NAM NGIEP 1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Quarterly Environment Monitoring Report
Second Quarter of 2020

April to June 2020

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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 Q2 2020, the Environmental Management Office (EMO) of NNP1PC received one Detail Work Programme (DWP) & Site Specific Environmental and Social Management and Monitoring Plan (SS-ESMMP) for review and approval. Two DWP & SS-ESMMP carried over from Q1 2020 were no longer active due to completion of the construction work. A total of eight Observations of Non-Compliance (ONCs) and one Non-Compliance Report Level 1 (NCR-Level 1) were active, (six ONCs carried over from Q1 2020, and two ONCs and one NCR were newly opened). Out of these, four ONCs were resolved during the reported period. Four ONCs and one NCR will be carried over to Q3 2020.

A total of 21 decommissioned construction sites and associated facilities were fully re-vegetated with local grass and local tree species. Two sites are pending rehabilitation: (i) LILAMA10 camp, until the country's COVID–19 lockdown is lifted; and (ii) the irrigation canal spoil disposal, until mid-wet season 2020. The Contractors are continuing aftercare and monitoring of the rehabilitated sites by routine inspections, replacing dead trees and adding new grasses and trees where necessary.

During Q2 2020, a total of 55 m^3 of solid waste from NNP1 project sites and camps was disposed of at the NNP1 Project Landfill, a decrease of 15.5 m^3 compared to Q1 2020. A total of 57.7 m^3 of solid waste from Phouhomxay, Thaheua and Hat Gniun villages was disposed of at the Houay Soup Landfill. A total of 3,137 kg of recyclable waste was recorded at the Community Waste Bank, and the villagers collected a total of 2,722 kg of food waste from the Owner's Site Office and Village (OSOV) for feeding their animals.

During the Q2 2020, Dissolved Oxygen (DO) levels at the surface of the Main Reservoir (R01, R02, R03, R04 and R05), Nam Ngiep Upstream station (NNG01), Nam Chian (NCH01) and Nam Phouan (NPH01) were generally above 6 mg/L. In addition, the DO levels in Nam Xao and Nam Houay Soup were above 6 mg/L, except for a couple of measurements.

The DO levels at the surface in the Re-regulation Reservoir (R07) were between 1.1 – 3.8 mg/L. During the periods with gate discharges (on 01 April, 08 April and 04 June 2020), the DO levels in the downstream stations remained above 6 mg/L, but fell below 6 mg/L during periods with turbine discharges.

The depth profiles monitoring indicates formation of oxyclines and thermal stratification in the main reservoir at all stations at depths between 2.5 – 11.0 m, except at R01. An anoxic condition was also observed in some stations.

Most of the watershed management activities under AIP2019 in both provinces were postponed until end of April 2020 due to the country's COVID-19 lockdown. Official handover ceremonies of the procured office and field equipment under NNP1PC additional No Net Loss (NNL) commitment to support the Watershed and Reservoir Protection Office (WRPO) of Xaysomboun and Bolikhamxay Provinces in implementing their AIP2019 activities were organized on 08 May 2020 in Bolikhamxay Province and 20 May 2020 in Xaysomboun Province respectively. The final technical consultation with relevant GOL offices on a final draft of NNP1 Reservoir Fishery Co-Management Plan (RFCM), a draft Xaysomboun regulation on the fishery management and a draft sustainable livelihood assessment report was organized on 21-22 May 2020. Bolikhamxay commenced reservoir patrolling activity in the reservoir Zone 2 in the third week of May 2020. Xaysomboun Provincial WRPO conducted the TPZ boundary survey and verification in Hom and Anouvong District between 08-26 June 2020. Reservoir patrolling was also carried out in the reservoir zone 4 of Thathom District and reservoir zone 2 and 3 of Hom District between 19-26 June 2020.

The NC-NX Biodiversity Offset Management AIP2020 was approved by ADB on 03 March 2020. The plan was approved by Bolikhamxay Provincial Biodiversity Offset Management Committee (BOMC) on 30 March 2020 and the fund was disbursed from DOF-MAF to Bolikhamxay Provincial Biodiversity Offset Management Unit (BOMU) on 08 June 2020. The management activities under spatial planning, law enforcement, and conservation linked livelihood progressed during this reported period.

The five types of species that dominated the fish catch by weight in Q2 2020 include one species (*Channa striata*) and four species group of Hampala, Poropuntius, *Sikukia gudgeri* and *Amblyrhynchichthys truncatus* and Barbonymus and Hypsibarbus that are classified as Least Concern (LC) according to the IUCN Red List of Threatened Species, except *Sikukia gudgeri* is classified as Data Deficient (DD). The recorded catch of threatened species includes four Vulnerable species (VU) and four Near Threatened species (NT).

2 INTRODUCTION

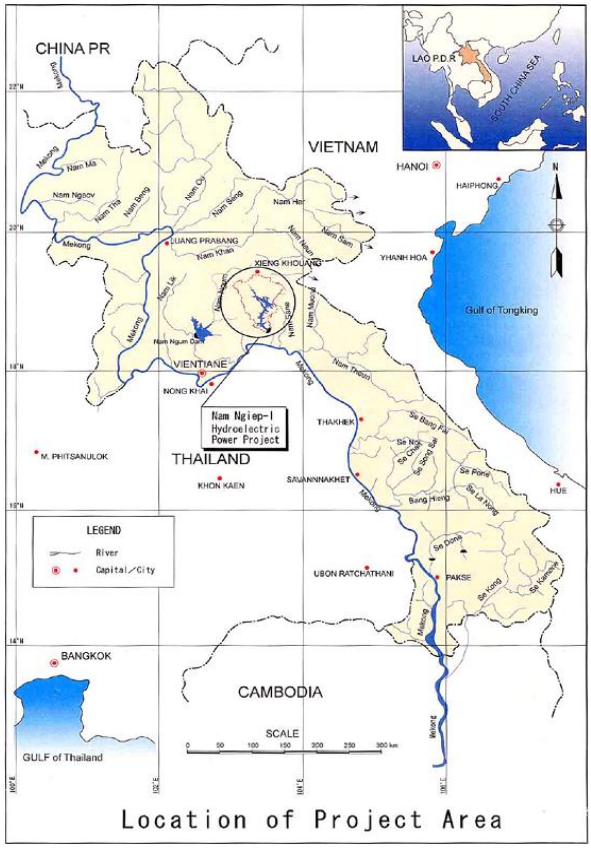
The Nam Ngiep originates in the mountains of Xieng Khouang Province, flowing through Khoun District into Thathom District of Xaysomboun Province, through Hom District and into Bolikhan District of Bolikhamxay Province. The Nam Ngiep meets the Mekong River just upstream from Paksan in Bolikhamxay Province.

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 **Q2 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 Q2 2020.

3.1 Contractor SS-ESMMPs

During Q2 2020, the Environmental Management Office (EMO) of NNP1PC received one Detailed Work Programme (DWP) & Site Specific Environmental and Social Management and Monitoring Plan (SS-ESMMP) for review and approval. Two DWP & SS-ESMMP carried over from the Q1 2020 were no longer active due to completion of the construction work.

The status of the submitted documents in Q2 2020 is shown in **Table 3-1** and more details can be found in ***Appendix 1***.

TABLE 3-1*: DOCUMENT REVIEWED DURING Q2 2020*

Document Name	Rev. 1	Rev. 2	Rev. 3	Approved
DWP & SS-ESMMP for construction work of Improvement and Drilling Boreholes in the Phouhomxay Resettlement Village	√			√
DWP & SS-ESMMP for the Installation of Double Corrosion Protection Rock Bolts at the Left Bank Slope		√		No longer active (Construction work was completed)
DWP & SS-ESMMP for Supply and Installation of Log Booms at the Main Dam and Re-regulation Dam of Namngiep 1 Hydropower Project		√		No longer active (Construction work was completed)

3.2 Results of Compliance Inspections at Construction Sites

During Q2 2020, the EMO conducted weekly and bi-weekly follow-up inspections at 30 sites including permanent and temporary contractor camps, and sites under decommissioning and rehabilitation. This is an increase of two sites (ground water well construction site and temporary camp in Phouhomxay resettlement village) compared to Q1 2020.

The status of Non-Compliance Reports (NCRs) and ONCs are summarized in **Table 3-2**, **Figure 3-1** and

Figure 3-2. The progress of corrective actions is presented in **Appendix 2**.

TABLE 3-2: STATUS OF NON-COMPLIANCE REPORT DURING Q2 2020

Status	ONC	NCR-Level 1	NCR-Level 2	NCR-Level 3	Incident Report
Carried over ONC/NCR from the previous quarter	6	0	0	0	0
Newly opened ONC/NCR in Q2 2020	2	1	0	0	0
Total No. of ONC/NCR in Q2 2020	**8**	**1**	**0**	**0**	**0**
Resolved ONC/NCR in Q2 2020	4	0	0	0	0
Unresolved ONC/NCR carried forward to the next quarter	**4**	**1**	**0**	**0**	**0**

FIGURE 3-1: STATUS OF ONCS DURING Q2 2020

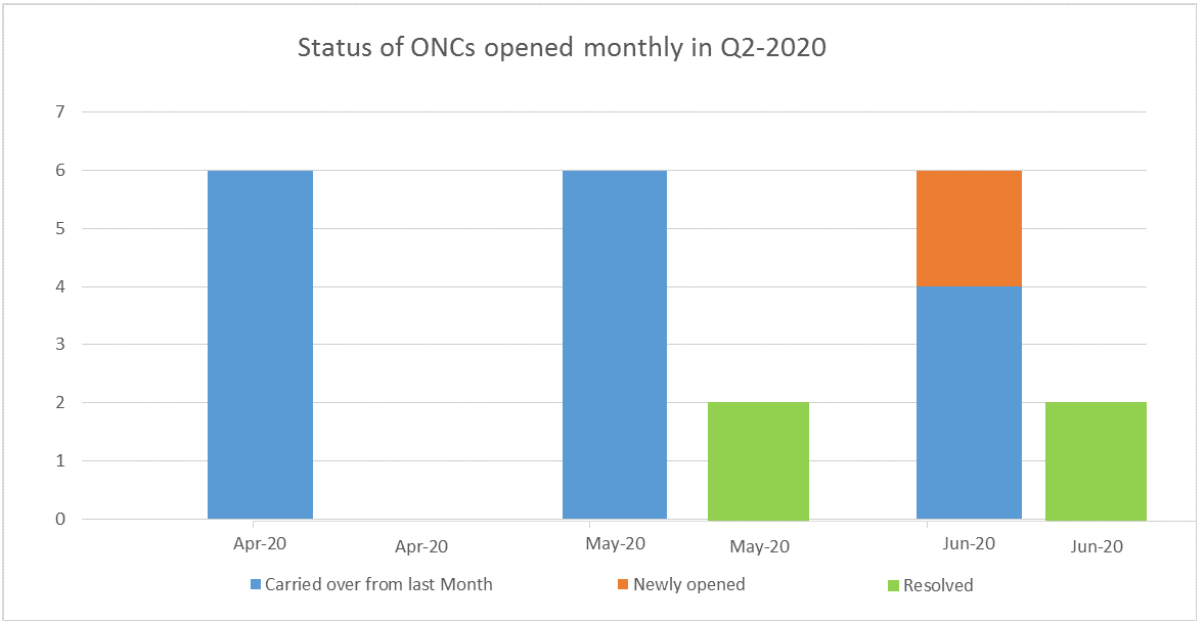
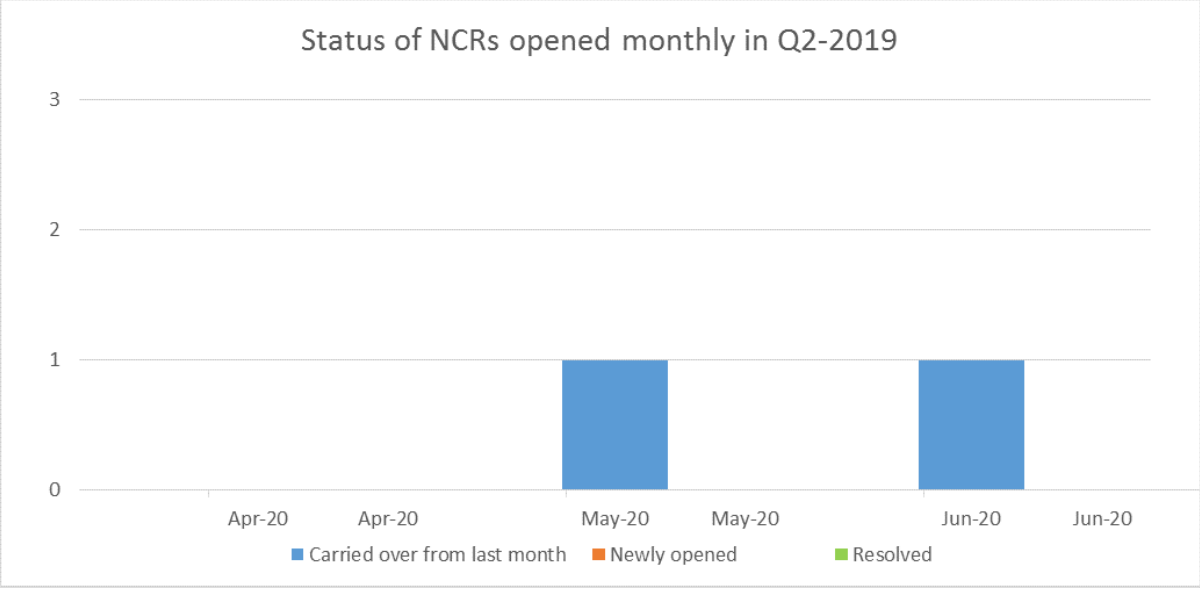


FIGURE 3-2*: STATUS OF NCRS DURING Q2 2020*



3.3 Results of Site Decommissioning and Rehabilitation

The status of site rehabilitation and revegetation is summarized in **Table 3-3** and the revegetated sites are shown in **Figure 3-3** together with the relevant photo documentation.

Out of the total 23 sites that are required to be decommissioned and rehabilitated, 22 sites were successfully decommissioned by the end of March 2020 and rehabilitation has been

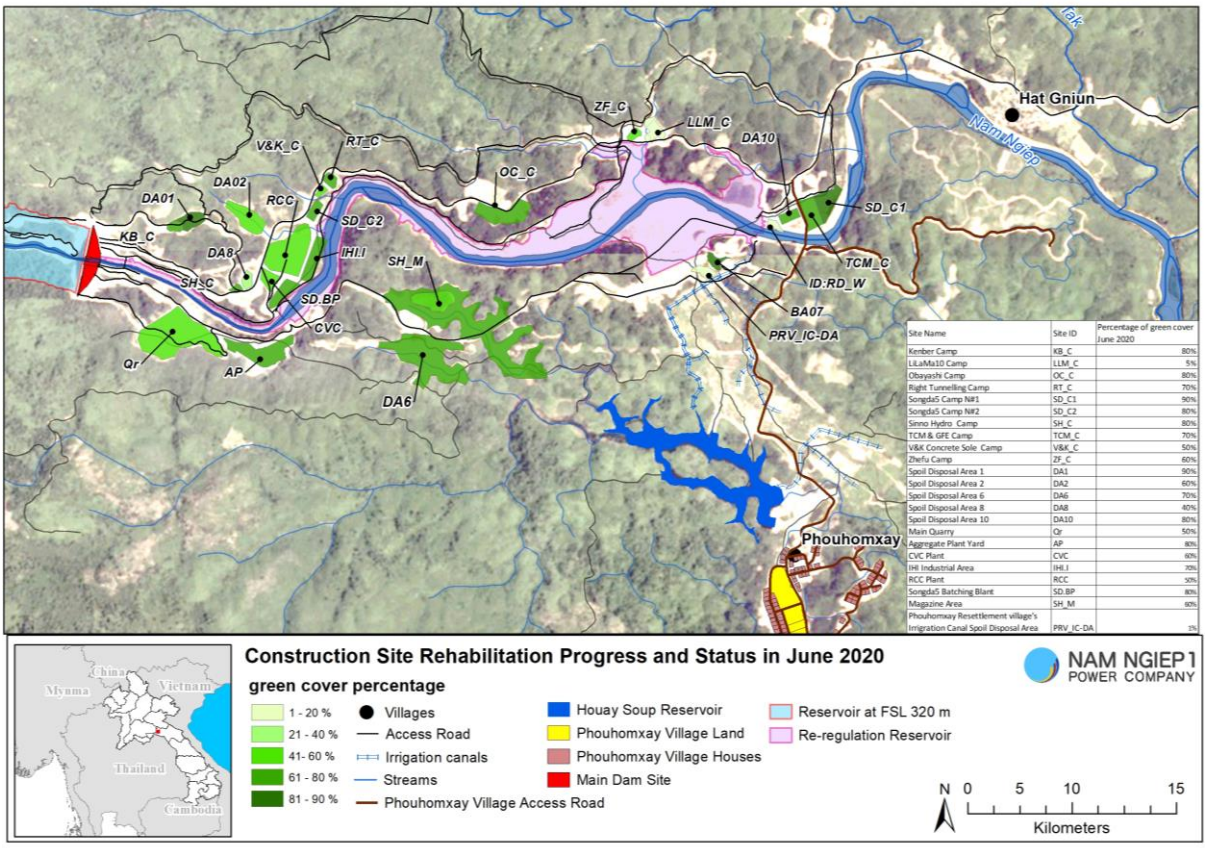
ongoing at all sites following the Construction Site Decommissioning and Rehabilitation Plan (CSDRP). All areas with suitable soil and site conditions within 21 sites (except the former LILAMA 10 Camp and the irrigation canal spoil disposal area) were successfully re-vegetated with local grass including 3 sites (former V&K camp, Song Da5 camp 1 and OC camp) where the local tree species were planted. The Civil Works Contractor has appointed sub-contractors to maintain the 13 on-going revegetated sites until the contractor's liability period by January 2021.

The two sites, former LILAMA10 camp and irrigation canal spoil disposal is pending rehabilitation. The HM Hydro Contractor responded to the NCR level 1 dated 15 April 2020 that they will complete the revegetation work for the former LILAMA 10 camp after the country's COVID-19 lockdown is lifted. The VSP contractor was instructed to carry out the revegetation for the irrigation canal spoil disposal during this wet season.

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

No	Site Name	Status of Decommissioning	Status of Re-vegetation	Percentage of green cover
01	KENBER camp	Completed	Completed	80
02	LILAMA10 camp	Completed	Pending	5
03	OBAYASHI camp	Completed	On-going	80
04	Right Tunnelling camp	Completed	On-going	70
05	Song Da5 camp no.1	Completed	On-going	90
06	Song Da5 camp no.2	Completed	On-going	80
07	TCM and GFE camp	Completed	Completed	70
08	V&K camp	Completed	On-going	50
09	ZHEFU camp	Completed	Completed	60
10	Sino Hydro camp	Completed	Completed	80
11	Spoil disposal no.1	Completed	Completed	90
12	Spoil Disposal No.2 & Main Dam Workshop	Completed	On-Going	60
13	Spoil disposal no.6	Completed	On-going	70
14	Spoil disposal no.8	Completed	On-going	40
15	Spoil disposal no.10	Completed	Completed	80
16	Main quarry	Completed	On-going	50
17	Aggregate plant yard	Completed	Completed	80
18	CVC plant yard	Completed	On-going	60
19	RCC plant yard	Completed	On-going	50
20	IHI field shop & labour camp	Completed	Completed	70
21	Song Da5 batching plant & stock yard	Completed	On-going	90
22	Song Da5 magazine	Completed	On-going	60
23	Irrigation canal spoil disposal Area *(Phouhomxay village)*	No need	Pending	1

FIGURE 3-3*: REVEGETATED SITES MAP*



PHOTOGRAPH 1: JOINT SITE INSPECTION OF ONE YEAR LIABILITY COMPLETION FOR THE MAIN ROAD TO PHOUHOMXAY VILLAGE

PHOTOGRAPH 2: JOINT SITE INSPECTION OF WORK COMPLETION FOR THE WATER SUPPLY IMPROVEMENT IN THE PHOUHOMXAY VILLAGE

PHOTOGRAPH 3: JOINT SITE INSPECTION FOR THE WORK COMPLETETION OF SUB-IRRIGATION CANALS CONSTRUCTION IN THE PHOUHOMXAY VILLAGE

PHOTOGRAPH 4: MONRE, BOLIKHAMXAY AND XAYSOMBOUN PONRE, BOLIKHAN AND THATHOM DONRE SITE VISIT ON 10 JUNE 2020

3.4 WASTE MANAGEMENT AT THE CONSTRUCTION SITES

3.4.1 General Waste Management

The solid waste management during Q2 2020 is summarized below:

- a total of 55 m^3 of solid waste from NNP1 project sites and camps was disposed of at the NNP1 Project Landfill, a decrease of 15.5 m^3 compared to Q1 2020.
- a total of 57.7 m^3 of solid waste from Phouhomxay, Thaheua and Hat Gniun villages was disposed of at the Houay Soup Landfill.
- a total of 3,137 kg of recyclable waste was recorded at the Community Waste Bank and villagers collected a total of 2,722 kg of food waste from the Owner's Site Office and Village (OSOV) for feeding their animals.

No recyclable waste was sold during Q2 2020 and the amounts of accumulated recyclable waste is shown in **Table 3-4**.

TABLE 3-4: *AMOUNTS OF RECYCLABLE WASTE DURING Q2 2020*

Source and Type of Recyclables		Unit	Total in Q2 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	Glass bottles	kg	53	0	53
3	Plastic bottles	kg	50	0	50
4	Aluminium cans	kg	48	0	48
5	Paper/Cardboard	kg	48	0	48
Sub-Total 2		**kg**	**199**	**0**	**199**
Grand Total 1+2		**kg**	**199**	**0**	**199**

3.4.2 Hazardous Waste Management

During Q2 2020, the joint hazardous materials and waste inventory monitoring missions were carried out at the remaining active sites and camps including NNP1PC's warehouse and OSOV camps. The amounts of hazardous waste and hazardous materials that were collected, stored and disposed of during Q2 2020 are shown in **Table 3-5**. 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 disposed of by Khounmixay Processing Factory.

TABLE 3-5: *HAZARDOUS MATERIAL AND HAZARDOUS WASTE RECORDED DURING Q2 2020*

No.	Type of Hazardous Material & Hazardous Waste	Unit	Total in Q2 2020	Used/ Disposed	Remaining
01	Diesel (fuel)	Litter	17,439	17,023	416
02	Gasoline	Litter	1000	175	825
03	Lubricants (turbine oil)	Litter	6,400	5754	646
04	Grease oil	Drum (30L)	29	0	29
05	Gear oil	Litter	100	0	100
06	Thinner	Drum (25L)	1	0	1
07	Colour paint	Can (3L)	3	0	3
08	Sika	Can (0.5L)	7	0	7
09	Fire extinguishers (18.5 kg)	Unit	8	0	8
10	Chlorine powder	Kg	70	5	65
11	Chlorine liquid	Litter	117	57	60
12	Used oil	Litre	72	40	112
13	Ink cartridge	Unit	142	0	142
14	Halogen/fluorescent bulbs	Unit	209	0	209
15	Empty spray can	Can	101	0	101
16	Used tire	Unit	0	0	0
17	Used battery	Unit	0	0	0
18	Oil water mixture	Litre	0	0	0

No.	Type of Hazardous Material & Hazardous Waste	Unit	Total in Q2 2020	Used/ Disposed	Remaining
19	Contaminated soil/sand	m^3	0.39	0	0.39
20	Clinic waste	kg	8.1	0	8.1

3.5 COMMUNITY WASTE MANAGEMENT SUPPORT

3.5.1 Animal Fodder (Pig Feed) Collection Programme

During Q2 2020, local villagers collected 2,722 kg of food waste from the Owner's Site Office and Village (OSOV) for feeding their animals, an increase of 852 kg compared to Q1 2020.

3.5.2 Community Solid Waste Management and Recycling Programme

During Q2 2020, the Community Recycle Waste Bank collected a total of 457 kg of glass bottles (442 kg from the Landfill recycling centres and 15 kg from the host villages) as summarized in **Table 3-6**.

TABLE 3-6: *AMOUNTS OF RECYCLABLE WASTE SOLD AT THE COMMUNITY RECYCLE WASTE BANK*

Type of Waste	Unit	Remaining in Q1 2020	Purchased in Q2 2020	Sold	Remaining in Q2 2020
Glass bottles	kg	1,792.0	457.0	0	2,249.0
Paper/cardboard	kg	852.5	0	0	852.5
Plastic bottles	kg	35.5	0	0	35.5
Aluminium cans	kg	0	0	0	0
Scrap metal	kg	0	0	0	0
Total	**kg**	**2,680.0**	**457.0**	**0**	**3,137.0**

During the Q2 2020, the local waste collection contractor carried out landfill operation and maintenance which included daily and weekly waste cover, repairing the damaged perimeter fence of the landfills, cutting grass and sediment clean up from the open ditches surrounding the leachate ponds.

The local waste collection contractor provided 75 wooden poles for repairing the NNP1 landfill fence and the waste drop-off stations in the host villages and Phouhomxay Village.

3.5.3 Houay Soup Landfill

During Q2 2020, approximately 57.7 m^3 of solid waste was collected from Thaheua, Hat Gniun and Phouhomxay villages and transported to Houay Soup Landfill for disposal. The basic landfill maintenance was carried out which included fixing fence, cleaning up the open ditches and cutting grass.

