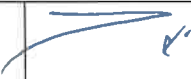
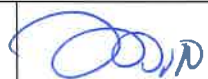




Nam Ngiep 1 Hydropower Project

Quarterly Environment Monitoring Report Fourth Quarter of 2024

October to December 2024

A	14 March 2025				Final
A0	04 March 2025	for Team leaders	Khamphone XAYSOMPHOU	Wanidaporn RODE	To ADB and LTA for Review
REV	DATE	AUTHOR	CHECKED	APPROVED	MODIFICATION DETAILS
Accessibility		Document No. NNP1-O-J0905-RP-016-A			
☒	Public				
☐	Internal				
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ABBREVIATIONS / ACRONYMS

AIP	Annual Implementation Plan
ADB	Asian Development Bank
ADM	Administration Division
BAC	Biodiversity Advisory Committee
BOF	Biodiversity Offset Framework
BOMC	Biodiversity Offset Management Committee
BOMP	Biodiversity Offset Management Plan
BOMU	Biodiversity Offset Management Unit
BSP	Biodiversity Service Provider
CA	Concession Agreement between the NNP1PC and GOL
CAP	Corrective Action Plan
CCA	Community Conservation Agreement
CDP	Community Development Plan
COD	Commercial Operation Date
CVC	Conventional Vibrated Concrete
CWC	Civil Works Contract
DAFO	District Agriculture and Forestry Office
DCC	Document Control
DD	Data Deficient of IUCN conservation status
DEB	Department of Energy and Business of the Ministry of Energy and Mine
DEMO	District Energy and Mines Office
DOF	Department of Forestry of Ministry of Agriculture and Forestry
DWP	Detailed Work Program
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

FMM	Financial Management Manual
FPF	Forest Protection Fund
GOL	Government of Lao PDR
GIS	Geographic Information Systems
HMWC	Hydraulic Metal Works Contract
HR	Human Resources
H&S	Health and Safety
IAP	Independent Advisory Panel
IEE	Initial Environmental Examination
IMA	Independent Monitoring Agency
INRMP	Integrated Natural Resources Management Plan
IUCN	International Union for Conservation of Nature
ISP	Intergraded Spatial Planning
KGS	Khammany General Service
KPI	Key performance Indicator
kV	kilo-Volt
LC	Least Concern of IUCN conservation status
LTA	Lender's Technical Advisor
LHSE	Lao Holding State Enterprise
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
MPI	Ministry of Planning and Investment
NC-NX	Nam Chouane-Nam Xang
NCR	Non-Compliance Report
NNP1PC	Nam Ngiep 1 Power Company Limited
OAA	Other aquatic animals
OC	Obayashi Corporation
OFIs	Opportunity for Improvement
O&M	Operation & Maintenance
ONC	Observation of Non-Compliance
OSOV	Owners' Site Office and Village

PAFO	Provincial Department of Agriculture and Forestry
PCD	Procurement Division
PEMO	Province Energy and Mine Office
PONRE	Provincial Department of Natural Resource and Environment, MONRE
RCC	Roller Compacted Concrete
SIR	Site Inspection Report
SMO	Social Management Office of ESD within NNP1PC
SMART	Spatial Monitoring and Reporting Tool
SOP	Standard Operating Procedure
SS-ESMMP	Site Specific Environmental and Social Monitoring and Management Plan
TD	Technical Division
TOR	Terms of Reference
TPZ	Totally Protected Zone
TSS	Total Suspended Solids
UAE	United Analysis and Engineering Consultant Company Ltd.
UR	Upper Reservoir
VU	Vulnerable of IUCN conservation status
WCS	Wildlife Conservation Organization
WMF	Watershed Management Fund
WMP	Watershed Management Plan
WRPC	Watershed and Reservoir Protection Committee
WRPO	Watershed and Reservoir Protection Office
WWTS	Wastewater Treatment System

EXECUTIVE SUMMARY

The quarterly environment monitoring report 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).

The 2024 management review meeting was held on 12 November 2024 to report on the ISO14001:2015 internal audit findings and progress on addressing Opportunity of Improvement (OIs) identified during the Surveillance Audit of 2024.

During Q4 2024, activities related to ISO14001:2015 implementation continued. This includes the implementation of the four (04) Environmental Management Plans (EMPs). The timeframe of the EMPs is from August 2024 to July 2025. The four EMPs include EMP01: HSE awareness training for NNP1PC staff and contractors, EMP02: Reducing the paper consumption in NNP1 offices, EMP03: Recycling the HDPE plastic waste by producing four HDPE waste bins, and EMP04: Planting trees at selected rehabilitation areas.

Three joint monthly site inspections were conducted by EMO, ADM and Technical Division (TD) to follow up on the progress of corrective actions from previous findings and any new findings. During the joint site inspections, several issues were identified, including the lack of temporary toilet, waste bins, and proper roofing of the hazardous materials and waste storage area at sub-contractor, SCI's workshop and the issue on biodiversity management at the SCI explosive storage facility. Three Site Inspection Reports (SIRs) were submitted to TD and ADM and all issues have been resolved by the end of Q4 2024.

In Q4 2024, a total of 19.56 m³ solid waste from NNP1 project sites and camps was disposed of at the NNP1 Project Landfill, an increase of 1.61 m³ compared with Q3 2024. The local contractor maintained routine waste collection and NNP1 landfill management throughout Q4 2024.

The environmental flow requirements have been monitored in accordance with the ESMMP-OP and the results show that the rate of water level increase due to dam operations (ramping-up) in a few cases did not comply with the requirements.

The concentration of dissolved oxygen (DO) at the surface level in R05 (Main Reservoir immediately upstream of the main dam) ranged between 5.4 mg/L and 8.2 mg/L. The monthly mean DO concentration at the intake level decreased from 3.1 mg/L in October 2024 to 2.1 mg/L in November 2024 and 1.6 mg/L in December 2024. The DO concentrations in Nam Chian and Nam Phouan were above 6 mg/L. The DO concentrations at the surface level in the Re-regulation Reservoir (R07) were between 2.1 and 5.6 mg/L. During combination of turbine and gate discharges in October 2024, DO concentration in Nam Ngiep downstream the Re-regulation Dam were greater than 6 mg/L (complied with the standard). However, during turbine discharge in November and December 2024, the DO levels in Nam Ngiep downstream for the first 13.2 km of the Re-regulation Dam were less than 6 mg/L.

The depth profile monitoring during the period indicates formation of oxyclines in the Main Reservoir at the monitored stations at varying depths.

There is no implementation progress from Bolikhamxay Watershed and Reservoir Protection Office (WRPO) in Q4 2024 as they are still waiting for the 2024 funds from the Forestry Protection Fund (FPF), Department of Forestry (DoF), Ministry of Agriculture and Forestry (MAF), although NNP1PC transferred funds to the FPF-DoF-MAF account on 17 July 2024.

In Q4 2024, the Xaysomboun WRPO has resumed the forest, Totally Protected Zone (TPZ), and reservoir patrolling under the approved AIP 2023. The approval meeting for the Fishery Co-management Plan and associated regulations was held in November 2024. The plan has been submitted to the Provincial Assembly Office and the XSB Provincial Governor for endorsement. It is expected that the plan will be disseminated by Q1 2025.

The construction of two reservoir checkpoints resumed on 6 December 2024 and construction is expected to be completed by March 2025. EMO is following up with Xaysomboun WRPO on staff deployment to these checkpoints. However, no timeline has been provided.

Bolikhamxay Biodiversity Offset Management Unit (BOMU) conducted the monthly patrolling and snare removal in Q4 2024. Improvement of the Community Conservation Agreement (CCA) is in progress. BSP-WCS, NNP1-EMO and relevant offices of Xaychamphone District completed a field visit to review and update the Participatory Land Use Plan (PLUP) of Sopkhone, Meungcham, and Phonmeung villages in Xaychamphone District. BOMU and Pu Mat National Park of Vietnam organized an exchange meeting to enhance their cooperation. The Bolikhamxay Provincial Assembly conducted an evaluation of the Nam Chouan-Nam Xang (NC-NX) regulations. The NC-NX AIP2025 preparation is in progress.

The fish species dominating the fish catch by weight in Q4 2024 include *Oreochromis niloticus* and four species group of *Poropuntius*, *Mastacembelus*, *Hampala*, and *Hypsibarbus* (including *Barbonymus gonionotus*) that are classified as Least Concern (LC) according to the IUCN Red List of Threatened Species and *Oreochromis niloticus* is an exotic species. The recorded catch of threatened species includes three species which are classified as Vulnerable species (VU): *Cirrhinus cirrhosus*, *Scaphognathops bandanensis*, and *Tor sinensis*.

1 INTRODUCTION

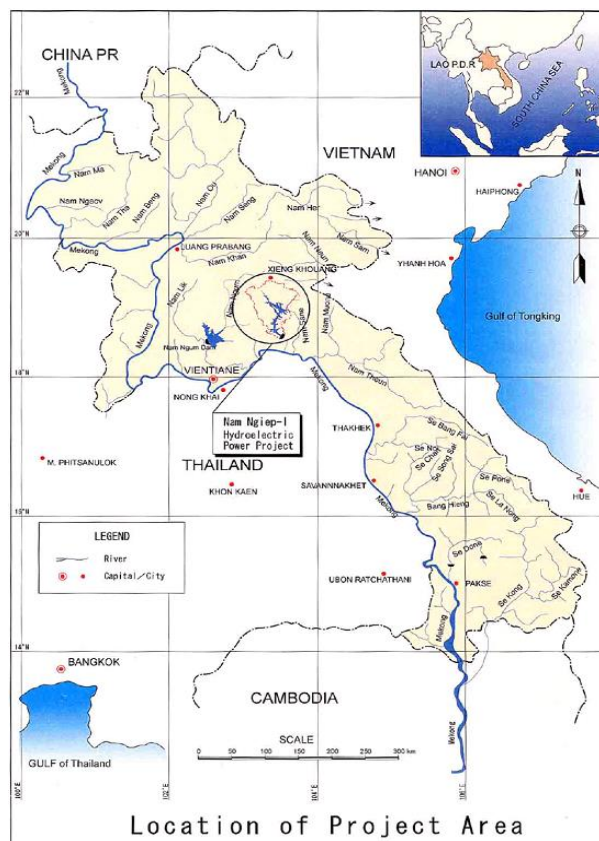
The Nam Ngiep originates in the mountains of Xiengkhouang Province, flowing through Khoun District into Thathom District of Xaysomboun Province, through Hom District and into Bolikhamxay District of Bolikhamxay Province. The Nam Ngiep meets the Mekong River just upstream from Pakxan in Bolikhamxay Province.

