NAM NGIEP 1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Environmental Management
Monthly Monitoring Report

May 2022

A	27 June 2022	Hendra WINASTU	Wanidaporn RODE	Khamlar PHONSAVAT	Final
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TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

EXECUTIVE SUMMARY

During May 2022, activities related to ISO14001:2015 implementation were continued such as revising and updating the environmental aspects according to the external auditor's comments and following up on the progress of Environmental Management Plans achievements.

During May 2022, one document was submitted to EMO for review and approval. EMO did not issue any Site Inspection Report of Observation of Non-Compliance (ONC) or Non-Compliance Reports (NCR) to the Contractor.

The operation and adjustment of the constructed wastewater treatment systems including the trial of bacteria seeding for the Sequencing Batch Reactor (SBR) system at OSOV2 continued in May 2022. The purpose of seeding is to reduce Nitrogen and Phosphorus in the effluent. It is expected that the operation of the system can be adjusted to meet the effluent standards by Q2 of 2022.

At R05 (in the Main Reservoir approx. 0.5 km upstream the Main Dam), the average DO concentration was 7.3 mg/L in the upper 7.5 m varying between 5.2 mg/L and 8.6 mg/L, and the oxycline was generally found at the depths between 5.0 m and 11.0 m with DO concentrations decreasing from about 7 mg/L to 3 mg/L. In the Re-regulation Reservoir, the DO concentrations were about 1 mg/L to 5 mg/L with mean of 2.6 mg/L.

The DO measurements downstream the Re-regulation Dam were carried out during gate discharge which due to reaeration has likely contributed to the high DO concentrations above 6 mg/L in all downstream stations.

No dead fish was observed in Nam Ngiep downstream during this monitoring period. NNP1PC continues to carefully compile and assess all monitoring data to determine if any additional water aeration measures may be necessary to improve the DO levels in Nam Ngiep River downstream the Re-regulation Dam.

In May 2022, the communities' general waste collection and the Houay Soup Landfill operation is under handover process to be managed by the local authorities (Bolikhan Environment Management Unit or EMU). The Bolikhan EMU completed two community consultations with the two host villages and another community consultation with Phouhomxay Village was postponed to early June 2022. The NNP1 waste collection and the Project Landfill continues to be operated by the former contractor (Nilun Construction Co., Ltd.) with a one-year contract under the management of NNP1PC Admin team. EMO continued l supporting the waste collection from the Phouhomxay village's Health Centre, school and NNP1PC's Resource Centre to be disposed at Houay Soup Landfill.

A total of 16.7 m^3 of solid waste was disposed of at the NNP1 Project Landfill, an increase of 5.7 m^3 compared with April 2022. A total of 4.3 m^3 of solid waste from Phouhomxay's Health Centre, school and NNP1PC Resource Centre was disposed of at the Houay Soup Landfill. There was no trading of recyclable waste at the community recycle waste bank during the period of reporting.

The Xaysomboun Provincial Watershed and Reservoir Protection Office (WRPO), NNP1 Environmental Management Office (EMO) and the Biodiversity Service Provider (BSP)-Wildlife Conservation Society (WCS) had a bi-weekly technical meeting on 11 May 2022 to follow up on the pending issues that was discussed during the internal meeting among Xaysomboun Watershed and

Reservoir Protection Committee (WRPC) and WRPO on 8 April 2022. The Bolikhamxay WRPO received the quarterly funds under their approved Annual Implementation Plan (AIP) 2022 in the first week of May 2022 and implemented some activities including: organizing the discussion on Law Enforcement with BSP-WCS on 10 May 2022, conducting forest and reservoir patrolling work between 16-25 May 2022, as well as carrying out the signs and poles installation for TPZ1 and forest land at Ban Phonsong. Bolikhamxay Nam Chouane-Nam Xang. The Biodiversity Offset Management Unit (NC-NX BOMU) had a discussion with EMO and BSP-WCS on 20 May 2022 on the assessment of the snare removal program and the other pending activities.

The fish catch monitoring for April 2022 in Nam Ngiep Watershed was dominated by *Oreochromis niloticus* and species groups of Poropuntius, Hampala, Barbonymus and Hypsibarbus and *Sikukia gudgeri* and *Amblyrhynchichthys truncates*. They are classified as Least Concern (LC) according to the IUCN Red List of Threatened Species, except *Sikukia gudgeri* which is classified as Data Deficient species (DD).

1. ENVIRONMENTAL MANAGEMENT MONITORING

1.1 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

During May 2022, activities related to ISO14001:2015 implementation continued such as revising and updating the environmental aspects according to the external auditor's comments and following up on the progress of Environmental Management Plans (EMP) achievements. The plans include: (i) reduce the use of A4 paper in the offices; (ii) reduce quantity of waste disposed in the landfill; (iii) monitoring the DO downstream of the Re-regulation Dam, (iv) provide training and drills for the staff and contractors; and (v) fluorescent lighting bulbs replacement.

1.2 COMPLIANCE MANAGEMENT

In May 2022, EMO received one Site Decommissioning Plan from the contractor (KENBER) for review and approval. The status of the review is summarised in ***Table 1-1***.

TABLE 1-1: SUMMARY OF DOCUMENT PENDING REVISION AND RESUBMISSION FOR REVIEW IN MAY 2022

Title	Date Received	Latest Status of documents which are pending to be submitted after revising
Site Decommissioning	30 May 2022 (1st submission) *Un-official*	No objection with comments on 31 May 2022. *Un-official*

The operation and adjustment of the constructed wastewater treatment systems including the trial of bacteria seeding for the Sequencing Batch Reactor (SBR) system at OSOV2 continued in May 2022. It is expected that the operation of the system can be adjusted to meet the effluent standards by Q2 of 2022.

EMO did not issue any Site Inspection Report of Observation of Non-Compliance (ONC) and Non-Compliance Reports (NCR) to the Contractor. The status of compliance reports (Observation of Non-Compliance or ONC; and Non-Compliance Report or NCR) issued by NNP1PC is summarized in ***Table 1-2*** and ***Table 1-3*** below.

TABLE 1-2: SUMMARY OF ONCS AND NCRS

Items	ONC	NCR-1	NCR-2	NCR-3
Carried over from April 2022	0	1	0	0
Newly Opened in May 2022	0	0	0	0
Total in May 2022	**0**	**1**	**0**	**0**
Resolved in May 2022	0	0	0	0
Carried over to June 2022	0	**1**	0	0
Unsolved Exceeding Deadlines	**0**	**0**	**0**	**0**

TABLE 1-3: SUMMARY OF THE ONC AND NCR ISSUED TO THE CONTRACTOR

Document Number / Date of Issue	Subject Description	Current Status at the end of May 2022
NC No. 01/22 Issued Date: 13-02-22 (NCR Level 1)	Some effluent discharge parameters continue to exceed the standards for almost 5 months following the completion of the improvement and modification in September 2021	• Adding the proper sludges/seeds into the Aeration Tank at OSOV2 WWTS and the Biofilm Septic Tank at the Main Powerhouse System – **In progress** (the effluent testing results from the trial will be reported next month). • Closely monitor the Influent to compare with the Effluent for the specific parameters to check the treatment effectiveness – **In progress.**

1.2.1 Site Inspection by Environment Management Unit (EMU)

The monthly site visit by the EMU of Bolikhan District and the quarterly site visit by the EMU of Xaysomboun Province were not carried out in May 2022.

1.2.2 Site Decommissioning and Rehabilitation

The draft memo of land use handover to GoL is under finalizing by relevant parties. No inspection and monitoring during this reporting period of May 2022. The next inspection will be conducted in June 2022.

1.3 WATER QUALITY MONITORING

The analyses of Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD_5), Faecal Coliform Bacteria, Total Coliform Bacteria and *E.coli* have been carried out by NNP1PC's environmental laboratory since August 2017.

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

Due to the COVID-19 pandemic and increasing infections in the project area and the communities nearby the project, the water sampling mission was carried out in late April 2022. Therefore, the results of COD, TOC, Ammonia-Nitrogen, Total Nitrogen, Total Phosphorus, Hydrogen Sulphide, Nitrate-Nitrogen, Phytoplankton Biomass, and Oil & Grease from the sampling in April 2022 are also reported in this report.

1.3.1 Effluent Discharge from Camps and Construction Sites

Detailed monitoring results are provided in the ***Annex A*** of this Report. The status of implementation of the corrective actions addressing non-compliances at the camps and key project facilities are summarized in ***Table 1-4*****.**

TABLE 1-4: STATUS OF CORRECTIVE ACTIONS FOR NON-COMPLIANCES AT WWTSS IN APRIL AND MAY 2022

Site	Sampling ID	Status	Corrective Actions (Expected Completion Date)
OSOV1	EF01	Non-compliance for faecal coliform and total coliform.	1) Completed proper fence installation to prevent cattle from accessing the OSOV1 wetland ponds (31 March 2022). 2) Completed additional planting of reeds in the OSOV1 wetland ponds (31 March 2022). 3) Added the proper sludge/seeds into the Aeration Tank at OSOV2 WWTS and the Biofilm Septic Tank at the Main Powerhouse System – the effluent testing results after adding will be reported in June 2022 (Q2 of 2022). 4) Replaced the detergent materials in the Main Powerhouse by using lower phosphate detergent (30 April 2022). 5) Closely monitor the Residual Chlorine content in the effluents of OSOV2 and the Main Powerhouse WWTS and adjust as necessary (30 April 2022). 6) Closely monitor the Influent to compare with the effluent for the specific parameters to check the treatment effectiveness (Q2 of 2022).
OSOV2	EF13	Non-compliance for total phosphorus, total nitrogen and ammonia-nitrogen.	
Main Powerhouse	EF19	Non-compliance for total phosphorus (two out of three), total nitrogen and ammonia-nitrogen (one out of three).	

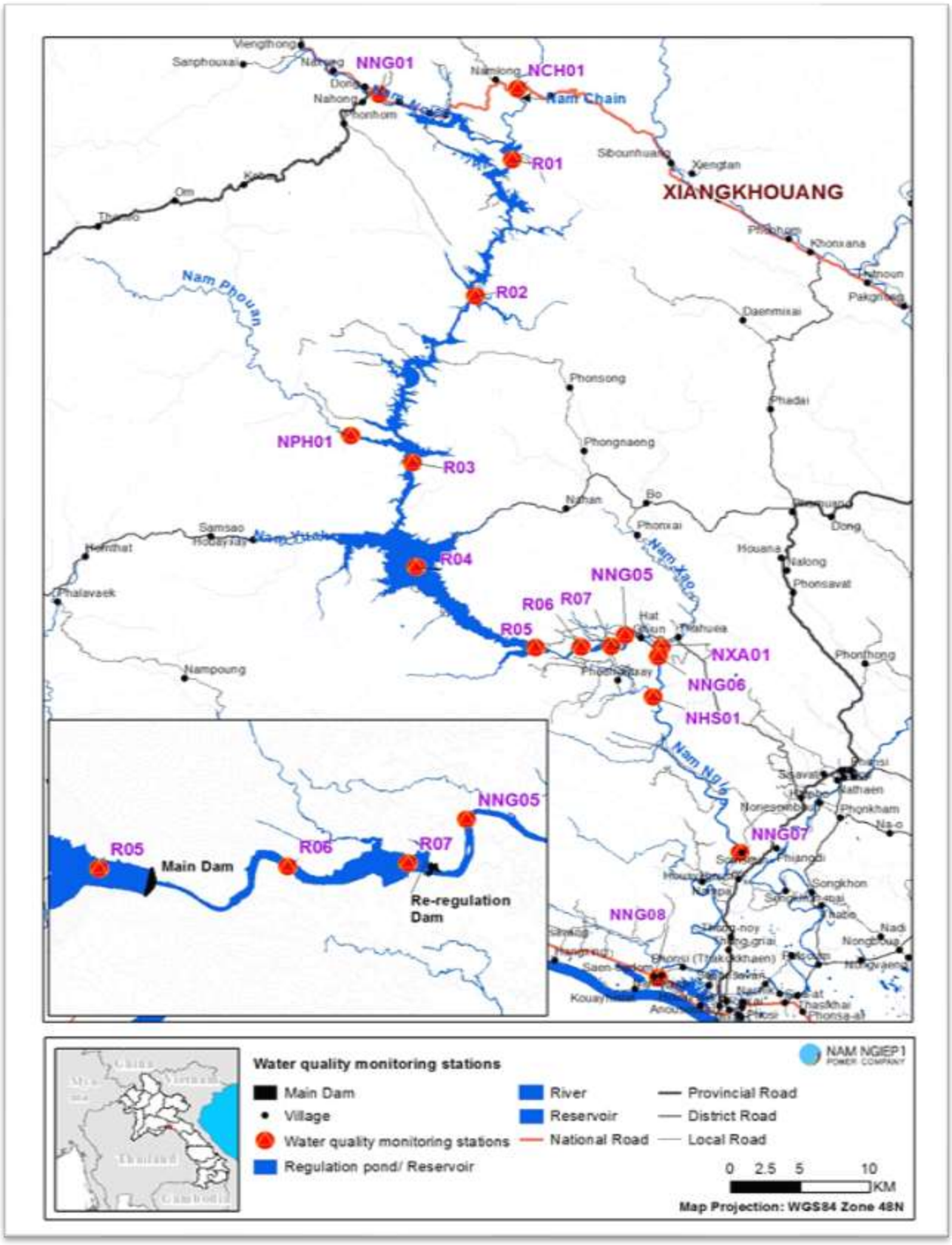
1.3.2 Ambient Surface Water and Reservoir Water Quality Monitoring

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

Weekly depth profile monitoring (pH, DO, conductivity and temperature) has been undertaken since 18 September 2018 for stations located in the Re-regulation reservoir and the main reservoir. The locations of the monitoring stations are shown in ***Figure 1-1.***

The monitoring results for key parameters (DO, TSS and BOD_5) during May 2022 are presented in ***Table 1-5, Table 1-6*** *and* ***Table 1-7*****.** The full set of data for April and May 2022 is attached in ***Annex A***. In addition, the trends of DO depth profile timeseries measurement graph for R05 station is shown in ***Figure 1-2***, the results for DO timeseries are presented as line graphs in ***Figure 1-4*** and DO Long Profile graphs in ***Figure 1-5***.