As of June 2020, the remaining capacity of the Houay Soup Landfill is approximately 5,790 m^3. The landfill could serve for 22 years by considering the average monthly waste disposal of 22 m^3, 30% of its volume reduction 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 from 01 January 2019 to 30 June 2020 is presented in the graph in ***Figure 3-4***, and inflow to the main reservoir and water level during Q2 2020 are displayed in the chart in ***Figure 3-5***.

During Q2 2020, the water level in the main reservoir decreased with about 6.6 m to reach its lowest level of 297.3 m asl. in the beginning of June 2020 - close to the minimum operating level of 296 m asl. During the remaining part of June 2020, the water level rose slightly to about 298.5 m asl.

From 01 April 2020 to 15 June 2020, the mean inflow to the main reservoir was 55 m^3/s (min 24 m^3/s and max 114 m^3/s). For May 2020 with a mean inflow of 52 m^3/s, this is well below the long-term mean inflow. The remaining part of June 2020 saw an increase in inflow to a mean about 140 m^3/s corresponding to the onset of the wet season and closer to the long-term mean.

Figure 3-4: ***Water Level, Inflow and Discharge for the Main Reservoir from 01-Jan-2019 to 30-Jun-2020***

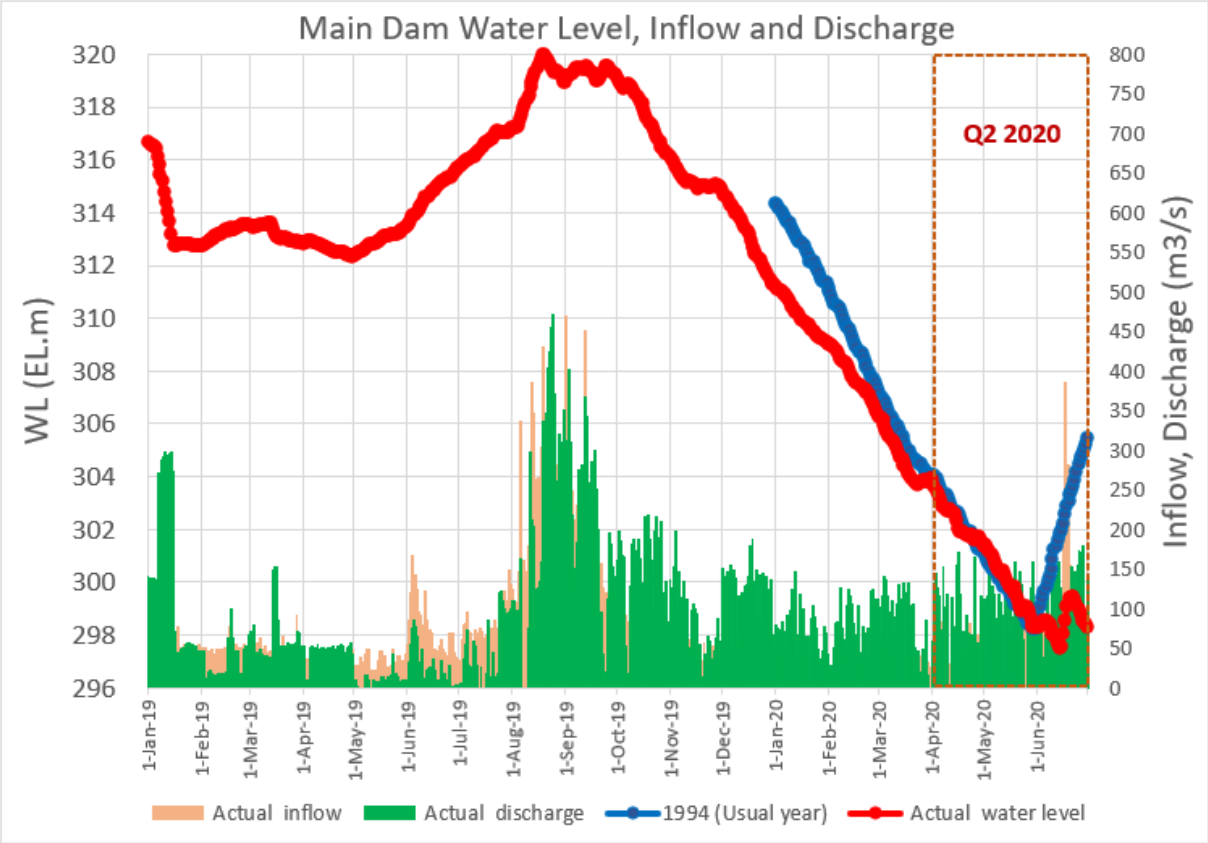
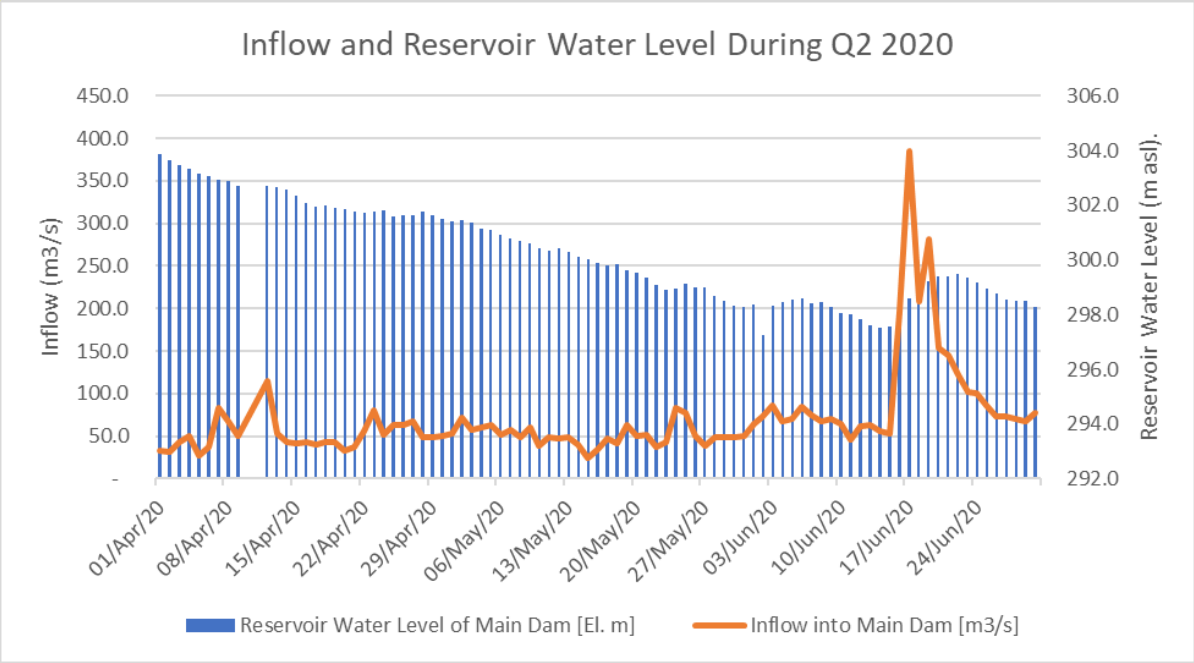


FIGURE 3-5 *INFLOW TO THE MAIN RESERVOIR AND WATER LEVEL DURING Q2 2020*



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 Q2 2020 are summarized in ***Table 3-7***.

TABLE 3-7: *SUMMARY OF EFRS COMPLIANCE MONITORING IN Q2 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)	68 out of 76 measurements comply
3	Maximum rate of change (both rise and fall, separately) in stage of 0.6 m per hour	One event was not complied with hourly fluctuations

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 Q2 2020 indicates that the minimum flow requirement of 27 m^3/s has been met at all times - as presented in ***During Q2*** 2020 the monthly mean discharge from the re-regulation dam varied between 80 m3/s and 90 m3/s with turbine discharges varying between 50 m3/s and 160 m3/s interrupted by periods with gate discharges of about 28 m3/s.

The discharge was kept above the minimum flow requirement of 27 m3/s at all times.

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

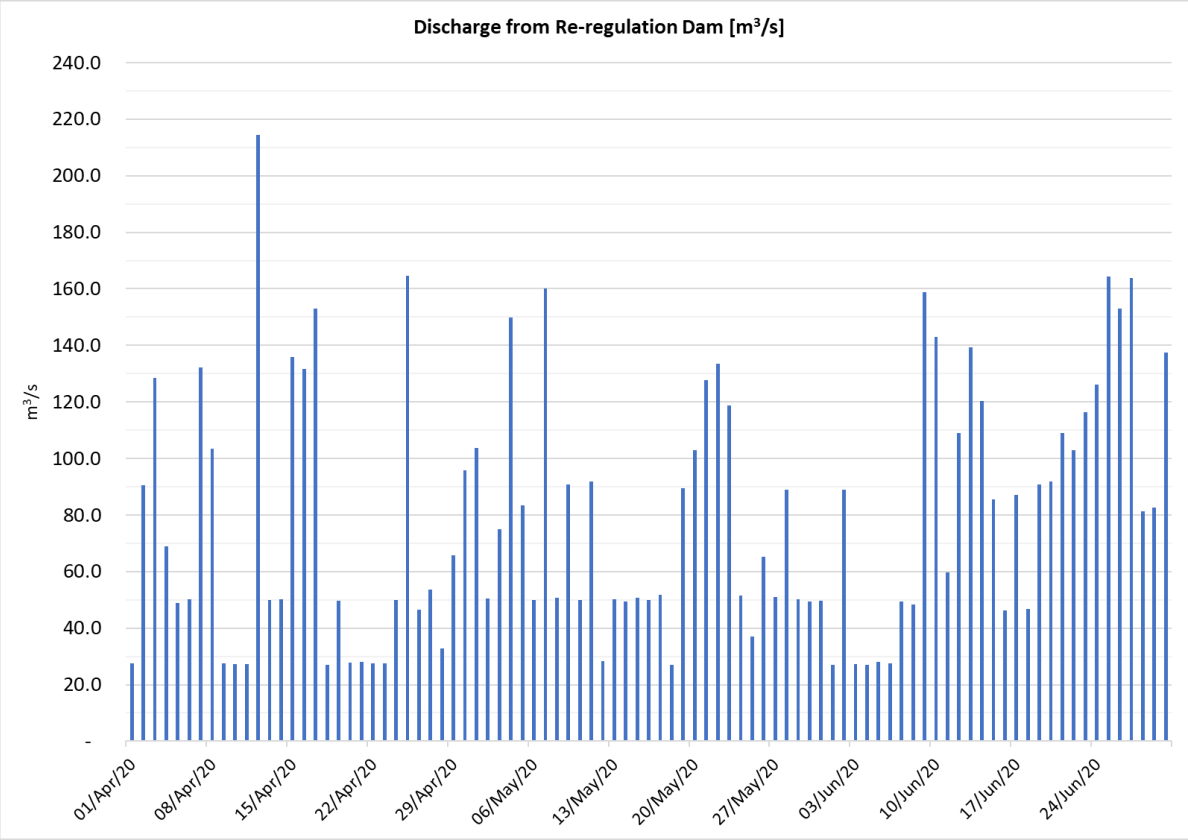
Figure 3-6

During Q2 2020 the monthly mean discharge from the re-regulation dam varied between 80 m^3/s and 90 m^3/s with turbine discharges varying between 50 m^3/s and 160 m^3/s interrupted by periods with gate discharges of about 28 m^3/s.

The discharge was kept above the minimum flow requirement of 27 m^3/s at all times.

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

FIGURE 3-6: *DISCHARGE FROM THE RE-REGULATION DAM DURING Q2 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 3-7.*** 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 3-8***. Depths below 0.5 m are shown in red font.

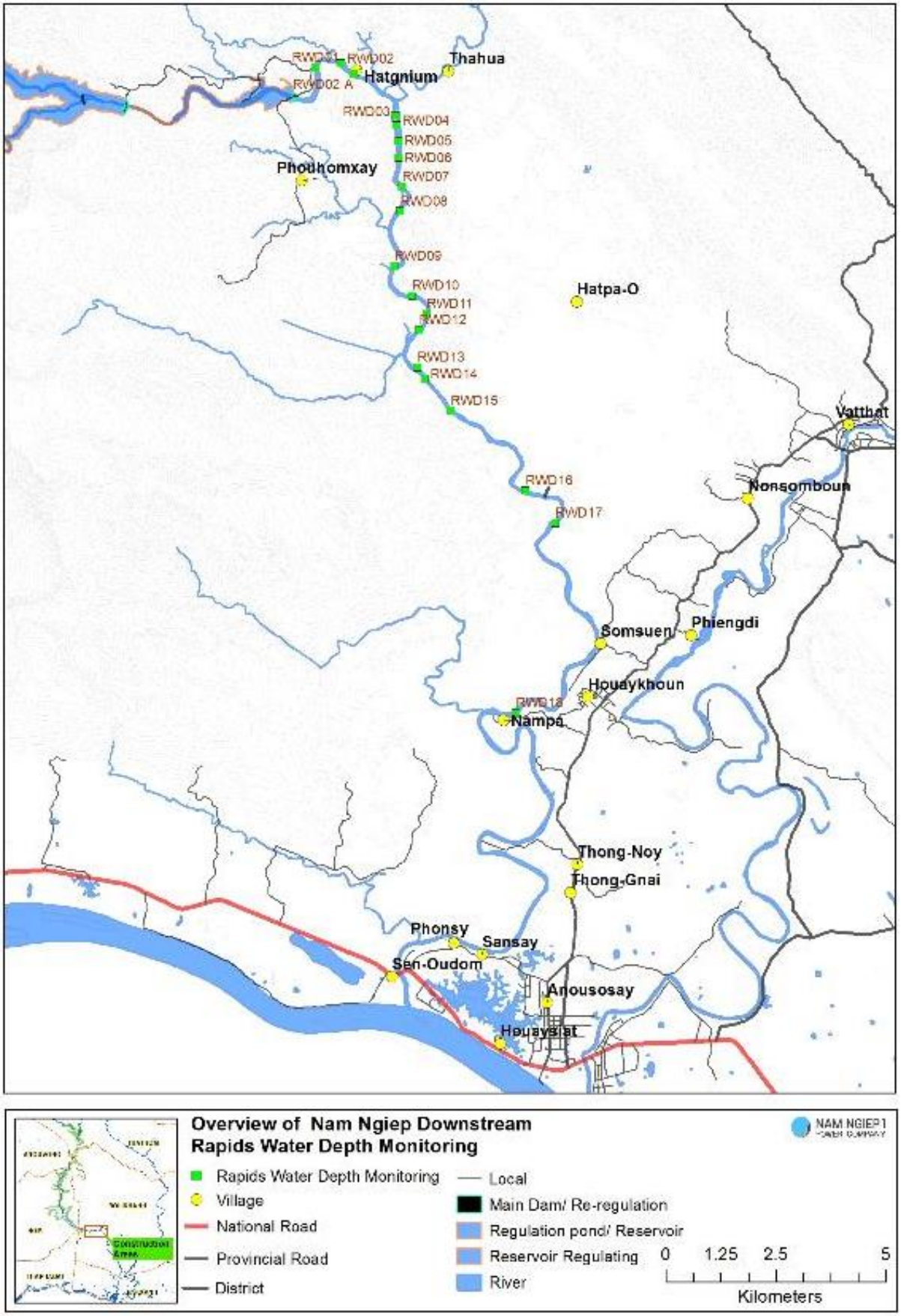
During Q2 2020, there was no instance of difficult navigation due to reduced water depths, and two occasions at low discharge of 27 m^3/s indicated a water depth of less than 0.5 m at stations close to the Re-regulation Dam.

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 3-8: *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)
8-Apr-20	27.4	0.38	0.44	0.47	0.56	0.73	0.7	0.5	0.74	0.81	0.89	0.9	1.15	1.3	1.4	1.45	1.5	1.39	1.52	1.34
6-May-20	50.4	0.58	0.64	0.67	0.76	0.93	0.9	0.7	0.94	1.01	1.09	1.1	1.35	1.5	1.6	1.65	1.7	1.59	1.72	1.54
4-Jun-20	27.0	0.3	0.35	0.38	0.32	0.58	0.55	0.43	0.7	0.87	0.95	0.74	1.02	1.08	1.3	1.45	1.5	1.65	1.8	1.4
17-Jun-20	50.2	0.6	0.65	0.68	0.63	0.98	0.95	0.9	1.2	1.17	1.3	1.24	1.52	1.68	2.01	2.1	2.2	2.35	2.45	2.05

FIGURE 3-7: 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.

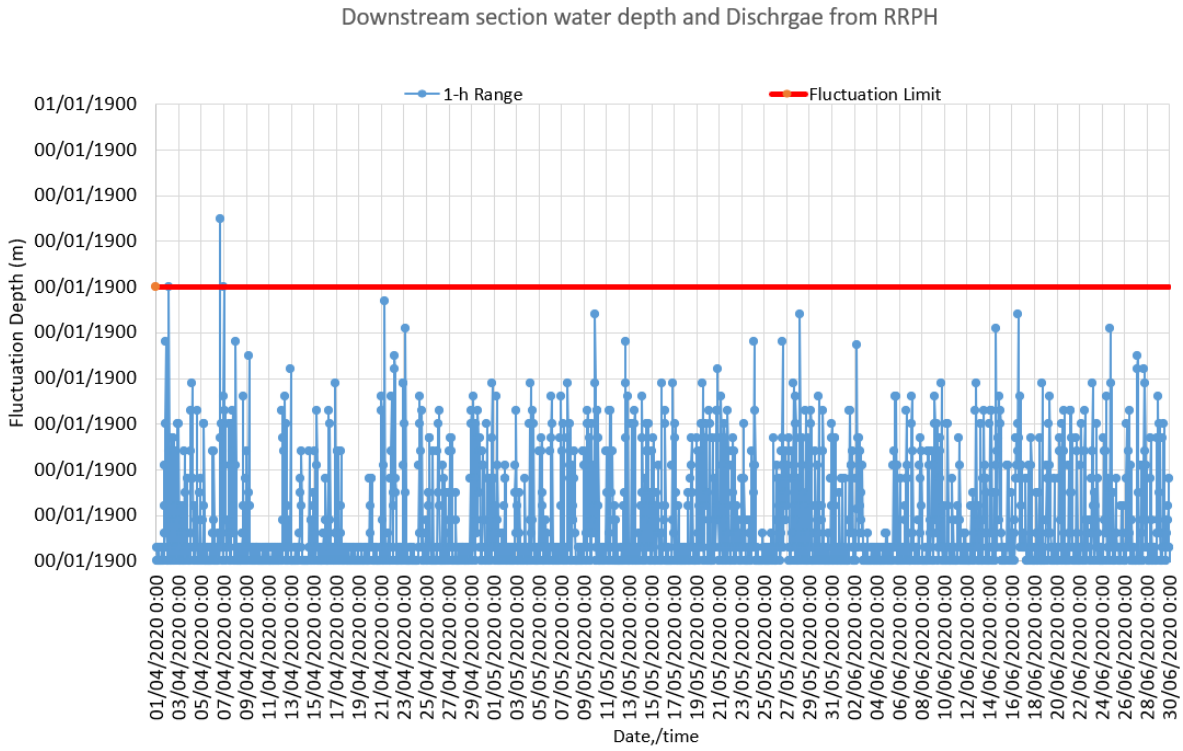
For the 0.6 m in 1-hour maximum fluctuation EFR, the cumulative rises and falls are calculated from the hourly water level recordings at the existing hydrometric gauging station at Hat Gniun Village.

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 Q2 2020, the maximum rate of change of 0.6 m over 1-hour included one event that did not comply with the requirement due to an emergency shutdown of the Re-regulation Power Generator for maintenance then there was a combined discharge from the re-regulation gate and turbine. The results are presented in ***Figure 3-8.***

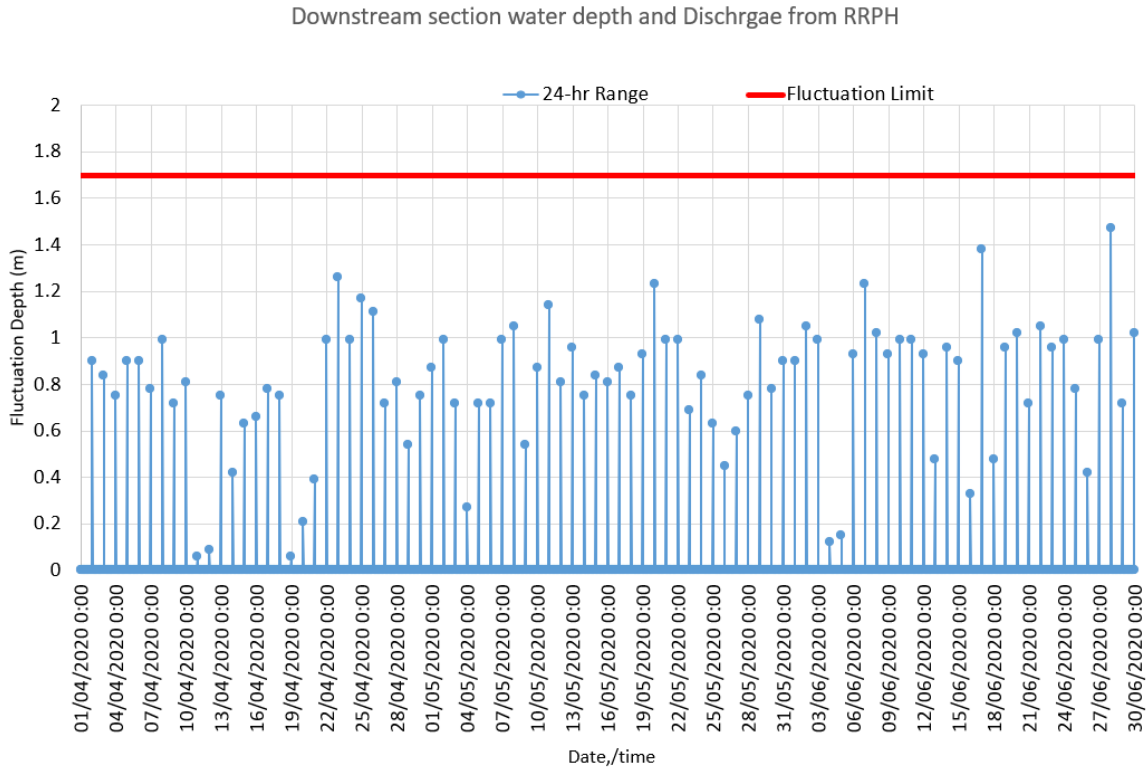
FIGURE 3-8: *HOURLY STAGE HEIGHT FLUCTUATIONS DURING Q2 2020*



During Q2 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).

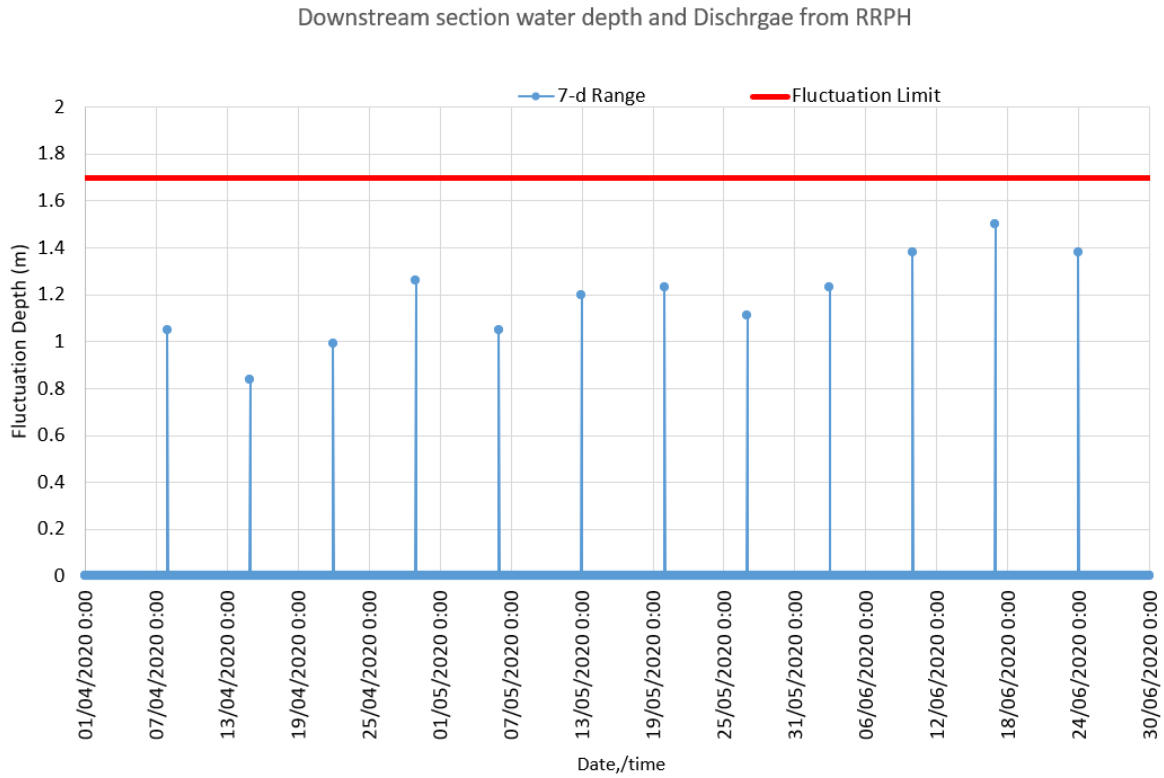
The results of the monitoring are presented in ***FIGURE 3-9.***

FIGURE 3-9: *24-HOUR STAGE HEIGHT DIFFERENCE (M) DURING Q2 2020*



During Q2 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 3-10***.