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 **Q1 2023**. 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.



2 ENVIRONMENTAL MANAGEMENT AND MONITORING

The environmental management and monitoring activities reported in this section document the implementation of the relevant sub-plans and programmes of the Environmental and Social Management and Monitoring Plan for the Operation Phase during Q4 2024.

2.1 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

The 2024 management review meeting was held on 12 November 2024 to report on the ISO14001:2015 internal audit findings and progress on addressing Opportunity of Improvement (OFIs) identified during the Surveillance Audit of 2024, and seek management's directives for enhancing the performance of the Environmental Management System (EMS). All divisions are committed to collaborating closely to address these identified observations and OFIs in preparation for the upcoming recertification audit in January 2025. The internal audit was conducted from 24 September to 9 October 2024, across 31 work functions. No non-conformities were raised, but 38 opportunities for improvement (OFIs) were identified, along with 20 recommendations. A summary of the internal audit findings is provided in **Table 2.1-1**, and the implementation progress for general observations and OFIs raised during the Surveillance Audit in February 2024 is shown in **Table 2.1-2**

Table 2.1-1: The Internal Audit's OFIs reported during the Management Review Meeting

No	OFI description	No. of Observations	Area of Observation
1	Documentation - DCC registration, updating procedures, records, and distribution	14	TD, ADM, HR, PCD, DCC, H&S, EMO
2	Emergency Preparedness - training, drills, records, equipment/kits	7	TD, ADM, H&S, PCD
3	Training needs and records	6	TD, EMO, ADM, H&S
4	Communication of NNP1 policies, SOPs, and relevant EMS documents to staff, contractors, GOL, and villagers	5	ADM, TD
5	Effluent discharge	3	OSOV2, Main Powerhouse
6	Waste management and environmental aspects	2	EMO, TD
7	Hygiene and sanitation	1	ADM, KGS (Canteen)

Table 2.1-2: The Surveillance Audit's OFIs reported during the Management Review Meeting

OFI	Description	Corrective Action
1	Posting the relevant hazard symbol on the chlorine tank.	Completed in April 2024.
2	Recording gas leak inspections of the LPG pipeline at the canteen, particularly at the joints.	Completed in May 2024. To be continued monthly.
3	Conducting inspections of the generators at OSOV1 and OSOV2.	Completed in April 2024. To be maintained annually.
4	Clearly recording inspections of the grounding system at the gas station to mitigate fire risks.	Completed in April 2024. To be continued annually.
5	Clearly recording the training evaluation methods and results.	Completed in April 2024. To be continued routinely.

During Q4 2024, activities related to ISO14001:2015 implementation continued. This includes the implementation of the four (04) Environmental Management Plans (EMPs). The timeframe of the EMPs is from August 2024 to July 2025. The four EMPs include EMP01: HSE awareness training for NNP1PC staff and contractors, EMP02: Reducing the paper consumption in NNP1 offices, EMP03: Recycling the HDPE plastic waste by producing four HDPE waste bins, and EMP04: Planting trees at selected rehabilitation areas.

The details of EMPs 2024 implementation are shown in **Table 2.1-3**.

TABLE 2.1-3: THE DETAILS OF EMPs 2024 IMPLEMENTATION

EMP No.	Activity Description	KPI	Evaluation Date	Implementation Progress
01/2024*	Providing HSE awareness training to NNP1PC staff and contractors	100% of new NNP1PC employees and contractors and 80% of existing NP1PC employees and contractors will be trained in health, safety, and environmental awareness August 2024 to July 2025	Aug 2024 – July 2025	Progress: 31% trained. Training is ongoing. Next review: Jan 2025.
02/2024*	Reducing the paper consumption in NNP1 offices	Total use of A4 paper for printing in the NNP1PC's offices (VTE, OSOV1, OSOV2) is reduced by 5% during August 2024 to July 2025 compared with the previous 12 months.	Sep 2024 - July 2025	Risk of non-achievement (25% increase). Monthly data collection ongoing. Next review: Jan 2025.
03/2024#	To make at least one new product (four HDPE waste bins) from the HDPE plastic waste within the implementation timeline from August 2024 to July 2025.	Collect and sort HDPE plastic waste to produce four waste bins from August 2024 to July 2025.	Sep 2024 - July 2025	Collection of HDPE bottle caps is ongoing. Progress to be reviewed Jan 2025.

EMP No.	Activity Description	KPI	Evaluation Date	Implementation Progress
04/2024*	Planting at least 200 trees at selected rehabilitation areas.	At least 50% of planted trees survive by July 2025.	Sep 2024 - July 2025	Current survival rate 72%: 144 out of 200 trees. Ongoing care activities. Next Progress will be review: February 2025.

*EMP_s implemented in 2023, continued in 2024 for further success

New EMP for implementation in 2024 and futures.

2.2 PROGRESS OF ENVIRONMENTAL MANAGEMENT SYSTEM

On 9 October 2024, HSE Induction Training was provided for 11 newcomers, including 1 EGAT&OM staff member and 10 security guards. A simple pre- and post-training assessment was applied, with questioning to ensure the trainees understood the key messages. A follow-up evaluation will be carried out to monitor HSE performance. The training will continue to ensure that 100% of new NNP1PC employees and contractors, as well as 80% of existing NP1PC employees and contractors are trained in health, safety and environmental to meet the objective of EMP:01/2024.



On 25 December 2024, monitoring and maintenance of planted trees at the project rehabilitation site were carried out indicating a 72% survival rate of a total 200 planted trees. This reflects a decrease from the previous assessment in October 2024, which recorded an 82% survival rate. To prevent further declines, watering will begin in January 2025 at a frequency of three times per week until first rainfall.



On 31 October 2024, a local contractor installed a fence to prevent livestock from damaging the trees. This fence is reusable and can be relocated to the next tree planting area once the trees in this location have matured.



2.3 CONTRACTOR SS-ESMMPs

In Q4 2024, one SSESMMMP for the sedimentation survey was submitted to the Environment Management Office (EMO) for review and approval. The aim is to gather accurate river cross section and hydrographic data for various applications, such as hydraulic modelling, for sedimentation survey, flood mapping, and river management for NamNgiep1 Hydropower project. The document includes some health, safety, and environmental management measures. However, key information on occupational health, safety, and environmental management is missing. The contractor has been requested to identify additional potential environmental and safety risks and propose appropriate management measures.

2.4 INSPECTION BY THE ENVIRONMENTAL MANAGEMENT UNIT (EMU)

On 13 December 2024, the Bolikhamxay PONRE and Bolikhan District EMU conducted a site visit to the NNP1PC project sites. The visit aimed to monitor the Environmental and social implementation progress conducted by Environmental and Social Division (ESD). The mission inspected the Main dam right bank excavation and quarry, rehabilitation sites, hazardous material and waste storage, camps and wastewater treatment systems.

During the wrap-up meeting, PONRE and EMU highlighted the key areas for improvement including implementing adequate measures at the main dam right bank excavation area to prevent rock and soil from entering the tailrace channel, ensuring the safe disposal of expired chemicals and hazardous waste, and continuing to monitor and report on soil erosion impacts along Nam Ngiep downstream. They also emphasized the importance of notifying provincial and district committees in advance of planned water releases during the rainy season. No significant concerns were raised about ongoing social management programs.