FIGURE 1-1: SURFACE WATER AND RE-REGULATION RESERVOIR WATER QUALITY MONITORING STATIONS

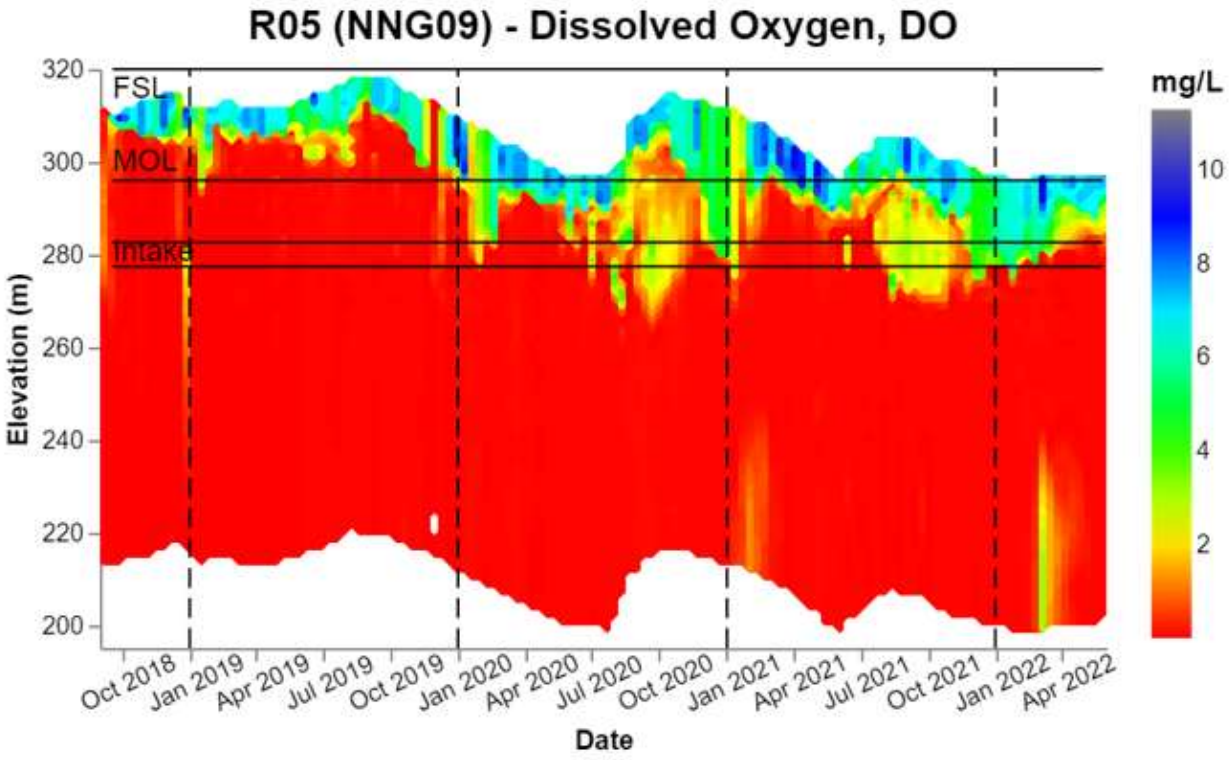


Main Reservoir

From 01 to 15 May 2022, the water level in the main reservoir decreased from El. 298.81 m asl to El. 298.12 m asl. then increased to El. 300.82 m on 31 May 2022.

At R05 (in the Main Reservoir approx. 0.5 km upstream the Main Dam), the average DO concentration was 7.3 mg/L in the upper 7.5 m varying between 5.2 mg/L and 8.6 mg/L, and the oxycline was generally found at the depths between 5.0 m and 11.0 m with DO concentrations decreasing from about 7 mg/L to 3 mg/L. DO concentrations below 0.5 mg/L (anoxic condition) were recorded at depth of 16 m which correspond to 6.0 m above the centre line of the intake.

FIGURE 1-2: DO DEPTH PROFILES TIME SERIES IN R05 (SINCE SEPTEMBER 2018 TO MAY 2022)



At R04, the DO levels in the upper 8.0 m varied between 5.2 mg/L and 8.1 mg/L with oxycline at depth of 7.5 m below surface and DO concentrations generally less than 2 mg/L at depths below 18 m.

At R03, the DO levels in the upper 6.0 m were above 6 mg/L, and in the depth interval from 6.5 m to 24 m, the DO concentrations gradually dropped to less than 3 mg/L. Below 24 m, the DO levels decreased to below 1 mg/L.

At R02, the DO levels in the entire water column varied between 4.9 mg/L and 7.3 mg/L with a mean of 6.3 mg/L.

At R01, the DO level at the water surface were about 7.7 mg/L.

As expected, the TSS concentrations in the main reservoir have been consistently low since the start of impounding with a mean of 5 mg/L compared with the high flow season means of about 100 – 250 mg/L and low flow season means of 20 mg/L - 50 mg/L prior to impounding.

The BOD_5 measurements at R01, R02, R03, R04 and R05 in both epilimnion and hypolimnion were less than 1.0 mg/L.

Re-regulation Reservoir

In May 2022, the turbine discharges from the Main Powerhouse varied between 14 and 232 m^3/s usually interrupted by night-time periods with no discharge.

The mean DO concentration in the water column were 2.6 mg/L in both R06 and R07.

The BOD_5 concentrations in both R06 and R07 were less than 1.0 mg/L.

Nam Ngiep Downstream

During May 2022, the discharge from the Re-regulation Dam was gate discharge at all times due to maintenance of the turbine. The DO measurements downstream the Re-regulation Dam were carried out during gate discharge which due to reaeration has likely contributed to the high DO concentrations above 6 mg/L in all downstream stations thus complying with the surface water quality standard.

No dead fish was observed in Nam Ngiep downstream during this monitoring period. NNP1PC continues to carefully compile and assess all monitoring data to determine if any additional water aeration measures may be necessary to improve the DO levels in Nam Ngiep River downstream the Re-regulation Dam.

The BOD_5 in the downstream station (NNG05) was less than 1 mg/L and complied with the national surface water quality standard.

Main Tributaries to Nam Ngiep

All monitored parameters in the Nam Phouan (NPH01), Nam Xao (NXA01) and Nam Houaysoup (NHS01) complied with the standards.

FIGURE 1-3: CONCENTRATION OF DISSOLVED OXYGEN (MG/L) IN THE UPPER 0.2 M SINCE SEPTEMBER 2019 TO MAY 2022

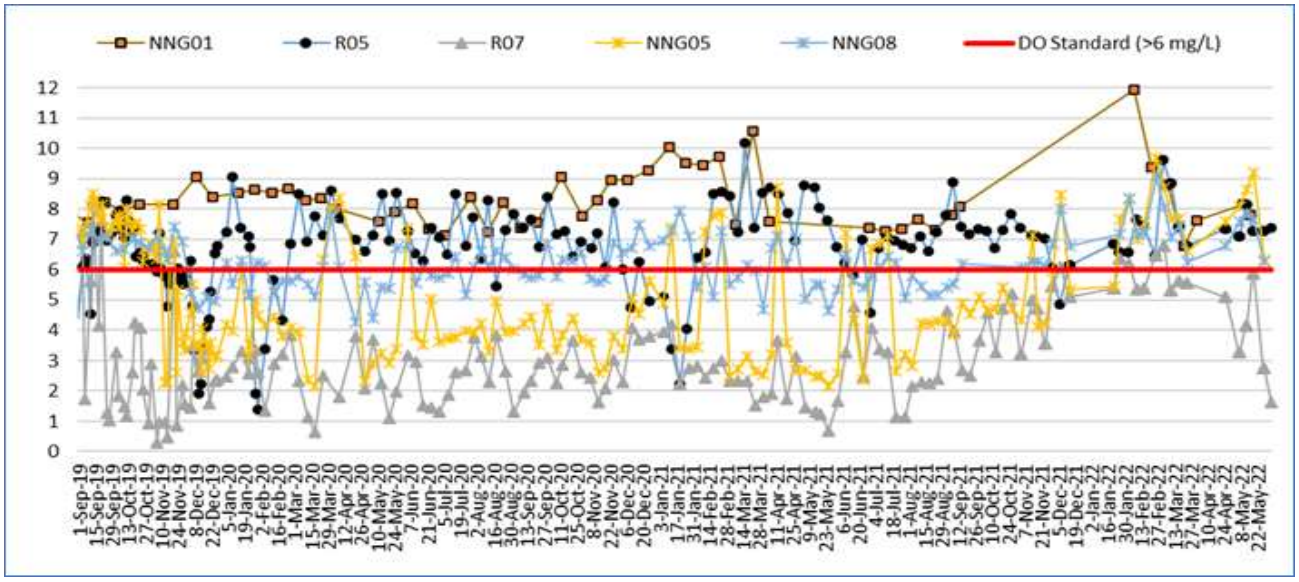


FIGURE 1-4: DISSOLVED OXYGEN (MG/L) LONG PROFILE IN MAY 2022 (FROM IMMEDIATELY UPPER MAIN DAM TO LOWER NAM NGIEP RIVER)

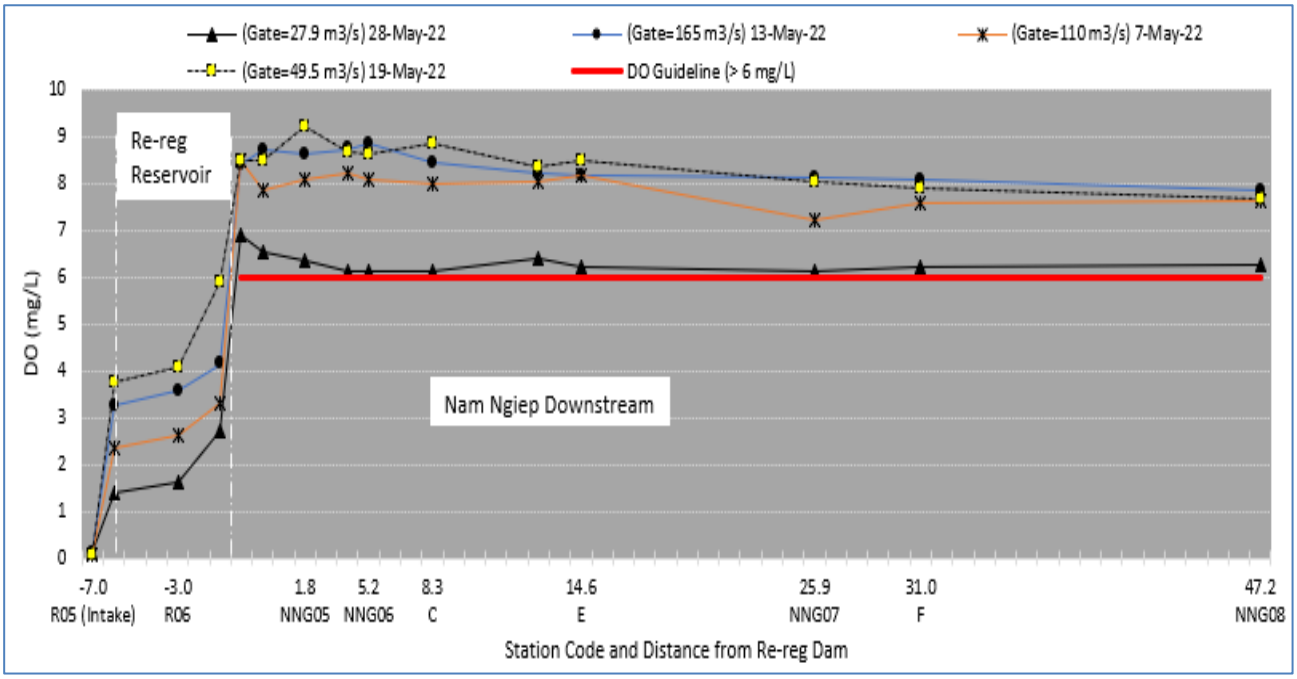


TABLE 1-5: RESULTS OF SURFACE WATER QUALITY MONITORING FOR DISSOLVED OXYGEN (MG/L) IN THE UPPER 0.2 M, NATIONAL WATER QUALITY STANDARD: >6.0 MG/L