FIGURE 3-10: *7- DAY STAGE HEIGHT DIFFERENCE (M) DURING Q2 2020*



3.7 ENVIRONMENTAL MONITORING

Due to the country's COVID-19 lockdown since mid-March 2020 until the end of June 2020, no water samples were shipped to UAE Laboratory in Thailand. The water samples were measured in-situ for dissolved oxygen, temperature, pH and conductivity and additional 5 parameters (TSS, BOD_5, Faecal Coliform, E. coli Bacteria and Total Coliform) were analysed at NNP1PC Environmental Laboratory. Therefore, there are no results for COD, Ammonia-Nitrogen, Total Nitrogen, Total Phosphorus and Oil and Grease in this report.

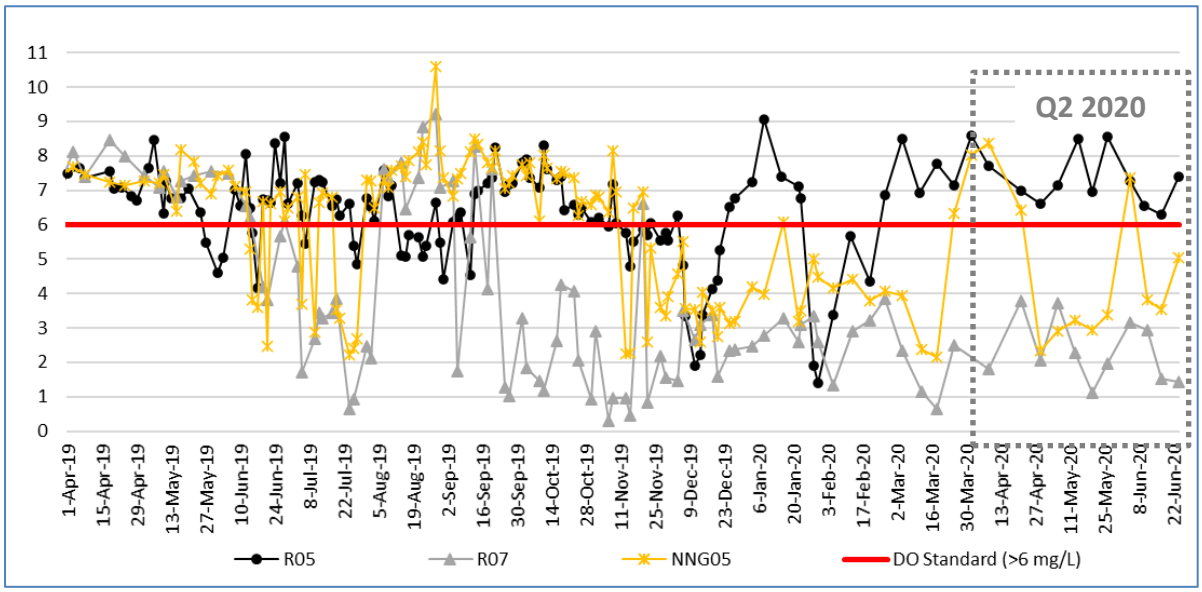
3.7.1 Surface Water (River) Quality

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 Q2 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 3-11,*** and the full set of surface water quality data are shown in ***Table 3-9.***

FIGURE 3-11: *DISSOLVED OXYGEN IMMEDIATELY UPSTREAM AND DOWNSTREAM OF THE MAIN DAM*



During the Q2 2020, the DO concentrations at the surface (depth 0.2 m) in R05 (Main Reservoir immediately upstream of the Main Dam), fluctuated between 6.3 – 8.6 mg/L.

The DO concentrations at the surface in the Re-regulation Reservoir (R07) were between 1.1 and 3.8 mg/L. Measurements during periods with gate discharge on 01 April, 08 April, 21 April and 04 June 2020, showed DO concentrations in the downstream stations (except NNG07 and NNG08 on 21 April 2020) above 6 mg/L due to the aeration generated by the gate discharge.

During the remaining part of Q2 2020, the DO level fell below 6 mg/L in the downstream stations during periods with turbine discharge. 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 to R04) had DO levels above 6 mg/L at the surface level. The concentration of DO in Nam Xao (except on 29 April, 13 May, 20 May and 11 June 2020) and Nam Houay Soup (except 13 May and 11 June 2020) were above 6 mg/L.

The Water Temperature and DO depth profile in the Main Reservoir are presented in ***Figure 3-12***, ***Figure 3-13*** and ***Figure 3-14***.

The monitoring results for the main reservoir in Q2 2020 compared to the previous quarter generally showed higher DO levels at the surface and stable stratification at a shallower depth as a consequence of the increase in ambient temperature towards the end of the dry season. Compared to the same period of last year (Q2 2019) at R05; (i) same as last year with a stable thermal stratification in the middle of dry season (April and May) which became weaker in June due to increasing inflow at the onset of the wet season; and (ii) slightly higher DO levels

in Q2 2020 in the upper water column and oxyclines and anoxic at slightly deeper levels, thus indicating a slight improvement in DO levels over a year.

The depth profiles monitoring during the period indicates formation of oxyclines and clear thermal stratification in the Main Reservoir at all stations at depths between 2.5 – 11.0 m, except R01.

There is no indication of a thermocline at R06 and R07 in the Re-regulation Reservoir.

FIGURE 3-12: MAIN RESERVOIR DISSOLVED OXYGEN DURING END OF THE SECOND QUARTER 2020

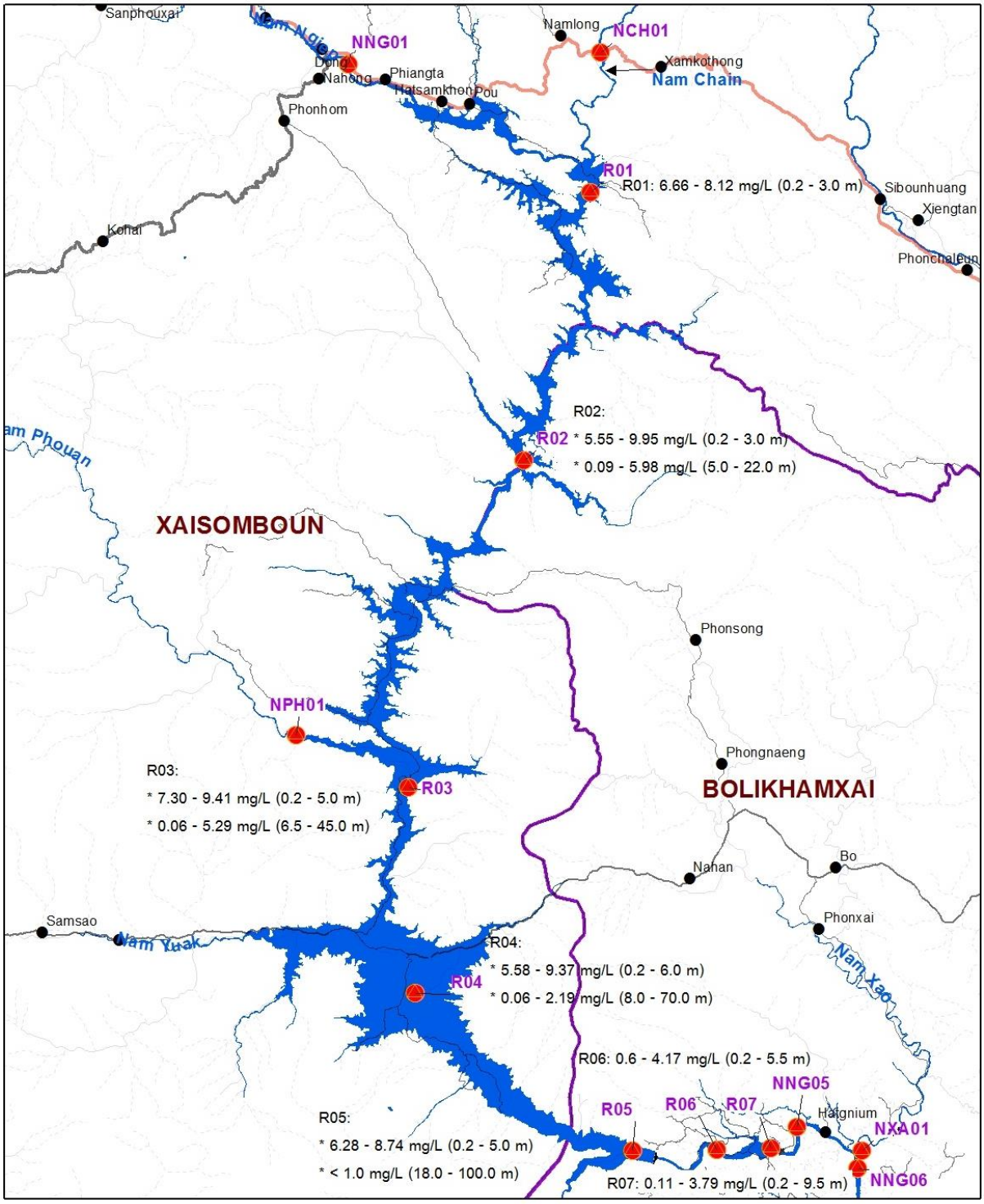


FIGURE 3-13: *WATER TEMPERATURE AND DISSOLVED OXYGEN – DEPTH PROFILES IN THE MAIN RESERVOIR IMMEDIATELY UPSTREAM OF THE MAIN DAM (R05)*

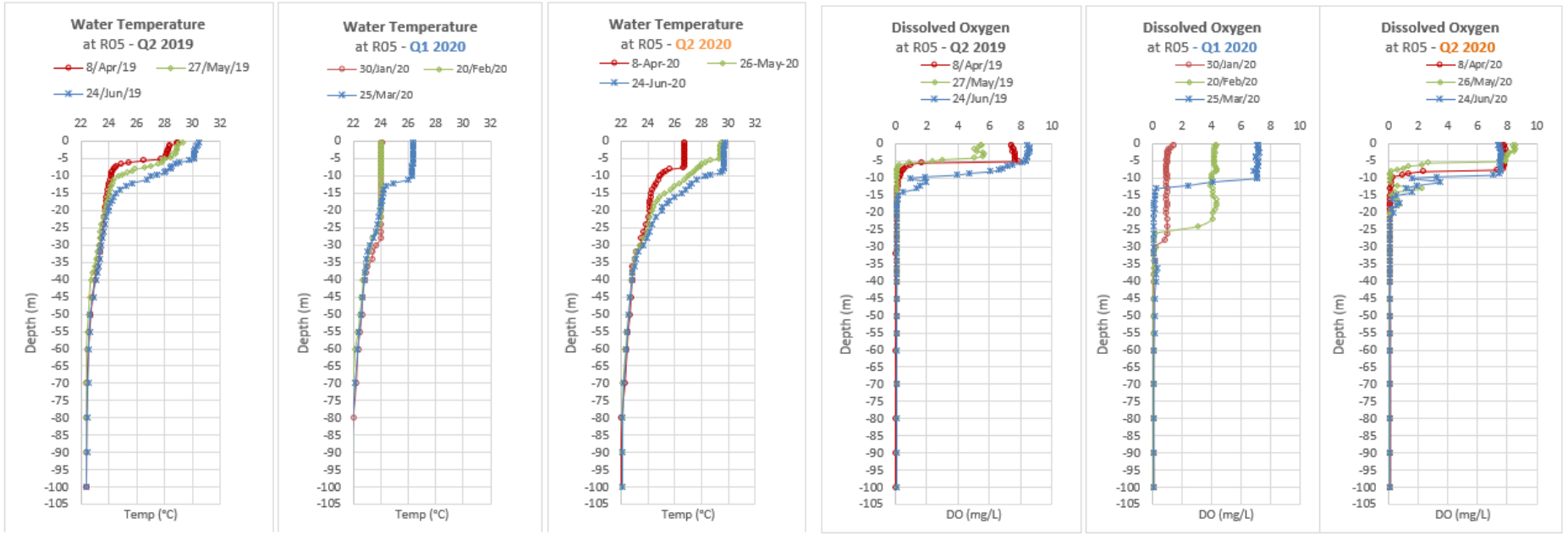


FIGURE 3-14: ***MONTHLY AVERAGE OF WATER TEMPERATURE AND DO DEPTH PROFILES IN THE MAIN RESERVOIR (R01 - R05), WITH POSITION OF INTAKE AT THE ACTUAL WATER LEVEL, AND IN THE RE-REGULATION RESERVOIR (R07) DURING SEPTEMBER 2018 - JUNE 2020***

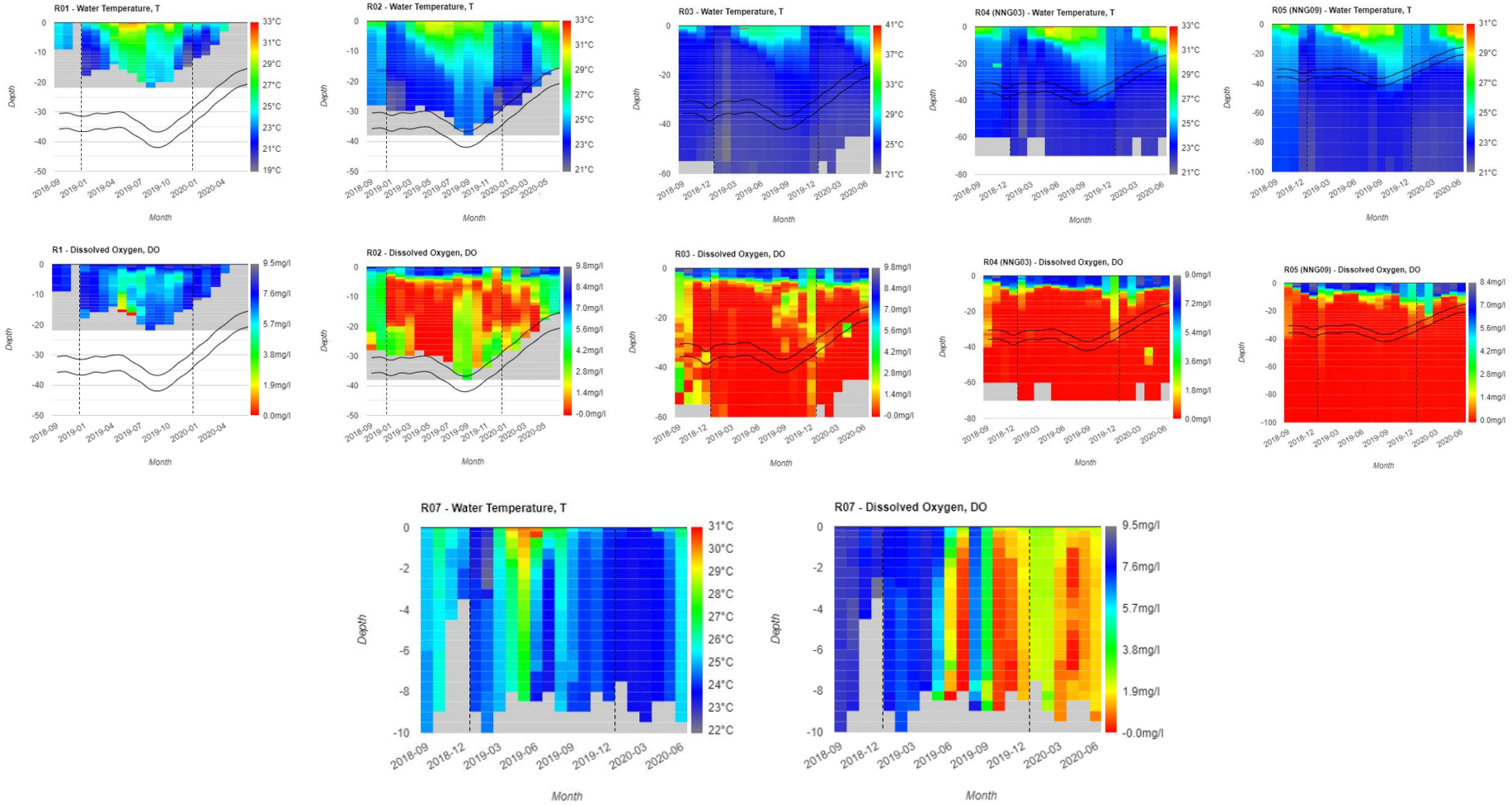


TABLE 3-9: *DO (MG/L) RESULTS OF SURFACE WATER IN MAIN RESERVOIR, RE-REGULATION RESERVOIR, NAM NGIEP AND ITS MAIN TRIBUTARIES MONITORED IN Q2 2020*

(NATIONAL SURFACE WATER QUALITY STANDARD FOR DO: >6.0 MG/L)

Station Code	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
1-Apr-20						8.6	4.17		8.02		7.5	7.8				
6-Apr-20	8.03												7.51			
8-Apr-20						7.71	1.56	1.8	8.38	8.07	6.17	6.09			6.89	8.23
9-Apr-20		6.8	6.68	7.53	6.94									7.96		
21-Apr-20						6.98	1.53	3.79	6.43		5.84	4.25			6.17	
29-Apr-20						6.62	2.27	2.07	2.34		4.75	5.59			5.82	
5-May-20		6.7	7.3	7.3	6.67											
6-May-20						7.15	3.13	3.71	2.91	2.25	4.44	4.41		6.63	6.52	6.1
11-May-20	7.59												7.23			
12-May-20														7.57		
13-May-20		7.2	7.71	7.74			2.04	2.27	3.23	3.08	4.42	5.43			5.14	5.79
14-May-20					8.35	8.51										
19-May-20		8.1	8.81	9.14	8.47									7.82		
20-May-20						6.95	1.04	1.12	2.93	3.16	4.91	5.37			5.16	6.67
25-May-20	7.91												8.16			
26-May-20						8.55	1.75	1.98	3.38	3.78	5.1	6.71			6.92	7.63
27-May-20		8.1	9.95	9.14	8.15									8.47		
3-Jun-20		7.3	7.61	7.83	7.31									8.75		
4-Jun-20						7.26	3.21	3.17	7.38	7.05	6.89	6.8			6.95	7.08
8-Jun-20	8.2												7.48			
9-Jun-20		7.6	7.81	8.17										8.18		
10-Jun-20					6.57	6.55										
11-Jun-20							2.68	2.95	3.83	3.04	5.8	5.56			5.38	5.88
17-Jun-20						6.29	1.37	1.53	3.53	4.3	5.92	6.06			6.48	6.03
22-Jun-20	7.34												8.47			
23-Jun-20		6.7	8.73	7.3	7.02									7.89		
24-Jun-20						7.39	1.63	1.44	5.03	4.95	4.09	5.81			6.59	6.7

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 Q2 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 3-10: ***BOD_5 (MG/L) RESULTS FOR THE SURFACE WATER IN NAM NGIEP AND ITS MAIN TRIBUTARIES MONITORED IN Q2 2020***

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

Station Code	NNG 01	R0 1	R0 2	R03	R04	R0 5	R06	R07	NNG 05	NN G06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS01
21-Apr-20						<1	5.93	3.76	1.53		2.25	1.52			<1	
11-May-20	<1												<1.0			
12-May-20		<1		1.01										1.26		
13-May-20							1.66	2.14	2.62	3.54	<1	<1			6.51	1.54
14-May-20					1.18	<1										
8-Jun-20	<1												<1.0			
9-Jun-20		<1		<1										<1		
10-Jun-20					<1	<1										
11-Jun-20							3.49	2.48	1.42	1.86	<1	<1			<1	<1
21-Apr-20 Hypolimnion						<1										
12-May-20 Hypolimnion				6.34												
14-May-20 Hypolimnion					3.15	6.0										
9-Jun-20 Hypolimnion				10.4												
10-Jun-20 Hypolimnion					6.36	4.6										

Faecal Coliforms Bacteria (FCB)

The results of the faecal coliform analyses in Q2 2020 are presented in **Table 3-11**. During April and May 2020, there were no exceedances of the National Surface Water Quality Standard (<1,000 MPN/100 ml) for faecal coliform bacteria in the reservoir or the main stream stations in Nam Ngiep. from R03 to NNG08 had concentrations below 50 MPN/100 ml. Measurements on 08 June 2020 and 09 June 2020 in NNG01, R01 and R03 had levels exceeding the standard. These stations are located far upstream the Project and the results are therefore unrelated to the Project.

TABLE 3-11: ***FAECAL COLIFORMS (MPN/100 ML) RESULTS IN NAM NGIEP AND ITS MAIN TRIBUTARIES IN Q2 2020***

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

Station Code	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
21-Apr-20						0	5	23	70		170	70			280	
21-Apr-20 Hypolimnion						0										
11-May-20	240												220			
12-May-20		110		2										1,600		
12-May-20 Hypolimnion				0												
13-May-20							2	23	13	26	130	110			14	280
14-May-20					4	2										
14-May-20 Hypolimnion					0	9.3										
8-Jun-20	1,600												350			
9-Jun-20		1,600		1,600										1,600		
9-Jun-20 Hypolimnion				1,600												
10-Jun-20					0	0										
10-Jun-20 Hypolimnion					0	0										
11-Jun-20							0	5	34	9	920	110			170	350

Total Coliforms

The results of measurements for total coliform bacteria are presented in ***Table 3-12***. The results indicate a similar pattern and same tendency as for faecal coliform bacteria.

TABLE 3-12: ***TOTAL COLIFORMS (MPN/100 ML) RESULTS IN NAM NGIEP AND ITS MAIN TRIBUTARIES IN Q2 2020***

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

Station Code	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
21-Apr-20						17	140	350	450		1,600	920			1,600	
21-Apr-20 Hypolimnion						17										
11-May-20	1,600												1,600			
12-May-20		1,600		170										1,600		
12-May-20 Hypolimnion				27												
13-May-20							170	110	220	920	920	350			920	1,600
14-May-20					1,600	110										

Station Code	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
14-May-20 Hypolimnion					130	79										
8-Jun-20	1,600												1,600			
9-Jun-20		1,600		1,600										1,600		
9-Jun-20 Hypolimnion				1,600												
10-Jun-20					130	70										
10-Jun-20 Hypolimnion					33	130										
11-Jun-20							540	1,600	1,600	1,600	1,600	1,600			1,600	1,600

3.7.2 Compliance Monitoring of Effluents from Project Sites

A total of 04 effluent monitoring sites were in use during Q2 2020 and the effluents were monitored in 02 camps (OSOV1 and OSOV2) and in the Wastewater Treatment System of the Main Powerhouse**.** The location of the effluent monitoring sites can be found in **Figure 3-15.**

The results are described in ***Table 3-13*** and the full data set is in ***Appendix 5.2***.