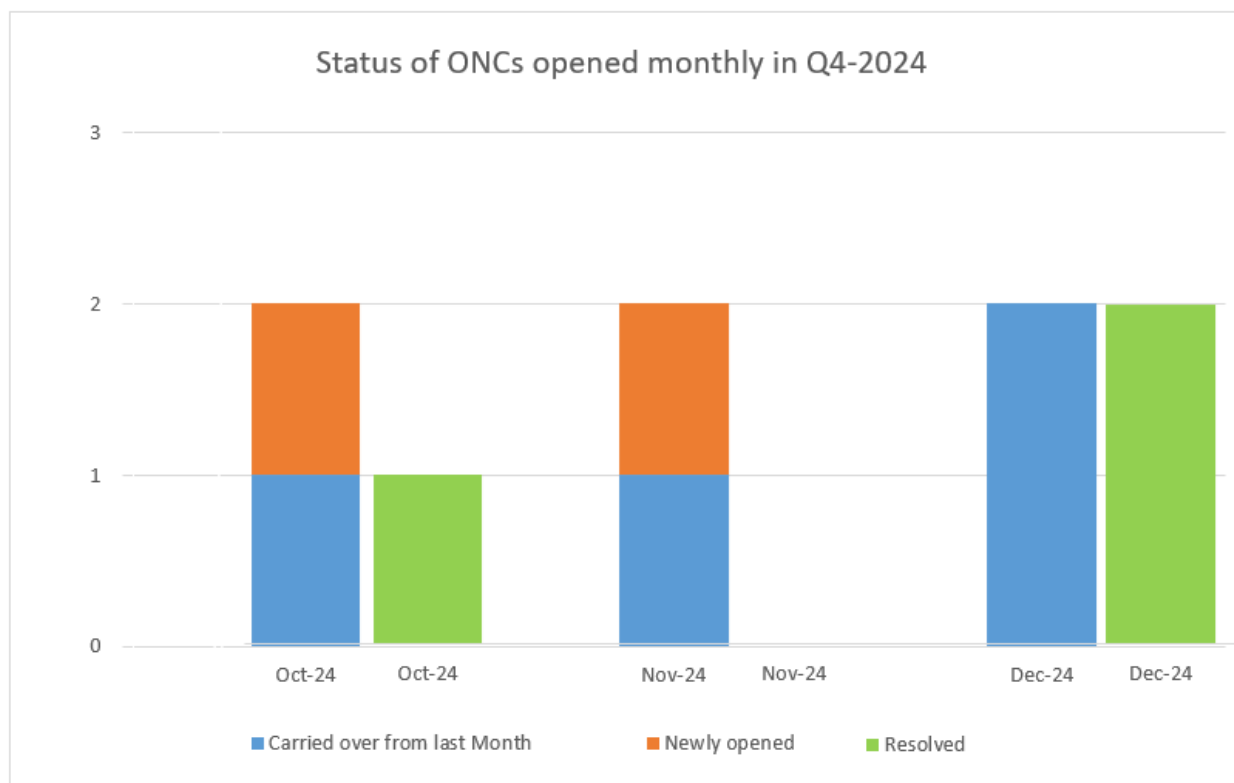
2.5 RESULTS OF COMPLIANCE INSPECTIONS AT CONSTRUCTION SITES

During Q4 2024, three joint monthly site inspections were conducted by EMO, ADM and Technical Division (TD) to follow up on the progress of corrective actions from previous and new findings. Three Site Inspection Reports (SIRs) were submitted to TD and ADM. During the joint site inspections, several issues were identified, including the lack of temporary toilet, waste bins, and proper roofing of the hazardous materials and waste storage area at sub-contractor, SCI's workshop and the issue on biodiversity management at SCI's explosive storage facility. However, the inspections confirmed that all issues have been resolved by end of Q4 2024.

The status of ONC and NCR reports is summarized in **Table 2.5-1** and **Figure 2.5-1**. The Site Inspection Results During Q4 2024 is presented in **Appendix 1**.

TABLE 2.5-1: STATUS OF ONCs AND NCRs REPORT DURING Q4 2024

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

FIGURE 2.5-1: STATUS OF ONCs DURING Q4 2024


2.6 SITE DECOMMISSIONING AND REHABILITATION

All 31 rehabilitated areas were inspected. No evidence of erosion or instability were observed at any of the inspected sites.

2.7 WASTE MANAGEMENT AT THE OPERATION SITES

2.7.1 Waste Management at NNP1 Project Sites

In Q4 2024, a total of 19.56 m³ solid waste from NNP1 project sites and camps was disposed of at the NNP1 Project Landfill, an increase of 1.61 m³ compared with Q3 2024. The local contractor maintained routine waste collection and NNP1 landfill management throughout Q4 2024. On 10 October 2024, the local contractor completed waste compaction and application of soil cover on the waste.



The amount of recyclable waste managed on site during Q4 2024 is shown in **Table 2.7-1**.

TABLE 2.7-1: AMOUNTS OF RECYCLABLE WASTE DURING Q4 2024

Source and Type of Recyclables		Unit	Carried Over from Q3 2024	Status in Q4 2024			
				Additions	Total (A)	Sold (B)	Remaining Amount (A - B)
Construction activity							
1	Scrap metal	kg	0	0	0	0	0
Sub-Total 1		kg	0	0	0	0	0
Operation camp							
2	Plastic bottle	kg	15	43	58	42	16
3	Aluminium Can	kg	N/A*	N/A	N/A*	N/A	N/A
4	Paper/Cardboard	kg	7	63	70	60	10
5	Glass	kg	54	88	142	105	37
6	Scrap metal	Kg	0	0	0	0	0
Sub-Total 2		kg	76	194	270	207	63
Grand Total (Sub-Total 1+2)		kg	76	194	270	207	63

*Please note that aluminium cans are collected and sold separately by housekeepers before storage so there is no accurate recorded quantity. The item is therefore marked Not-available (N/A).

2.7.2 Hazardous Waste Management

The amounts of hazardous waste and hazardous materials that were collected, stored and disposed of during Q4 2024 are shown in **TABLE 2.7-2**.

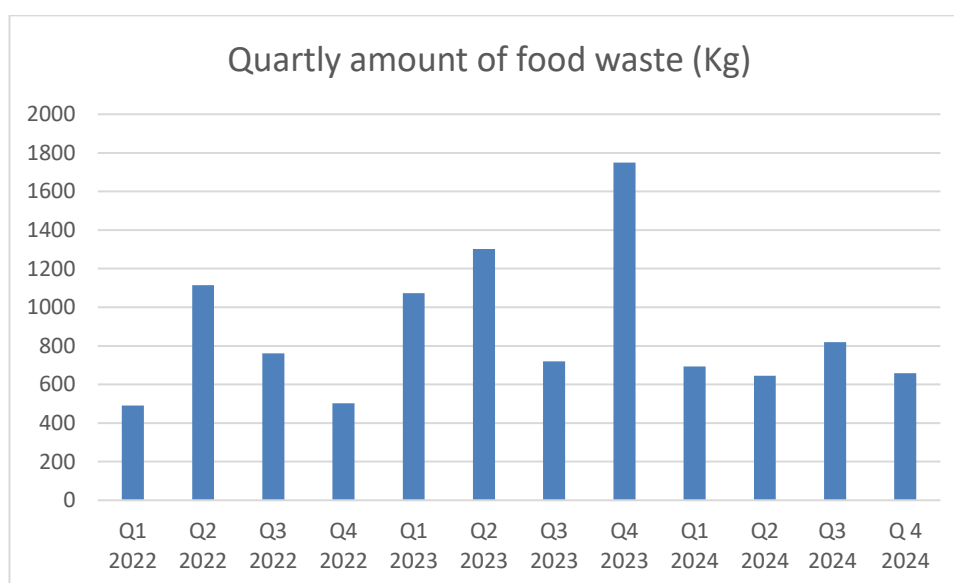
TABLE 2.7-2: HAZARDOUS MATERIAL AND HAZARDOUS WASTE RECORDED DURING Q4 2024

No.	Type of Hazardous Material	Unit	Total in Q4 2024	Used/ Disposed	Remaining
1	Diesel	Litre	15,004	11,517	3,487
2	Gasoline	Litre	2,406	1,940	466
3	Lubricant (Turbine oil)	Litre	31	0	31
4	Colour paint	Litre	39	0	39
5	Thinner	Litre	1	0	1
6	Grease oil	Litre	781	20	761
7	Gear Oil	Litre	24	6	18
8	Chlorine Liquid	Litre	250	175	75
9	HA Cut AF	Litre	3,925	0	3,925
10	HA Cut Cat AF	Litre	373	0	373
	Type of Hazardous Waste				
11	Used Oil (Hydraulic + Engine)	Litre	355	0	355
12	Used oil mixed with water	Litre	0	0	0

No.	Type of Hazardous Material	Unit	Total in Q4 2024	Used/ Disposed	Remaining
13	Empty used oil drum/container (drum 200L)	Unit	53	0	53
14	Use Oil Filter	Unit	31	0	31
15	Contaminated soil, sawdust and textile material	m ³	1.2	0	1.2
16	Used tyre	Drum	5	0	5
17	Empty used chemical drum/container (drum 20L)	Unit	153	0	153
18	Lead acid batteries	Unit	6	0	6
19	Empty paint and spray cans	Can	150	0	150
20	Halogen/fluorescent bulbs	Unit	509	0	509
21	Empty cartridge (Ink)	Piece	133	0	133
22	Clinic Waste	Kg	4	0	4
23	Expired Chlorine Powder	Kg	65	0	65

2.7.3 Animal Fodder (Pig Feed) Collection Programme

During Q4 2024, local villagers collected 658.4 kg of food waste from the Owner's Site Office and Village (OSOVI's canteen) for feeding their animals. Additionally, food waste management was conducted by Khammany General Service (KGS) routinely.



2.7.4 Community Solid Waste Management and Recycling Programme

NNP1-EMO has collaborated with Bolikhan EMU on the handover of the Houay Soup Landfill and community waste management. It was agreed that villagers from Thahuea, Hat Gniun, and Phouhomxay could use NNP1PC's landfill, with NNP1PC committing to repair the Houay Soup landfill for shared use once NNP1PC's landfill is full. This agreement was reported to the Department of Natural Resources and Environment Inspection, Ministry of Natural Resources and Environment (DNREI-MONRE), which raised no objections. Both EMU and EMO will continue to guide communities on proper waste disposal at the NNP1PC landfill.

The local waste collection contractor confirmed that a small portion of waste from Hat Gniun and Phouhomxay (PHX) was disposed of in July and October 2024. However, the quantities of project waste and community waste were combined in the reporting. To address this, additional community consultations with the three villages are planned for February 2025 and the waste inventories will be enhanced to quantify the community waste disposal separately.

2.8 RESERVOIR OPERATIONS

2.8.1 Main Reservoir

The water level in the main reservoir and inflow to the since January 2023 are displayed in the graphs in **Figure 2.8-1** and **Figure 2.8-2**.

During Q4 2024, the mean daily inflow to the main reservoir was 116 m³/s. The minimum daily inflow was 45 m³/s, maximum daily inflow was recorded at 446 m³/s, and 25th percentile of 69 m³/s and 75th percentile of 153 m³/s. As indicated in **Figure 2.8-1**, the inflow during Q4 2024 was lower compared to the same period in 2023.

The water level in the main reservoir decreased with 4.40 m from El. 319.97 m asl (01 October 2024) to 315.57 m asl (31 December 2024).