DO (mg/L)	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
5-May-22		7.68	7	7.89										7.09		
6-May-22					7.25	7.09	2.61	3.29								
7-May-22						7.09	2.61	3.29	8.1	8.09	7.24	7.61			6.16	6.35
10-May-22	8.16												8.76			
12-May-22						8.16	3.6	4.15								
13-May-22						8.16	3.6	4.15	8.63	8.87	8.13	7.87			7.06	6.62
16-May-22	7.79												8.36			
17-May-22		7.76	7.28	7.63										8.38		
18-May-22					7.38	7.29	4.08	5.89								
19-May-22						7.29	4.08	5.89	9.2	8.61	8.05	7.66			6.69	7.53
27-May-22					7.27	7.28	1.64	2.74								
28-May-22						7.28	1.64	2.74	6.34	6.14	6.12	6.25			6.78	6.11

TABLE 1-6: RESULTS OF SURFACE WATER QUALITY MONITORING FOR TOTAL SUSPENDED SOLIDS (MG/L)

Total Suspended Solids (mg/L)	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
10-May-22	32.2												<5			
17-May-22		257		<5										67.5		
17-May-22 Bottom				<5												
18-May-22					<5	<5	<5	<5								
18-May-22 Bottom					<5	<5										
19-May-22									<5	<5	5.65	<5			5.37	<5

TABLE 1-7: RESULTS OF SURFACE WATER QUALITY MONITORING FOR BOD_5 (MG/L) - WATER QUALITY STANDARD: < 1.5 MG/L

BOD_5 (mg/L)	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
10-May-22	<1												<1			
17-May-22		<1		<1										<1		
17-May-22 Bottom				<1												
18-May-22					<1	<1	<1	<1								
18-May-22 Bottom					<1	<1										
19-May-22									<1	<1	<1	<1			<1	<1

1.3.3 Groundwater Quality Monitoring

During May 2022, community groundwater quality analyses were carried out for seven wells located in Somseun Village, Nam Pa Village, Thong Noy Village, Pou Village and Phouhomxay Village. The community groundwater samples were taken from household water taps (except in Phouhomxay Village).

The results indicate that:

- Both wells in Phouhomxay Village (GPHX01 and GPHX02) complied with the National Standards.
- The well in Somsuen Village, Nam Pa Village and Thong Noy Village did not comply with the Standard for faecal coliform and *E. Coli* bacteria.
- Both wells (GPOU01 and GPOU02) in Pou Village did not comply with the Standard for faecal coliform and E.Coli bacteria.

The community groundwater quality monitoring results are presented in ***Table 1-8*.**

The villagers were advised to boil water before drinking. This advice is in accordance with the Law on Hygiene, Disease Prevention and Health Promotion No 01/NA of 10 April 2001, which states that domestic water supply for daily use is not required to be readily drinkable but would normally have to be boiled or otherwise treated before it would be suitable for drinking. The villagers generally use tap water for washing and cleaning. They were informed about the monitoring results and recommended to carry out the operation and maintenance improvement as well as were encouraged to boil water before drinking.

TABLE 1-8: GROUNDWATER QUALITY MONITORING RESULTS IN SOMSUEN, NAM PA, THONGNOY AND POU VILLAGES

	Site Name	Phouhomxay Village		Somseun Village	Nampa Village	ThongNoy Village	Pou Village	
Parameter (Unit)	**Station**	GPHX01	GPHX02	GSXN01	GNPA01	GTHN01	GPOU01	GPOU02
	Guideline	9-May-22	9-May-22	9-May-22	9-May-22	9-May-22	10-May-22	10-May-22
pH	6.5 - 9.2	7.59	7.55	7.6	7.29	7.06	7.15	7.12
Sat. DO (%)		39.7	53.1	54.7	89.3	47	78.6	81.2
DO (mg/L)		3.1	4.24	4.4	7.04	3.61	6.28	6.55
Conductivity (µS/cm)		421	430	377	404	396	23	337
Temperature (°C)		28.17	27.8	27.87	27.49	29.06	26.85	26.22
Turbidity (NTU)	<20	2.69	2.77	0.47	0.17	1.61	2.31	2.17
Faecal coliform (MPN/100ml)	0	0	0	4.5	22	240	12	4.5
E.coli Bacteria (MPN/100ml)	0	0	0	4.5	22	240	12	4.5

1.3.4 Gravity Fed Water Supply (GFWS) Quality Monitoring

The results of the water quality analyses are presented in ***Table 1-9***.

Faecal Coliform and *E.coli* exceeded the standards in the water supply of Thaheua Village (WTHH02), Hat Gniun Village (WHGN02) and Phouhomxay Village (WPHX02 – Primary School Water Tap and WPHX03 – Household Water Tap). Note here that all water taps were disinfected before sampling and during sampling of tap water in Phouhomxay Village, surface water from Houay Soup Stream was still supplied into the system and the samples likely represent a mixture of surface water and groundwater from the boreholes, where, as mentioned in ***Section 1.3.3*** and as shown in ***Table 1-8***, the groundwater samples from the two wells in Phouhomxay Village both complied with the GOL Drinking Water Standards for *E.coli* and faecal coliform bacteria.

As observed in the field during water sampling, livestock are roaming around the water intake areas which may contribute to the presence of Faecal Coliform Bacteria and *E.coli* in GFWS samples. The villagers were advised to boil water before drinking in accordance with the Law as mentioned in 1.3.3 as well as recommended to carry out the operation and maintenance improvement.

TABLE 1-9: RESULTS OF THE GRAVITY FED WATER SUPPLY QUALITY MONITORING

	Site Name	Thaheua Village	Hat Gniun Village	Phouhomxay Village	
	Station	WTHH02	WHGN02	WPHX02	WPHX03
Parameter (Unit)	Guideline	09-May-22	09-May-22	09-May-22	09-May-22
pH	6.5 - 8.5	7.65	7.69	7.72	7.73
Sat. DO (%)		93.5	94	90.8	77.4
DO (mg/L)		7.26	7.38	7.11	5.87
Conductivity (µS/cm)	<1,000	82	129	130	128
Temperature (°C)	<35	28.36	27.76	27.88	29.13
Turbidity (NTU)	<10	1.08	1.21	1.76	1.25
Faecal Coliform (MPN/100 mL)	0	7	70	70	49
E.coli Bacteria (MPN/100 mL)	0	7	49	70	49

1.3.5 Landfill Leachate Monitoring

During May 2022, the landfill leachate monitoring was conducted at NNP1 Project Landfill (Last pond - LL4) and at Houay Soup Solid Waste Landfill (Last pond - LL6).

The results indicate that NNP1 Project Landfill leachate and Houay Soup Landfill leachate fully complied with the standards. The leachate is still contained in the leachate ponds without being discharged to the environment. EMO will continue to monitor the leachate and report the results in the next monthly progress report. The landfill leachate monitoring results for May 2022 can be found in ***Table 1-10***.

TABLE 1-10: RESULTS OF THE LANDFILL LEACHATE MONITORING

		Site Name	NNP1 Landfill Leachate					Houay Soup Landfill	
		Location	Pond No.01	Pond No.02	Pond No.03	Pond No.04	Discharge Point	Last pond	Discharged Point
		Station	LL1	LL2	LL3	LL4	LL5	LL6	LL7
Date	Parameter (Unit)	Guideline							
4-May-22	pH	6.0-9.0				8.32		8.64	
4-May-22	Sat. DO (%)					128.1		208.1	
4-May-22	DO (mg/L)					9.14		14.74	
4-May-22	Conductivity (µS/cm)					120		192	
4-May-22	Temperature (°C)					33.28		33.8	
4-May-22	Turbidity (NTU)					15.3		32.6	
4-May-22	COD (mg/L)	<125				54.4		55.2	

		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	Discharged Point
		Station	LL1	LL2	LL3	LL4	LL5	LL6	LL7
Date	Parameter (Unit)	Guideline							
4-May-22	Faecal Coliform (MPN/100mL)	<400				23		13	
4-May-22	Total Coliform (MPN/100mL)	<400				350		79	
4-May-22	Total Nitrogen (mg/L)	<10				1.1		0.52	
4-May-22	Lead (mg/L)	<0.2				<0.01		<0.01	
4-May-22	Copper (mg/L)					<0.006		<0.006	

1.4 DISCHARGE MONITORING

1.4.1 Main Reservoir – Water Level, Inflow and Discharge

The water level in the main reservoir, inflow to the reservoir and discharge from the reservoir have been monitored since the start of the impounding on 15 May 2018. The graph in ***Figure 1-5*** *and* ***Figure 1-6*** presents the values recorded since January 2020.

During May 2022, the mean inflow to the main reservoir was 126 m^3/s. The minimum and maximum inflows were 41 m^3/s (on 01 May 2022) and 349 m^3/s (on 23 May 2022) respectively.

From 01 to 15 May 2022, the water level in the main reservoir decreased from El. 298.81 m asl to El. 298.12 m asl then increased to El. 300.82 m on 31 May 2022

In May 2022, the hourly turbine discharges from the Main Powerhouse varied between 14 m^3/s and 232 m^3/s usually interrupted by night-time periods with no discharge.

FIGURE 1-5: INFLOW TO THE MAIN RESERVOIR DURING JANUARY 2020 TO MAY 2022

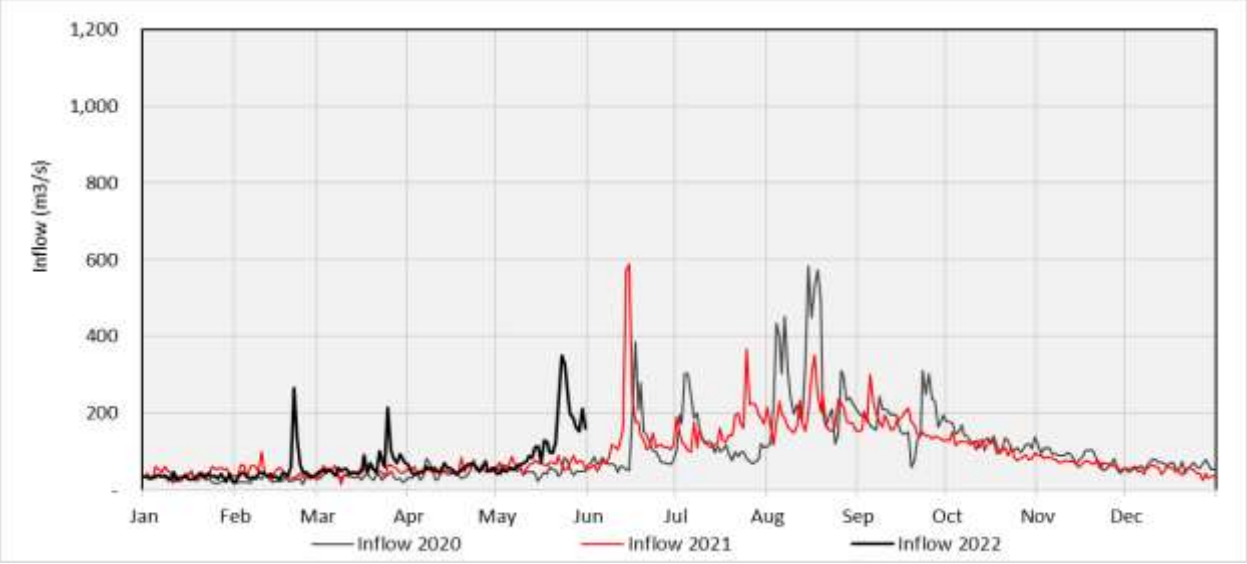
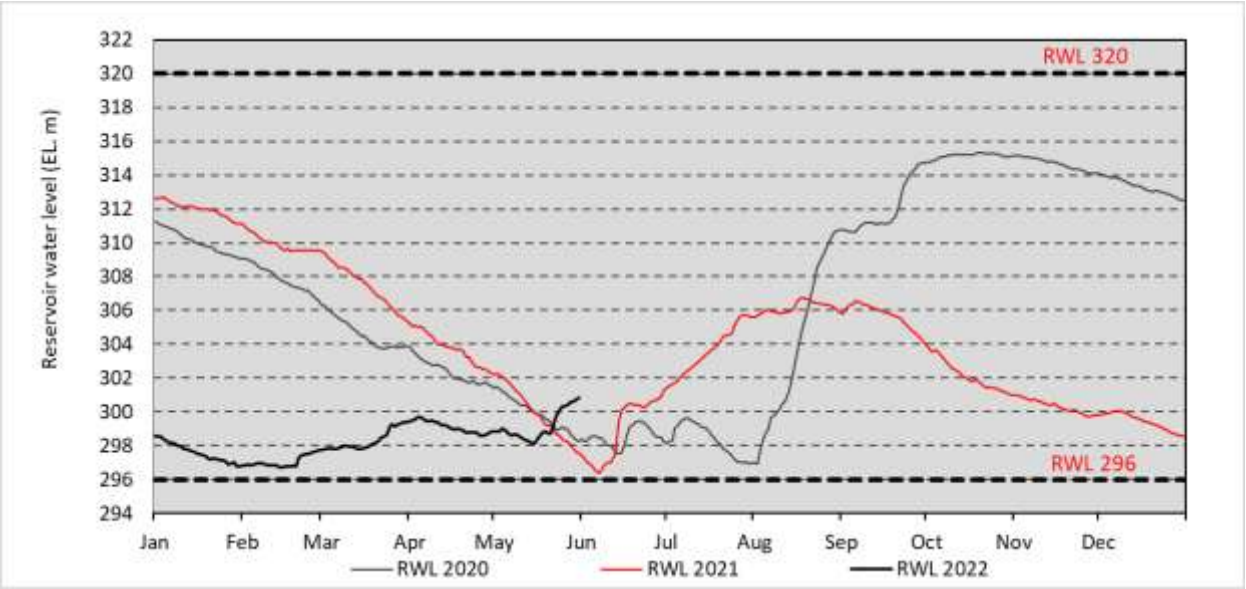


