/L)	<10.0	<1	<1	<1
03-Sep	Oil & Grease (mg/L)	<10.0	3	<1	<1
17-Sep	Oil & Grease (mg/L)	<10.0			
03-Jul	Total coliform (MPN/100 mL)	<400	920	16,000	79
22-Jul	Total coliform (MPN/100 mL)	<400	350	20,000	
03-Aug	Total coliform (MPN/100 mL)	<400	920	0	0
17-Aug	Total coliform (MPN/100 mL)	<400	1,600	0	0
03-Sep	Total coliform (MPN/100 mL)	<400	1,600	0	0
17-Sep	Total coliform (MPN/100 mL)	<400	1,600	16,000	
03-Jul	Faecal Coliform (MPN/100 mL)	<400	540	16,000	0
22-Jul	Faecal Coliform (MPN/100 mL)	<400	350	20,000	
03-Aug	Faecal Coliform (MPN/100 mL)	<400	540	0	0
17-Aug	Faecal Coliform (MPN/100 mL)	<400	540	0	0
03-Sep	Faecal Coliform (MPN/100 mL)	<400	1,600	0	0
17-Sep	Faecal Coliform (MPN/100 mL)	<400	170	16,000	
03-Jul	Effluent Discharge Volume (L/mn)		6	3	900
22-Jul	Effluent Discharge Volume (L/mn)		6	4	
03-Aug	Effluent Discharge Volume (L/mn)		6	12	1450
17-Aug	Effluent Discharge Volume (L/mn)		6	12	2000
03-Sep	Effluent Discharge Volume (L/mn)		6	3.75	1410
17-Sep	Effluent Discharge Volume (L/mn)		6	6	
03-Jul	Chlorination Dosing Rate (mL/mn)		n/a	15	250
22-Jul	Chlorination Dosing Rate (mL/mn)		n/a	51	
03-Aug	Chlorination Dosing Rate (mL/mn)		n/a	30	135
17-Aug	Chlorination Dosing Rate (mL/mn)		n/a	26	500
03-Sep	Chlorination Dosing Rate (mL/mn)		n/a	40	350

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		Site Name	OSOV 1	OSOV 2 (ESD Camp)	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
17-Sep	Chlorination Dosing Rate (mL/mn)		n/a		
03-Jul	Residual Chlorine (mg/L)	<1.0	n/a	0.4	1.19
22-Jul	Residual Chlorine (mg/L)	<1.0	n/a	0.0	
03-Aug	Residual Chlorine (mg/L)	<1.0	n/a	0.3	0.96
17-Aug	Residual Chlorine (mg/L)	<1.0	n/a	0.6	0.71
03-Sep	Residual Chlorine (mg/L)	<1.0	n/a	1.20	1.18
17-Sep	Residual Chlorine (mg/L)	<1.0	n/a	0.04	

APPENDIX 5-3: *GROUNDWATER QUALITY MONITORING RESULTS – Q3 2020*

		Site Name	**Phouhomxay Village**		**Somseun Village**	**Nampa Village**	**Thongnoy Village**	**Pou Village**
Month Year	**Parameter (Unit)**	**Station**	**GPHX01**	**GPHX02**	**GSXN01**	**GNPA01**	**GTHN01**	**GPOU 01**
		Guideline						
06-Jul-20	pH	6.5 - 9.2						7.3
13-Jul-20	pH	6.5 - 9.2			7.28	7.01	7.79	
24-Jul-20	pH	6.5 - 9.2	6.74	6.57				
11-Aug-20	pH	6.5 - 9.2						8.53
21-Aug-20	pH	6.5 - 9.2	7.63	8.21	8.5	8.68	8.44	
14-Sep-20	pH	6.5 - 9.2	6.28	6.76	6.86	7.08	6.82	7.72
06-Jul-20	Sat. DO (%)							96.8
13-Jul-20	Sat. DO (%)				79.9	92	75.8	
24-Jul-20	Sat. DO (%)		32	36				
11-Aug-20	Sat. DO (%)							90.7
21-Aug-20	Sat. DO (%)		49.2	48.6	78.5	84.2	56.3	
14-Sep-20	Sat. DO (%)		40	43.8	89.9	99.1	52	83.2
06-Jul-20	DO (mg/l)							6.92
13-Jul-20	DO (mg/l)				6.03	7.13	5.73	
24-Jul-20	DO (mg/l)		2.44	2.75				
11-Aug-20	DO (mg/l)							6.69
21-Aug-20	DO (mg/l)		4.05	4.01	6.41	6.85	5.32	
14-Sep-20	DO (mg/l)		3.22	3.58	6.84	7.58	3.95	6.34
06-Jul-20	Conductivity (µS/cm)							58.2
13-Jul-20	Conductivity (µS/cm)				255	374	296	
24-Jul-20	Conductivity (µS/cm)		122.2	256				