FIGURE 2.8-1: INFLOW TO THE MAIN RESERVOIR

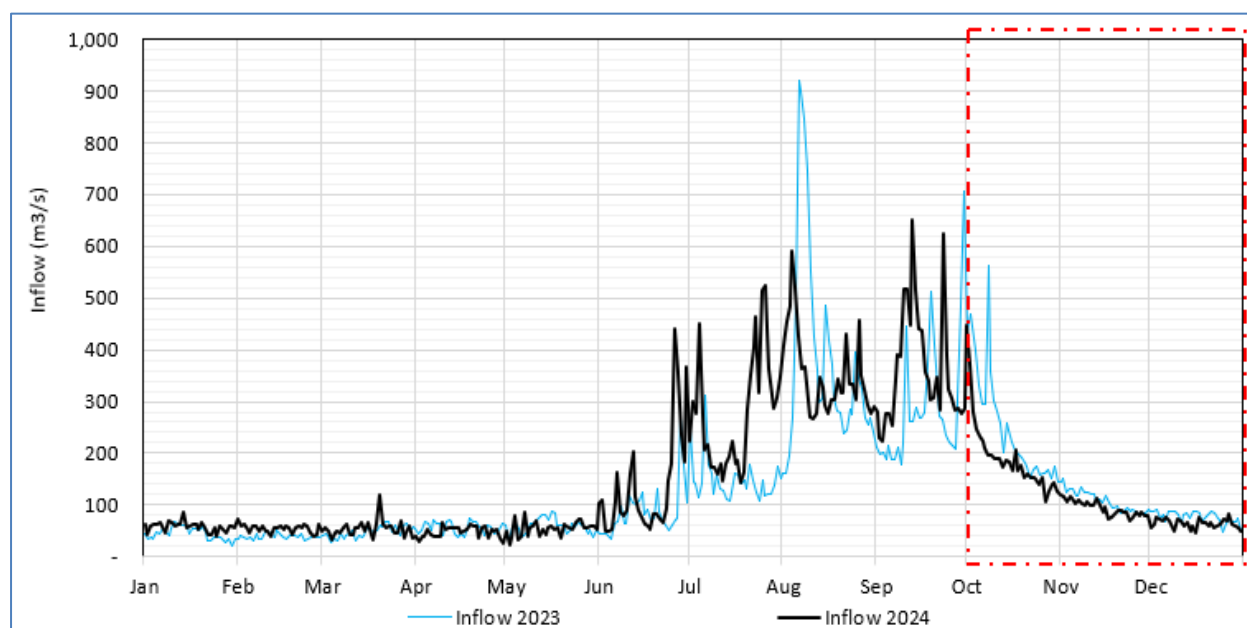
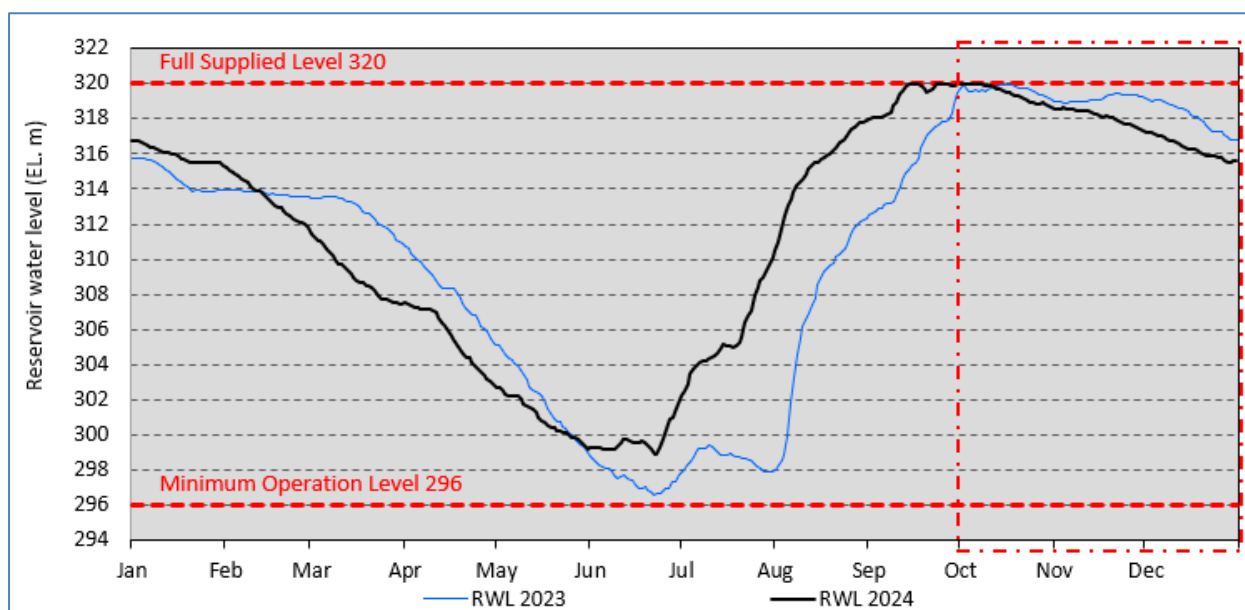


FIGURE 2.8-2: WATER LEVEL OF THE MAIN RESERVOIR

2.8.2 Environmental Flow Requirements 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), except with respect to thalweg water depth monitoring.

The results of the EFR compliance monitoring during Q4 2024 are summarized in **Table 2.8-1**.

TABLE 2.8-1: SUMMARY OF EFRs COMPLIANCE MONITORING IN Q4 2024

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)	The Q4 2024 monthly thalweg monitoring missions only included monitoring of navigation difficulties and not water depth measurements, because the discharge from the re-regulation dam exceeded 50 m³/s at the time of the missions. The results of previous monitoring missions, as also confirmed by the LTA, have documented that when the discharge is 30 m³/s or greater, the water depth requirements are met and there are no problems with navigating the river. Furthermore, in Q4 2024, at the beginning of the dry season, NNP1PC conducted interviews with inhabitants

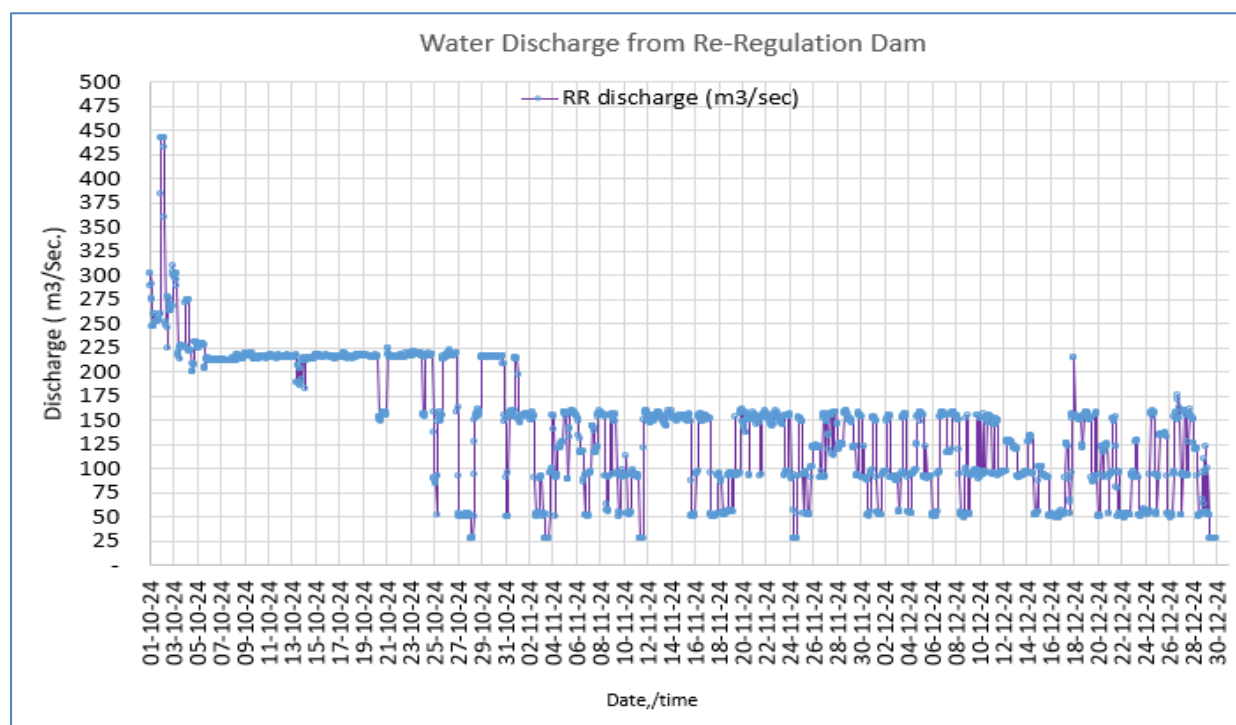
No	EFRs in the Downstream of the Re-regulation dam	EFRs compliance
		who use boats to gather and assess any complaints about boat navigation difficulties, there were no complaints from inhabitants and no damage observed. NNP1PC has consulted with the Environmental and social specialist who recommended that revisions to the monitoring programme should be made as part of ESMMP-OP update which will be commenced from Q4 2024 to Q1 2025
3	Maximum rate of change (both rise and fall, separately) in stage of 0.6 m per hour	There were four instances of non-compliance for 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)	Full compliance for 24-hour fluctuations
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)	There was an instance of non-compliance for 7-day fluctuations

2.8.2.1 Minimum Flow Requirements

The discharge monitoring data for the re-regulation dam during Q4 2024 indicates that the minimum flow requirement of 27 m³/s has been met at all times. The Re-regulation Dam discharge graph can be found in **Figure 2.8-3**.

During Q4 2024, the mean discharge from the re-regulation dam was about 212 m³/s in October 2024 and about 118 m³/s and 103 m³/s in November and December 2024 respectively.