FIGURE 1-6: WATER LEVEL FOR THE MAIN RESERVOIR DURING JANUARY 2020 TO MAY 2022



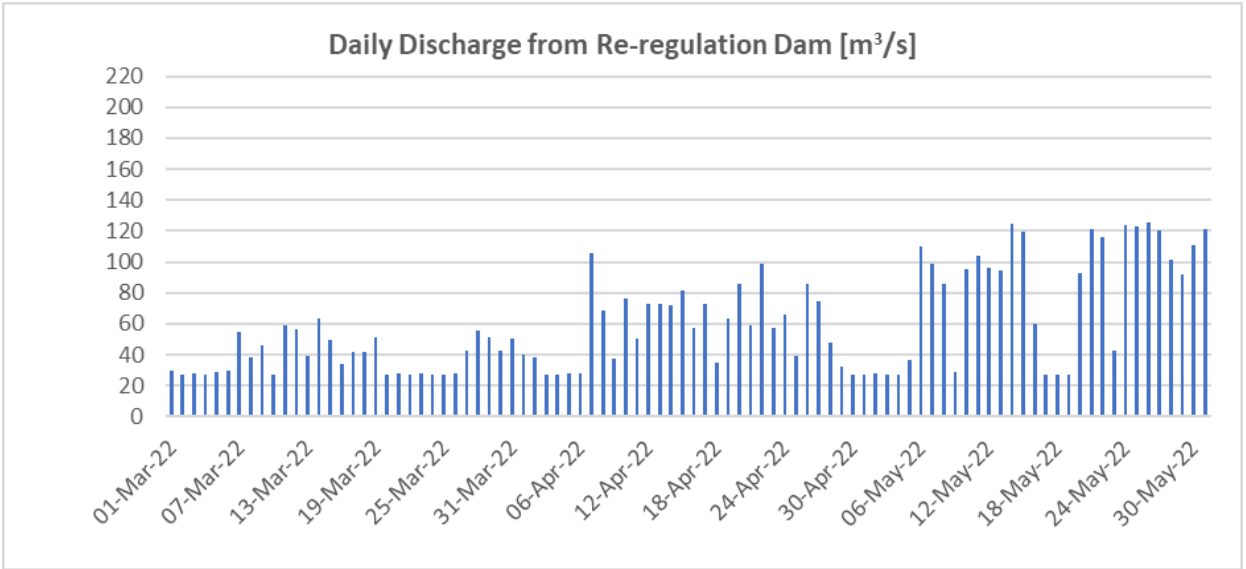
1.4.2 Re-regulation Reservoir – Discharge

The daily discharge monitoring data for the Re-regulation Dam during March to May 2022 is presented in ***Figure 1-7***.

During May 2022, the mean daily discharge from the Re-regulation Dam was about 81 m^3/s with hourly gate discharge varied between 27 m^3/s and 185 m^3/s, and no hourly turbine discharge. The hourly 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 1-7: DAILY DISCHARGE MONITORING AT THE RE-REGULATION DAM IN MARCH TO MAY 2022



1.4.3 Nam Ngiep Downstream Water Depth Monitoring

In May 2022, EMO carried out four boat missions to monitor the water depth in the Nam Ngiep downstream of the Re-regulation Dam. A total of 19 sites have been identified with potential shallow water depths and during the boat missions, the thalweg water depth was less than 0.5 m at one site (distance between 1.5 and 5.6 km from the Re-regulation Dam) during the discharge about 27 m^3/s on 28 May 2022 but the team did not have any difficulties with boat navigation.

NNP1PC TD and EMO team conducted a joint survey during low discharge (about 27 m^3/s) on 28 May 2022 to determine the need for minor excavations in the thalweg riverbed to ensure compliance with the water depth requirement of at least 0.5 m and one site was observed the water depth less than 0.5 m during the mission. NNP1PC TD is considering the excavation methods and their findings will be reported in the June 2022 Report.

1.5 PROJECT WASTE MANAGEMENT

1.5.1 Solid Waste Management

In May 2022, a total of 16.7 m^3 of solid waste was disposed of at the NNP1 Project Landfill, an increase of 5.7 m^3 compared with April 2022.

The Contractor continued the regular waste collection from the NNP1PC's operation sites and operated the project landfill for three days per week. The work included waste segregation and disposal, waste cover and compaction, grass cutting and repairing of perimeter fences.

FIGURE 1-8: WASTE MANAGEMENT ACTIVITIES AT NNP1 LANDFILL DURING MAY 2022

WASTE SPOT CHECK AND WASTES COLLECTION	
	

WASTE DUMP AND WASTES COVER


The total amount of recyclable waste selling and collection this month is summarized in ***Table 1-11.***

TABLE 1-11: AMOUNTS OF RECYCLABLE WASTE SOLD AND COLLECTION IN MAY 2022

Source and Type of Recycled Waste		Unit	Sold	Cumulative Total by May 2022
1	Plastic bottles	kg	0	**10**
2	Aluminium can	kg	0	**0**
3	Paper/Cardboard	kg	0	**3**
4	Glass	kg	0	**46**
5	Scrap Metal	Kg	0	**0**
Total		**kg**	**0**	**59**

In May 2022, the access to OSOV1 continued to be restricted and the villagers collected 385 kg food wastes from the OSOV1 canteen for feeding their animals.

1.5.2 Hazardous Materials and Waste Management

The types and amounts of hazardous materials and hazardous waste stored on site in May 2022 are shown in ***Table 1-12*** and ***Table 1-13.***

***TABLE 1-12**: RECORD OF HAZARDOUS MATERIAL INVENTORY*

No.	Type of Hazardous Material	Unit	Total in May 2022 (A)	Used (B)	Remaining at the end of May 2022 (A – B)
1	Diesel	Litre	7,222	3,842	**3,380**
2	Gasoline	Litre	1,758	525	**1,233**
3	Lubricant (Turbine oil)	Litre	2,250	1,009	**1,241**
4	Colour Paint	Litre	242	0	**242**
5	Thinner	Litre	7	0	**7**
6	Grease Oil	Litre	785	0	**785**
7	Gear Oil	Litre	240	7	**233**
8	Chlorine Liquid	Litre	191	71	**120**
9	Chlorine Powder	kg	65	0	**65**
10	SIKA	Litre	7	0	**7**

***TABLE 1-13**: RECORD OF HAZARDOUS WASTE INVENTORY*

No.	Hazardous Waste Type	Unit	Total in May 2022 (A)	Disposed (B)	Remaining at the end of May 2022 (A - B)
1	Used Oil (Hydraulic + Engine)	Litre	312.3	0	**312.3**
2	Used oil mixed with water	Litre	0	0	**0**
3	Empty used oil drum/container (drum 200L)	Unit	13	0	**13**
4	Contaminated soil, sawdust and textile material	m^3	0.5	0	**0.5**
5	Used tyre	Drum	16	2	**14**
6	Empty used chemical drum/container (drum 20L)	Unit	6	0	**6**
7	Lead acid batteries	Unit	9	0	**9**
8	Empty paint and spray cans	Unit	175	0	**175**
9	Halogen/fluorescent bulbs	kg	282	0	**282**
10	Empty cartridge (Ink)	Unit	169	0	**169**
11	Clinic Waste	Kg	11.5	9	**2.5**

1.6 COMMUNITY WASTE MANAGEMENT

1.6.1 Community Recycling Programme

The community waste bank program is under progress of being handed over to the Bolikhan District EMU. No recycle waste trade activities in the community recycle waste bank in May 2022.

1.6.2 Community Solid Waste Management

The communities' solid waste management and the Houay Soup Landfill operation was under processing to be handed over to the local authorities (Bolikhan EMU). The Bolikhan EMU completed two community consultation meetings with two host villages but the consultation meeting with Phouhomxay Village was postponed to early June 2022 due to the unavailability of the village authorities.

During this transition period of May 2022. EMO supported waste collection from Phouhomxay Village (along the main road), the health centre, school and the NNP1PC's Resource Centre on a weekly basis. A total of 4.3 m^3 from those areas was disposed of at Houay Soup Landfill.

FIGURE 1-9: WASTE MANAGEMENT ACTIVITIES DURING MAY 2022

WEEKLY WASTE COLLECTION FROM PHOUHOMXAY VILLAGE AND TRANSPORT TO HOUAY SOUP LANDFILL	
	

2. WATERSHED AND BIODIVERSITY MANAGEMENT

2.1 WATERSHED MANAGEMENT

2.1.1 Implementation of Annual Implementation Plan (AIP)

2.1.1.1 Xaysomboun Watershed and Reservoir Protection Office (WRPO)

Xaysomboun WRPO, EMO, and BSP-WCS organized a bi-weekly technical meeting on 11 May 2022 in Xaysomboun Provincial Agriculture and Forestry Office (PAFO). The meeting was attended by 14 people (included 4 women) comprising 8 representatives from XSB WRPO/PAFO, 3 representatives from WCS-BSP, and 3 representatives from EMO.

The objectives of the meeting are to discuss the work progress, pending issues and action plan of Xaysomboun WRPO. The results from the meeting are highlighted as follow:

***Urgent tasks in May 2022**:*

- Xaysomboun WRPO in collaboration with technical staff of Provincial Department of Home Affairs to prepare an Agreement on establishment of a Provincial Task Force for the Provincial

Governor's review and approval per recommendations from the meeting on NNP1 watershed management that was organized on 7 February 2022 at Xaysomboun Provincial Administration Office. Xaysomboun WRPO will develop a budget plan for the Provincial Task Force in collaboration with EMO.

- Xaysomboun WRPO to submit the financial report for the implementation of the previous Annual Implementation Plan (AIP) as of 30 April 2022 and the budget plan for organizing a site visit on the ongoing mineral exploration activity in the NNP1 watershed Totally Protected Zone 1 (TPZ1) to EMO by 25 May 2022. The site visit is tentatively scheduled to 7 June 2022.
- Xaysomboun WRPO in collaboration with DAFOs of Hom and Thathom to organize the consultation meeting on role and responsibilities for reservoir fishery management of relevant provincial and district offices at respective district level.
- Xaysomboun WRPO to follow up with the DAFO and relevant GoL agencies at district level on the progress of appointment of staff and officials for sub-station and patrolling teams per recommendation from the meeting on NNP1 watershed management held on 7 February 2022 and 8 April 2022 at XSB Provincial Administration Office.

Tasks in May and June 2022*:*

- Xaysomboun WRPO to coordinate with the DAFOs and the relevant sectors on resource arrangement and officials to be stationed in the WRPO field sub-office and join the patrol team referring to the Minute of Meeting on 7 February 2022.
- Xaysomboun WRPO to organize training for land use planning for relevant staff at the district level. For the improvement of the agricultural and forestry land use plan for Phonhom Village, the work and budget plans should be revised in collaboration with Thathom DAFO in order to be in line with the actual work and then be implemented after receiving the 2022 budget plan.
- Xaysomboun WRPO to submit the Monthly Progress Reports (MPR) from June 2021 to April 2022 after Xaysomboun PAFO provide comments and approve the MPRs.
- Agreed to organize a monthly technical meeting during the 20th to 25th of each month. The next technical monthly meeting will be organized on the 21 June 2022.
- NNP1 has submitted the budget plan of Xaysomboun WRPO AIP 2022 to ADB for review and comments and expects to receive their comments within June 2022.