Month Year	Parameter (Unit)	Site Name	Phouhomxay Village		Somseun Village	Nampa Village	Thongnoy Village	Pou Village
		Station	GPHX01	GPHX02	GSXN01	GNPA01	GTHN01	GPOU 01
		Guideline						
11-Aug-20	Conductivity (µS/cm)							8.6
21-Aug-20	Conductivity (µS/cm)		163	421	314	402	450	
14-Sep-20	Conductivity (µS/cm)		193	425	323	427	3.85	12.59
06-Jul-20	Temperature (°C)							30.3
13-Jul-20	Temperature (°C)				28.1	26.8	28.2	
24-Jul-20	Temperature (°C)		27.6	27.5				
11-Aug-20	Temperature (°C)							28.5
21-Aug-20	Temperature (°C)		25.29	25.05	25.54	25.77	25.52	
14-Sep-20	Temperature (°C)		26.32	26.09	29.6	29.3	30.05	26.9
06-Jul-20	Turbidity (NTU)	<20						2.42
13-Jul-20	Turbidity (NTU)	<20			2.4	1.83	2.08	
24-Jul-20	Turbidity (NTU)	<20	3.64	4.56				
11-Aug-20	Turbidity (NTU)	<20						5.8
21-Aug-20	Turbidity (NTU)	<20	6.62	4.61	2.69	2.45	2.73	
14-Sep-20	Turbidity (NTU)	<20	5.46	10.02	2.34	2.43	2.41	3.43
06-Jul-20	Fecal coliform (MPN/100ml)	0						4.5
13-Jul-20	Fecal coliform (MPN/100ml)	0			2	4.5	49	
24-Jul-20	Fecal coliform (MPN/100ml)	0	47	7.8				
11-Aug-20	Fecal coliform (MPN/100ml)	0						79
21-Aug-20	Fecal coliform (MPN/100ml)	0	33	0	2	0	49	

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Month Year	Parameter (Unit)	Site Name	Phouhomxay Village		Somseun Village	Nampa Village	Thongnoy Village	Pou Village
		Station	GPHX01	GPHX02	GSXN01	GNPA01	GTHN01	GPOU 01
		Guideline						
14-Sep-20	Fecal coliform (MPN/100ml)	0	4.5	11	4.5	4.5	240	350
06-Jul-20	E.coli Bacteria (MPN/100ml)	0						4.5
13-Jul-20	E.coli Bacteria (MPN/100ml)	0			2	4.5	33	
24-Jul-20	E.coli Bacteria (MPN/100ml)	0	40	7.8				
11-Aug-20	E.coli Bacteria (MPN/100ml)	0						79
21-Aug-20	E.coli Bacteria (MPN/100ml)	0	23	0	2	0	49	
14-Sep-20	E.coli Bacteria (MPN/100ml)	0	4.5	11	4.5	4.5	240	350
14-Sep-20	Arsenic (mg/)	<0.05	0.005	0.012	0.0013	0.0009	0.0019	<0.0003
14-Sep-20	Cadmium (mg/l)	<0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
14-Sep-20	Total Iron (mg/l)	<1	2.34	1.24	0.017	0.032	0.042	0.059
14-Sep-20	Manganese (mg/l)	<0.5	0.03	0.01	<0.005	<0.005	0.016	0.014
14-Sep-20	Mercury (mg/l)	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
14-Sep-20	Lead (mg/l)	<0.05	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008