The changes in the discharge from the re-regulation dam were informed in advance to the RMU and to the heads of the downstream villages, who then announced the changes to the communities over the village speaker systems. There were no complaints related to the flow discharges or fluctuation levels downstream the Re-regulation dam during the reporting period.

FIGURE 2.8-3: DISCHARGE FROM THE RE-REGULATION DAM DURING Q4 2024

2.8.2.2 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 2.8-4**. 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 (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 re-regulation dam).

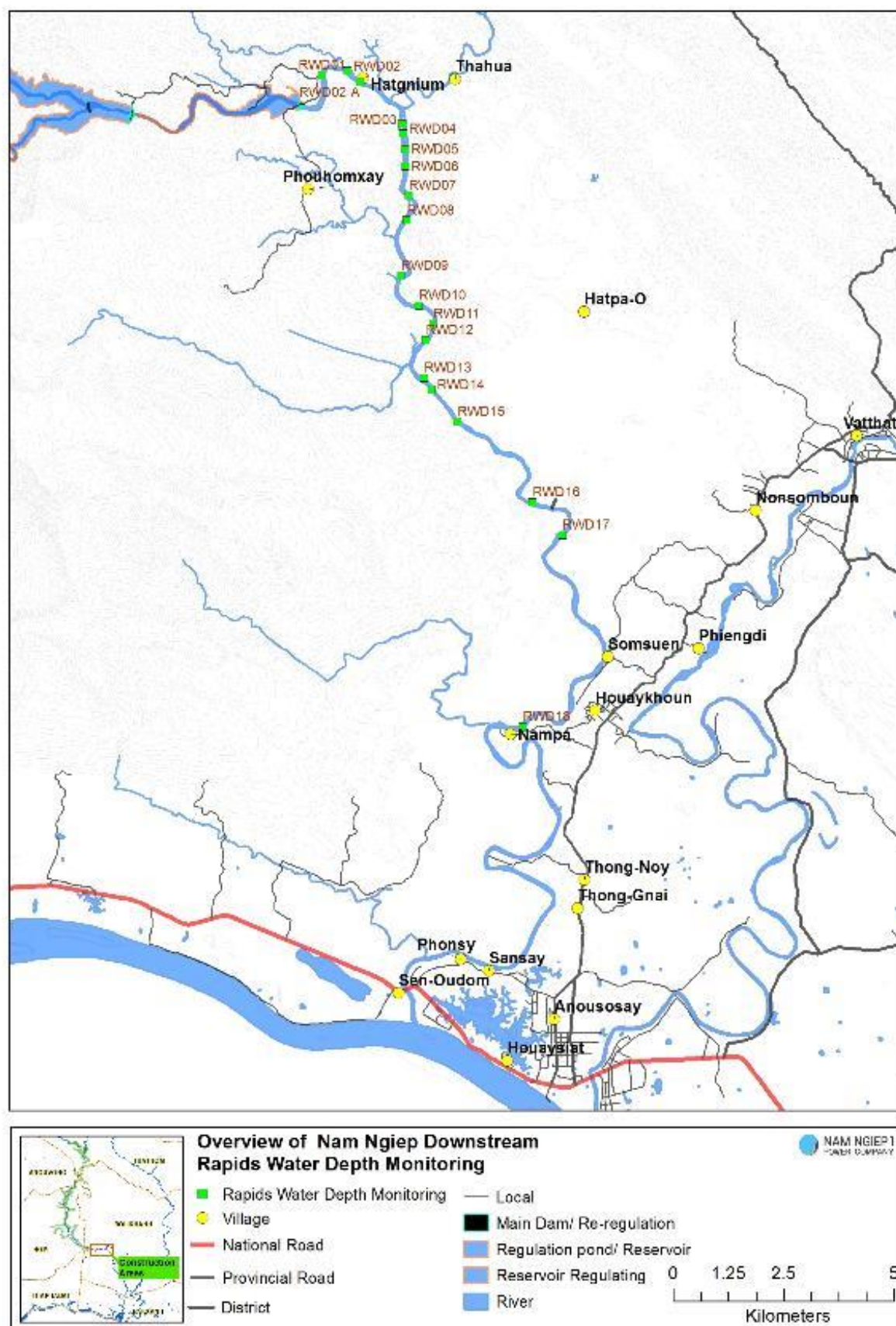
Starting in December 2020, the water depths have been measured across the river channel where visual observations or boat navigation indicate shallow waters to ensure that the measurements represent the river thalweg.

According to the recommendations by the Lenders' Technical Advisor (LTA) during the virtual site visit on 21 to 26 November 2021, NNP1PC has continued to monitor the situation at the critical sites under conditions with discharge of less than 30 m³/s for detecting any navigation problems and also monitor whether any complaints have been raised to consider how to solve the problems, if any. The results of these monitoring missions have documented that when the discharge is 30 m³/s or greater, the water depth requirements are met and there are no problems with navigating the river.

NNP1PC carried out three boat monitoring missions in Q4 2024, however, as the discharge exceeded 50 m³/s on all three missions, the thalweg water depths were not measured. There were no boat navigation difficulties during the missions.

NNP1PC has consulted with the Environmental and social specialist who recommended that revisions to the monitoring programme should be made as part of ESMMP-OP update which will be commenced from Q4 2024 to Q1 2025.

FIGURE 2.8-4: LOCATION MAP OF RIVER DEPTH MONITORING POINTS



2.8.2.3 Stage Height Fluctuations

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

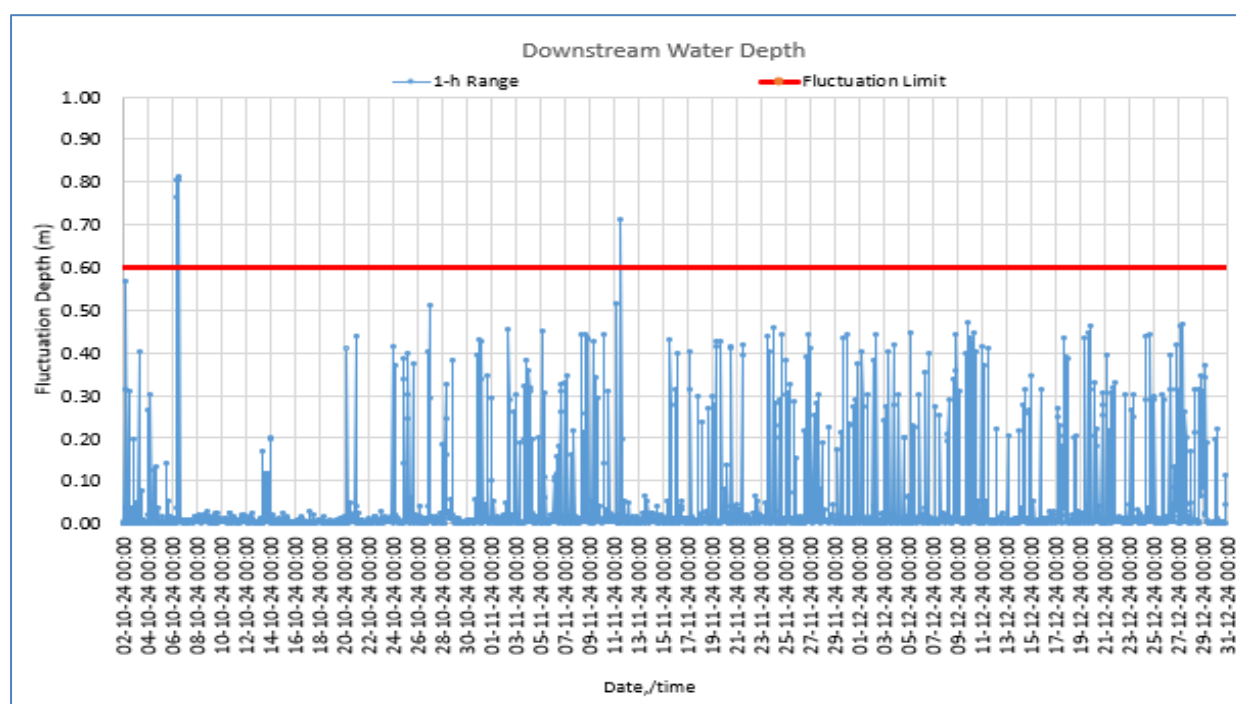
1. A requirement on the rate of change which is set at a maximum of 0.6 m per hour (calculated from the hourly water level recordings).
2. Requirements on the range in fluctuations over 24-hour periods and 7-day periods respectively, which is set at a maximum of 1.7 m for both periods. In other words,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

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 requirements 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 Q4 2024, the maximum allowed rate of change of 0.6 m over 1-hour was complied with for all hourly periods, except on 06 October 2024 where there were three instances of exceedances and on 11 November 2024 where there was one instance of exceedance. As of now, no complaints have been received, and no damage has been observed. The results are presented in **Figure 2.8-5**.