2.1.1.2 Bolikhamxay Watershed and Reservoir Protection Office (WRPO)

Bolikhamxay WRPO received their quarterly funds (Q1 and Q2) under their approved AIP 2022 in the first week of May 2022. They organized a discussion with BSP-WCS on the Law Enforcement strategy on 10 May 2022 and conducted forest and reservoir patrolling between 16-23 May 2022.

2.1.1.3 NNP1PC EMO

Implementation of the agriculture extension service plan for improving home gardening and Kai Noi rice production by growing vegetable in greenhouse and organic rice farming in Thathom District started on 6 April 2022. Village meetings to present the activities and to select households for a farming demonstration plot were organized at Phonhom and Nahong Village on 6 and 7 April 2022 respectively.

The trainers who are professors from Faculty of Agriculture of National University of Laos (NUOL) are finalizing training and budget plan for pineapple and orange farming and cattle fattening program in May 2022.

EMO was supported Thathom DAFO in organizing a second phase of organic farming training that was scheduled in June 2022. In addition, EMO team also supports Thathom DAFO on monitoring and providing the technical support of the Kai Noi rice farming program for the six selected farmers at the demonstration plots in Ban Nahong and Phonhom.

After consultation meetings in March 2022, Hom District Governor issued agreement and license of group establishment for cattle production group and orange production group. EMO team also had discussions with Thathom DAFO on the plan for establishing the local producer groups at Nahong and Phonhom Village. They confirmed that a kick-off meeting on group establishment can be organized in June 2022.

NNP1 management had a discussion with Vice Minister of Minister of Agriculture and Forestry (MAF) at Vice Minister Office in Vientiane on 30 May 2022 participated by Vice Minister of MAF, representatives of DOF-MAF, NNP1 Managing Director, NNP1 ESD Deputy Managing Director, and NNP1 EMO Manager. The meeting was organized to seek the guidance from Vice Minister of MAF on the financial and pending issues of the NNP1 watershed and biodiversity program related to No Net Loss (NNL) in biodiversity including the on-going mining exploration activity in the NNP1 watershed TPZ. The Vice Minister advised DOF-MAF in close collaboration with Ministry of Finance (MoF), relevant GOL committees, and NNP1PC to finalize the FMM as soon as possible and to ensure that everything is aligned with the GOL financial policy (referring to MoF Decree No. 4000). In addition, the Vice Minister also advised DOF-MAF to obtain more information and better understand the situation on the mining exploration in the province and report back to him so that he can raise the concern to the GOL planning and investment team in which the vice minister is also honourable member.

NNP1PC received an official request from Ministry of Defense (Ref No. 2546/MoD dated 24 May 2022) and DOF-MAF (Ref. No. 3371/DOF dated on 25 May 2022) to provide financial support for the investigation on 128 families who occupied the land within the Samriam area of Hom District that may impact the forest and land within NNP1 watershed TPZ1. A special committee has been established through the agreement from MoD office (Ref No. 2454/MoD dated 19 May 2022) comprised of representatives from MoD, Xaysomboun Provincial Military office, Hom District governor office, military, and home affair office, Bolikhan District Governor office, DoF and DoFI of MAF, as well as Department of Land (DoL) of Ministry of Natural Resource and Environment (MoNRE) to conduct site inspection, technical analysis, and organize consultation meetings to deal with the threats. NNP1PC has further discussed and agreed with DOF-MAF that the financial support will come under the GOL Concession Agreement (CA) Fund and the activity was scheduled in June 2022.

2.1.2 Preparation of Annual Implementation Plan (AIP) 2022

2.1.2.1 Xaysomboun WRPO

EMO team has reviewed the budget plan of Xaysomboun AIP2022 and submitted to ADB and IAP on 10 May 2022 for their review and expects to obtain their no objection in June 2022.

2.1.2.2 Bolikhamxay WRPO

Bolikhamxay WRPO received their quarterly funds (Q1 and Q2) under their approved AIP 2022 in the first week of May 2022.

2.2 BIODIVERSITY OFFSET MANAGEMENT

2.2.1 Implementation of BOMP Annual Implementation Plan (AIP)

The progress on the implementation of key activities by Component in May 2022 are described below:

a. Component 1 - Spatial Planning and Regulation

The Biodiversity Offset Management Unit (BOMU) continued the process of obtaining the official approval from the Bolikhamxay Provincial and District management offices.

b. Component 2 – Law Enforcement

There were 3 patrol teams assigned for guarding each patrol sub-station in May 2022. EMO, Nam Chouane-Nam Xang (NC-NX) BOMU, and BSP-WCS had a meeting on 20 May 2022 about the continuation of patrolling work. It was agreed that NC-NX BOMU may use the remaining budget from other activities under the previous AIP 2021 such as from the village land use updating activity to continue the patrol sub-station guarding and field patrolling with one or two team mobilizations if the budget is sufficient.

c. Component 3 – Conservation Outreach

BSP-WCS continues to further improve the draft Nam Chouane-Nam Xang (NC-NX) outreach strategy. The radio-broadcast outreach will continue to be implemented until July 2022.

d. Component 4 – Conservation linked livelihood development

The activity under the approved Community Development Plan (CDP) was scheduled in May 2022.

BSP-WCS continued improving the Lao version of the draft Community Conservation Agreement (CCA) for BOMU review and comments.

BSP-WCS is analysing the snare removal assessment results. It was agreed by EMO, NC-NX BOMU, and BSP-WCS during the meeting on 20 May 2022 that the snare removal activity will be resumed in June 2022 after the assessment results are finalized and shared.

2.2.2 Preparation of Annual Implementation Plan (AIP) 2022

EMO submitted an official response to the compiled comments from GOL committees on the final draft of Financial Management Manual (FMM) to Department of Forestry (DOF) of Ministry of Agriculture and Forestry (MAF) on 20 May 2022. Meeting on this matter will be organized after the review by DOF-MAF.

2.3 FISHERY MONITORING

The fishery monitoring is based on the 7-day reported catch from the Daily Catch Logbook (DCL) survey of the month by covering the upstream, upper reservoir, lower reservoir, downstream and Mekong areas.

The fish species dominating the fish catch by weight in April 2022 as listed in ***Table 2-1.*** All species are classified as Least Concern (LC) according to the IUCN Red List of Threatened Species[1], except *Sikukia gudgeri* is classified as Data Deficient species (DD).

TABLE 2-1: FISH SPECIES DOMINATING THE FISH CATCH IN APRIL 2022

Species	Lao Name	Fish Catch (kg)	IUCN Red List Classification
Oreochromis niloticus	ปานิน	173.7	LC
Poropuntius normani, Poropuntius laoensis, Poropuntius carinatus	ปาจาด	133.6	LC
Hampala dispar, Hampala macrolepidota	ปาสูด	117.7	LC
Barbonymus gonionotus, Hypsibarbus malcomi, Hypsibarbus vernayi, Hypsibarbus wetmorei	ปาปาฆา	85.5	LC
Sikukia gudgeri, Amblyrhynchichthys truncatus	ปาขาวซาย	71.6	DD, LC

The recorded catch of Threatened species (IUCN Red List classification) in April 2022 are presented in ***Table 2-2.*** The list includes three species that are classified as Vulnerable species (VU).

TABLE 2-2: THREATENED SPECIES OF APRIL 2022 FISH CATCH

Species	Lao Name	Fish Catch (kg)	IUCN Red List Classification
Cirrhinus cirrhosus	ปาแกง/ปาบอมจัม	0.5	VU
Scaphognathops bandanensis	ปาอวมไฝ/ปาป่วม	10	VU
Tor sinensis	ปาแดง	11.1	VU

Species abundance and occurrence is based on the 7-day reported catch from the Daily Catch Logbook (DCL) survey in April 2022. The catch is divided in three areas including above the main dam, below the main dam and Mekong area. Main biodiversity indicators in April 2022 for above dam, below dam and Mekong area are presented in ***Table 2-3.***

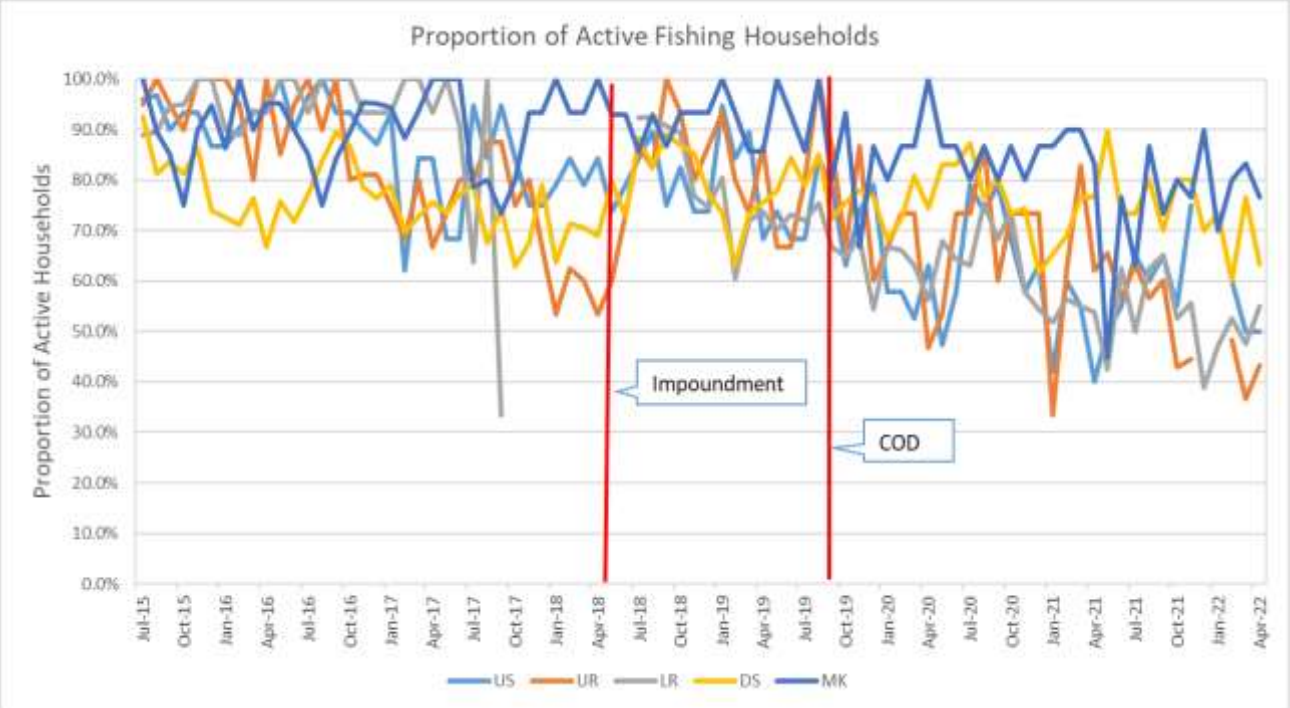
[1] The IUCN Red List of Threatened Species is the world's most comprehensive inventory and classification of threatened species. The Red List classifies species into nine groups: Extinct (EX), Extinct in the wild (EW), Critically endangered (CR), Endangered (EN), Vulnerable (VU), Near threatened (NT),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

TABLE 2-3: MAIN BIODIVERSITY INDICATORS FOR APRIL 2022

Biodiversity Indicators	Mekong	Below dam	Above dam
Total species and groups	21	27	35
Single species	16	16	23
Species groups	5	11	12
Top 15 species (% total catch weight)	95.19%	89.73%	92.65%
Proportion for species groups	29.42%	72.35%	43.61%
Diversity index (Shannon)	2.6563	2.5617	2.5509

Figure 2-1 shows the proportion of total number of households actively fishing by fishing zone including upstream (US), upper reservoir (UR), lower reservoir (LR), downstream (DS) and Mekong (MK). It ranges between 43% and 76% of active fishing households for all fishing zones in April 2022.