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

- Non-compliance with faecal coliform, total coliform, TSS and BOD_5 for Main Powerhouse's Wastewater Treatment System (EF19) on 07 May 2020;
- Frequent noncompliance with faecal coliform in EF01, EF13 and EF14;

FIGURE 3-15: *LOCATION OF EFFLUENT MONITORING POINTS*

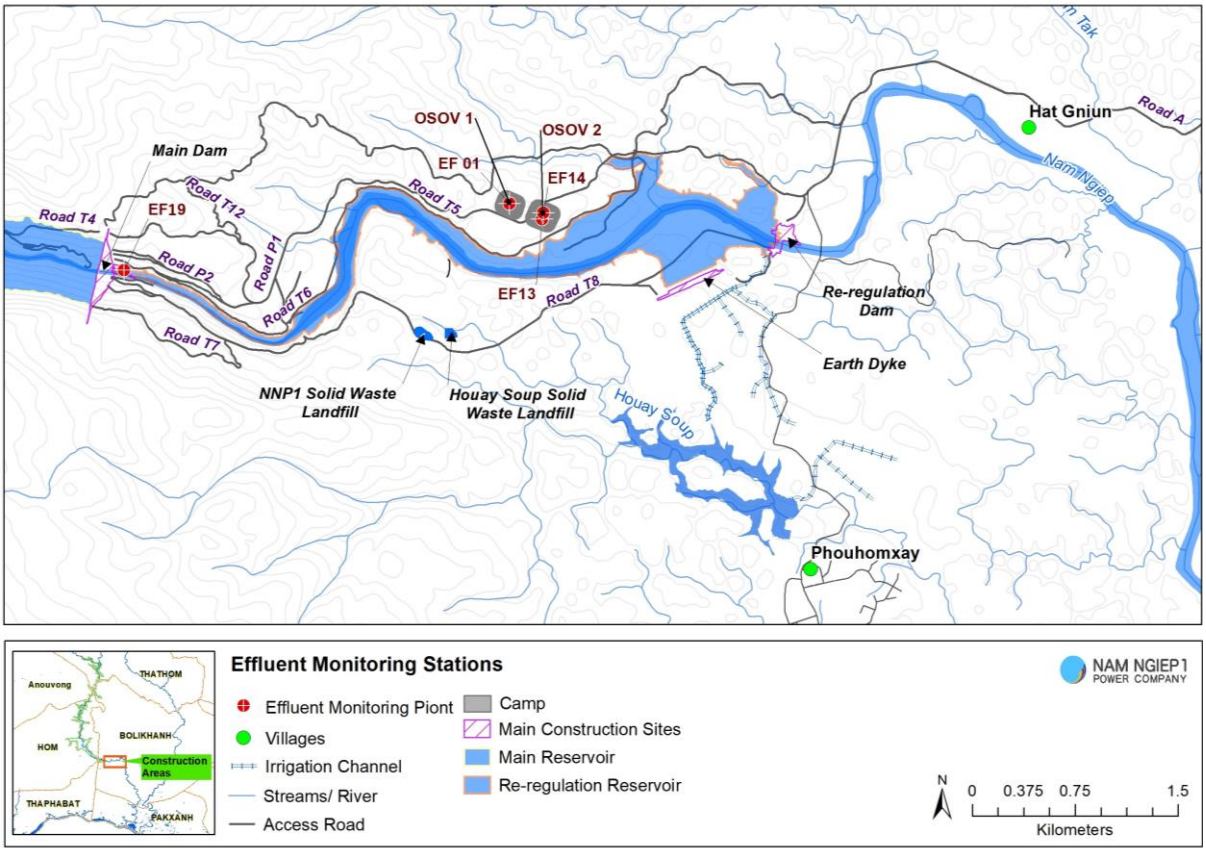


TABLE 3-13: *RESULTS OF THE EFFLUENT WATER QUALITY MONITORING OF THE CAMPS IN Q2 2020*

		Site Name	OSOV 1 (Owner's Site Office and Village)	OSOV2 (ESD Camp 2 / Former HM Camp)	OSOV2 (ESD Camp 1 / Former IHI Camp)	Main Powerhouse
		Station Code	EF01	EF13	EF14	EF19
Date	Parameter (Unit)	Guideline in the CA				
23-Apr-20	pH	6.0 - 9.0	6.21	6.38	6.25	
07-May-20	pH	6.0 - 9.0	6.5	6.27	5.93	7.59
18-May-20	pH	6.0 - 9.0	6.1	6.49	6.25	
01-Jun-20	pH	6.0 - 9.0	6.3	6.12	6.03	7.51
15-Jun-20	pH	6.0 - 9.0	6.29	6.08	6.12	7.28
23-Apr-20	TSS (mg/L)	<50	<5	16.7	12	
07-May-20	TSS (mg/L)	<50	<5	23.6	9.27	91.8
18-May-20	TSS (mg/L)	<50	<5	23.7	9.0	
01-Jun-20	TSS (mg/L)	<50	<5	6.8	6	37.3
15-Jun-20	TSS (mg/L)	<50	<5	8.9	12.1	46.2
23-Apr-20	BOD_5 (mg/L)	<30	<6	37.95	<6	
07-May-20	BOD_5 (mg/L)	<30	<6	40	14.7	40.03
18-May-20	BOD_5 (mg/L)	<30	<6	<6	15.36	
01-Jun-20	BOD_5 (mg/L)	<30	6.09	10.26	<6	<6
15-Jun-20	BOD_5 (mg/L)	<30	<6	16.38	9.87	<6
23-Apr-20	Total coliform (MPN/100 mL)	<400	920	16,000	13	
07-May-20	Total coliform (MPN/100 mL)	<400	1,600	35,000	16,000	16,000
18-May-20	Total coliform (MPN/100 mL)	<400	1,600	16,000	35,000	
01-Jun-20	Total coliform (MPN/100 mL)	<400	9,200	16,000	3,500	0
15-Jun-20	Total coliform (MPN/100 mL)	<400	350	160,000	16,000	0
23-Apr-20	Faecal Coliform (MPN/100 mL)	<400	47	16,000	2	
07-May-20	Faecal Coliform (MPN/100 mL)	<400	170	35,000	16,000	16,000
18-May-20	Faecal Coliform (MPN/100 mL)	<400	1,600	16,000	16,000	
01-Jun-20	Faecal Coliform (MPN/100 mL)	<400	9,200	16,000	3,500	0
15-Jun-20	Faecal Coliform (MPN/100 mL)	<400	350	35,000	16,000	0

TABLE 3-14: *COMPLIANCE STATUS OF EFFLUENT DISCHARGE FROM THE CAMPS IN Q2-2020*

Site	ID	WWTS	Key Non-Compliance Issues in Q2-2020	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 4 out of 5 samplings. Q2 mean 2,734 MPN/100 mL. - Faecal coliform (<400 MPN/100 mL): Non-compliance in 2 out of 5 samplings. Q2 mean 2,273 MPN/100 mL.	- The ADM was instructed to conduct regular maintenance work (wetland weeding and cleaning). - A short-term contract was sign on 10 April 2020 with a consultant to assess the current wastewater treatment system and make suggestions for long-term improvements. EMO provided the WWTS design drawings and water quality results to the Consultant for doing a desk review. Pending site visit by the consultant due to the country's COVID–19 lockdown.
OSOV 2 (ESD Camp 2 / Former HM Camp)	EF13	Septic tanks (kitchen and black water) and wetland with chlorination system (grey water)	- BOD_5 (<30 mg/L): Non-compliance in 2 out of 5 samplings. Q2 mean 21.38 mg/L. - Total coliform (<400 MPN/100 mL): Non-compliance in all 5 samplings. Q2 mean 48,600 MPN/100 mL. - Faecal coliform (<400 MPN/100 mL): Non-compliance in all 5 samplings. Q2 mean 23,600 MPN/100 mL.	- The ADM was instructed to conduct regular operation and maintenance work (wetland weeding, cleaning and chorine dosing); - As above.
OSOV 2 (ESD Camp 1 / Former IHI Camp)	EF14	Septic tanks (kitchen and black water) and wetland with chlorination system (grey water)	- pH (6.0 – 9.0): Non-compliance in 1 out of 5 samplings. Q2 mean 6.12. - Total coliform (<400 MPN/100 mL): Non-compliance in 4 out of 5 samplings. Q2 mean 14,103 MPN/100 mL.	As above.

Site	ID	WWTS	Key Non-Compliance Issues in Q2-2020	Corrective Actions
			- Faecal coliform (<400 MPN/100 mL): Non-compliance in 4 out of 5 samplings. Q2 mean 10,300 MPN/100 mL.	
Main Powerhouse	EF19	Septic tanks (grey and black water), biofilm tank and chlorination tank.	- TSS (<50 mg/L): Non-compliance in 1 out of 3 samplings. Q2 mean 58.4 mg/L. - BOD_5 (<30 mg/L): Non-compliance in 1 out of 3 samplings. Q2 mean 14.9 mg/L. - Total coliform (<400 MPN/100 mL): Non-compliance in 1 out of 3 samplings. Q2 mean 5,333 MPN/100 mL. - Faecal coliform (<400 MPN/100 mL): Non-compliance in 1 out of 3 samplings. Q2 mean 5,333 MPN/100 mL.	As above.

3.7.3 Groundwater Quality Monitoring

Due to the Covid-19 lockdown measures, the community groundwater quality monitoring was not conducted in April 2020.

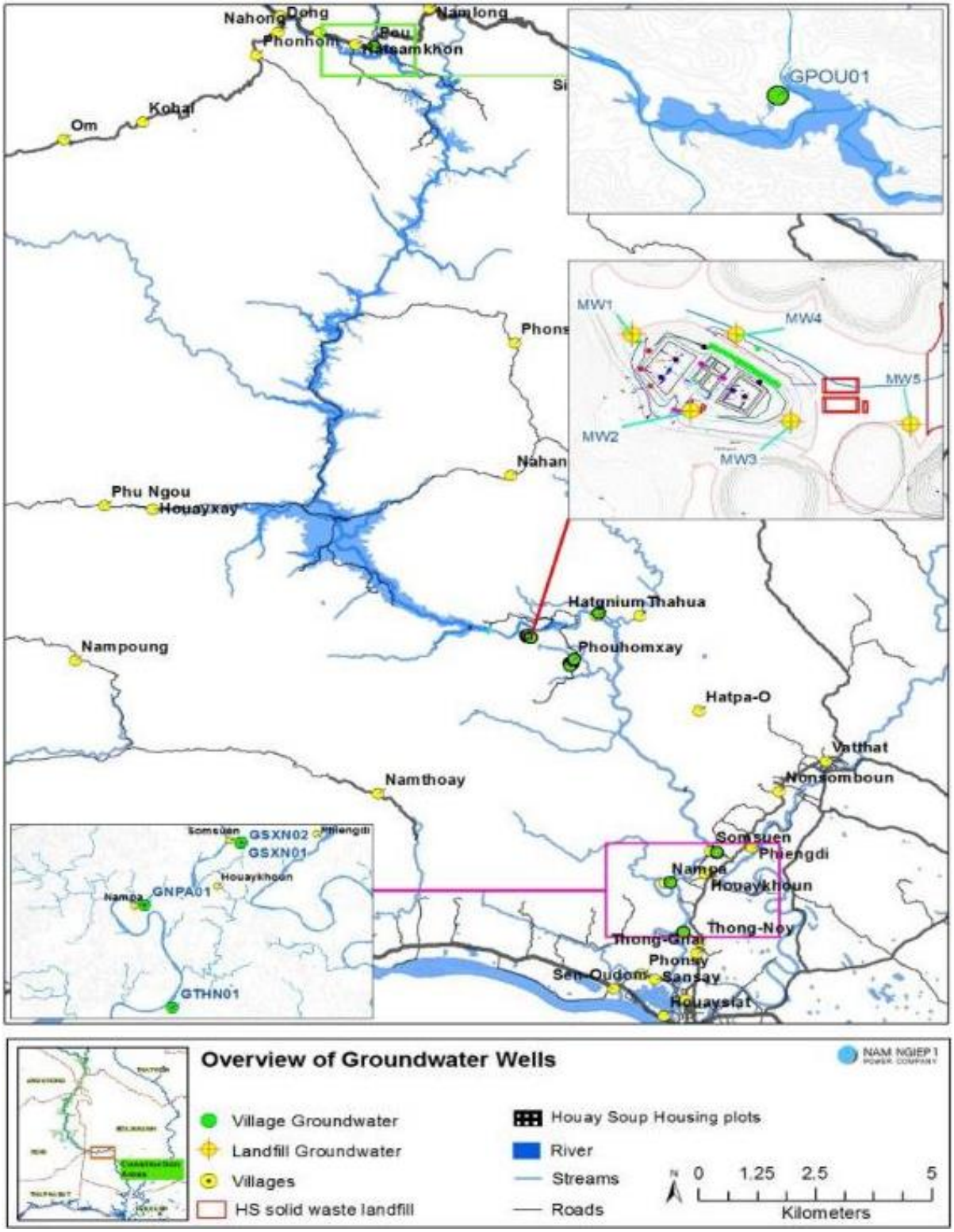
During the Q2 2020, a total of six boreholes at Somseun, Nam Pa, Thong Noy, Pou Villages (one borehole in each village) and Phouhomxay Village (two new boreholes – commencing in June 2020) have been monitored for the following parameters:

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 bacteria (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).

The groundwater sampling locations are displayed in ***Figure 3-16*** and the groundwater monitoring data is presented in ***Appendix 5.4.***

FIGURE 3-16: *GROUNDWATER SAMPLING LOCATIONS*



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

Somsuen Village: all monitored parameters complied with the standard, except faecal coliform and E.coli bacteria in all Q2 2020 samples.

Nam Pa Village and **Thong Noy Village:** all monitored parameters complied with the standard, except faecal coliform and E.coli bacteria in all Q2 2020 samples.

Pou Village: all monitored parameters complied with the standard, except faecal coliform and E.coli bacteria in May 2020 sample.

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

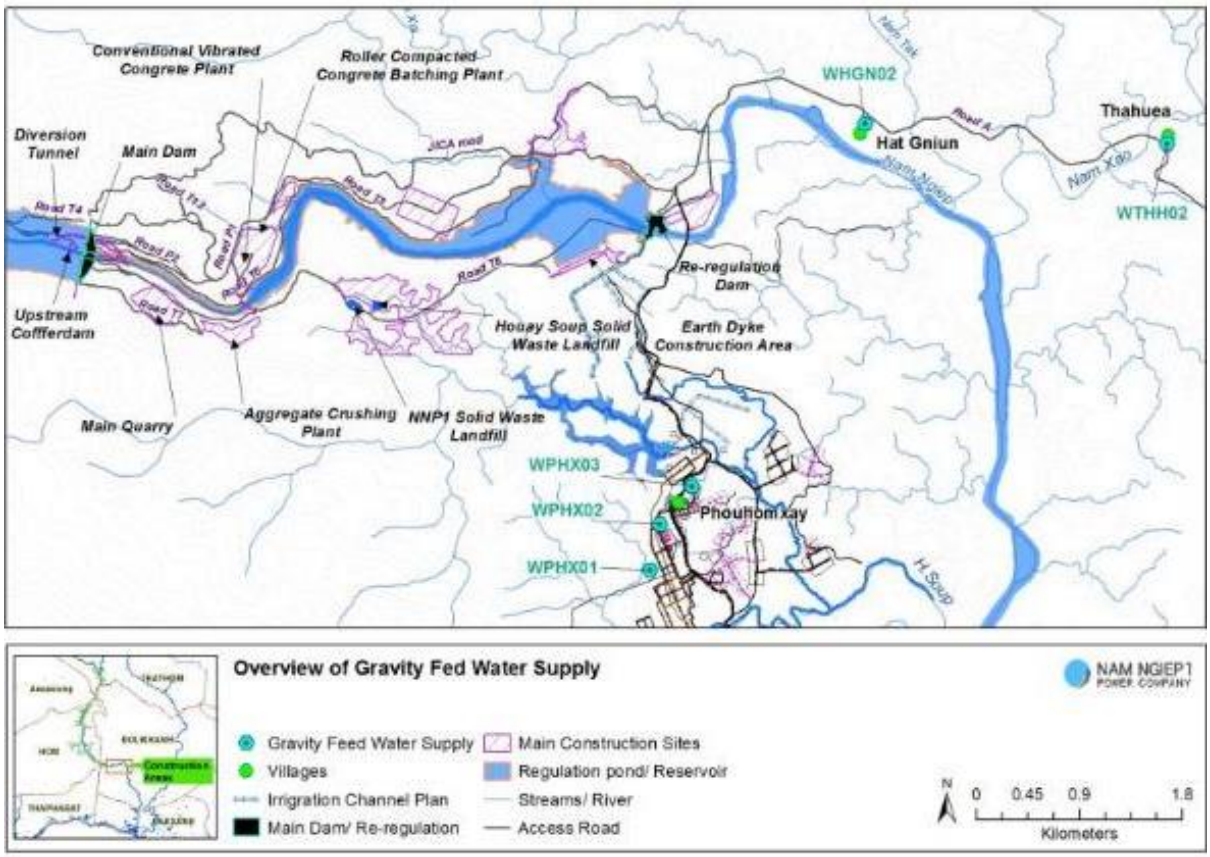
The villagers were advised to boil water before drinking. This advice is in accordance with the Law on Hygiene, Disease Prevention and Health Promotion No 01/NA of 10 April 2001, which states that domestic water supply for daily use is not required to be readily drinkable but would normally have to be boiled or otherwise treated before it would be suitable for drinking. NNP1PC – ESD has planned to investigate the source of contamination in Q3 2020 and the results will be provided in Q3 2020 Report.

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.

Due to the Covid-19 lockdown measures, the gravity fed water supply monitoring was not conducted in April 2020.

FIGURE 3-17: *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 3-15***. The full set of data is presented in ***Appendix 5.5***

TABLE 3-15*: THE GFWS MONITORING RESULT IN Q2 2020*

Date		Parameter (Unit)	Site Name	Thaheua Village	Hat Gnuin Village	Phouhomxay Village		
			Station	WTHH 02	WHGN 02	WPHX 01	WPHX 02	WPHX 03
			Guideline					
22-May-20	pH		6.5 - 8.6	8.6	7.18	8.49	8.79	8.95
05-Jun-20			6.5 - 8.6	7.68	7.76	7.34	6.33	6.1
22-May-20	Faecal coliform (MPN/100 mL)		0	4.5	33	46	7.8	17
05-Jun-20			0	1,600	94	920	540	920
22-May-20	E.Coli bacteria (MPN/100 mL)		0	2	33	33	7.8	11
05-Jun-20			0	1,600	94	920	540	920

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

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

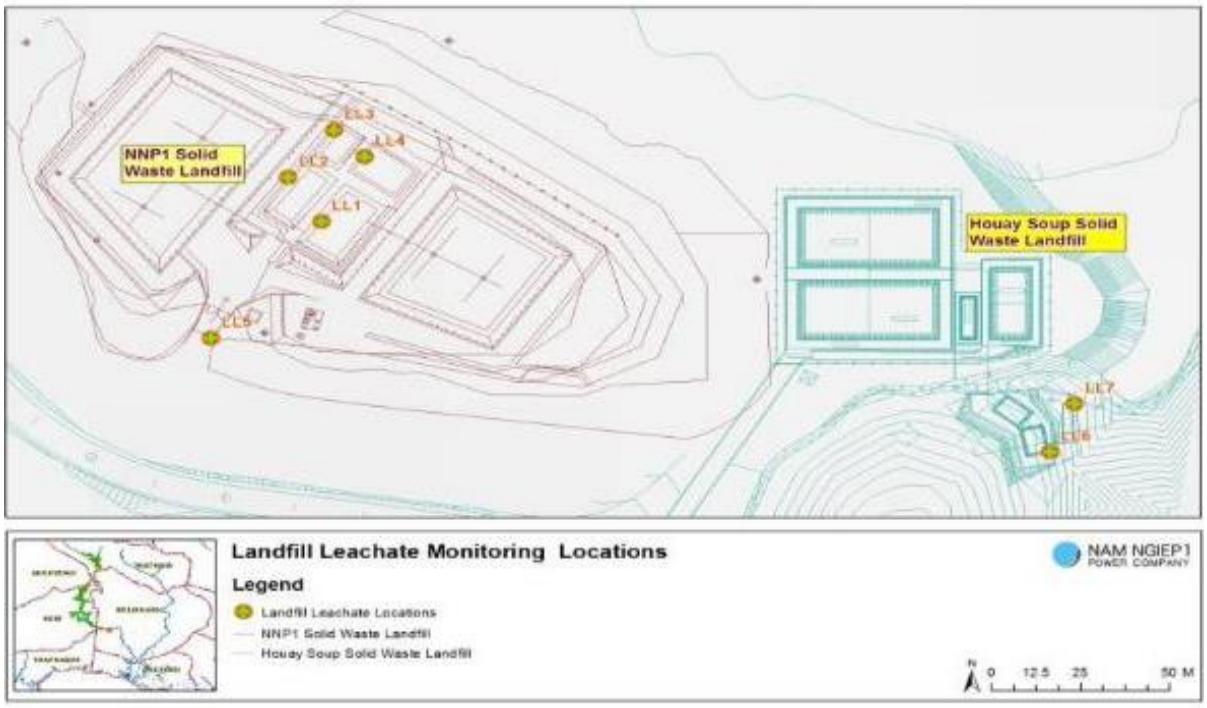
Phouhomxay Village (WPHX01-raw water in the head tank before filtration; **WPHX02**-tap water at primary school; and **WPHX03**-tap water at the villager's house**):** all parameters complied with the standard, except pH, faecal coliform and E.coli bacteria.

As observed in the field during water sample collection, the livestock activities in the water intake areas may contributed to the presence of Faecal Coliform Bacteria and E.coli in GFWS samples. The villagers were advised to boil water before drinking. This advice is in accordance with the Law on Hygiene, Disease Prevention and Health Promotion No 01/NA of 10 April 2001, which states that domestic water supply for daily use is not required to be readily drinkable but would normally have to be boiled or otherwise treated before it would be suitable for drinking. In addition, the NNP1PC is planning to improve the water quality of this GFWS system in Phouhomxay in 2020.

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 3-18***.

FIGURE 3-18: *LANDFILL LEACHATE MONITORING LOCATION*



There was no discharge from the last ponds of NNP1 Project Landfill and Houay Soup Landfill during Q2 2020. However, the landfill leachate monitoring at the last ponds were carried out in June 2020 to monitor its system treatment capacity, results indicate compliance with the applicable standards for all monitored parameters, except total coliform. The monitoring data can be found in ***Appendix 5.6.***

4 WATERSHED AND BIODIVERSITY MANAGEMENT

4.1 WATERSHED MANAGEMENT

4.1.1 Implementation of Watershed Management Plan

The delivery of three aluminium boats that will be handed to GOL (Bolikhamxay and Xaysomboun Provincial WRPOs) to conduct the NNP1 reservoir patrolling under the approved AIP2019 is still pending due to the country's COVID-19 lockdown. Official handover ceremonies of the procured office and field equipment under the NNP1PC additional No Net Loss (NNL) commitment to support the WRPO of Xaysomboun and Bolikhamxay Provinces for implementing the AIP2019 activities were organized on 08 May 2020 in Bolikhamxay Province and on 20 May 2020 in Xaysomboun Province.

NNP1PC organized a final consultation meeting on the final draft of Fishery Co-Management Plan (FCMP) and Fishery Regulation for NNP1 main Reservoir on 21 May 2020 at Xaysomboun PAFO in Anouvong District, Xaysomboun Province. The meeting was chaired by the Head of Xaysomboun PAFO/Vice Chairperson of Xaysomboun WRPC and attended by 23 people which comprised representatives from Xaysomboun WRPO, Bolikhamxay Provincial WRPO, DAFO of Thathom District and Hom District, provincial and district levels of Fishery Sections of both Bolikhamxay and Xaysomboun Provinces, as well as NNP1PC staff. The meeting agreed in principle on the final draft of FCMP and Fishery Regulation. NNP1PC and the Fishery

Consultant have improved the final drafts based on the comments. The drafts are being translated to English and will be submitted to ADB in July 2020 for review and comment prior to approval by Xaysomboun PAFO.

NNP1PC organized a technical meeting on the result of an assessment on sustainable livelihood opportunities for NNP1 watershed communities on 22 May 2020 at Xaysomboun PAFO. The meeting was attended by three representatives from Xaysomboun PAFO/WRPO and four representatives from NNP1PC including the Consultant. The technical staff of PAFO provided the following comments to the reports: (i) the additional information on the agriculture activities funded by others and previous projects should be elaborated in the final report; and (b) the proposed action plan of each community shall be prioritized. The final report is expected to be ready for Provincial WRPC/WRO consideration in July 2020.

Xaysomboun Provincial WRPO conducted TPZ boundary survey and verification between 8-26 June 2020 in Hom and Anouvong Districts. The team also conducted reservoir patrol activities between 19-26 June 2020 in reservoir Zone 4 of Thathom District and in reservoir zone 2 and 3 of Hom District. The results of these activities will be reported and discussed in July 2020.

Bolikhamxay Provincial WRPO submitted the monthly progress report of May 2020. It is noted that the reservoir patrol activity was carried out and the patrol team encountered two cases of land encroachment totalling around 29 ha for upland rice plantation and three cases of illegal logging. These cases were recorded close to NNP1 main reservoir at Phonsong Village, Bolikhan District. The patrol team issued warning letters to the offenders and submitted a report to the District Office of Forest Inspection (DOFI) for further action.

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) reviewed 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. At the end of Q2 2020, the MOU was not yet finalized.

Xaysomboun and Bolikhamxay Provincial Agriculture and Forestry Offices (PAFO) received an official letter from the Department of Forestry (DOF) of Ministry of Agriculture and Forestry (MAF) on 24 April 2020 to notify on the WCS engagement as a Biodiversity Service Provider (BSP) under an ADB Project through MAF and request PAFOs to facilitate the attainment of necessary permits from relevant authorities for the WCS staff to work with NNP1PC staff and get access to the relevant sites.

NNP1PC organized and hosted a kick-off meeting for the BSP to meet and get introduced with Bolikhamxay Provincial BOMU and WRPO teams on 15 May 2020 and with Xaysomboun Provincial WRPO teams on 04 June 2020. At these meetings, the overall BSP team introduction, role and responsibility, as well as mechanisms for reporting and monitoring by relevant agencies (GOL, NNP1PC and BSP) were discussed in detail.

NNP1PC-EMO and the BSP continued to make progress by having many unofficial discussions via phone calls and emails on several topics such as the preparation of a Law Enforcement Strategy (LES) document for NC-NX offset site, the future biological monitoring focussing on the design of camera traps and listening post survey for the NC-NX Offset Site and NNP1 sub-catchment, community outreach program, conservation linked livelihood and the training on patrolling and SMART.

4.2.2 Implementation of Biodiversity Offset Management Plan

Bolikhamxay Provincial Biodiversity Offset Management Unit (BOMU) has continued implementing the planned activities using the remaining budget of AIP2019. After receiving the ADB no-objection for the AIP2020 prepared by GOL and NNP1PC on 03 March 2020, the BOMU officially submitted the AIP2020 approved by ADB to the Bolikhamxay Provincial Biodiversity Offset Management Committee or BOMC for review and approval. The BOMC approved the AIP2020 on 30 March 2020. An official request for fund disbursement for the first and the second quarters of 2020 under the approved AIP2020 was issued by DOF-MAF on 24 April 2020 due to the country's COVID-19 lockdown. NNP1PC transferred the fund to the central account of DOF-MAF on 08 May 2020 and Bolikhamxay Provincial NC-NX BOMU received the fund from DOF-MAF on 08 June 2020.