APPENDIX 5-4: GRAVITY FED WATER SUPPLY MONITORING RESULTS – Q3 2020

		Site Name	Thaheua Village	Hat Gnuin Village	Phouhomxay Village		
		Station	WTHH02	WHGN02	WPHX01	WPHX02	WPHX03
Date	Parameter (Unit)	Guideline					
13-Jul-20	pH	6.5 - 8.6	8.02	7.89	8.03	8.54	8.72
21-Aug-20	pH	6.5 - 8.6	8.15	7.96	8.01	7.83	7.4
14-Sep-20	pH	6.5 - 8.6	6.78	6.64	7.24	6.89	6.44
13-Jul-20	Sat. DO (%)		103.6	97.2	100.9	94	101.4
21-Aug-20	Sat. DO (%)		92.5	91.3	97.3	87.9	92.6
14-Sep-20	Sat. DO (%)		118.1	109.7	117.1	110.3	112
13-Jul-20	DO (mg/L)		7.54	7.34	7.87	6.97	7.47
21-Aug-20	DO (mg/L)		7.4	7.37	8.18	7.11	7.55
14-Sep-20	DO (mg/L)		8.77	8.53	9.55	8.24	8.39
13-Jul-20	Conductivity (µS/cm)	<1,000	26.2	152.6	38.6	39.6	42.2
21-Aug-20	Conductivity (µS/cm)	<1,000	21	30	10	9	9
14-Sep-20	Conductivity (µS/cm)	<1,000	35	50	9	10	10
13-Jul-20	Temperature (°C)	<35	28.18	28.3	26.4	28.9	29.5
21-Aug-20	Temperature (°C)	<35	26.8	26.26	24.09	26.14	25.75
14-Sep-20	Temperature (°C)	<35	31.04	28.19	25.69	30.68	30.42
13-Jul-20	Turbidity (NTU)	<10	8.78	13.04	2.03	2.12	1.87
21-Aug-20	Turbidity (NTU)	<10	13.9	11.35	3.37	2.56	2.64
14-Sep-20	Turbidity (NTU)	<10	4.5	3.21	2.21	2.53	2.61
13-Jul-20	Faecal Coliform (MPN/100 mL)	0	1,600	170	130	79	79
21-Aug-20	Faecal Coliform (MPN/100 mL)	0	1,600	1600	540	540	33
14-Sep-20	Faecal Coliform (MPN/100 mL)	0	8	17	14	17	27
13-Jul-20	E.coli Bacteria (MPN/100 mL)	0	1,600	170	130	79	79
21-Aug-20	E.coli Bacteria (MPN/100 mL)	0	540	920	540	240	33
14-Sep-20	E.coli Bacteria (MPN/100 mL)	0	8	17	14	17	27
14-Sep-20	Arsenic (mg/L)	<0.05	<0.0003	<0.0003		<0.0003	<0.0003
14-Sep-20	Cadmium (mg/L)	<0.003	<0.002	<0.002		<0.002	<0.002
14-Sep-20	Iron (mg/L)		0.12	0.086		0.114	0.112
14-Sep-20	Lead (mg/L)	<0.01	<0.01	<0.01		<0.01	<0.01
14-Sep-20	Manganese (mg/L)	<0.5	0.009	0.014		0.006	<0.005
14-Sep-20	Mercury (mg/L)	<0.001	<0.0002	<0.0002		<0.0002	<0.0002

APPENDIX 5-5: LANDFILL LEACHATE MONITORING RESULTS – Q3 2020

		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							
3-Jul-20	pH	6.0-9.0				8.56		7.93	
17-Aug-20	pH	6.0-9.0					7.95	7.46	
3-Sep-20	pH	6.0-9.0				8.72		7.39	
3-Jul-20	Sat. DO (%)					85		94.3	
17-Aug-20	Sat. DO (%)						117.7	135.2	
3-Sep-20	Sat. DO (%)					128.8		139.4	
3-Jul-20	DO (mg/L)					6.44		7.1	
17-Aug-20	DO (mg/L)						9.06	10.23	
3-Sep-20	DO (mg/L)					8.76		9.15	
3-Jul-20	Conductivity (µS/cm)					81.5		256	
17-Aug-20	Conductivity (µS/cm)						84.6	269	
3-Sep-20	Conductivity (µS/cm)					38.3		313	
3-Jul-20	Temperature (°C)					27.9		28.3	
17-Aug-20	Temperature (°C)						27	27.9	
3-Sep-20	Temperature (°C)					32.9		32.5	
3-Jul-20	Turbidity (NTU)					22.22		14.57	
17-Aug-20	Turbidity (NTU)						7.18	10.31	
3-Sep-20	Turbidity (NTU)					4.32		10.2	
3-Jul-20	BOD_5 (mg/L)	<30				<6		7.77	
17-Aug-20	BOD_5 (mg/L)	<30					<6	7.11	
3-Sep-20	BOD_5 (mg/L)	<30				<6		10.47	
17-Aug-20	COD (mg/L)	<125					<25	64.8	
3-Sep-20	COD (mg/L)	<125				<25		91.6	
3-Jul-20	Faecal Coliform (MPN/100mL)	<400				17		14	
17-Aug-20	Faecal Coliform (MPN/100mL)	<400					130	33	
3-Sep-20	Faecal Coliform (MPN/100mL)	<400				0		1,600	
3-Jul-20	Total Coliform (MPN/100mL)	<400				1,700		920	
17-Aug-20	Total Coliform (MPN/100mL)	<400					920	1,600	
3-Sep-20	Total Coliform (MPN/100mL)	<400				240		1,600	
17-Aug-20	Total nitrogen (mg/L)	<10					1.53	6.76	

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		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**							
3-Sep-20	Total nitrogen (mg/L)	<10				1.85		5.58	
17-Aug-20	Lead (mg/L)	<0.2					<0.010	<0.010	
3-Sep-20	Lead (mg/L)	<0.2				<0.010		<0.010	
17-Aug-20	Copper (mg/L)						<0.006	<0.006	
3-Sep-20	Copper (mg/L)					<0.006		<0.006	
17-Aug-20	Iron (mg/L)						0.309	0.981	
3-Sep-20	Iron (mg/L)					<0.01		0.166	
17-Aug-20	Ammonia nitrogen (mg/L)	<10					<2.0	6.20	
3-Sep-20	Ammonia nitrogen (mg/L)	<10				<2		4.40	
17-Aug-20	Oil & Grease (mg/L)	<10					<1	<1	
3-Sep-20	Oil & Grease (mg/L)	<10				<1		<1	