FIGURE 2-1: PROPORTION OF TOTAL NUMBER OF HOUSEHOLDS ACTIVELY FISHING BY FISHING ZONE FROM JULY 2015 TO APRIL 2022

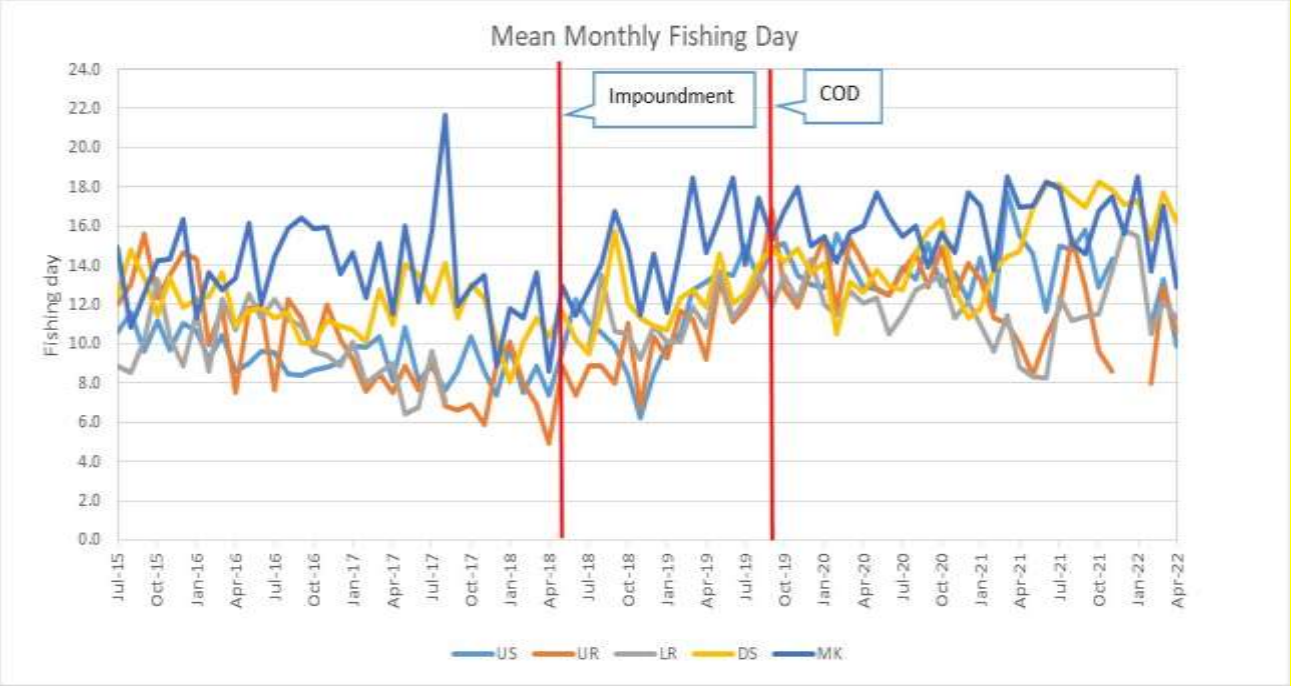


Note:

Proportion of Active Fishing Households = (Active Fishing Households/Total Interviewed Households) x 100%.

Figure 2-2 shows the average (mean) of monthly fishing day from July 2015 to April 2022 for the upstream (US), upper reservoir (UR), lower reservoir (LR), downstream (DS) and Mekong (MK) area.

FIGURE 2-2: MEAN OF MONTHLY FISHING DAY FROM JULY 2015 TO APRIL 2022



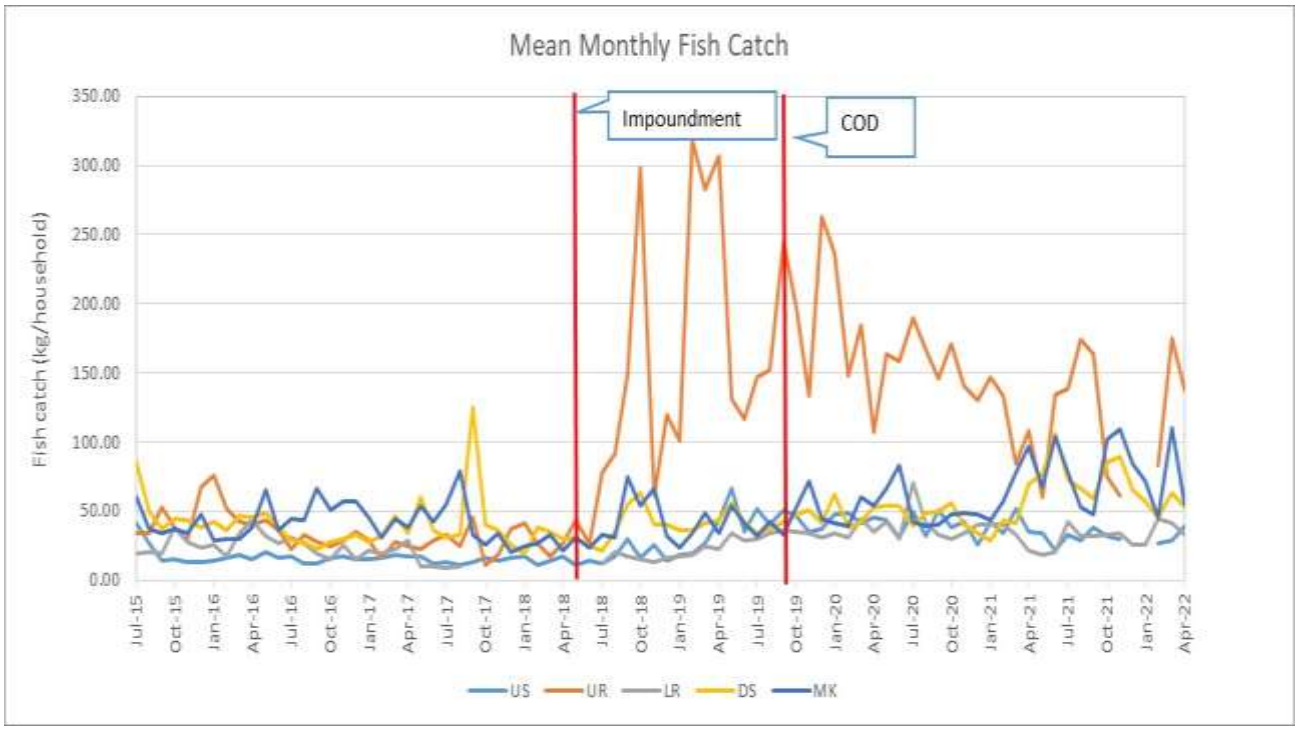
The mean monthly number of fishing day for the month of April from 2016 to 2022 for the upstream, upper reservoir, lower reservoir, downstream and Mekong area are displayed in ***Table 2-4***.

TABLE 2-4: MEAN REPORTED NUMBER OF FISHING DAYS BY FISHING ZONE FOR THE MONTH OF APRIL FROM 2016 TO 2022

Fishing Zone	April 2016 (day)	April 2017 (day)	April 2018 (day)	April 2019 (day)	April 2020 (day)	April 2021 (day)	April 2022 (day)
Upstream	8.57	8.14	7.35	13.19	12.86	15.54	9.86
Upper reservoir	7.50	7.50	4.90	9.23	14.08	10.00	10.55
Lower reservoir	10.71	9.00	0.00	10.82	12.05	8.78	11.30
Downstream	10.90	10.95	10.38	11.85	12.61	14.72	16.24
Mekong	13.39	11.54	8.57	14.64	16.00	16.97	12.86

The mean monthly household fish catch from July 2015 to April 2022 for the upstream (US), upper reservoir (UR), lower reservoir (LR), downstream (DS) and Mekong (MK) area are presented in ***Figure 2-3.***

FIGURE 2-3: MEAN MONTHLY HOUSEHOLD FISH CATCH FROM JULY 2015 TO APRIL 2022



The mean household fish catch for the month of April from 2016 to 2022 in the upstream, upper reservoir, lower reservoir, downstream and Mekong area are displayed in ***Table 2-5.***

TABLE 2-5: MEAN MONTHLY HOUSEHOLD FISH CATCH FOR THE MONTH OF APRIL FROM 2016 TO 2022

Fishing Zone	April 2016 (kg)	April 2017 (kg)	April 2018 (kg)	April 2019 (kg)	April 2020 (kg)	April 2021 (kg)	April 2022 (kg)
Upstream	15.46	17.14	17.82	43.15	45.57	34.77	39.56
Upper reservoir	40.46	24.96	26.51	306.73	107.69	108.57	137.44
Lower reservoir	43.11	28.76	0.00	22.68	34.89	21.49	32.88
Downstream	45.50	33.67	30.36	43.85	53.38	69.75	52.69
Mekong	38.49	38.31	21.10	34.46	54.20	96.93	54.97

The mean daily fish catch per household from July 2015 to April 2022 are displayed in ***Figure 2-4*** and the mean fish catch per household per fishing day for the month of April from 2016 to 2022 are shown in ***Table 2-6.***

FIGURE 2-4: MEAN DAILY FISH CATCH PER HOUSEHOLD FROM JULY 2015 TO APRIL 2022

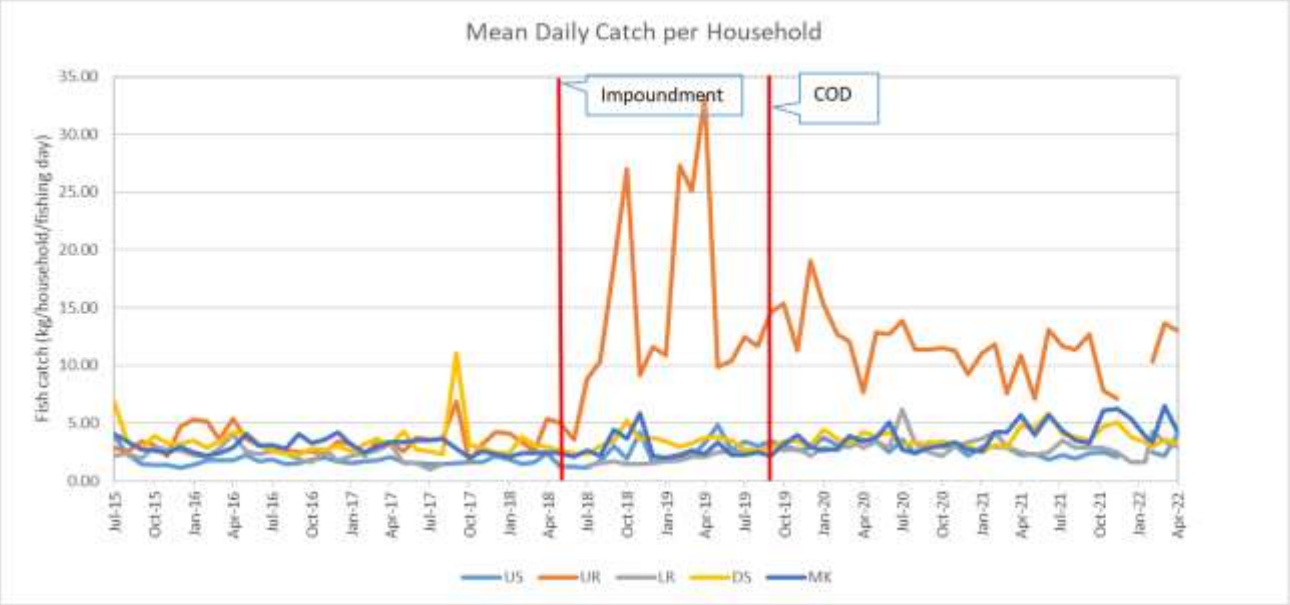


TABLE 2-6: MEAN DAILY FISH CATCH PER HOUSEHOLD FOR THE MONTH OF APRIL FROM 2016 TO 2022

Fishing Zone	April 2016 (kg)	April 2017 (kg)	April 2018 (kg)	April 2019 (kg)	April 2020 (kg)	April 2021 (kg)	April 2022 (kg)
Upstream	1.74	1.75	1.60	2.13	2.94	2.90	2.16
Upper reservoir	3.60	3.31	2.59	25.08	12.07	7.61	13.62
Lower reservoir	2.80	2.64	0.00	2.09	3.49	2.93	3.39
Downstream	3.45	3.68	3.08	3.23	3.20	2.86	3.59
Mekong	2.36	2.95	2.43	2.62	3.87	4.19	6.49

The survey results in April 2022 indicate that tributary and stream is the main fishing habitat for the upstream and lower reservoir zones, while the main fishing habitat for the upper reservoir, downstream and Mekong zones are the reservoir, Nam Ngiep, and Mekong respectively. The proportion of fishing habitats in April 2022 are displayed in ***Table 2-7.***

TABLE 2-7: PROPORTION OF THE CATCH REPORTED BY MAIN HABITATS (%) IN APRIL 2022

Habitats	US	UR	LR	DS	MK
Mekong	0.0%	0.0%	0.00%	15.63%	88.68%
Nam Ngiep	45.0%	13.9%	0.00%	47.82%	0.00%
Nam Xan	0.0%	0.0%	0.00%	0.00%	0.00%

Habitats	US	UR	LR	DS	MK
Reservoir	7.9%	85.2%	17.18%	0.00%	0.00%
Tributary and stream	47.1%	1.0%	81.99%	27.57%	0.00%
Wetland	0.0%	0.0%	0.83%	3.00%	11.32%
Others	0.0%	0.0%	0.00%	5.99%	0.00%

Total reported fish and OAA (other aquatic animals) catch (proportion of OAA) for the same 7-day period from July 2015 to April 2022 are presented in ***Figure 2-5*** and the proportion of OAA catch for the month of April from 2016 to 2022 are shown in ***Table 2-8.***

FIGURE 2-5: PROPORTION OF OAA TO THE TOTAL REPORTED NUMBER OF FISH AND OAA FOR A 7-DAY PERIOD BY FISHING ZONE FROM JULY 2015 TO APRIL 2022