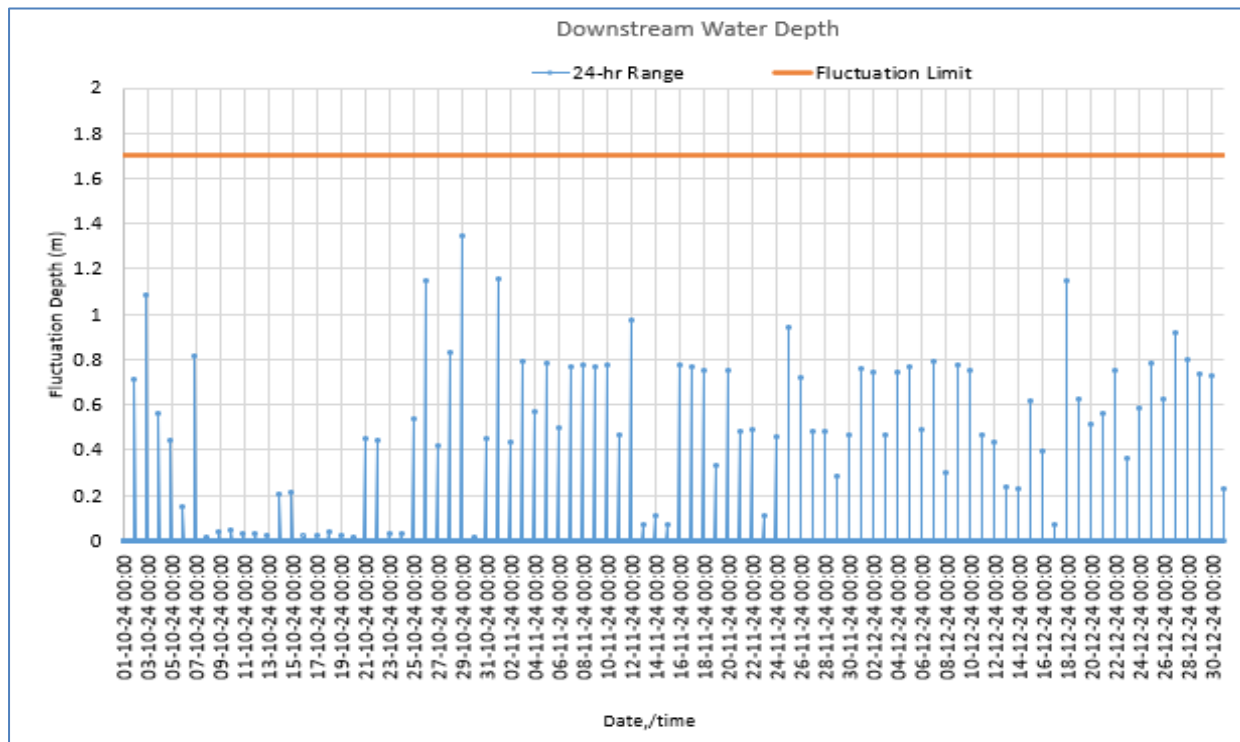
FIGURE 2.8-5: HOURLY STAGE HEIGHT FLUCTUATIONS DURING Q4 2024



During Q4 2024, the maximum allowed difference in stage height of 1.7 m over 24-hour was complied with for all 24-hour periods (00:00 – 23:59).

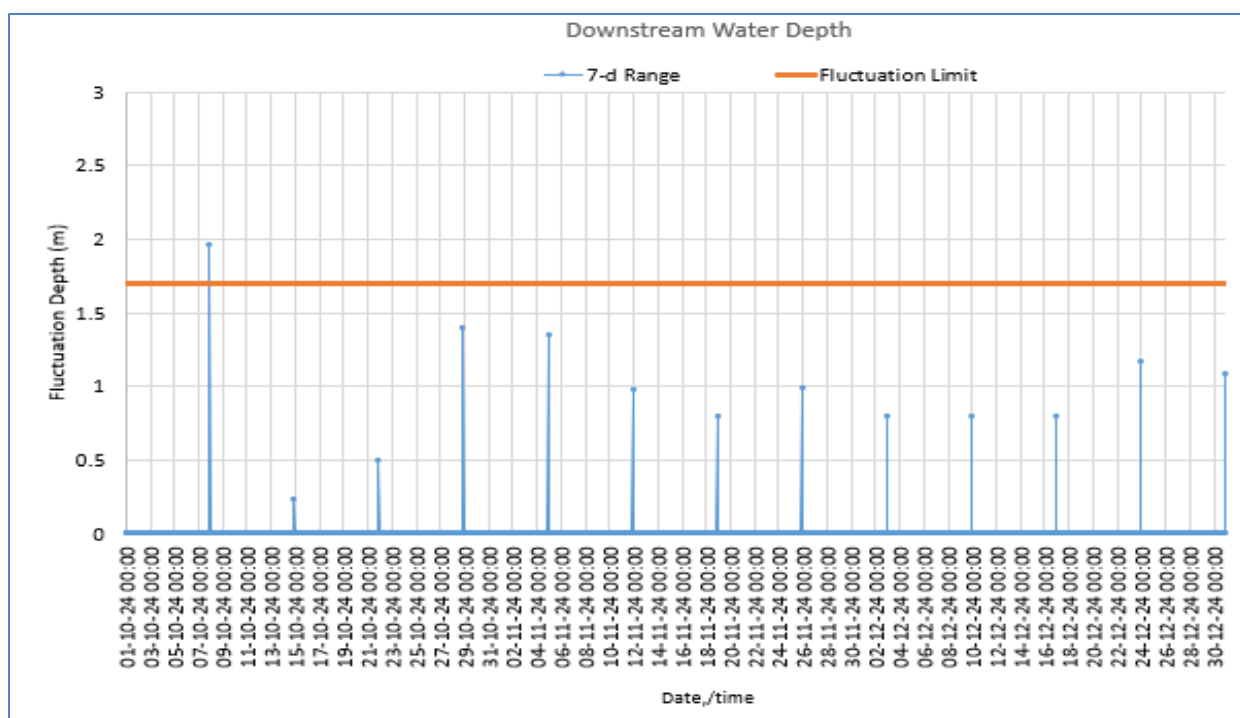
The results of the monitoring are presented in **Figure 2.8-6**.

FIGURE 2.8-6: 24-HOUR STAGE HEIGHT DIFFERENCE (M) DURING Q4 2024



During Q4 2024, the maximum difference in stage height of 1.7 m over 7-days was complied with for all 7-day periods, except one 7-days period on 07 October 2024. The results are presented in **Figure 2.8-7**.

FIGURE 2.8-7: 7-DAY STAGE HEIGHT DIFFERENCE (M) DURING Q4 2024



2.9 WATER QUALITY MONITORING

2.9.1 Surface Water (River) and Depth Profile Water Quality

Descriptions of each monitoring station, surface water and depth profile water quality monitoring parameters, and the location of sampling map can be found in **Appendix 3** and all surface water quality data for Q4 2024 are listed in **Appendix 5-1**.

Dissolved Oxygen (DO)

The results of DO measurements for the station immediately upstream of the main dam (R05 – intake at 276 m asl.) and immediately downstream of the re-regulation dam (NNG05) are presented in **Figure 2.9-1**, the DO long profile measurement as timeseries are presented in **Figure 2.9-2**, and the full set of DO surface water quality data are shown in **Table 2.9-1**.

The water temperature and DO depth profiles in the main reservoir at R05 during Q4 2023, Q3 2024 and Q4 2024 are presented in **Figure 2.9-4** to **Figure 2.9-6**.