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

a. Component 1 - Spatial Planning and Regulation

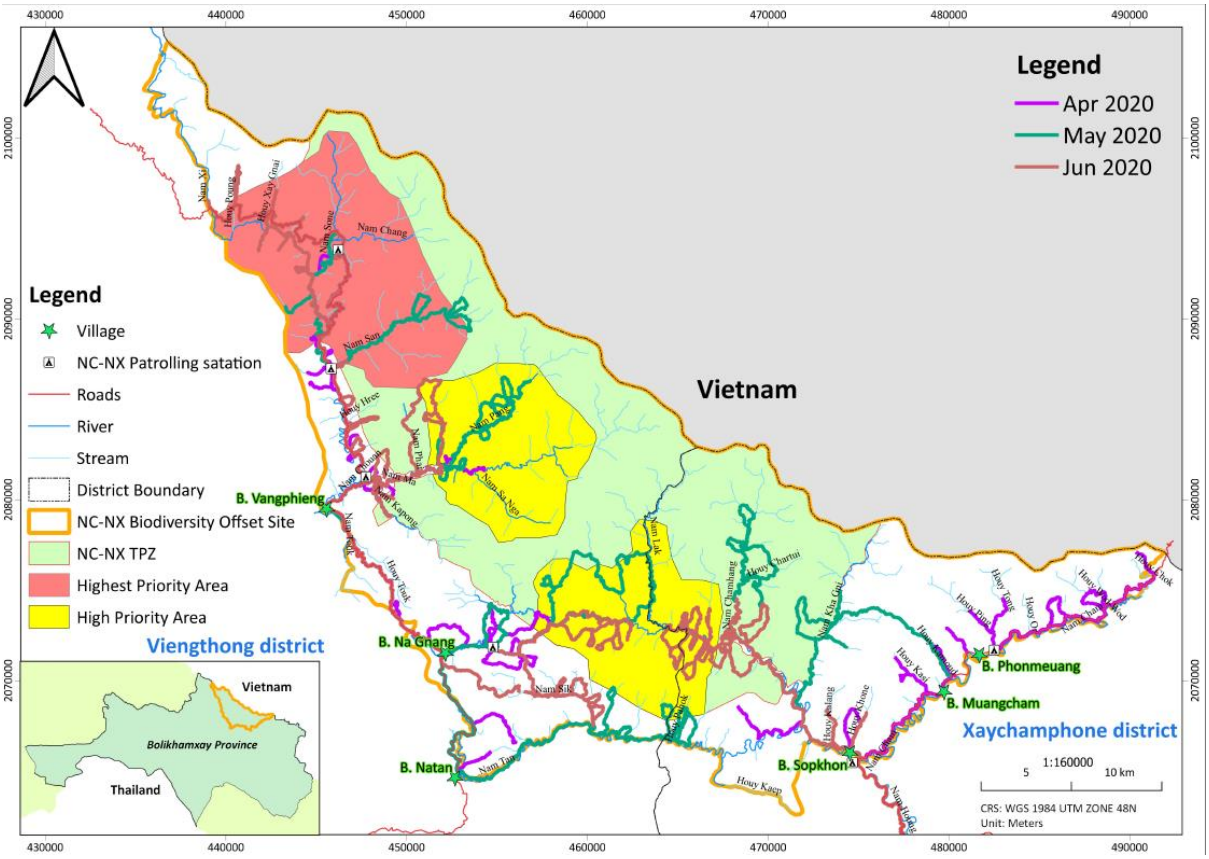
Bolikhamxay Provincial NC-NX BOMU resumed the NC-NX boundary post demarcation and TPZ signage installation in the five remaining villages after Government lifted the COVID-19 preventive measures. The activity was scheduled from 17 June to 04 July 2020.

b. Component 2 – Enforcement

During 8-28 April 2020, four patrolling teams continued with patrolling activities. The first team carried out patrolling at TPZ highest priority area including Nam Sone, Nam Chang, Nam San, Houy Patao and Houy Phalai. The second team carried out patrolling at Nam Ma TPZ high priority area which include Nam Ma, Nam Pang and Nam Kapong. The third team carried out patrolling at Xaychamphone District area including Nam Tan, Nam Houng, Houy Tong, Houy Mouang, Houy Wod-wod and Houy Chok. The fourth team carried out patrolling at Nam houng TPZ high priority area including Nam Houng, Nam Tan and Nam Kha Gna.

During 8-29 May 2020, four patrolling teams continued with patrolling activities. The first team carried out patrolling at TPZ highest priority area including Nam San, Nam Sone and Nam Chouane. The second team carried out patrolling at Nam Ma TPZ high priority area including Nam Ma, Nam Pang and Nam Mong. The third team carried out patrolling at Xaychamphone district area including Nam Houng, Nam Kha Gni, Nam Chamhang, Houay Kamoud, Houay Khone and Nam Chantui. The fourth team carried out patrolling at Nam Houng TPZ high priority area including Nam Houng, Nam Tan, Nam Kha Gna, Nam Kapa, Nam Lak, Houay Vangmoun, Houay Kanang and Houay San.

FIGURE 4-1: *MAP OF PATROLLING TRACK FROM APRIL - JUNE 2020*

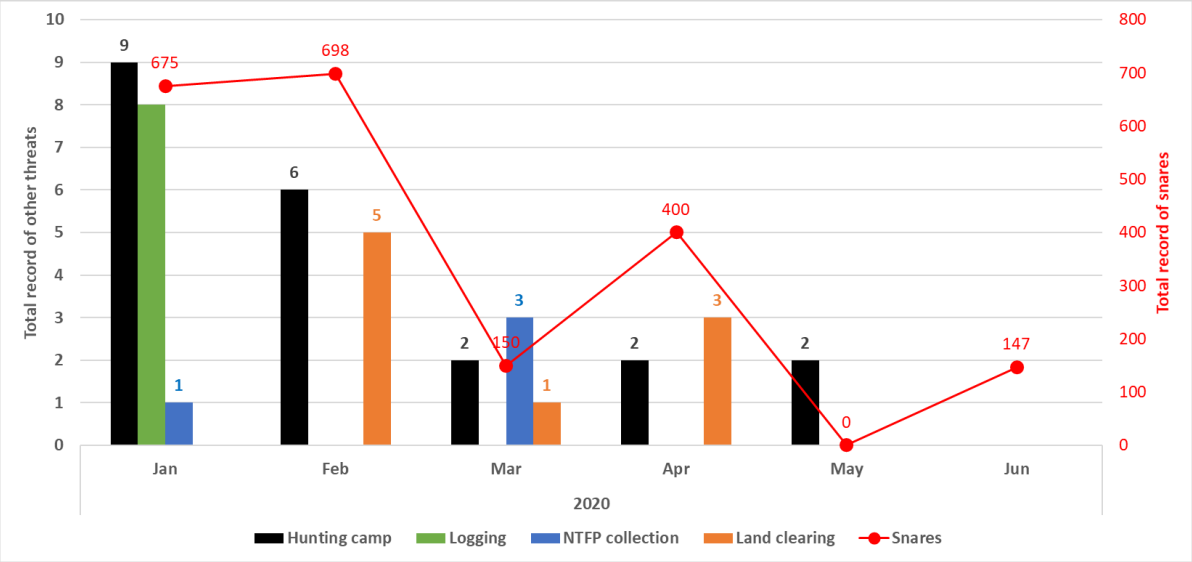


The record of threats from patrolling work in 2020 is presented in **Figure 4-2**. The team confiscated a total of 250 small wire snares and 150 big wire snares in April 2020 from around Ban Meungcham of Xaychamphone District which is outside NC-NX TPZ; and 100 small wire snares around Nam Houng TPZ high priority area and 47 big wire snares around Nam Sik outsidet TPZ area in June 2020.

The patrolling team observed and destroyed the total of four hunting camps between April to June 2020. The hunting related activity in this quarter mostly recorded around Nam Houng TPZ high priority area, Houay Payang TPZ highest priority area, and Nam Kha Gni area but outside TPZ priority area.

The patrolling team recorded four land clearing for upland cultivation outside TPZ priority area around Houay Patao and Houay Phai in Vangphieng Village and Houay Touk in Na Gnang Village.

FIGURE 4-2: *OVERALL RECORD OF THREATS IN NC-NX OFFSET SITES IN 2020*



The record of wildlife observed from patrolling work in Q2 2020 is presented in **Table 4-1**. There are total 472 wildlife recorded through direct observation between April and June 2020.

TABLE 4-1: *LIST OF WILDLIFE RECORDED FROM DIRECT OBSERVATION BETWEEN APRIL-JUNE 2020*

Species (English Name)	Species (Scientific Name)	Total
Black Giant Squirrel	*Ratufa bicolor*	22
Brown Hornbill	*Anorrhinus tickelli*	26
Civet	*Paradoxurus sp* *Viverra megaspila*	1 1
Eagle	*Aquila heliaca*	5
Great Hornbill	*Buceros bicornis*	20
Hog Badger	*Arctonyx collaris*	6
Impressed Tortoise	*Manouria impressa*	6
Macaque	*Cercopithecus nictitans* *Macaca arctoides*	208 6
Muntjac	*Muntiacus vuquangensis*	8
Otter	*Lutra lutra*	1
Phayre's Leaf Monkey	*Cercopithecus nictitans* *Semnopithecus ajax*	16 103
Red-shanked Douc Langur	*Pygathrix nemaeus*	5
Sambar	*Rusa unicolor*	1
White-cheeked gibbon	*Hylobates agilis*	24
Wild Pig	*Sus scrofa*	10
Red Junglefowl	*Gallus gallus*	1
Great Thick-knee	*Esacus recurvirostris*	1
Asiatic Brush tailed Porcupine	*Atherurus macrourus*	1
Grand Total		**472**

FIGURE 4-3: PATROL TEAM REMOVING THE SNARE AT HOUY WOD-WOD, XAYCHAMPHONE DISTRICT

FIGURE 4-4: *INACTIVE HUNTING CAMP WAS OBSERVED AT HOUY TONG, XAYCHAMPHONE DISTRICT*

FIGURE 4-5: *PHAYRE'S LEAF MONKEY*

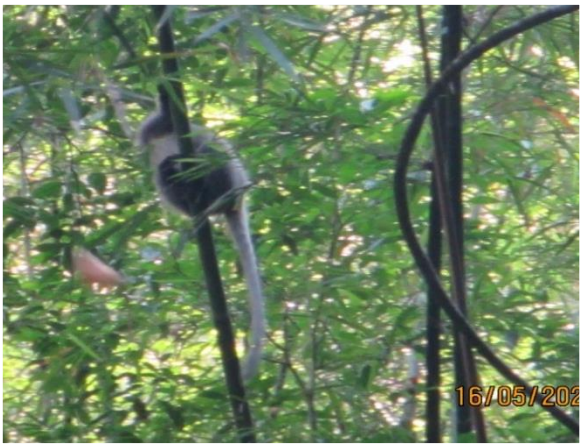


FIGURE 4-6: *GREAT THICK-KNEE*

FIGURE 4-7: *WHITE-CHEEKED GIBBON*

FIGURE 4-8: *RUFOUS-NECKED HORNBILL*

c. Component 4 – Conservation linked livelihood

A contractual agreement with the new Consultant for preparing the NC-NX Community Development Plan (CDP) was signed on 08 April 2020. A draft inception report was finalized on 30 April 2020. NNP1PC and the CDP consultant conducted a field assessment in the six NC-NX villages between 25 May – 02 June 2020 with the participation of the BSP team. The technical workshop on the CDP with relevant GOL office was scheduled on 30 June - 01 July 2020.

5 BIOMASS CLEARANCE / FLOATING DEBRIS REMOVAL

NNP1PC-EMO conducted regular monitoring and removal of floating materials/logs from the temporary log-boom as needed.

6 FISHERY MONITORING

The five type of species that dominated the fish catch by weight in Q2 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, except *Sikukia gudgeri* is classified as Data Deficient (DD).

TABLE 6-1: ***FISH SPECIES DOMINATING THE FISH CATCH IN Q2 2020***

Species	Lao Name	Fish Catch in Q2 2020 (kg)	IUCN Red List Classification
Hampala dispar, Hampala macrolepidota	ปาสูด	370.9	LC
Poropuntius normani, Poropuntius laoensis, Poropuntius carinatus	ปาจาด	373.2	LC
Sikukia gudgeri, Amblyrhynchichthys truncatus	ปาຂาอຊาย	394.9	DD, LC
Barbonymus gonionotus, Hypsibarbus malcomi, Hypsibarbus vernayi, Hypsibarbus wetmorei	ปาปาฆา	364.7	LC
Channa striata	ปาถ่	211.6	LC

The recorded catch of Threatened species (IUCN Red List classification) in the Q2 2020 fish catch is presented in Table 6-2. The list includes four Vulnerable species (VU) and four Near Threatened species (NT).

TABLE 6-2: *THREATENED AND NEAR THREATENED SPECIES OF THE Q2 2020 FISH CATCH*

Species	Lao Name	Fish Catch in Q2 2020 (kg)	IUCN Red List Classification
Cirrhinus cirrhosus	ปามอมจัม/ปาแกง	11	VU
Cirrhinus molitorella	ปาแกง	6	NT
Cyprinus carpio	ปาไม	25	VU
Neolissochilus stracheyi	ปาสอง	17.1	NT
Onychostoma gerlachi	ปาถึง	21.2	NT
Scaphognathops bandanensis	ปาอวนไฟ/ปาป่วน	55.9	VU
Tor sinensis	ปาแดง	127	VU
Wallago attu	ปาค้าว	2.3	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 **Table 6-3**.

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
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 June 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 – JUNE 2020*

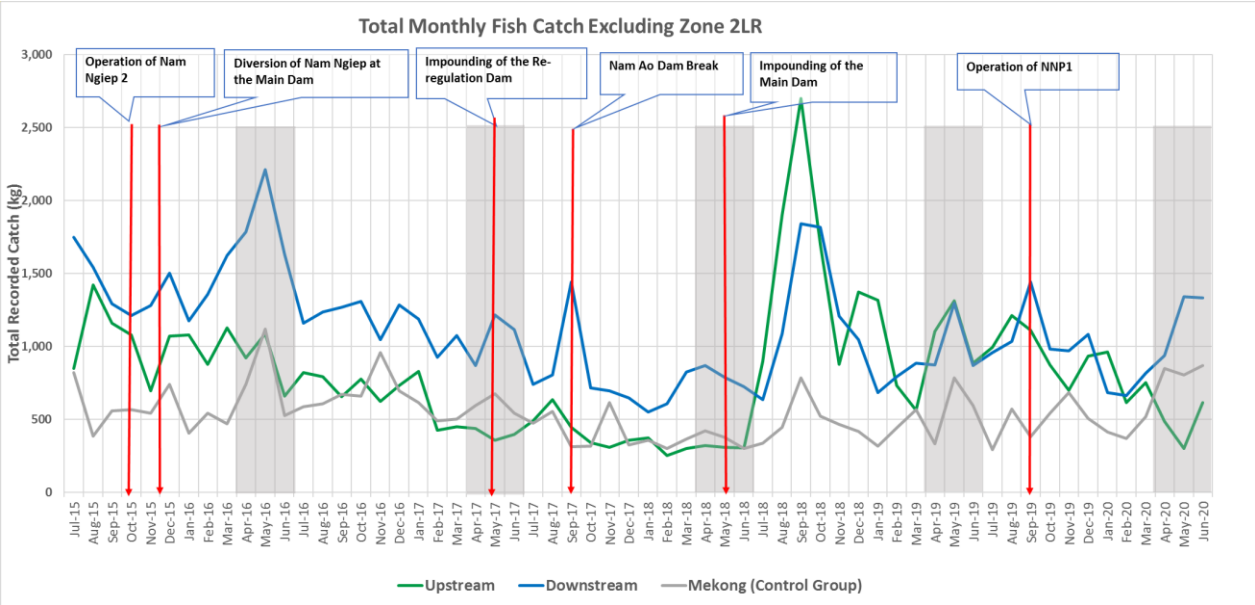


Table 6-4 and **Figure 6-2** show the total recorded fish catch for Q2 in 2016 – 2020 by the upstream (excluding Zone 2LR), downstream and the Mekong control group fishing households. Note that the recording days was reduced from 30 days/month to only seven days/month starting from February 2019 due 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 will carefully consider the different sampling programs that were implemented.

TABLE 6-4: *TOTAL FISH CATCH IN Q2 BY UPSTREAM (EXCLUDING ZONE 2LR), DOWNSTREAM AND THE MEKONG CONTROL GROUP FISHING HOUSEHOLDS*

Fishing Zone	Q2 2016 (kg)	Q2 2017 (kg)	Q2 2018 (kg)	Q2 2019 (kg)	Q2 2020 (kg)
Upstream	2,668.0	1,191.7	934.7	3,305.1	1,405.9
Downstream	5,627.0	3,200.2	2,386.8	3,038.8	3,610.2
Mekong Control Group	2,387.7	1,816.0	1,100.7	1,715.0	2,523.7

FIGURE 6-2: *TOTAL FISH CATCH FOR Q2 IN 2016 – 2020 BY UPSTREAM (EXCLUDING ZONE 2LR), DOWNSTREAM AND MEKONG CONTROL GROUP FISHING HOUSEHOLDS*

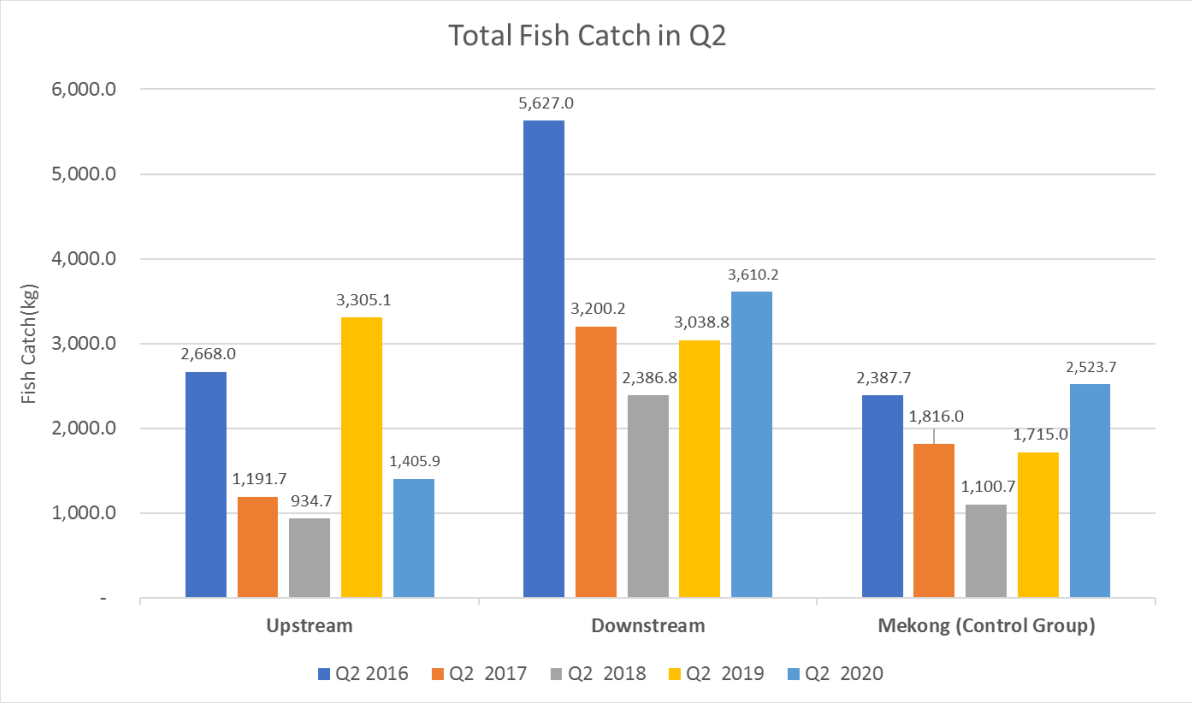
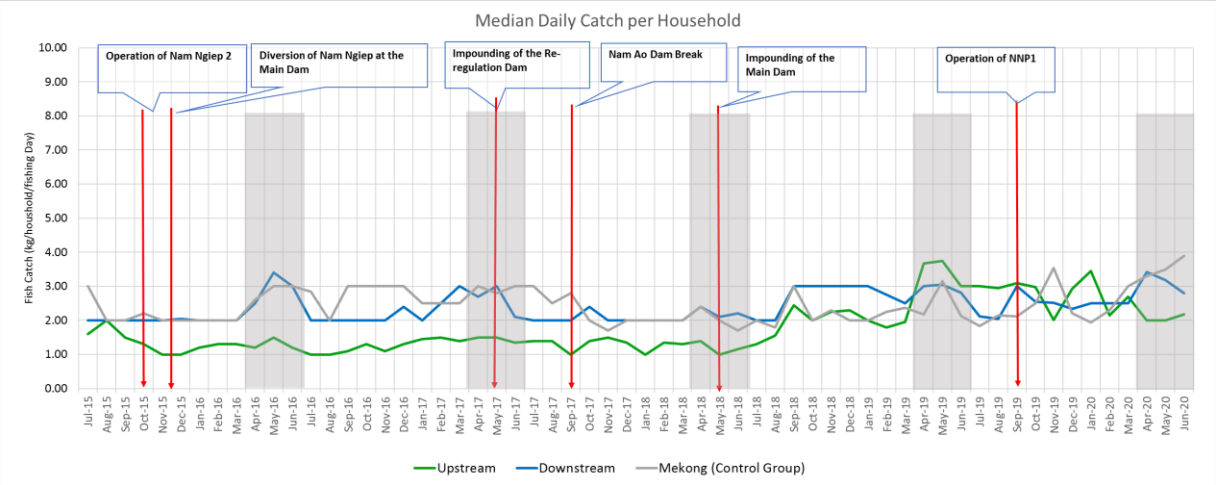


Table 6-5 presents the median household fish catch per fishing day for Q2 in 2016 – 2020 in the upstream (excluding Zone 2LR), downstream and the Mekong Control Group, and **Figure 6-3** shows the median monthly household fish catch per fishing day from July 2015 to June 2020.

TABLE 6-5: *MEDIAN HOUSEHOLD FISH CATCH PER FISHING DAY FOR Q2 IN 2016 - 2020*

Fishing Zone	Q2 2016 (kg)	Q2 2017 (kg)	Q2 2018 (kg)	Q2 2019 (kg)	Q2 2020 (kg)
Upstream (Excluding Zone 2LR)	1.30	1.45	1.18	3.47	2.06
Downstream	2.97	2.60	2.23	2.95	3.13
Mekong (Control Group)	2.87	2.93	2.03	2.49	3.57

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



To test whether there are any significant differences among the quarterly mean household fish catch per fishing day for each fishing zone, one-way ANOVA (analysis of variance) statistical tests have been performed on the data from each fishing zone. The null-hypothesis is that the sample means are equal, and the alternative hypothesis is that at least one of the means is statistically different. The level of significance is set to 0.05 (5%). The results of the one-way ANOVA tests are presented in **Table 6-6.**

TABLE 6-6: *RESULTS OF ONE-WAY ANOVA TESTS ON MEAN HOUSEHOLD FISH CATCH IN Q2*

Fishing Zone	F-Statistic	*P*-value	F-Critical	Significance
Upstream	48.56	$3.12*10^{-39}$	2.38	Highly Significant
Downstream	20.00	$2.62*10^{-16}$	2.37	Highly Significant
Mekong Control Group	15.57	$1.52*10^{-12}$	2.38	Highly Significant

The rule for interpreting the results of an ANOVA test is that if the F-statistic is lower than the F-Critical value then this supports that the null-hypothesis cannot be rejected (same if the *p*-value is greater than the significance level). The results of the ANOVA tests in ***Table 6-6*** indicates that upstream, downstream and Mekong area are highly significant difference.

7 Health and Safety

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

TABLE 7-1: SAFETY INCIDENTS REPORTED IN Q2 2020

Type of Incidents	LTI	RI	NM	PD	FI	MVI	Total
No. of Incidents in Q2 2020	0	0	0	0	0	0	0
Cumulative Total Incidents to 30 June 2020	20	18	22	23	9	62	**154**

LEGEND:

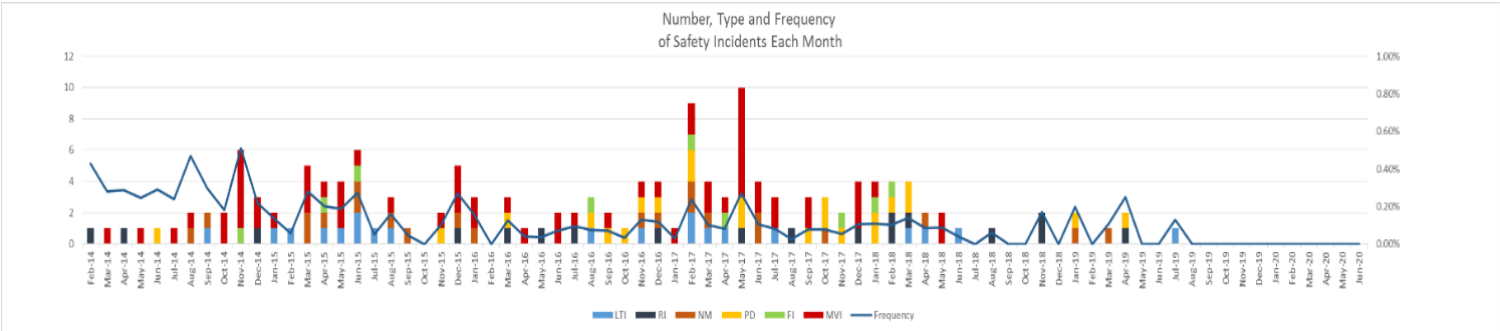
LTI	-	Lost Time Incident
RI	-	Recordable Injury
NM	-	Near Miss
PD	-	Property Damage
FI	-	Fire Incident
MVI	-	Motor Vehicle Incident

There were no incidents or accidents reported during Q2 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 JUNE 2020



APPENDICES

APPENDIX 1: STATUS OF DOCUMENTS REVIEW AND APPROVAL DURING Q2 2020

No	Site name	Document Name	Contractor / Subcontractor	Approval Status by EMO/NNP1 (date)	Detailed Site Information	Monthly Construction & Operation Status as of 30 June 2020
1	Phouhomxay Resettlement Village	DWP & SS-ESMMP for construction work of Improvement and Drilling Boreholes in the Phouhomxay Resettlement Village	Thanaxay Construction Sole Co., Ltd.	1st submission on 11 May 2020 - *No objection with no further comment on 19 June 2020*		Completed
2	Main Dam	DWP & SS-ESMMP for the Installation of Double Corrosion Protection Rock Bolts at the Left Bank Slope	Song Da 5 Contractor	2nd submission on 07 February 2020, *No longer active (Construction was completed)*		Completed
3	Main Dam and Re-regulation Dam	DWP & SS-ESMMP for Supply and Installation of Log Booms at the Main Dam and Re-regulation Dam of Namngiep 1 Hydropower Project	TLEC Contractor	2nd submission on 12 February 2020, *No longer active (Construction was completed)*		Completed

APPENDIX 2: ENVIRONMENTAL MONITORING CORRECTIVE ACTIONS Q2-2020

No	Issue ID	Inspection Date	Site Name	Issue / Description	Action Required/ Recommendation	Deadline	Latest Follow-up	Status
1	ONC_VSP-0014	19.02.20	Rock/spoil disposal of Irrigation Canal *(Phouhomxay village)*	On 19-Nov-19, EMO was invited to join 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 parallel with a preparation and submission of the Site Decommissioning and Rehabilitation Plan (SDRP) for NNP1 review and approval. In Dec-19, the previous ADB & IAP mission raised the same concern on insufficient topsoil covering for this	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 (NCR2) following a failure to accomplish the pending rehabilitation work.	07.03.20	29.06.20	Un-resolved

No	Issue ID	Inspection Date	Site Name	Issue / Description	Action Required/ Recommendation	Deadline	Latest Follow-up	Status
				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.				
2	ONC_AM-0003	28.02.20	OSOV	With reference to the LTA's recommendation made during the mission 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 requested EMO to check if simple/basic improvement of	As per the justification, ADM shall carry out a basic improvement of the second wetland pond similarly to the first wetland pond. However, ADM requested to provide a list and descriptions of necessary improvement work items for EMO's record and inspection reference.	12.03.20	17.03.20	Un-resolved

No	Issue ID	Inspection Date	Site Name	Issue / Description	Action Required/ Recommendation	Deadline	Latest Follow-up	Status
				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. **Progress:** - Based on the monitoring result, 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.				