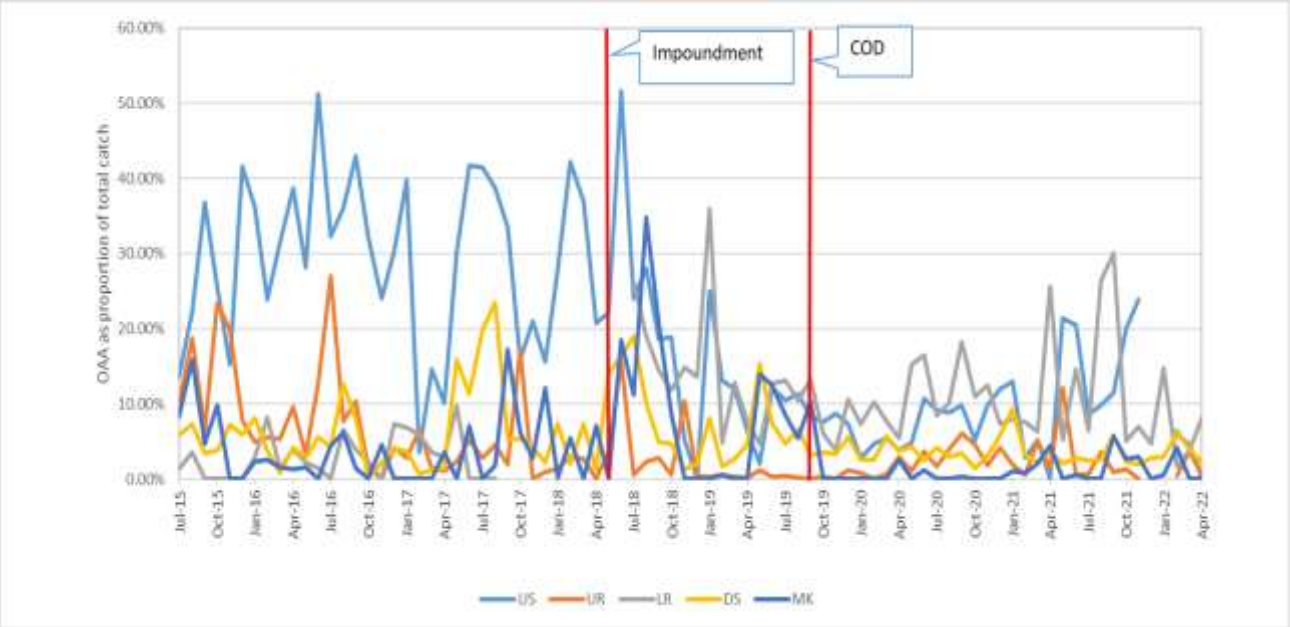


TABLE 2-8: PROPORTION OF OAA TO THE TOTAL REPORTED NUMBER OF FISH AND OAA FOR THE MONTH OF APRIL FROM 2016 TO 2022

Fishing Zone	April 2016	April 2017	April 2018	April 2019	April 2020	April 2021	April 2022
Upstream	38.71%	10.11%	20.71%	6.43%	3.77%	0.00%	0.00%
Upper reservoir	9.58%	1.06%	0.00%	0.16%	2.92%	1.49%	0.57%
Lower reservoir	3.98%	2.89%	0.00%	7.68%	5.51%	25.69%	8.16%
Downstream	4.23%	1.39%	1.32%	4.61%	3.65%	3.70%	2.18%
Mekong	1.30%	3.57%	7.11%	0.00%	2.57%	4.40%	0.00%

3. EXTERNAL MISSIONS AND VISITS

There was no external mission and visit during the month of reporting.

ANNEXES

ANNEX A: RESULTS OF WATER QUALITY MONITORING

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

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
Date	Parameters (Unit)	Guideline																
1-Apr-22	pH	5.0 - 9.0	7.23												7.24			
23-Apr-22	pH	5.0 - 9.0		6.63	6.69	7.24										6.87		
24-Apr-22	pH	5.0 - 9.0					6.88	6.79	6.79	6.7								
25-Apr-22	pH	5.0 - 9.0									6.87	7	6.83	6.88			6.09	7.05
5-May-22	pH	5.0 - 9.0		7.01	7.07	7.26										7.15		
6-May-22	pH	5.0 - 9.0					7.82	7.73	7.37	7.45								
7-May-22	pH	5.0 - 9.0									7.43	7.55	7.6	7.66			7.58	7.61
10-May-22	pH	5.0 - 9.0	7.7												7.8			
12-May-22	pH	5.0 - 9.0						7.47	7.37	7.36								
13-May-22	pH	5.0 - 9.0									7.45	7.39	7.46	7.19			7.5	7.47
16-May-22	pH	5.0 - 9.0	6.65												6.6			
17-May-22	pH	5.0 - 9.0		6.89	6.72	6.83										7.05		
18-May-22	pH	5.0 - 9.0					6.92	6.86	6.78	6.84								
19-May-22	pH	5.0 - 9.0									6.92	6.94	6.88	6.98			6.94	6.85
27-May-22	pH	5.0 - 9.0					6.92	6.87	6.85	6.86								
28-May-22	pH	5.0 - 9.0									7.01	6.95	6.93	6.96			6.93	6.95
1-Apr-22	Sat. DO (%)		92.9												88.7			
23-Apr-22	Sat. DO (%)			96.7	92.3	100										96.6		

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
Date	Parameters (Unit)	Guideline																
24-Apr-22	Sat. DO (%)						97.3	94.5	55.3	66.9								
25-Apr-22	Sat. DO (%)										91.1	87.2	87.2	86.9			78.3	82.2
5-May-22	Sat. DO (%)			95.2	91.5	102.6										95.4		
6-May-22	Sat. DO (%)						93.7	90.9	31.3	42.4								
7-May-22	Sat. DO (%)										96.9	96.9	87.9	93.4			79.7	79.9
10-May-22	Sat. DO (%)		98.4												106.6			
12-May-22	Sat. DO (%)							105.8	42.8	50.3								
13-May-22	Sat. DO (%)										102.7	106	98.2	95.6			89.1	81.2
16-May-22	Sat. DO (%)		94.5												99.9			
17-May-22	Sat. DO (%)			91.5	94.4	99.2										97.2		
18-May-22	Sat. DO (%)						95.2	93.5	49.3	75								
19-May-22	Sat. DO (%)										112	104.9	100.8	99.2			84.2	92.4
27-May-22	Sat. DO (%)						95	94	19.6	32.9								
28-May-22	Sat. DO (%)										76.6	74.8	74.5	76			89.2	74.8
1-Apr-22	DO (mg/L)	>6.0	7.62												7.61			
23-Apr-22	DO (mg/L)	>6.0		7.64	7.15	7.81										7.95		
24-Apr-22	DO (mg/L)	>6.0					7.52	7.35	4.24	5.09								
25-Apr-22	DO (mg/L)	>6.0					7.52	7.35	4.24	5.09	7.6	7.22	7.08	6.79			6.02	6.63
5-May-22	DO (mg/L)	>6.0		7.68	7	7.89										7.09		
6-May-22	DO (mg/L)	>6.0					7.25	7.09	2.61	3.29								
7-May-22	DO (mg/L)	>6.0						7.09	2.61	3.29	8.1	8.09	7.24	7.61			6.16	6.35
10-May-22	DO (mg/L)	>6.0	8.16												8.76			
12-May-22	DO (mg/L)	>6.0						8.16	3.6	4.15								
13-May-22	DO (mg/L)	>6.0						8.16	3.6	4.15	8.63	8.87	8.13	7.87			7.06	6.62

		River Name	Nam Ngiep								Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites								Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
Date	Parameters (Unit)	Guideline																
16-May-22	DO (mg/L)	>6.0	7.79												8.36			
17-May-22	DO (mg/L)	>6.0		7.76	7.28	7.63										8.38		
18-May-22	DO (mg/L)	>6.0					7.38	7.29	4.08	5.89								
19-May-22	DO (mg/L)	>6.0						7.29	4.08	5.89	9.2	8.61	8.05	7.66			6.69	7.53
27-May-22	DO (mg/L)	>6.0					7.27	7.28	1.64	2.74								
28-May-22	DO (mg/L)	>6.0						7.28	1.64	2.74	6.34	6.14	6.12	6.25			6.78	6.11
1-Apr-22	Conductivity (µs/cm)		110												36			
23-Apr-22	Conductivity (µs/cm)			91	85	76										126		
24-Apr-22	Conductivity (µs/cm)						71	69	78	78								
25-Apr-22	Conductivity (µs/cm)										79	81	79	80			168	42
5-May-22	Conductivity (µs/cm)			91	88	76										97		
6-May-22	Conductivity (µs/cm)						72	70	79	80								
7-May-22	Conductivity (µs/cm)										80	80	78	79			147	60
10-May-22	Conductivity (µs/cm)		96												61			
12-May-22	Conductivity (µs/cm)							70	81	81								
13-May-22	Conductivity (µs/cm)										83	83	80	76			151	59
16-May-22	Conductivity (µs/cm)		99												38			
17-May-22	Conductivity (µs/cm)			92	88	74										141		
18-May-22	Conductivity (µs/cm)						71	69	83	78								
19-May-22	Conductivity (µs/cm)										81	83	81	73			130	36
27-May-22	Conductivity (µs/cm)						72	71	83	80								
28-May-22	Conductivity (µs/cm)										81	87	74	58			121	24
1-Apr-22	Temperature (°C)		25.38												23.03			
23-Apr-22	Temperature (°C)			26.97	28.64	28.14										25.03		

		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	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
Date	Parameters (Unit)	Guideline																
24-Apr-22	Temperature (°C)						28.58	28.32	29.17	29.85								
25-Apr-22	Temperature (°C)										24.81	24.73	25.88	28.1			29.24	26.45
5-May-22	Temperature (°C)			26.28	28.95	28.96										24.41		
6-May-22	Temperature (°C)						28.6	28.08	24.26	27.4								
7-May-22	Temperature (°C)										24.4	24.42	25.29	25.62			28.75	27.18
10-May-22	Temperature (°C)		24.72												25.22			
12-May-22	Temperature (°C)							28.79	24.42	25.23								
13-May-22	Temperature (°C)										24.26	24.33	24.82	25.11			27.38	25.78
16-May-22	Temperature (°C)		25.04												24.22			
17-May-22	Temperature (°C)			23.53	28.75	29.08										22.64		
18-May-22	Temperature (°C)						28.58	28	24.8	27.53								
19-May-22	Temperature (°C)										25.43	25.58	26.84	28.61			27.31	25.71
27-May-22	Temperature (°C)						29.24	28.56	24.47	25.13								
28-May-22	Temperature (°C)										24.73	25.23	25.29	26.01			27.44	26.1
1-Apr-22	Turbidity (NTU)		8.19												13			
23-Apr-22	Turbidity (NTU)			13	1.73	1.63										10.4		
24-Apr-22	Turbidity (NTU)						1.46	1.42	1.98	2.28								
25-Apr-22	Turbidity (NTU)										1.47	1.47	2.39	8.69			5.89	3.47
5-May-22	Turbidity (NTU)			18	1.75	1.2										4.69		
6-May-22	Turbidity (NTU)						1.33	1.09	0.93	2.76								
7-May-22	Turbidity (NTU)										1.9	2.4	4.54	5.3			4.22	3.43
10-May-22	Turbidity (NTU)		31.8												4.86			
12-May-22	Turbidity (NTU)								1.19	2.06								
13-May-22	Turbidity (NTU)										1.49	3.47	7.08	15.6			5.53	4.89

		River Name	Nam Ngiep								Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites								Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
Date	Parameters (Unit)	Guideline																
16-May-22	Turbidity (NTU)		114												18.1			
17-May-22	Turbidity (NTU)			257	3.4	1.94										71.4		
18-May-22	Turbidity (NTU)						1.75	1.31	1.47	2.75								
19-May-22	Turbidity (NTU)										1.41	4.81	6.39	5.42			12.4	3.94
27-May-22	Turbidity (NTU)						1.17	1.28	1.58	1.7								
28-May-22	Turbidity (NTU)										2.23	16	8.68	9.05			70.6	6.41
1-Apr-22	TSS (mg/L)		6.43												7.4			
23-Apr-22	TSS (mg/L)			17.33		<5										9.14		
24-Apr-22	TSS (mg/L)						<5	<5	<5	<5								
25-Apr-22	TSS (mg/L)										<5	<5	<5	7.77			5.46	<5
10-May-22	TSS (mg/L)		32.2												<5			
17-May-22	TSS (mg/L)			257.6		<5										67.55		
18-May-22	TSS (mg/L)						<5	<5	<5	<5								
19-May-22	TSS (mg/L)										<5	<5	5.65	<5			5.37	<5
1-Apr-22	BOD_5 (mg/L)	<1.5	<1												<1			
23-Apr-22	BOD_5 (mg/L)	<1.5		<1		<1										<1		
24-Apr-22	BOD_5 (mg/L)	<1.5					<1	<1	<1	1.19								
25-Apr-22	BOD_5 (mg/L)	<1.5									<1	<1	<1	<1			<1	<1
10-May-22	BOD_5 (mg/L)	<1.5	<1												<1			
17-May-22	BOD_5 (mg/L)	<1.5		<1		<1										<1		
18-May-22	BOD_5 (mg/L)	<1.5					<1	<1	<1	<1								
19-May-22	BOD_5 (mg/L)	<1.5									<1	<1	<1	<1			<1	<1
22-Apr-22	COD (mg/L)	<5.0	<5												<5			
23-Apr-22	COD (mg/L)	<5.0														<5		