FIGURE 2.9-1: DISSOLVED OXYGEN IMMEDIATELY UPSTREAM AND DOWNSTREAM OF THE MAIN DAM

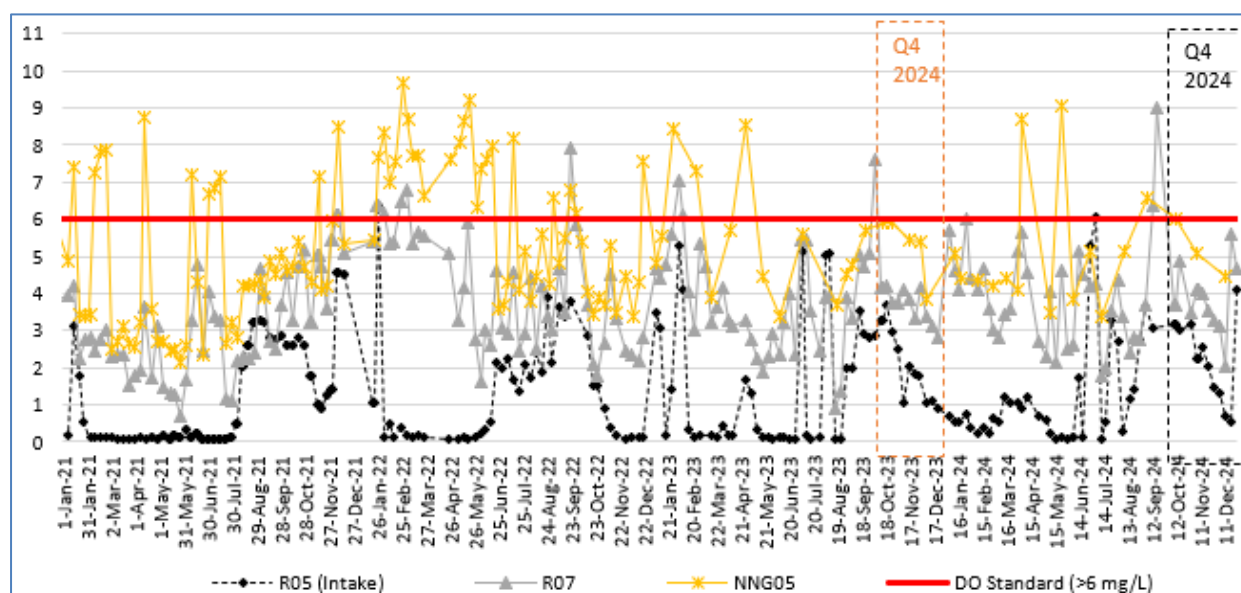
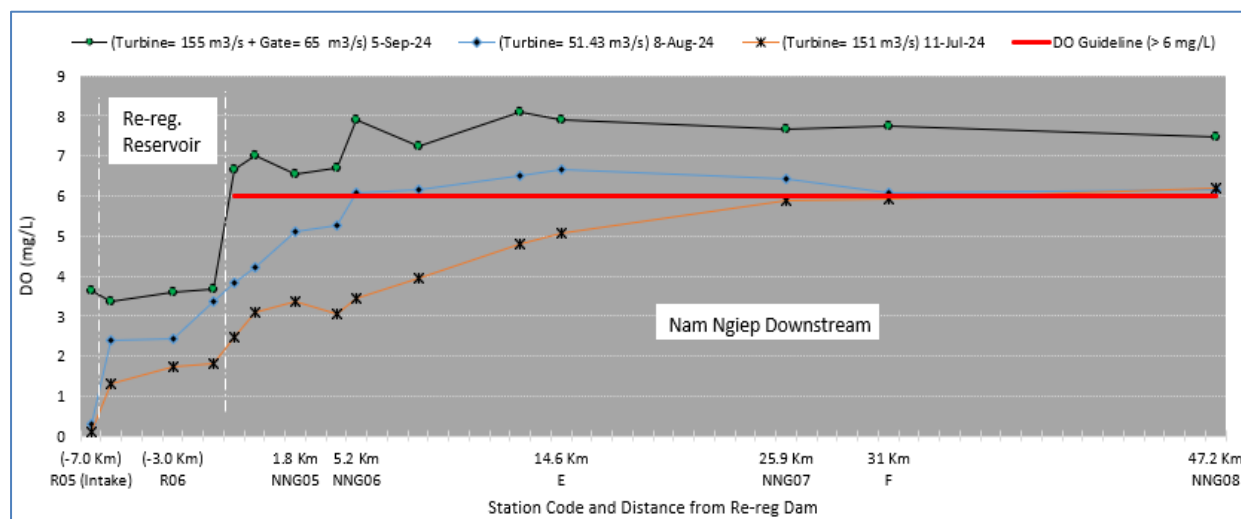
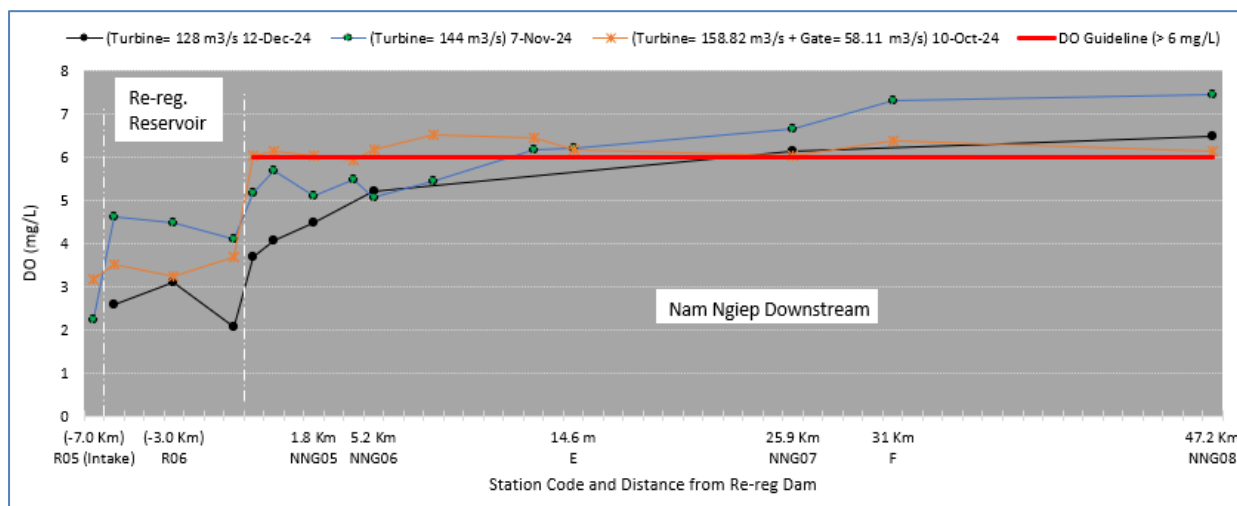


FIGURE 2.9-2: DISSOLVED OXYGEN LONG PROFILE MEASUREMENT FROM IMMEDIATELY UPSTREAM THE MAIN DAM TO LOWER NAM NGIEP (Q3 2024 AND Q4 2024)





Main Reservoir

Figure 2.9-6 and **Figure 2.9-7** present the DO and water temperature depth profile timeseries in the Main Reservoir (R04 and R05) from September 2018 to December 2024, the graphs clearly show seasonal variations in water temperatures and a deepening of the thermocline during periods with cooler water leading to a corresponding deepening of the oxycline.

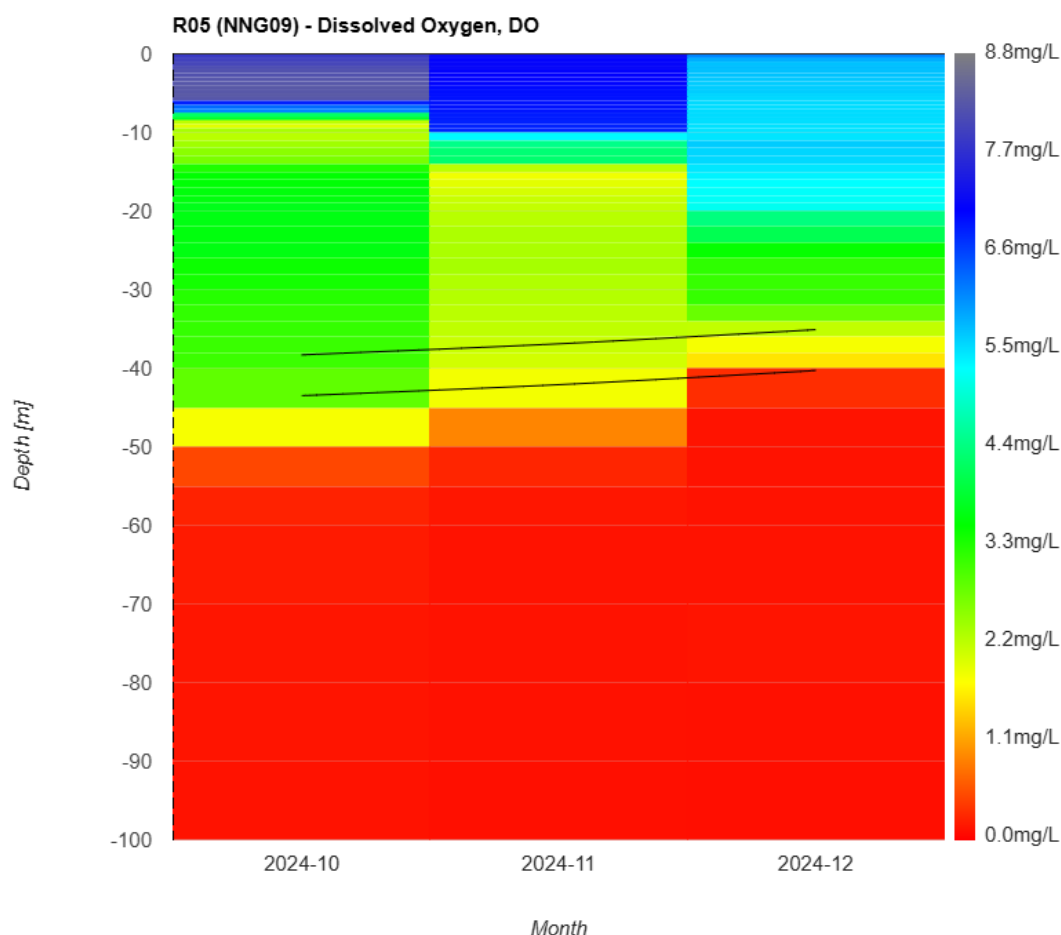
The depth profile monitoring during Q4 2024 indicates formation of thermoclines and oxyclines in the main reservoir at the monitored stations at different depths.

At R05, when comparing Q4 2024 with Q4 2023, the thermocline and oxycline show similar patterns except for December, because of the lower water temperature in December 2024 compared to December 2023.

Figure 2.9-5 shows the DO and water temperature depth profiles for Q4 2023, Q3 2024 and Q4 2024 at R05. The profiles for Q3 2024 and Q4 2024 show decreasing water temperatures, formation of thermocline at about 7.0 m - 8.0 m below surface (October 2024) and formation of an oxycline occurred at 6.5 m – 26 m depths. The profiles for Q4 2024 indicate that oxygen depletion (about 2 mg/L DO) is found at about 55 m below surface in October 2024 gradually decreasing to a depth of about 36 m in December 2024. Compared to Q4 2023, there are no obvious improvements in the DO levels.

The monthly mean DO concentration at the intake level decreased from 3.1 mg/L in October 2024, to 2.1 mg/L in November 2024 and 1.6 mg/L in December 2024. Anoxic levels were found at decreasing depths from about 55 m in October 2024 (about 15 m below the intake sill) to 50 m in November 2024 (about 10 m below the intake sill) and to a depth of about 45 m in December 2024 (about 5 m below the intake sill), with a peak in DO of 2 mg/L to 3 mg/L at about 45 m depth followed by a drop in DO down to anoxic levels at 55 m depth (about 15 m below the intake sill) (see **Figure 2.9-3**).

The DO concentrations at R03 and R04 showed a similar pattern to R05.

FIGURE 2.9-3 MONTHLY MEAN CONCENTRATIONS OF DISSOLVED OXYGEN IN R05

At R02, during Q4 2024, DO concentrations varied between 3.1 mg/L and 9.1 mg/L with an average of 6.7 mg/L in the upper 6.0 m and at depths from 6.5 m to about 36 m below surface the DO varied between 0.1 mg/L and 7.2 mg/L. Anoxic conditions were found at the depths between 8.0 m and 12 m during November 2024.

At R01, the mean DO concentration throughout the quarter was about 7.9 mg/L over the entire water column with no measurements below 5.6 mg/L.

Re-regulation Reservoir (R06 and R07)

The depth profiles at R06 and R07 in the Re-regulation Reservoir showed no indications of a thermocline, because the Re-regulation Reservoir behaves more like a river than a lake.