No	Issue ID	Inspection Date	Site Name	Issue / Description	Action Required/ Recommendation	Deadline	Latest Follow-up	Status
3	ONC_OC-0347	17.03.20	Spoil Disposal no.6	Since the landscaping work for spoil disposal no.6 (area 6.3) was completed in the middle of February 2020, no revegetation work is being carried out for this area, it was observed that the covered soil layer on the sloping area started to erode after the first rain. Without a proper prevention measures, this has a high potential risk of massive slope erosion and collapse. Please note that, NNP1PC-TD has allowed the PowerGrid contractor to dispose spoil from the excavation of tower no. 1 at the middle slope of this area. Therefore, this additional disturbed area by the PowerGrid contractor can be excluded from CWC's occupied area because this newly disposed spoil area will be treated and revegetated	The contractor was instructed to take appropriate corrective action as the following: - Provide/install cut-of drain on the top of slopes to reduce the amount vertical run-off through the sloping areas; - Conduct slope trimming and compaction using excavator's bucket where the cracks of soil layer are visible; - Conduct seeding work on the sloping area to aid vegetation cover. This can assist on quicker slope stabilization and soil erosion minimization.	27.03.20	26.05.20	Resolved

No	Issue ID	Inspection Date	Site Name	Issue / Description	Action Required/ Recommendation	Deadline	Latest Follow-up	Status
				by the PowerGrid contractor at later stage.				
4	ONC_OC-0348	17.03.20	Spoil disposal no.6	Most of the trees planted in December 2019 were totally dried up. EMO has instructed the contractor to remove the dead trees and replace with proper native trees/seedling as well as conduct a grass seed sowing for quicker green cover; In early January 2020, a number of local flowers have been planted and replaced the dead trees. Then, no further revegetation work is implemented.	The contractor was instructed to continue seeding/planting works at this area (no adding of additional flowers).	27.03.20	27.05.20	Resolved
5	ONC_OC-0349	24.03.20	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	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	Action needed throughout the Liability Period	15.06.20	Resolved

No	Issue ID	Inspection Date	Site Name	Issue / Description	Action Required/ Recommendation	Deadline	Latest Follow-up	Status
				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 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 03 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:**	be added if any future replacement of the dead and weak trees; - No further flowers, fruit trees are allowed to be additional planted/replaced.			

No	Issue ID	Inspection Date	Site Name	Issue / Description	Action Required/ Recommendation	Deadline	Latest Follow-up	Status
				On 24 March 2020, during this week joint site inspection, two commercial species (06 Mai Sack and 04 Mai Du) and one local soft tree species (04 Mai samsara) have replaced the dead trees.				
6	ONC_OC-0350	24.03.20	Sand stock yard	Landscaping of the Temporary Sand Stock Yard was completed on 08 November 2019, but no revegetation work is performed. Please also noted that this area remained sandy condition (thin soil surface, but thick sand layer underneath) that posts difficulty for revelation work and natural regrowth.	The contractor was instructed to take the following actions: - Assess and treat this landscaped area to aid revegetation work and natural regrowth condition; - The revegetation work needs to catch up with this year wet season which is considerably staring now.	27.03.20	15.06.20	Resolved
7	NCR_HM-0007	06.04.20	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	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	15.07.20	25.06.20	Un-resolved (the issue will be delayed until the country's Covid-19

No	Issue ID	Inspection Date	Site Name	Issue / Description	Action Required/ Recommendation	Deadline	Latest Follow-up	Status
				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 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	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.			lockdown is lifted)

No	Issue ID	Inspection Date	Site Name	Issue / Description	Action Required/ Recommendation	Deadline	Latest Follow-up	Status
				April 2020, EMO followed up, but so far, there was no response/update either TD-O&M and 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 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.				
8	ONC_AM-0004	17.06.20	OSOV	On 17 June 2020, EMO conducted a waste segregation spot check at the main waste drop-off stations in OSOV1, it was found that: - Three out of four waste drop-off stations have insufficient waste bin which	- At least 2 waste bins for general waste and recycle waste shall be provided at each mentioned waste drop-off stations; - Replace the damaged waste bin labels for clear waste drop-off indication;	15.07.20	26.06.20	Un-resolved

No	Issue ID	Inspection Date	Site Name	Issue / Description	Action Required/ Recommendation	Deadline	Latest Follow-up	Status
				resulted in mixed waste disposal in the same bin; - Some damaged waste bin labels need replacement and there was an evidence of waste being disposed in an incorrect waste bin (EMO provided the waste bin labels to ADM since early of this year). - General waste and recycle waste were mixed in the same bags by NNP1 staff.	- ADM and the waste management team of EMO shall organize the waste management training to NNP1PC key personnel (training will be jointly implemented between ADM and EMO as per camp operation rules and waste management measures); - Provide feedback to NNP1PC staff in the OSOV1 to improve waste segregation practice.			
9	ONC_AM-0005	17.06.20	OSOV	Recycle waste was left outside the storage facility, undesignated storage of damaged equipment, tools, materials and loose logs. 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.	30.06.20	30.06.20	Resolved

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

CODES AND LOCATION STATION FOR SURFACE WATER QUALITY MONITORING

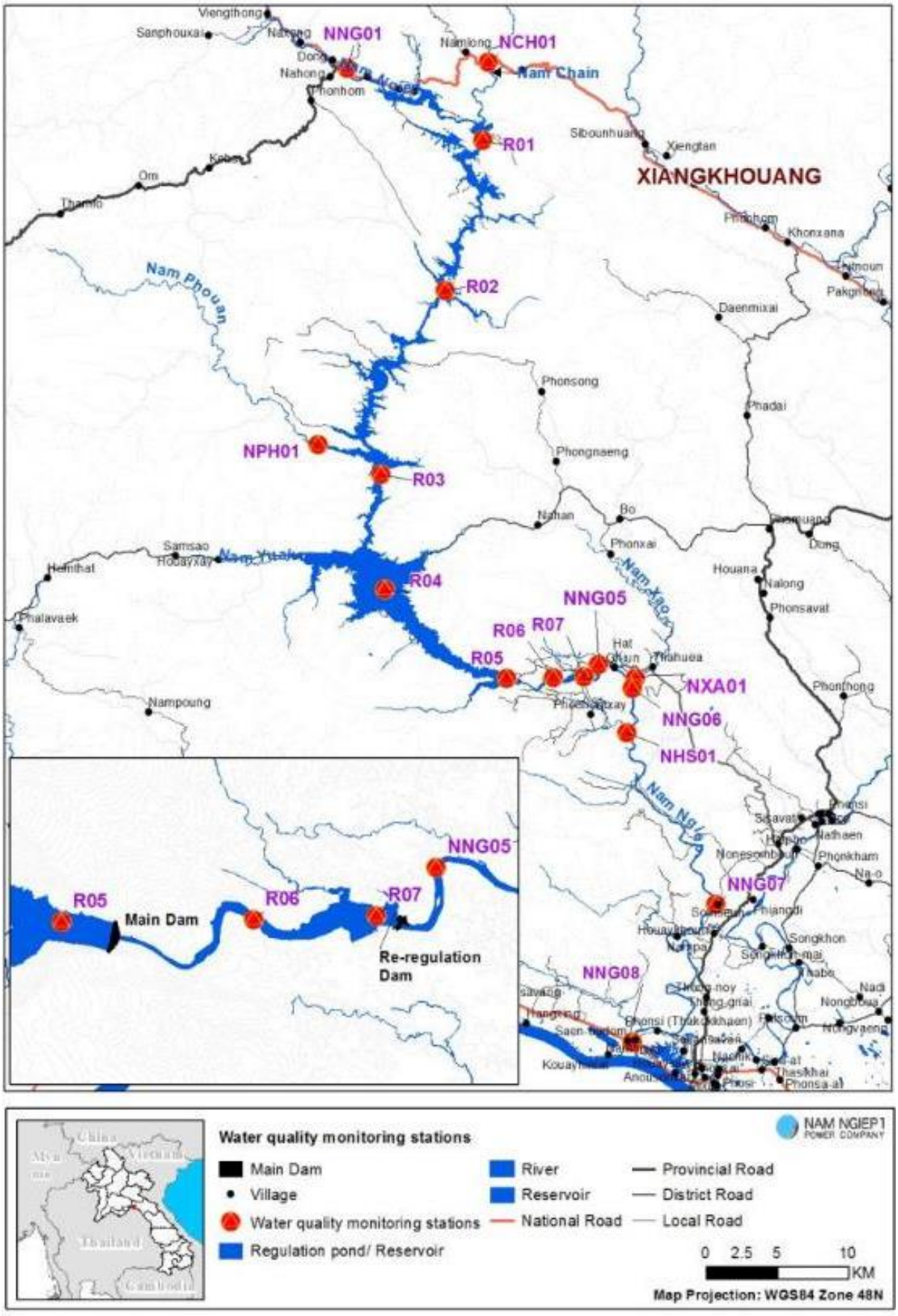
Site Code	Location station	Zone
NNG01	Nam Ngiep Upstream of Ban Phiengta	Upstream Project Construction Site
R01	Main reservoir upstream main dam approx. 50 Km.	
R02	Main reservoir upstream main dam approx. 35 Km.	
NNG02/R03	Nam Ngiep Upstream of Nam Phouan Confluence / Main reservoir upstream main dam approx. 21 Km.	
NNG03/R04	Nam Ngiep Downstream of Ban Sop-Youak / 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), 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].

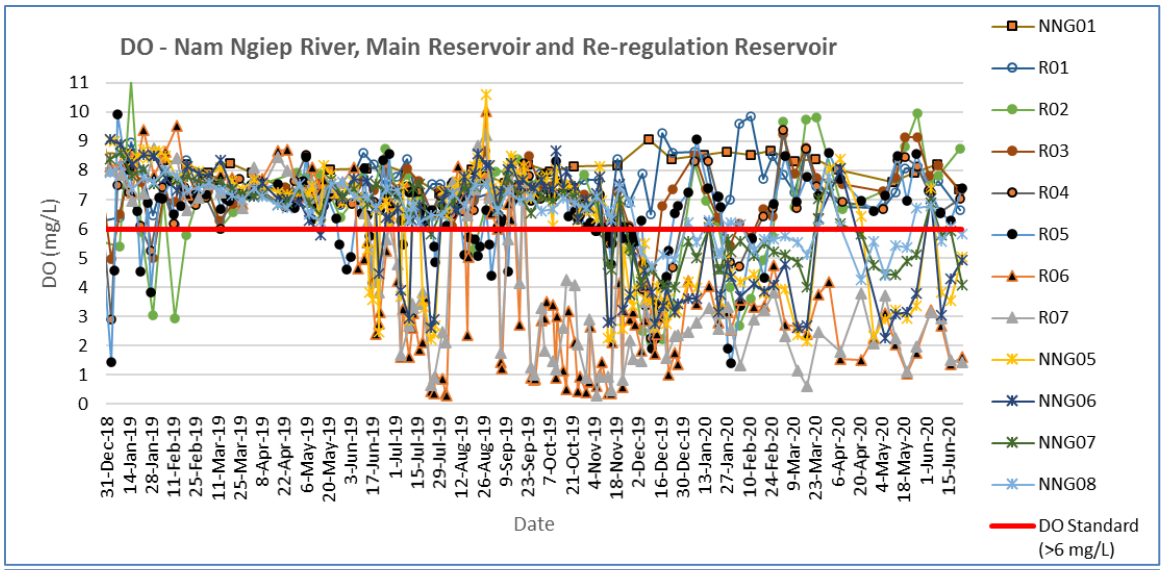
Frequency of Monitoring	Parameters (Unit)	Monitoring Sites
Fortnightly	pH, DO (%), DO (mg/L), Conductivity (µs/cm), Temperature (°C), Turbidity (NTU)	All stations
Monthly	TSS (mg/L), BOD_5 (mg/L), COD (mg/L), NH_3-N (mg/L), NO_3-N (mg/L), total coliform (MPN/100 mL), faecal coliform (MPN/100 mL), Hydrogen sulphide (mg/L), Phytoplankton biomass, TOC and TKN.	As per ESMMP-OP.

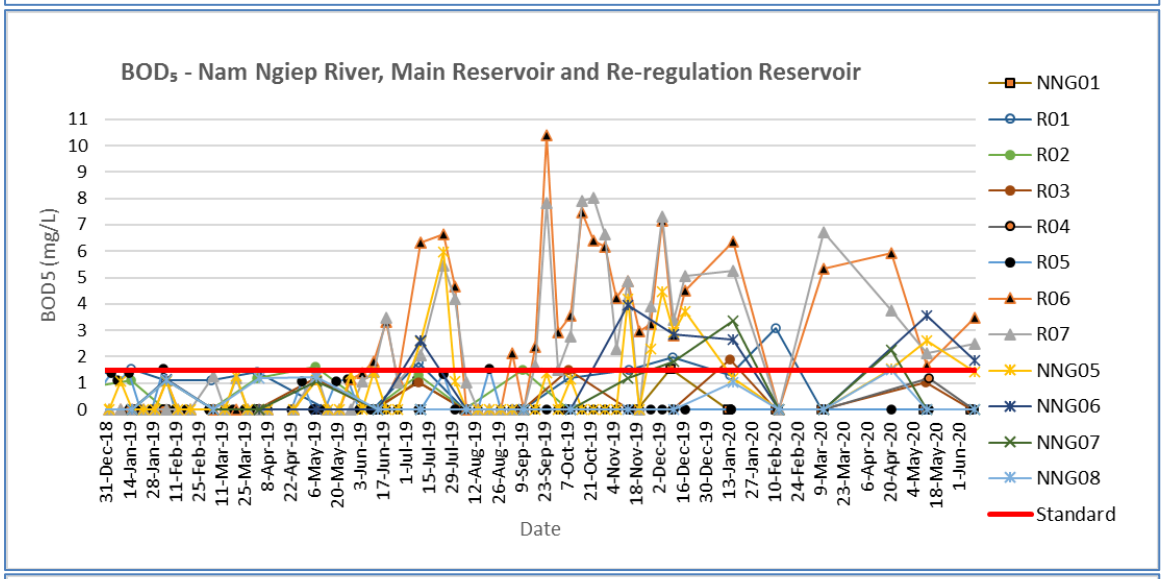
SURFACE WATER QUALITY MONITORING LOCATIONS

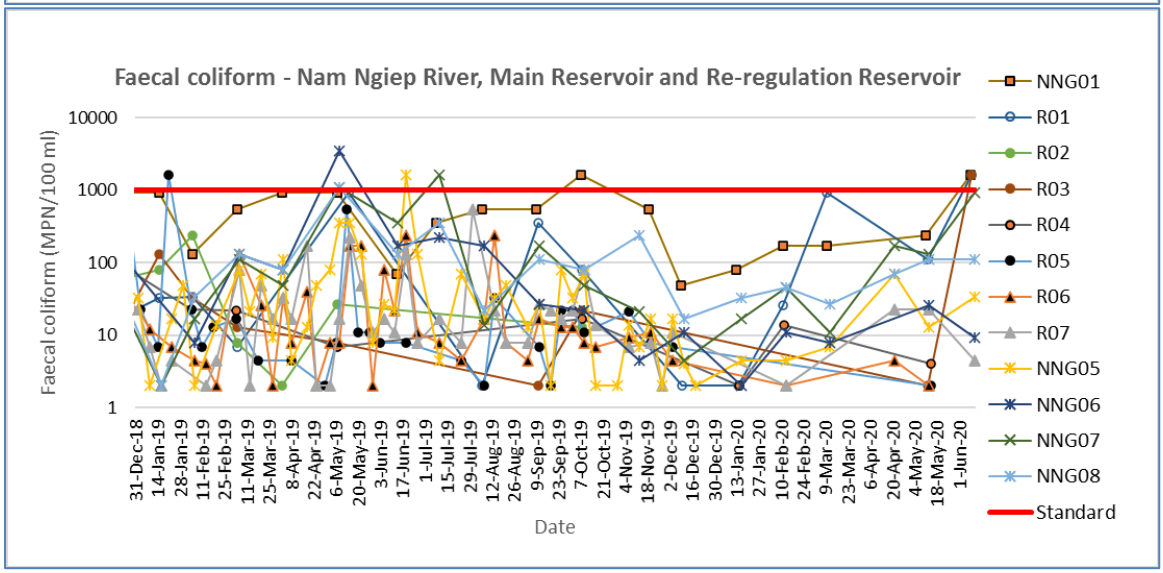


APPENDIX 4: KEY TRENDS OF WATER QUALITY MONITORING FROM DECEMBER 2018 TO END OF JUNE 2020 (ONLY PARAMETERS THAT EXCEEDED THE STANDARDS)

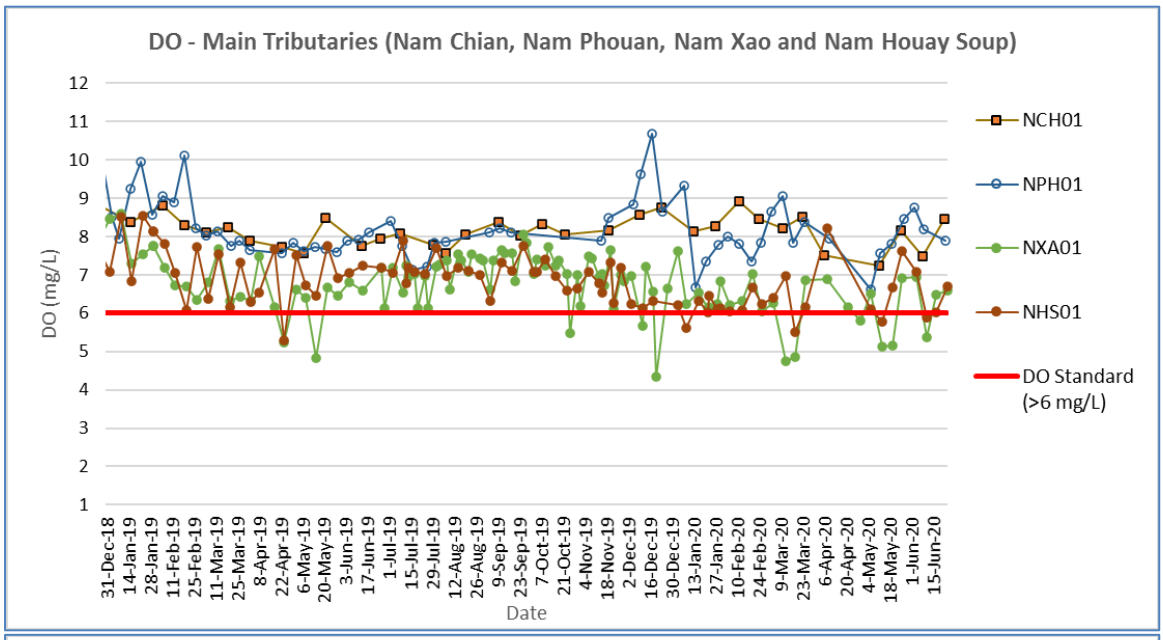
Nam Ngiep Surface Water

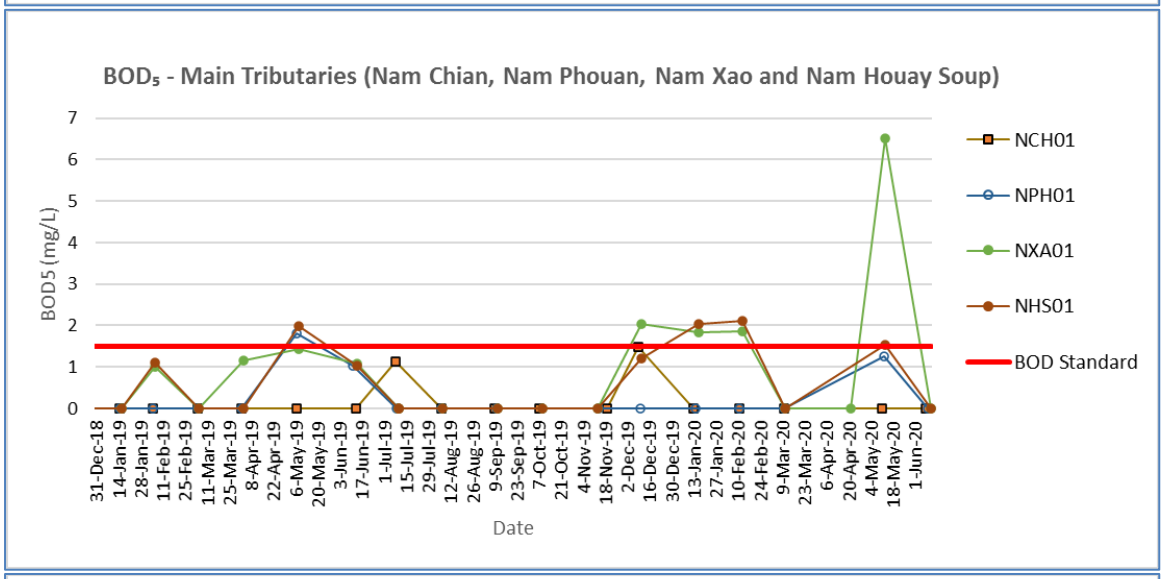


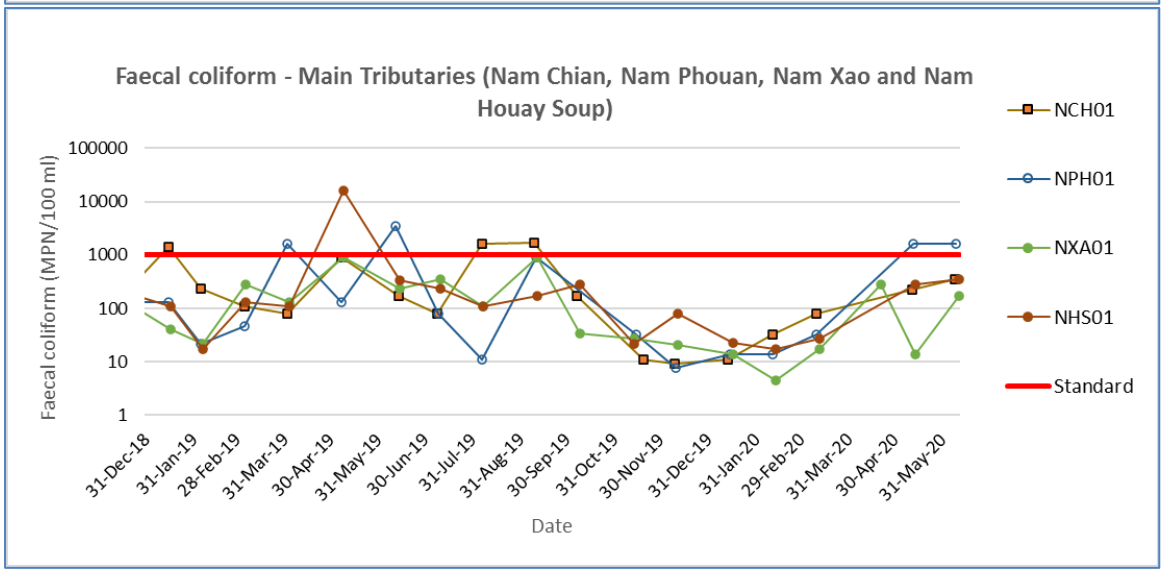




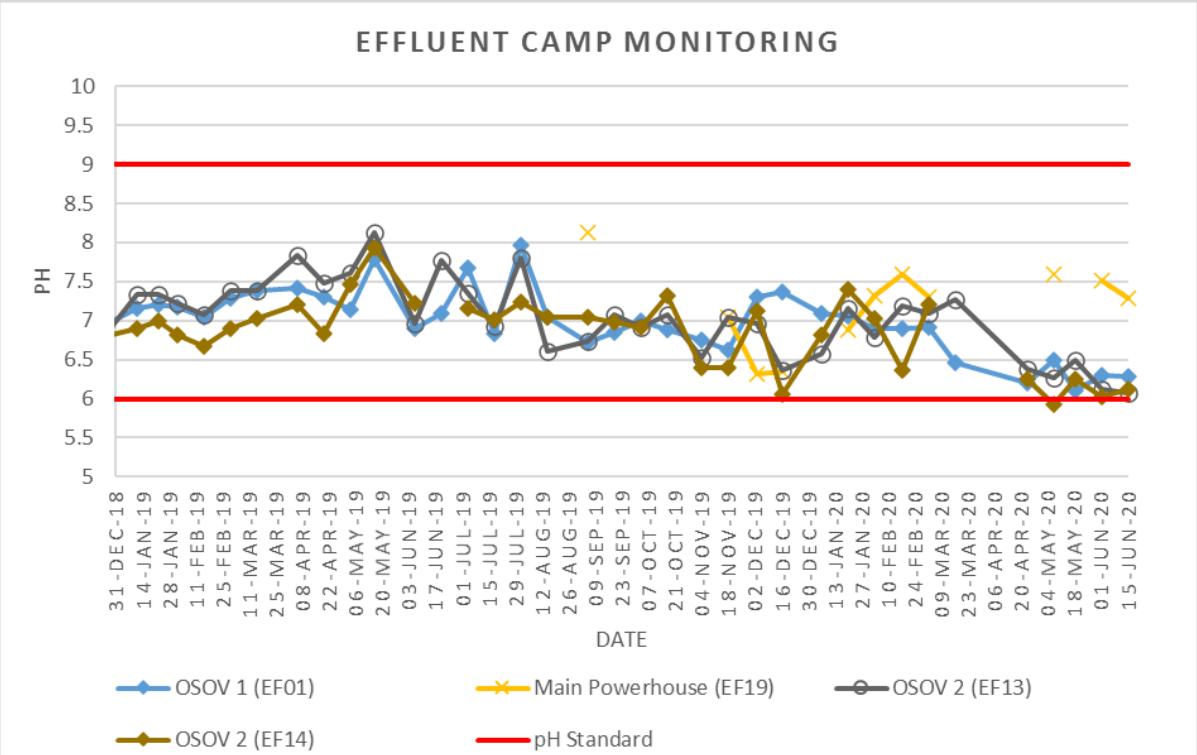
Key Water Quality Parameters for the Nam Ngiep Tributaries: Nam Chian, Nam Phouan, Nam Xao, Nam Houay Soup