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
Date	Parameters (Unit)	Guideline																
24-Apr-22	COD (mg/L)	<5.0							<5	<5								
25-Apr-22	COD (mg/L)	<5.0									<5	<5	<5	<5			6.4	<5
10-May-22	COD (mg/L)	<5.0	<5												<5			
17-May-22	COD (mg/L)	<5.0														<5		
18-May-22	COD (mg/L)	<5.0							<5	<5								
19-May-22	COD (mg/L)	<5.0									<5	<5	<5	<5			<5	<5
22-Apr-22	NH_3-N (mg/L)	<0.2	<0.2												<0.2			
23-Apr-22	NH_3-N (mg/L)	<0.2		<0.2		<2										<0.2		
24-Apr-22	NH_3-N (mg/L)	<0.2					<2	<2										
10-May-22	NH_3-N (mg/L)	<0.2	<0.2												<0.2			
17-May-22	NH_3-N (mg/L)	<0.2		<0.2		<2										<0.2		
18-May-22	NH_3-N (mg/L)	<0.2					<0.2	<0.2										
22-Apr-22	NO_3-N (mg/L)	<5.0	0.09												0.17			
23-Apr-22	NO_3-N (mg/L)	<5.0		0.15		0.06										0.16		
24-Apr-22	NO_3-N (mg/L)	<5.0					0.05	0.06										
10-May-22	NO_3-N (mg/L)	<5.0	0.05												0.05			
17-May-22	NO_3-N (mg/L)	<5.0		<0.02		0.06										0.08		
18-May-22	NO_3-N (mg/L)	<5.0					0.07	0.07										
1-Apr-22	Faecal coliform (MPN/100 mL)	<1,000	540												110			
23-Apr-22	Faecal coliform (MPN/100 mL)	<1,000														33		
24-Apr-22	Faecal coliform (MPN/100 mL)	<1,000							14	27								

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
Date	Parameters (Unit)	Guideline																
25-Apr-22	Faecal coliform (MPN/100 mL)	<1,000									14	170	170	920			920	540
10-May-22	Faecal coliform (MPN/100 mL)	<1,000	1,600												1,600			
17-May-22	Faecal coliform (MPN/100 mL)	<1,000														17		
18-May-22	Faecal coliform (MPN/100 mL)	<1,000							14	9								
19-May-22	Faecal coliform (MPN/100 mL)	<1,000									27	26	22	79			27	22
1-Apr-22	Total Coliform (MPN/100 mL)	<5,000	1,600												1,600			
23-Apr-22	Total Coliform (MPN/100 mL)	<5,000														27		
24-Apr-22	Total Coliform (MPN/100 mL)	<5,000							14	11								
25-Apr-22	Total Coliform (MPN/100 mL)	<5,000									7	14	26	540			70	49
10-May-22	Total Coliform (MPN/100 mL)	<5,000	1,600												1,600			
17-May-22	Total Coliform (MPN/100 mL)	<5,000														70		
18-May-22	Total Coliform (MPN/100 mL)	<5,000							130	22								
19-May-22	Total Coliform (MPN/100 mL)	<5,000									170	70	79	110			79	79
22-Apr-22	TKN		<1.5												<1.5			

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
Date	Parameters (Unit)	Guideline																
23-Apr-22	TKN			<1.5		<1.5										<1.5		
24-Apr-22	TKN						<1.5	5										
10-May-22	TKN		<1.5												<1.5			
17-May-22	TKN			<1.5		<1.5												
18-May-22	TKN						<1.5	<1.5								<1.5		
22-Apr-22	TOC (mg/L)		1.46												2.5			
23-Apr-22	TOC (mg/L)															1.71		
24-Apr-22	TOC (mg/L)								1.87	1.82								
25-Apr-22	TOC (mg/L)										1.58	1.52	1.67	1.82			3.36	6.57
10-May-22	TOC (mg/L)		1.99												1.53			
17-May-22	TOC (mg/L)															2.38		
18-May-22	TOC (mg/L)								1.65	2.21								
19-May-22	TOC (mg/L)										1.85	1.77	2.6	3.3			4.79	11.1
23-Apr-22	Phytoplankton Biomass (g dry wt/m³)			16.6		2.4												
24-Apr-22	Phytoplankton Biomass (g dry wt/m³)						0.4	0.8										
17-May-22	Phytoplankton Biomass (g dry wt/m³)			182		1.8												
18-May-22	Phytoplankton Biomass (g dry wt/m³)						0.6	0.8										
22-Apr-22	Total Phosphorus (mg/L)		0.02												0.02			
23-Apr-22	Total Phosphorus (mg/L)			0.03		0.02										0.03		
24-Apr-22	Total Phosphorus (mg/L)						0.02	0.03										
10-May-22	Total Phosphorus (mg/L)		0.04												0.01			

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
Date	Parameters (Unit)	Guideline																
17-May-22	Total Phosphorus (mg/L)			0.2		0.02										0.14		
18-May-22	Total Phosphorus (mg/L)						0.01	0.02										
22-Apr-22	Total Dissolved Phosphorus (mg/L)		0.01												0.01			
23-Apr-22	Total Dissolved Phosphorus (mg/L)			0.02		0.01										0.02		
24-Apr-22	Total Dissolved Phosphorus (mg/L)						0.01	0.03										
10-May-22	Total Dissolved Phosphorus (mg/L)		0.02												<0.01			
17-May-22	Total Dissolved Phosphorus (mg/L)			0.13		0.01										0.08		
18-May-22	Total Dissolved Phosphorus (mg/L)						<0.01	0.01										
23-Apr-22	Hydrogen Sulfide (mg/L)			<0.02		<0.02												
24-Apr-22	Hydrogen Sulfide (mg/L)						<0.02	<0.02										
17-May-22	Hydrogen Sulfide (mg/L)			<0.02		<0.02												
18-May-22	Hydrogen Sulfide (mg/L)						<0.02	<0.02										
23-Apr-22	Turbidity (NTU)-bottom					2.01												
24-Apr-22	Turbidity (NTU)-bottom						0.46	0.44										
17-May-22	Turbidity (NTU)-bottom					1.94												
18-May-22	Turbidity (NTU)-bottom						1.75	1.31										
23-Apr-22	TSS (mg/L)-bottom					<5												
24-Apr-22	TSS (mg/L)-bottom						<5	5										
17-May-22	TSS (mg/L)-bottom					<5												

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
Date	Parameters (Unit)	Guideline																
18-May-22	TSS (mg/L)-bottom							<5	<5									
23-Apr-22	BOD_5 (mg/L)-bottom						<1											
24-Apr-22	BOD_5 (mg/L)-bottom							7.71	7.32									
17-May-22	BOD_5 (mg/L)-bottom						<1											
18-May-22	BOD_5 (mg/L)-bottom							<1	<1									
23-Apr-22	NH_3-N (mg/L)-bottom						<0.2											
24-Apr-22	NH_3-N (mg/L)-bottom							0.2	<0.2									
17-May-22	NH_3-N (mg/L)-bottom						0.4											
18-May-22	NH_3-N (mg/L)-bottom							0.3	<0.2									
23-Apr-22	NO_3-N (mg/L)-bottom						0.18											
24-Apr-22	NO_3-N (mg/L)-bottom							0.11	0.14									
17-May-22	NO_3-N (mg/L)-bottom						0.08											
18-May-22	NO_3-N (mg/L)-bottom							0.06	0.07									
23-Apr-22	TKN-bottom						<1.5											
24-Apr-22	TKN-bottom							<1.5	<1.5									
17-May-22	TKN-bottom						<1.5											
18-May-22	TKN-bottom							<1.5	<1.5									
23-Apr-22	Total Dissolved Phosphorus (mg/L)-bottom						0.02											
24-Apr-22	Total Dissolved Phosphorus (mg/L)-bottom							0.01	0.01									
17-May-22	Total Dissolved Phosphorus (mg/L)-bottom						0.01											
18-May-22	Total Dissolved Phosphorus (mg/L)-bottom							0.02	0.02									

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						Within / Re-regulation Reservoir		Downstream				Tributaries Upstream		Tributaries Downstream	
		Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
Date	Parameters (Unit)	Guideline																
23-Apr-22	Total Phosphorus (mg/L)-bottom					0.02												
24-Apr-22	Total Phosphorus (mg/L)-bottom						0.02	0.01										
17-May-22	Total Phosphorus (mg/L)-bottom					0.02												
18-May-22	Total Phosphorus (mg/L)-bottom						0.03	0.03										
23-Apr-22	Hydrogen Sulfide (mg/L)-bottom					<0.02												
24-Apr-22	Hydrogen Sulfide (mg/L)-bottom						<0.02	<0.02										
17-May-22	Hydrogen Sulfide (mg/L)-bottom					<0.02												
18-May-22	Hydrogen Sulfide (mg/L)-bottom						<0.02	<0.02										
23-Apr-22	Phytoplankton Biomass (g dry wt/m^3)-bottom					1.2												
24-Apr-22	Phytoplankton Biomass (g dry wt/m^3)-bottom						5.2	3.2										
17-May-22	Phytoplankton Biomass (g dry wt/m^3)-bottom					4.4												
18-May-22	Phytoplankton Biomass (g dry wt/m^3)-bottom						2.8	2										

TABLE A-2: RESULTS OF CAMP EFFLUENTS IN APRIL AND MAY 2022

	Site Name	OSOV1 (Owner's Site Office and Village)			
	Station Code	EF01			
	Date	02-Apr-22	26-Apr-22	04-May-22	25-May-22
Parameters (Unit)	**Guideline**				
pH	6.0 - 9.0	7.29	6.5	7.07	7.37
Sat. DO (%)		72.9	82.5	89.9	72.5
DO (mg/L)		5.81	6.35	7.1	5.72
Conductivity (µs/cm)		320	382	352	262
Temperature (°C)		26.89	28.89	27.41	27.47
Turbidity (NTU)		0.65	0.07	0.39	0.4
TSS (mg/L)	<50	0.6	0.1	<5	<5
BOD_5 (mg/L)	<30	<6	<6	<6	<6
COD (mg/L)	<125	<25	<25	<25	Pending
NH_3-N (mg/L)	<10.0	<2	<2	<2	Pending
Total Nitrogen (mg/L)	<10.0	0.5	0.52	0.51	Pending
Total Phosphorus (mg/L)	<2	1.33	1.39	1.9	Pending
Oil & Grease (mg/L)	<10.0	<1		<1	
Total coliform (MPN/100 mL)	<400	5,400	350	1,600	1,600
Faecal Coliform (MPN/100 mL)	<400	1,600	350	540	1,600
Residual Chlorine (mg/L)	<1.0				

	Site Name	OSOV2 (ESD Camp)				Main Powerhouse			
	Station Code	EF13				EF19			
	Date	01-Apr-22	26-Apr-22	04-May-22	25-May-22	02-Apr-22	26-Apr-22	04-May-22	25-May-22
Parameters (Unit)	Guideline								
pH	6.0 - 9.0	7.68	6.97	7.32	7.74	7.83	7.22	7.37	7.84
Sat. DO (%)		73.4	19.2	62.2	82.7	75.3	54.6	53.4	69
DO (mg/L)		5.81	1.56	4.91	6.52	5.85	4.3	4.06	5.35
Conductivity (µs/cm)		533	525	567	574	879	882	1,067	977
Temperature (°C)		27.15	26.21	27.42	27.53	28.27	27.5	29.78	28.3
Turbidity (NTU)		12	8.98	5.45	6.93	8.81	3.2	6.85	10.3
TSS (mg/L)	<50	18.93	9	5.31	<5	9.5	1.3	8.33	10
BOD_5 (mg/L)	<30	7.26	15.6	<6	<6	7.62	<6	19.2	<6
COD (mg/L)	<125	41	33	26.3	Pending	48	<25	33	Pending
NH_3-N (mg/L)	<10.0	22.5	21.5	22.6	Pending	7.3	8.6	18.3	Pending
Total Nitrogen (mg/L)	<10.0	24.3	23.0	24.3	Pending	8.4	9.9	19.8	Pending
Total Phosphorus (mg/L)	<2	2.2	2.1	2.2	Pending	7.4	5.0	6.8	Pending
Oil & Grease (mg/L)	<10.0	<1		<1		1		<1	
Total coliform (MPN/100 mL)	<400	22	110	0	0	0	49	1,600	0
Faecal Coliform (MPN/100 mL)	<400	0	110	0	0	0	49	1,600	0
Residual Chlorine (mg/L)	<1.0	0.77	0.60	0.82	1.98	0.49	0.07	0.06	1.33