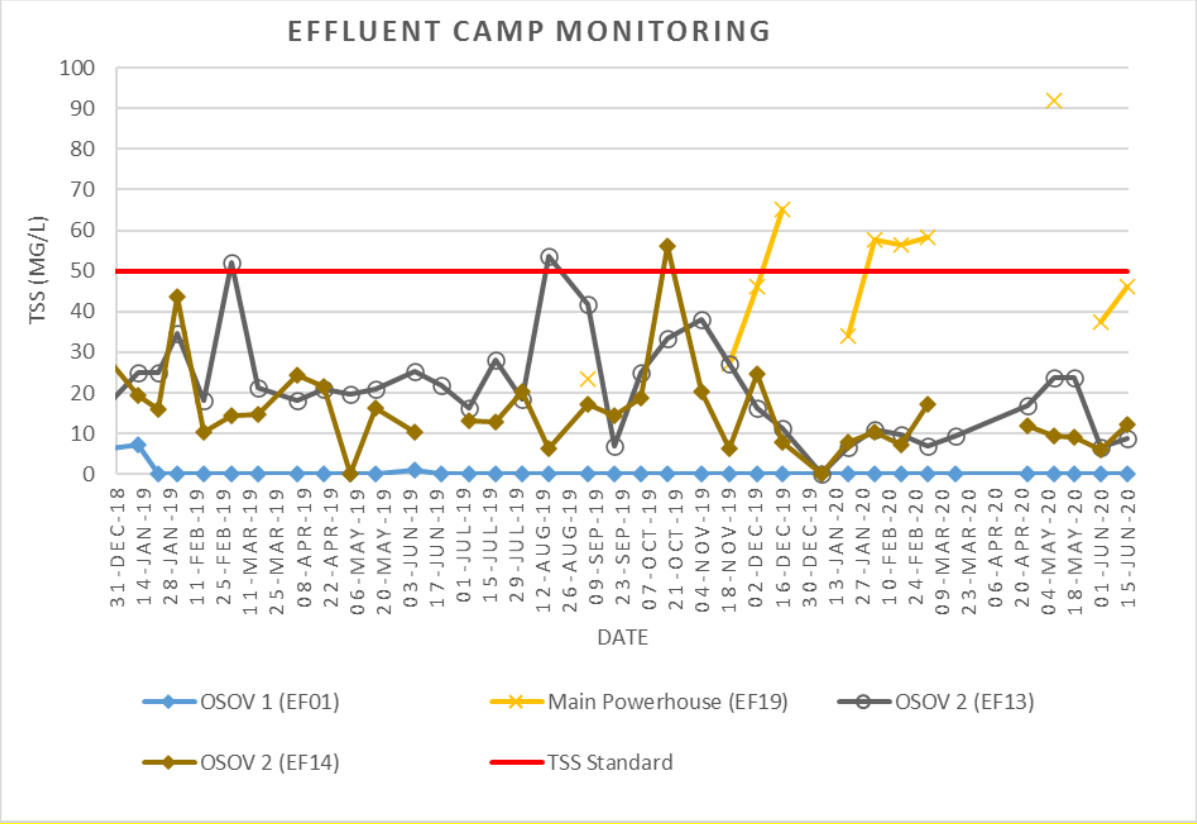


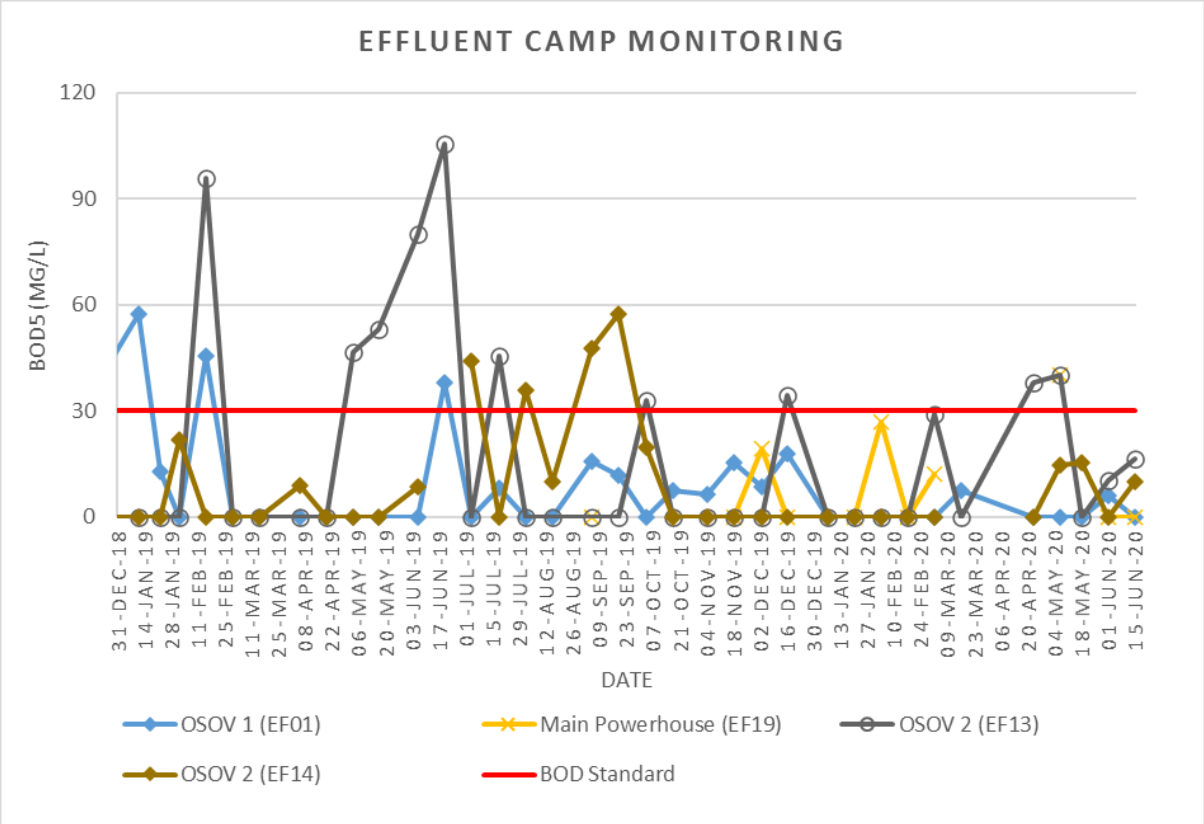


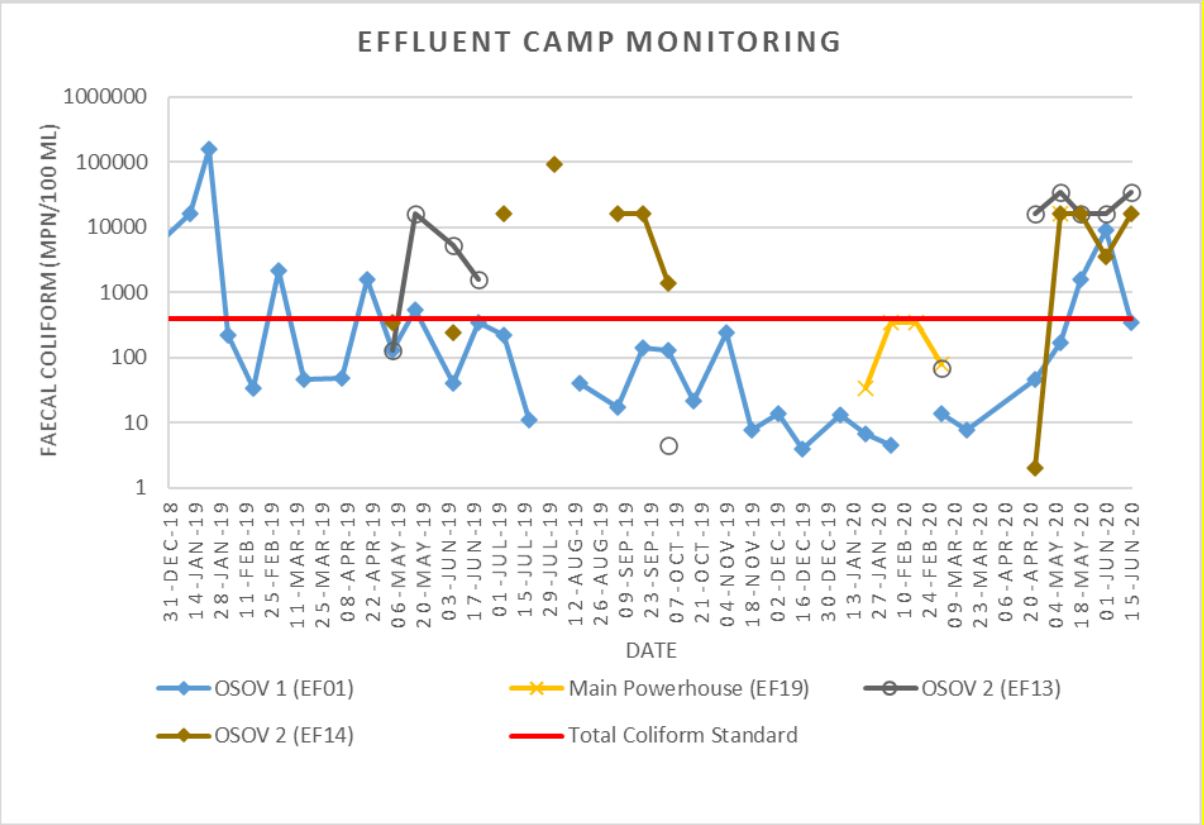


Camps' Effluent Water Quality Trends (Since December 2018 – June 2020)






EFFLUENT CAMP MONITORING
BOD5 (MG/L)
120
90
60
30
0
31-DEC-18
14-JAN-19
28-JAN-19
11-FEB-19
25-FEB-19
11-MAR-19
25-MAR-19
08-APR-19
22-APR-19
06-MAY-19
20-MAY-19
03-JUN-19
17-JUN-19
01-JUL-19
15-JUL-19
29-JUL-19
12-AUG-19
26-AUG-19
09-SEP-19
23-SEP-19
07-OCT-19
21-OCT-19
04-NOV-19
18-NOV-19
02-DEC-19
16-DEC-19
30-DEC-19
13-JAN-20
27-JAN-20
10-FEB-20
24-FEB-20
09-MAR-20
23-MAR-20
06-APR-20
20-APR-20
04-MAY-20
18-MAY-20
01-JUN-20
15-JUN-20
DATE
OSOV 1 (EF01)
Main Powerhouse (EF19)
OSOV 2 (EF13)
OSOV 2 (EF14)
BOD Standard


EFFLUENT CAMP MONITORING
FAECAL COLIFORM (MPN/100 ML)
1000000
100000
10000
1000
100
10
1
31-DEC-18
14-JAN-19
28-JAN-19
11-FEB-19
25-FEB-19
11-MAR-19
25-MAR-19
08-APR-19
22-APR-19
06-MAY-19
20-MAY-19
03-JUN-19
17-JUN-19
01-JUL-19
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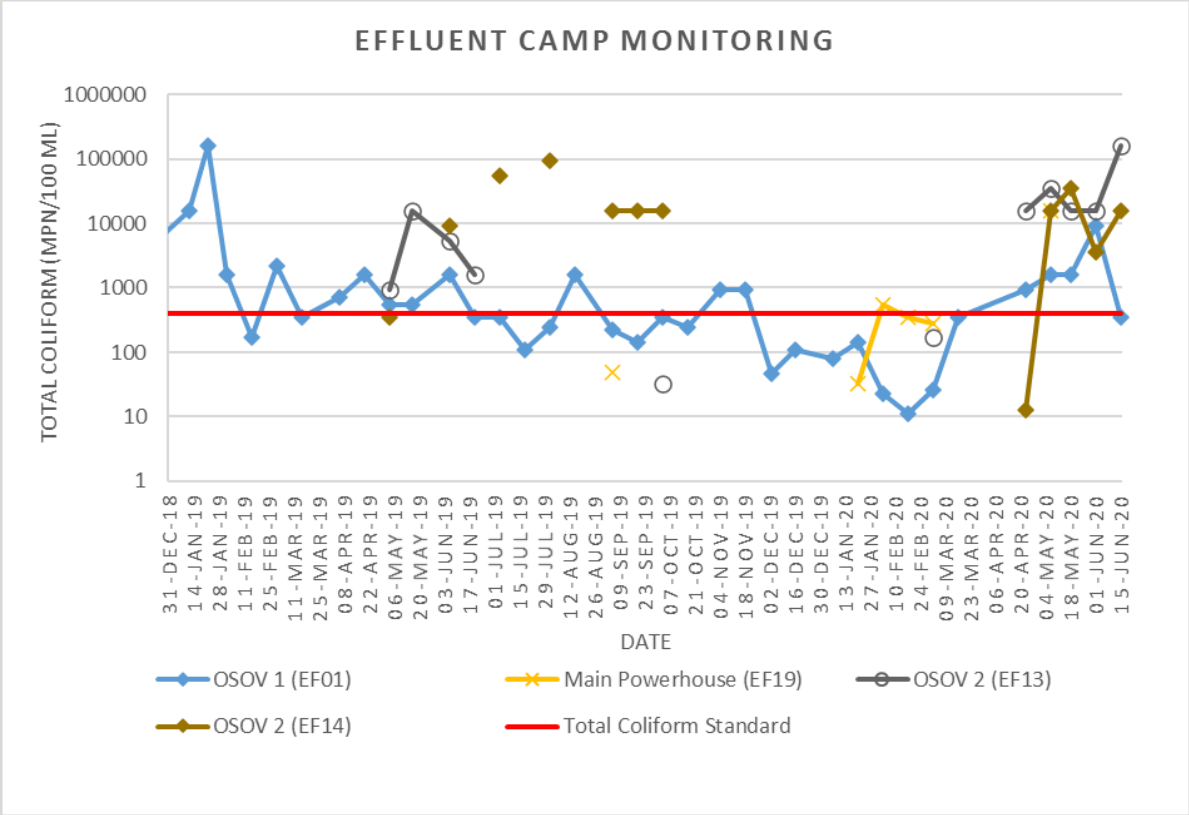
09-SEP-19
23-SEP-19
07-OCT-19
21-OCT-19
04-NOV-19
18-NOV-19
02-DEC-19
16-DEC-19
30-DEC-19
13-JAN-20
27-JAN-20
10-FEB-20
24-FEB-20
09-MAR-20
23-MAR-20
06-APR-20
20-APR-20
04-MAY-20
18-MAY-20
01-JUN-20
15-JUN-20
DATE
OSOV 1 (EF01)
Main Powerhouse (EF19)
OSOV 2 (EF13)
OSOV 2 (EF14)
Total Coliform Standard


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

APPENDIX 5: *WATER QUALITY MONITORING DATA*

APPENDIX 5-1: *SURFACE WATER QUALITY MONITORING – Q2 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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
1-Apr-20	pH	5.0 - 9.0						7.02	7.09		7.47		7.78	7.51				
6-Apr-20	pH	5.0 - 9.0	7.02												7.73			
8-Apr-20	pH	5.0 - 9.0						7.2	6.66	6.68	6.85	6.93	7.14	7.17			6.94	6.99
9-Apr-20	pH	5.0 - 9.0		7.34	6.9	7.58	7.57									7.56		
21-Apr-20	pH	5.0 - 9.0						7.52	6.71	6.77	7.04		6.34	6.5			7.27	
29-Apr-20	pH	5.0 - 9.0						7.36	7.06	6.85	6.92		7.29	7.38			6.91	
5-May-20	pH	5.0 - 9.0		8.24	7.59	8.62	7.05											
6-May-20	pH	5.0 - 9.0						6.45	5.6	5.56	6.12	6.46	6.35	6.22		8.23	6.78	6.21
11-May-20	pH	5.0 - 9.0	6.91												7.73			
12-May-20	pH	5.0 - 9.0														6.6		
13-May-20	pH	5.0 - 9.0		6.57	6.27	7.82			6.52	6.1	6.13	6.16	6.36	6.33			3.62	6.61
14-May-20	pH	5.0 - 9.0					7.46	7.23										
19-May-20	pH	5.0 - 9.0		6.48	6.59	8.05	6.36									6.54		
20-May-20	pH	5.0 - 9.0						7.28	6.6	6.65	6.22	6.3	7.1	7.28			6.37	7.05
25-May-20	pH	5.0 - 9.0	7.12												7.99			
26-May-20	pH	5.0 - 9.0						7.02	6.79	6.8	6.2	6.46	6.58	6.74			6.82	7.16
27-May-20	pH	5.0 - 9.0		6.75	7.07	7.71	7.61									7.01		
3-Jun-20	pH	5.0 - 9.0		6.77	7.34	7.9	6.86									7.41		
4-Jun-20	pH	5.0 - 9.0						6.84	6.93	6.98	7.63	6.89	6.71	6.65			6.63	7.05
8-Jun-20	pH	5.0 - 9.0	6.43												7.98			
9-Jun-20	pH	5.0 - 9.0		7.12	7.66	7.47										7.18		
10-Jun-20	pH	5.0 - 9.0					7.09	6.92										

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
11-Jun-20	pH	5.0 - 9.0							7.13	7.17	7.41	7.78	7.72	7.11			7.33	7.58
17-Jun-20	pH	5.0 - 9.0						7.51	6.96	7.03	6.97	7.36	7.45	7.42			7.2	7.42
22-Jun-20	pH	5.0 - 9.0	7.9												8.2			
23-Jun-20	pH	5.0 - 9.0		7.98	8.46	7.99	7.61									7.91		
24-Jun-20	pH	5.0 - 9.0						7.55	7.19	7.18	7.28	7.66	7.6	7.78			7.43	7.65
1-Apr-20	Sat. DO (%)							108	49.8		96.8		95.1	99.7				
6-Apr-20	Sat. DO (%)		104.2												97			
8-Apr-20	Sat. DO (%)							96.1	18.6	22.1	101.5	97.7	75.1	74.1			79.5	100.9
9-Apr-20	Sat. DO (%)			82	84.8	96.1	88.1									99.7		
21-Apr-20	Sat. DO (%)							89.3	18.7	46.7	78.3		72.7	53			80.9	
29-Apr-20	Sat. DO (%)							83.6	27.1	25.8	28		57.9	70.4			75.2	
5-May-20	Sat. DO (%)			82.6	98.5	97.9	87.6											
6-May-20	Sat. DO (%)							92.9	38	45.6	36.1	30.8	56.9	56.5		85.4	91.6	80.9
11-May-20	Sat. DO (%)		103.9												98.6			
12-May-20	Sat. DO (%)															93.5		
13-May-20	Sat. DO (%)			93.5	103.4	105			24.3	27.2	39.8	37.7	55.8	68.8			64.6	77.4
14-May-20	Sat. DO (%)						111	112.5										
19-May-20	Sat. DO (%)			103	116.8	124.2	114.6									94.8		
20-May-20	Sat. DO (%)							92	12.2	13.6	35.7	38.4	62.2	68.5			69	85.1
25-May-20	Sat. DO (%)		102.8												107.1			
26-May-20	Sat. DO (%)							112.1	20.9	23.8	41.5	46.8	63.9	84.3			90.5	96.7
27-May-20	Sat. DO (%)			109.3	133.2	123.5	109.6									109.1		
3-Jun-20	Sat. DO (%)			96.3	101.5	105.4	96.5									105.7		
4-Jun-20	Sat. DO (%)							94.8	39.8	40.9	93.6	91.2	89.9	57.4			90	88
8-Jun-20	Sat. DO (%)		110.4												100			

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
9-Jun-20	Sat. DO (%)			100.3	105	110.3										103		
10-Jun-20	Sat. DO (%)						88.3	87.2										
11-Jun-20	Sat. DO (%)								32.4	38	47.5	37.3	73.9	72.4			72.6	74.6
17-Jun-20	Sat. DO (%)							82.3	16.6	18.7	42.9	53.8	72.3	73.8			80.5	73.8
22-Jun-20	Sat. DO (%)		99.3												113.3			
23-Jun-20	Sat. DO (%)			86.4	116.3	98	93.9									95.2		
24-Jun-20	Sat. DO (%)							97.4	20	17.6	62.8	61.7	51.9	73.9			86.2	84.5
1-Apr-20	DO (mg/L)	>6.0						8.6	4.17		8.02		7.5	7.8				
6-Apr-20	DO (mg/L)	>6.0	8.03												7.51			
8-Apr-20	DO (mg/L)	>6.0						7.71	1.56	1.8	8.38	8.07	6.17	6.09			6.89	8.23
9-Apr-20	DO (mg/L)	>6.0		6.76	6.68	7.53	6.94									7.96		
21-Apr-20	DO (mg/L)	>6.0						6.98	1.53	3.79	6.43		5.84	4.25			6.17	
29-Apr-20	DO (mg/L)	>6.0						6.62	2.27	2.07	2.34		4.75	5.59			5.82	
5-May-20	DO (mg/L)	>6.0		6.72	7.3	7.3	6.67											
6-May-20	DO (mg/L)	>6.0						7.15	3.13	3.71	2.91	2.25	4.44	4.41		6.63	6.52	6.1
11-May-20	DO (mg/L)	>6.0	7.59												7.23			
12-May-20	DO (mg/L)	>6.0														7.57		
13-May-20	DO (mg/L)	>6.0		7.24	7.71	7.74			2.04	2.27	3.23	3.08	4.42	5.43			5.14	5.79
14-May-20	DO (mg/L)	>6.0					8.35	8.51										
19-May-20	DO (mg/L)	>6.0		8.07	8.81	9.14	8.47									7.82		
20-May-20	DO (mg/L)	>6.0						6.95	1.04	1.12	2.93	3.16	4.91	5.37			5.16	6.67
25-May-20	DO (mg/L)	>6.0	7.91												8.16			
26-May-20	DO (mg/L)	>6.0						8.55	1.75	1.98	3.38	3.78	5.1	6.71			6.92	7.63
27-May-20	DO (mg/L)	>6.0		8.12	9.95	9.14	8.15									8.47		
3-Jun-20	DO (mg/L)	>6.0		7.28	7.61	7.83	7.31									8.75		

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
4-Jun-20	DO (mg/L)	>6.0						7.26	3.21	3.17	7.38	7.05	6.89	6.8			6.95	7.08
8-Jun-20	DO (mg/L)	>6.0	8.2												7.48			
9-Jun-20	DO (mg/L)	>6.0		7.64	7.81	8.17										8.18		
10-Jun-20	DO (mg/L)	>6.0					6.57	6.55										
11-Jun-20	DO (mg/L)	>6.0							2.68	2.95	3.83	3.04	5.8	5.56			5.38	5.88
17-Jun-20	DO (mg/L)	>6.0						6.29	1.37	1.53	3.53	4.3	5.92	6.06			6.48	6.03
22-Jun-20	DO (mg/L)	>6.0	7.34												8.47			
23-Jun-20	DO (mg/L)	>6.0		6.66	8.73	7.3	7.02									7.89		
24-Jun-20	DO (mg/L)	>6.0						7.39	1.63	1.44	5.03	4.95	4.09	5.81			6.59	6.7
1-Apr-20	Conductivity (µs/cm)							78	95		94		92	90				
6-Apr-20	Conductivity (µs/cm)		57.8												23.1			
8-Apr-20	Conductivity (µs/cm)							76	92	85	98	87	88	83			116	46
9-Apr-20	Conductivity (µs/cm)			95	92	79	76									97		
21-Apr-20	Conductivity (µs/cm)							76	93	90	89		92	88			151	
29-Apr-20	Conductivity (µs/cm)							75	94	91	95		92	90			188	
5-May-20	Conductivity (µs/cm)			78	96	80	77											
6-May-20	Conductivity (µs/cm)							75	93	87	91	92	91	86		88	184	41

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
11-May-20	Conductivity (µs/cm)		54.3												27.8			
12-May-20	Conductivity (µs/cm)															88		
13-May-20	Conductivity (µs/cm)			68	94	80			93	90	91	92	87	86			127	40
14-May-20	Conductivity (µs/cm)						77	75										
19-May-20	Conductivity (µs/cm)			98	89	82	77									86		
20-May-20	Conductivity (µs/cm)							75	96	90	91	91	89	82			183	33
25-May-20	Conductivity (µs/cm)		114.5												149			
26-May-20	Conductivity (µs/cm)							72	92	92	93	91	85	63			100	30
27-May-20	Conductivity (µs/cm)			89	90	77	74									94		
3-Jun-20	Conductivity (µs/cm)			104	101.5	105.4	75									102		
4-Jun-20	Conductivity (µs/cm)							72	86	83	70	89	63	44			133	20
8-Jun-20	Conductivity (µs/cm)		70.8												23.4			
9-Jun-20	Conductivity (µs/cm)			77	94	78										76		

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
10-Jun-20	Conductivity (µs/cm)						75	72										
11-Jun-20	Conductivity (µs/cm)								86	82	86	86	82	70			148	26
17-Jun-20	Conductivity (µs/cm)							72	90	85	71	73	49	34			76	19
22-Jun-20	Conductivity (µs/cm)		130												67.6			
23-Jun-20	Conductivity (µs/cm)			99	87	78	73									87		
24-Jun-20	Conductivity (µs/cm)							72	87	85	83	87	81	72			127	33
1-Apr-20	Temperature (°C)							26.9	24.39		24.79		27.6	27.96				
6-Apr-20	Temperature (°C)		26												25.9			
8-Apr-20	Temperature (°C)							26.68	24.03	25.23	24.99	24.86	25.35	25.69			26.26	25.61
9-Apr-20	Temperature (°C)			25.2	27.78	27.92	27.62									26.68		
21-Apr-20	Temperature (°C)							28.11	26.15	27.39	25.29		27.02	26.64			29.68	
29-Apr-20	Temperature (°C)							27.39	24.42	26.56	24.8		25.63	26.65			28.6	
5-May-20	Temperature (°C)			28.37	31.29	30.78	29.67											
6-May-20	Temperature (°C)							28.99	25.25	26.01	26.22	26.65	28.15	28.13		27.91	30.44	30.23

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
11-May-20	Temperature (°C)		29.2												28.7			
12-May-20	Temperature (°C)															26.84		
13-May-20	Temperature (°C)			28.65	30.86	31.29			24.18	24.96	25.32	25.08	27.32	27.68			29.79	30.71
14-May-20	Temperature (°C)						30.45	29.87										
19-May-20	Temperature (°C)			27.89	30.17	31.59	31.25									27		
20-May-20	Temperature (°C)							30.02	24.63	25.17	25.51	25.42	27.37	28.11			30.17	28.11
25-May-20	Temperature (°C)		26.5												26.9			
26-May-20	Temperature (°C)							29.44	24.86	24.88	25.66	25.68	26.59	27.12			29.29	27.44
27-May-20	Temperature (°C)			31.06	30.67	31.38	30.94									28.5		
3-Jun-20	Temperature (°C)			30.01	30.35	30.69	29.91									25.08		
4-Jun-20	Temperature (°C)							29.29	26.53	28.57	27.67	28.03	27.96	28.22			28.87	26.51
8-Jun-20	Temperature (°C)		28.3												27.5			
9-Jun-20	Temperature (°C)			29.1	31.2	31.12										27.06		
10-Jun-20	Temperature (°C)						30.8	30.35										

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
11-Jun-20	Temperature (°C)								25.5	26.48	26.25	26.31	27.68	29.1			31.28	27.58
17-Jun-20	Temperature (°C)							29.33	25.22	25.64	25.53	25.74	25.55	25.63			26.35	25.51
22-Jun-20	Temperature (°C)		28.5												27.6			
23-Jun-20	Temperature (°C)			28.85	30.43	21.29	30.69									24.77		
24-Jun-20	Temperature (°C)							29.72	25.79	25.78	26.58	26.62	27.04	27.74			29.21	27.4
1-Apr-20	Turbidity (NTU)							1.67	3.03		9.48		16.01	7.82				
6-Apr-20	Turbidity (NTU)		3.3												6.7			
8-Apr-20	Turbidity (NTU)							1.72	3.01	5.07	8.83	18.2	9.57	8.3			25.1	22.62
9-Apr-20	Turbidity (NTU)			48.3	1.72	1.62	1.29									6.17		
21-Apr-20	Turbidity (NTU)							2.29	4.54	6.35	5.64		10.46	10.19			6.27	
21-Apr-20	Turbidity (NTU)-Hypoliminion							2.4										
29-Apr-20	Turbidity (NTU)							2.01	2.4	8.52	4.75		5.52	9.5			4.21	
5-May-20	Turbidity (NTU)			37.51	4.14	2.33	2.52											

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
6-May-20	Turbidity (NTU)							2.56	3.45	4.09	5.38	5.91	5.4	6.98		13.82	4.77	12.25
11-May-20	Turbidity (NTU)		18.32												13.4			
12-May-20	Turbidity (NTU)															49.34		
12-May-20	Turbidity (NTU)-Hypoliminion					2.12												
13-May-20	Turbidity (NTU)			38.35	4.76	3.01			2.53	4.55	3.34	3.59	4.94	6.36			5.4	6.29
14-May-20	Turbidity (NTU)						2.78	2.91										
14-May-20	Turbidity (NTU)-Hypoliminion						2.19	2.15										
19-May-20	Turbidity (NTU)			69.07	3.55	2.08	2.45									42.06		
20-May-20	Turbidity (NTU)							3.9	3.06	5.46	5.08	5.14	5.57	6.73			6.64	10.84
25-May-20	Turbidity (NTU)		22.19												7.58			
26-May-20	Turbidity (NTU)							3.05	2.72	4.65	3.82	5.63	8.39	12.28			22.13	5.98
27-May-20	Turbidity (NTU)			59.62	5.31	2.8	2.81									25.68		
3-Jun-20	Turbidity (NTU)			74.48	30.35	3.21	2.64									23.17		

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
4-Jun-20	Turbidity (NTU)							2.5	6.68	4.06	7	17.28	20.13	14.39			44.39	13.74
8-Jun-20	Turbidity (NTU)		11.33												12.47			
9-Jun-20	Turbidity (NTU)			64.71	4.53	3.72										19.97		
9-Jun-20	Turbidity (NTU)-Hypoliminion					2.58												
10-Jun-20	Turbidity (NTU)						3.21	2.07										
10-Jun-20	Turbidity (NTU)-Hypoliminion						2.69	5										
11-Jun-20	Turbidity (NTU)								2.36	3.57	4.17	4.93	7.7	9.33			15.39	7.11
17-Jun-20	Turbidity (NTU)							2.19	2.69	3.75	8.94	28.44	43.47	40.07			108	13.48
22-Jun-20	Turbidity (NTU)		41.47												9.12			
23-Jun-20	Turbidity (NTU)			61.25	3	1.9	2.08									26.85		
24-Jun-20	Turbidity (NTU)							2.95	2.6	3.76	3.67	7.35	8	7.62			33.74	11.47
21-Apr-20	TSS (mg/L)							<5	<5	5.21	<5		15.2	26.49			7.8	
21-Apr-20	TSS (mg/L)-Hypoliminion							<5										
11-May-20	TSS (mg/L)		26.5												10.97			

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
12-May-20	TSS (mg/L)			202.37		6.66										635.65		
12-May-20	TSS (mg/L)-Hypoliminion					19.48												
13-May-20	TSS (mg/L)								<5	<5	<5	<5	5.32	18.54			8.2	<5
14-May-20	TSS (mg/L)						<5	<5										
14-May-20	TSS (mg/L)-Hypoliminion						7.6	<5										
8-Jun-20	TSS (mg/L)		10.53												9.26			
9-Jun-20	TSS (mg/L)			346.19		6.6										65.87		
9-Jun-20	TSS (mg/L)-Hypoliminion					23.58												
10-Jun-20	TSS (mg/L)						<5	<5										
10-Jun-20	TSS (mg/L)-Hypoliminion						12.01	6.36										
11-Jun-20	TSS (mg/L)								<5	<5	5.8	<5	14.69	14.41			14.13	5.24
21-Apr-20	BOD_5 (mg/L)	<1.5						<1	5.93	3.76	1.53		2.25	1.52			<1	
21-Apr-20	BOD_5 (mg/L)-Hypoliminion	<1.5						<1.0										
11-May-20	BOD_5 (mg/L)	<1.5	<1												<1			
12-May-20	BOD_5 (mg/L)	<1.5		<1		1.01										1.26		
12-May-20	BOD_5 (mg/L)-Hypoliminion	<1.5				6.34												
13-May-20	BOD_5 (mg/L)	<1.5							1.66	2.14	2.62	3.54	<1	<1			6.51	1.54
14-May-20	BOD_5 (mg/L)	<1.5					1.18	<1										
14-May-20	BOD_5 (mg/L)-Hypoliminion	<1.5					3.15	6.03										

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
8-Jun-20	BOD_5 (mg/L)	<1.5	<1												<1			
9-Jun-20	BOD_5 (mg/L)	<1.5		<1		<1										<1		
9-Jun-20	BOD_5 (mg/L)-Hypoliminion	<1.5				10.38												
10-Jun-20	BOD_5 (mg/L)	<1.5					<1	<1										
10-Jun-20	BOD_5 (mg/L)-Hypoliminion	<1.5					6.36	4.6										
11-Jun-20	BOD_5 (mg/L)	<1.5							3.49	2.48	1.42	1.86	<1	<1			<1	<1
21-Apr-20	Faecal coliform (MPN/100 mL)	<1,000						0	5	23	70		170	70			280	
21-Apr-20	Faecal coliform (MPN/100 mL)-Hypoliminion	<1,000						0										
11-May-20	Faecal coliform (MPN/100 mL)	<1,000	240												220			
12-May-20	Faecal coliform (MPN/100 mL)	<1,000		110		2										1,600		

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
12-May-20	Faecal coliform (MPN/100 mL)- Hypoliminion	<1,000				0												
13-May-20	Faecal coliform (MPN/100 mL)	<1,000							2	23	13	26	130	110			14	280
14-May-20	Faecal coliform (MPN/100 mL)	<1,000					4	2										
14-May-20	Faecal coliform (MPN/100 mL)- Hypoliminion	<1,000					0	9.3										
8-Jun-20	Faecal coliform (MPN/100 mL)	<1,000	1,600												350			
9-Jun-20	Faecal coliform (MPN/100 mL)	<1,000		1,600		1,600										1,600		

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
9-Jun-20	Faecal coliform (MPN/100 mL)-Hypoliminion	<1,000				1,600												
10-Jun-20	Faecal coliform (MPN/100 mL)	<1,000					0	0										
10-Jun-20	Faecal coliform (MPN/100 mL)-Hypoliminion	<1,000					0	0										
11-Jun-20	Faecal coliform (MPN/100 mL)	<1,000							0	5	34	9	920	110			170	350
21-Apr-20	Total Coliform (MPN/100 mL)	<5,000						17	140	350	450		1,600	920			1,600	
21-Apr-20	Total Coliform (MPN/100 mL)-Hypoliminion	<5,000						17										

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
11-May-20	Total Coliform (MPN/100 mL)	<5,000	1,600												1,600			
12-May-20	Total Coliform (MPN/100 mL)	<5,000		1,600		170										1,600		
12-May-20	Total Coliform (MPN/100 mL)- Hypoliminion	<5,000				27												
13-May-20	Total Coliform (MPN/100 mL)	<5,000							170	110	220	920	920	350			920	1,600
14-May-20	Total Coliform (MPN/100 mL)	<5,000					1,600	110										
14-May-20	Total Coliform (MPN/100 mL)- Hypoliminion	<5,000					130	79										

		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	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Date	Parameters (Unit)	Guideline																
8-Jun-20	Total Coliform (MPN/100 mL)	<5,000	1,600												1,600			
9-Jun-20	Total Coliform (MPN/100 mL)	<5,000		1,600		1,600										1,600		
9-Jun-20	Total Coliform (MPN/100 mL)- Hypoliminion	<5,000				1,600												
10-Jun-20	Total Coliform (MPN/100 mL)	<5,000					130	70										
10-Jun-20	Total Coliform (MPN/100 mL)- Hypoliminion	<5,000					33	130										
11-Jun-20	Total Coliform (MPN/100 mL)	<5,000							540	1,600	1,600	1,600	1,600	1,600			1,600	1,600

APPENDIX 5-2: *EFFLUENT CAMP MONITORING RESULTS – Q2 2020*

		Site Name	OSOV 1 (Owner's Site Office and Village)	OSOV2 (ESD Camp 2 / Former HM Camp)	OSOV2 (ESD Camp 1 / Former IHI Camp)	Main Powerhouse
		Station Code	EF01	EF13	EF14	EF19
Date	Parameter (Unit)	Guideline in the CA				
23-Apr-20	pH	6.0 - 9.0	6.21	6.38	6.25	
07-May-20	pH	6.0 - 9.0	6.5	6.27	5.93	7.59
18-May-20	pH	6.0 - 9.0	6.1	6.49	6.25	
01-Jun-20	pH	6.0 - 9.0	6.3	6.12	6.03	7.51
15-Jun-20	pH	6.0 - 9.0	6.29	6.08	6.12	7.28
23-Apr-20	Sat. DO (%)		40.7	13.6	43.5	
07-May-20	Sat. DO (%)		44.2	13.9	8.5	0.84
18-May-20	Sat. DO (%)		40.6	7.7	30.3	
01-Jun-20	Sat. DO (%)		44.1	68.9	52.4	55.1
15-Jun-20	Sat. DO (%)		42.6	38.6	57.6	41.1
23-Apr-20	DO (mg/L)		3.11	1.03	3.3	
07-May-20	DO (mg/L)		3.31	0.97	0.63	1.42
18-May-20	DO (mg/L)		2.9	0.55	2.84	
01-Jun-20	DO (mg/L)		3.36	5.16	3.98	4.06
15-Jun-20	DO (mg/L)		3.17	2.84	4.21	2.99
23-Apr-20	Conductivity (µs/cm)		319	367	348	
07-May-20	Conductivity (µs/cm)		348	325	182.8	1650
18-May-20	Conductivity (µs/cm)		338	404	190	
01-Jun-20	Conductivity (µs/cm)		223	197	141.4	834
15-Jun-20	Conductivity (µs/cm)		337	190	215	866
23-Apr-20	Temperature (°C)		28	28.2	28.2	
07-May-20	Temperature (°C)		28.6	30.6	28.9	25.96
18-May-20	Temperature (°C)		31.2	30.2	30.4	
01-Jun-20	Temperature (°C)		27.7	28.7	28	27.8

		Site Name	OSOV 1 (Owner's Site Office and Village)	OSOV2 (ESD Camp 2 / Former HM Camp)	OSOV2 (ESD Camp 1 / Former IHI Camp)	Main Powerhouse
		Station Code	EF01	EF13	EF14	EF19
Date	Parameter (Unit)	Guideline in the CA				
15-Jun-20	Temperature (°C)		28.8	29.7	107.5	30.4
23-Apr-20	Turbidity (NTU)		1.72	7.83	11.09	
07-May-20	Turbidity (NTU)		1.75	13.29	6.24	9.82
18-May-20	Turbidity (NTU)		2.32	21.94	6.97	
01-Jun-20	Turbidity (NTU)		5.01	5.93	5.84	14.41
15-Jun-20	Turbidity (NTU)		2.33	5.55	4.47	14.16
23-Apr-20	TSS (mg/L)	<50	<5	16.7	12	
07-May-20	TSS (mg/L)	<50	<5	23.6	9.27	91.8
18-May-20	TSS (mg/L)	<50	<5	23.7	9.0	
01-Jun-20	TSS (mg/L)	<50	<5	6.8	6	37.3
15-Jun-20	TSS (mg/L)	<50	<5	8.9	12.1	46.2
23-Apr-20	BOD_5 (mg/L)	<30	<6	37.95	<6	
07-May-20	BOD_5 (mg/L)	<30	<6	40	14.7	40.03
18-May-20	BOD_5 (mg/L)	<30	<6	<6	15.36	
01-Jun-20	BOD_5 (mg/L)	<30	6.09	10.26	<6	<6
15-Jun-20	BOD_5 (mg/L)	<30	<6	16.38	9.87	<6
23-Apr-20	Total coliform (MPN/100 mL)	<400	920	16,000	13	
07-May-20	Total coliform (MPN/100 mL)	<400	1,600	35,000	16,000	16,000
18-May-20	Total coliform (MPN/100 mL)	<400	1,600	16,000	35,000	
01-Jun-20	Total coliform (MPN/100 mL)	<400	9,200	16,000	3,500	0
15-Jun-20	Total coliform (MPN/100 mL)	<400	350	160,000	16,000	0
23-Apr-20	Faecal Coliform (MPN/100 mL)	<400	47	16,000	2	
07-May-20	Faecal Coliform (MPN/100 mL)	<400	170	35,000	16,000	16,000
18-May-20	Faecal Coliform (MPN/100 mL)	<400	1,600	16,000	16,000	
01-Jun-20	Faecal Coliform (MPN/100 mL)	<400	9,200	16,000	3,500	0
15-Jun-20	Faecal Coliform (MPN/100 mL)	<400	350	35,000	16,000	0

		Site Name	OSOV 1 (Owner's Site Office and Village)	OSOV2 (ESD Camp 2 / Former HM Camp)	OSOV2 (ESD Camp 1 / Former IHI Camp)	Main Powerhouse
		Station Code	EF01	EF13	EF14	EF19
Date	Parameter (Unit)	Guideline in the CA				
23-Apr-20	Effluent Discharge Volume (L/mn)		10	4	1	
07-May-20	Effluent Discharge Volume (L/mn)		7.5	2.4	3	
18-May-20	Effluent Discharge Volume (L/mn)		6	4		
01-Jun-20	Effluent Discharge Volume (L/mn)		6	4	2	
15-Jun-20	Effluent Discharge Volume (L/mn)		6	4	3	
23-Apr-20	Chlorination Dosing Rate (mL/mn)			12	5	
07-May-20	Chlorination Dosing Rate (mL/mn)			0	0.8	
18-May-20	Chlorination Dosing Rate (mL/mn)			0.08		
01-Jun-20	Chlorination Dosing Rate (mL/mn)			0.08		475
15-Jun-20	Chlorination Dosing Rate (mL/mn)			0.08	0.5	420
23-Apr-20	Residual Chlorine (mg/L)	<1.0		0.1	0.67	
07-May-20	Residual Chlorine (mg/L)	<1.0		0.0	0.06	0.12
18-May-20	Residual Chlorine (mg/L)	<1.0		0.1	0.14	
01-Jun-20	Residual Chlorine (mg/L)	<1.0		0.1	0.07	1.67
15-Jun-20	Residual Chlorine (mg/L)	<1.0		0.0	0.09	0.49

APPENDIX 5-3: *GROUNDWATER QUALITY MONITORING RESULTS – Q2 2020*

Month Year	Parameter (Unit)	Site Name	Phouhomxay Village		Somseun Village	Nampa Village	Thongnoy Village	Pou Village
		Station	GPHX 01	GPHX 02	GSXN01	GNPA 01	GTHN01	GPOU 01
		Guideline						
11-May-20	pH	6.5 - 9.2						6.66
22-May-20	pH	6.5 - 9.2			7.27	7.33	7.11	
05-Jun-20	pH	6.5 - 9.2			7.54	7.56	7.04	
08-Jun-20	pH	6.5 - 9.2						7.96
19-Jun-20	pH	6.5 - 9.2	6.06	6.2				
11-May-20	Sat. DO (%)							87.3
22-May-20	Sat. DO (%)				84.3	93.3	35.9	
05-Jun-20	Sat. DO (%)				78.2	80.7	56.3	
08-Jun-20	Sat. DO (%)							88.8
19-Jun-20	Sat. DO (%)		33.3	27.8				
11-May-20	DO (mg/l)							6.16
22-May-20	DO (mg/l)				6.3	6.87	2.55	
05-Jun-20	DO (mg/l)				6.12	6.31	4.3	
08-Jun-20	DO (mg/l)							6.46
19-Jun-20	DO (mg/l)		2.59	2.17				
11-May-20	Conductivity (µS/cm)							22
22-May-20	Conductivity (µS/cm)				319	348	259	
05-Jun-20	Conductivity (µS/cm)				337	375	396	
08-Jun-20	Conductivity (µS/cm)							14.86
19-Jun-20	Conductivity (µS/cm)		209	276				
11-May-20	Temperature (°C)							31.2
22-May-20	Temperature (°C)				28.9	29.8	31.4	
05-Jun-20	Temperature (°C)				27.21	27.99	29.34	
08-Jun-20	Temperature (°C)							29.1
19-Jun-20	Temperature (°C)		26.5	26.6				
11-May-20	Turbidity (NTU)	<20						2.95

Month Year	Parameter (Unit)	Site Name	Phouhomxay Village		Somseun Village	Nampa Village	Thongnoy Village	Pou Village
		Station	GPHX 01	GPHX 02	GSXN01	GNPA 01	GTHN01	GPOU 01
		Guideline						
22-May-20	Turbidity (NTU)	<20			2.15	1.69	1.94	
05-Jun-20	Turbidity (NTU)	<20			1.75	1.71	2.03	
08-Jun-20	Turbidity (NTU)	<20						3.04
19-Jun-20	Turbidity (NTU)	<20	2.35	2.32				
11-May-20	Fecal coliform (MPN/100ml)	0						2
22-May-20	Fecal coliform (MPN/100ml)	0			6.8	4.5	1,600	
05-Jun-20	Fecal coliform (MPN/100ml)	0			2	4	240	
08-Jun-20	Fecal coliform (MPN/100ml)	0						0
19-Jun-20	Fecal coliform (MPN/100ml)	0	6.8	1.8				
11-May-20	E.coli Bacteria (MPN/100ml)	0						2
22-May-20	E.coli Bacteria (MPN/100ml)	0			4	4.5	350	
05-Jun-20	E.coli Bacteria (MPN/100ml)	0			0	4	240	
08-Jun-20	E.coli Bacteria (MPN/100ml)	0						0
19-Jun-20	E.coli Bacteria (MPN/100ml)	0	6.8	1.8				

APPENDIX 5-4: *GRAVITY FED WATER SUPPLY MONITORING RESULTS – Q2 2020*

		Site Name	Thaheua Village	Hat Gnuin Village	Phouhomxay Village		
		Station	WTHH02	WHGN02	WPHX 01	WPHX 02	WPHX 03
Date	Parameter (Unit)	Guideline					
22-May-20	pH	6.5 - 8.6	8.6	7.18	8.49	8.79	8.95
05-Jun-20	pH	6.5 - 8.6	7.68	7.76	7.34	6.33	6.1
22-May-20	Sat. DO (%)		99.6	96	96.1	97	93.8
05-Jun-20	Sat. DO (%)		81.3	102.8	113.6	112.7	104.9
22-May-20	Sat. DO (%)		99.6	96	96.1	97	93.8
22-May-20	DO (mg/L)		7.18	6.92	7.4	6.92	6.8
05-Jun-20	DO (mg/L)		6.26	8.03	9.39	8.57	8.13
22-May-20	Conductivity (µS/cm)	<1,000	53	71.1	10.37	9.34	8.78
05-Jun-20	Conductivity (µS/cm)	<1,000	70	96	15	13	13
22-May-20	Temperature (°C)	<35	30.9	30.9	27	31.4	30.4
05-Jun-20	Temperature (°C)	<35	30.25	28.26	24.83	29.54	28.55
22-May-20	Temperature (°C)	<35	30.9	30.9	27	31.4	30.4
22-May-20	Turbidity (NTU)	<10	2.14	3.66	1.75	2.11	1.92
05-Jun-20	Turbidity (NTU)	<10	2.62	2.11	4.01	4.18	3.19
22-May-20	Faecal Coliform (MPN/100 mL)	0	4.5	33	46	7.8	17
05-Jun-20	Faecal Coliform (MPN/100 mL)	0	1,600	94	920	540	920
22-May-20	E.coli Bacteria (MPN/100 mL)	0	2	33	33	7.8	11
05-Jun-20	E.coli Bacteria (MPN/100 mL)	0	1,600	94	920	540	920

APPENDIX 5-5: *LANDFILL LEACHATE MONITORING RESULTS – Q2 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 d Point
		Station	LL1	LL2	LL3	LL4	LL5	LL6	LL7
Date	Parameter (Unit)	Guideline							
1-Jun-20	pH	6.0-9.0				8.71		8.15	
1-Jun-20	Sat. DO (%)					130.6		139.7	
1-Jun-20	DO (mg/L)					9.45		10.33	
1-Jun-20	Conductivity (µS/cm)					59.1		330	
1-Jun-20	Temperature (°C)					30.5		29.3	

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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							
1-Jun-20	Turbidity (NTU)					37.25		10.56	
1-Jun-20	BOD_5 (mg/L)	<30				<6		<6	
1-Jun-20	Faecal Coliform (MPN/100 mL)	<400				11		0	
1-Jun-20	Total Coliform (MPN/100 mL)	<400				920		920	