The mean monthly DO concentrations at R06 over the entire water column increased from 3.1 mg/L in October, 3.5 mg/L in November to 3.7 mg/L in December 2024. A similar pattern was found at R07. The DO concentrations in R06 and R07 are likely linked to the DO concentrations at the intake level in the main reservoir. It should be noted that the actual flow patterns and movements of water from R05 to the intake is not known and is likely rather complex with circulation patterns or other complex water movements near the intake, which adds uncertainties to correlating water quality data at or near the intake depth at R05 in the main reservoir with water quality data in the Re-regulation Reservoir.

Nam Ngiep Upstream and Tributaries

The Nam Ngiep Upstream station, NNG01, and the station in Nam Chian (NCH01) a left bank tributary at the upper part of the reservoir had DO concentrations above 6 mg/L during Q4 2024.

Downstream Stations

During Q4 2024, a total of three monitoring missions were conducted. All three monitoring missions were undertaken during discharges greater than 50 m³/s (greater than minimum environmental flow requirement).

As indicated in **Figure 2.9-2**, during combination of turbine and gate discharges in October 2024, the DO concentration in all Nam Ngiep downstream stations were about 6 mg/L and complied with the Standard. However, periods with only turbine discharge (November and December 2024) resulted in DO concentrations varying between 3 mg/L and 5 mg/L over the first 8.3 km downstream the re-regulation dam and then gradually increasing to close to 6 mg/L (the National Surface Water Quality Standard) near the confluence with the Mekong River.

No dead fish was observed in Nam Ngiep downstream during Q4 2024.

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.

FIGURE 2.9-4: MAIN RESERVOIR DISSOLVED OXYGEN AT THE END OF Q4 2024

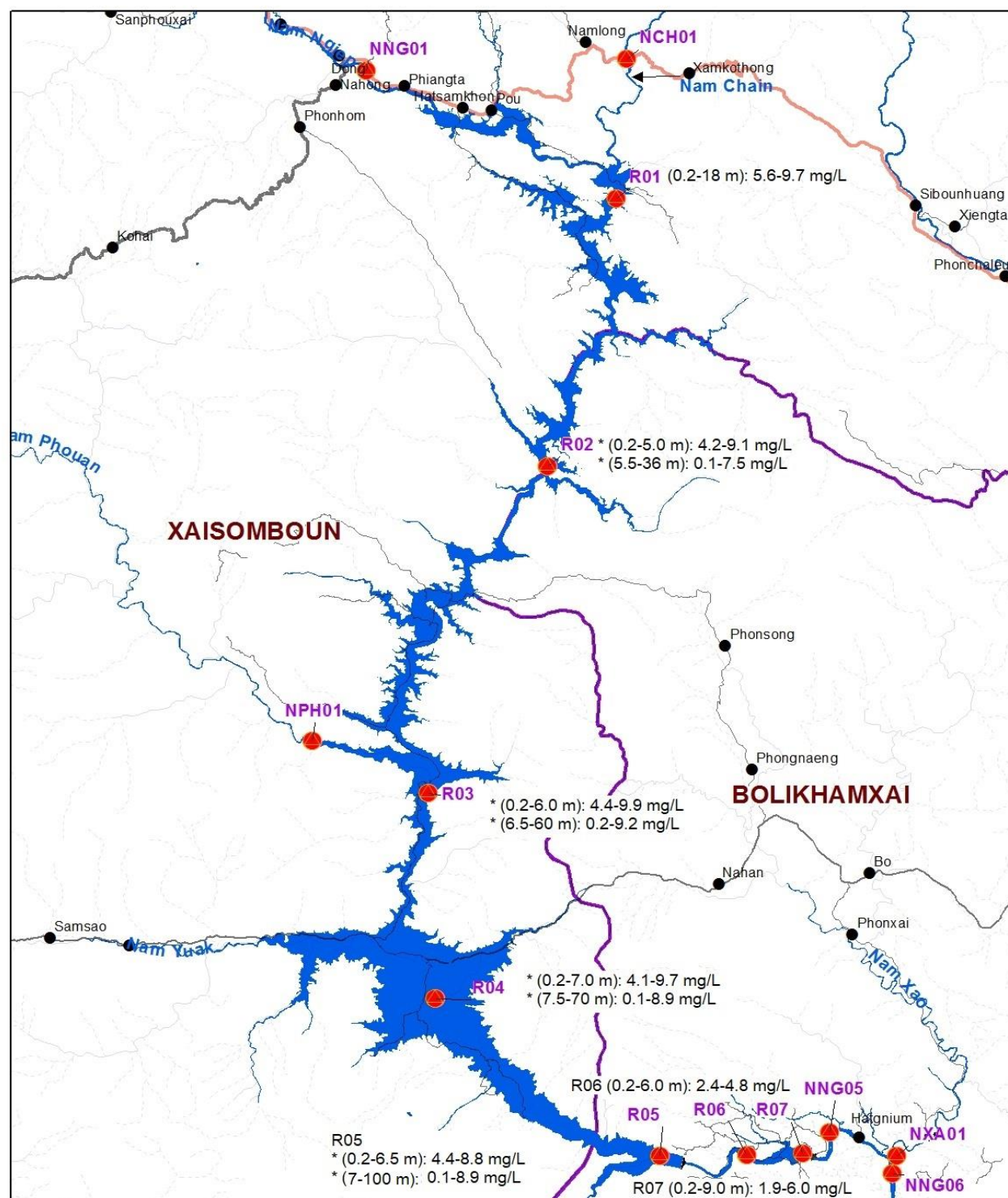


FIGURE 2.9-5: WATER TEMPERATURE AND DISSOLVED OXYGEN – DEPTH PROFILES IN THE MAIN RESERVOIR IMMEDIATELY UPSTREAM OF THE MAIN DAM (R05)

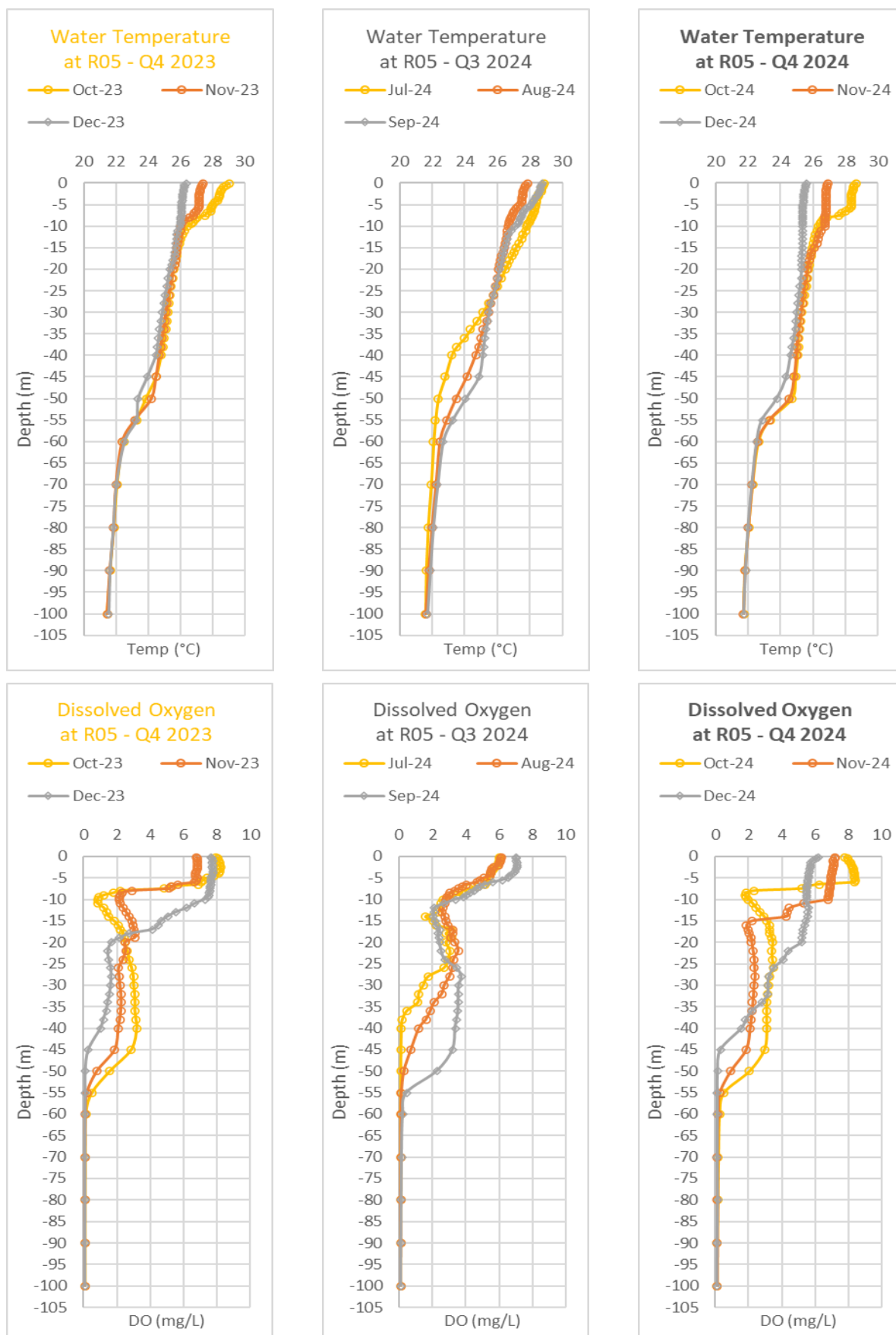


FIGURE 2.9-6: WATER TEMPERATURE AND DO DEPTH PROFILES IN THE MAIN RESERVOIR (R04 - R05), WITH POSITION OF INTAKE AT THE ACTUAL WATER LEVEL DURING SEPTEMBER 2018 – DECEMBER 2024

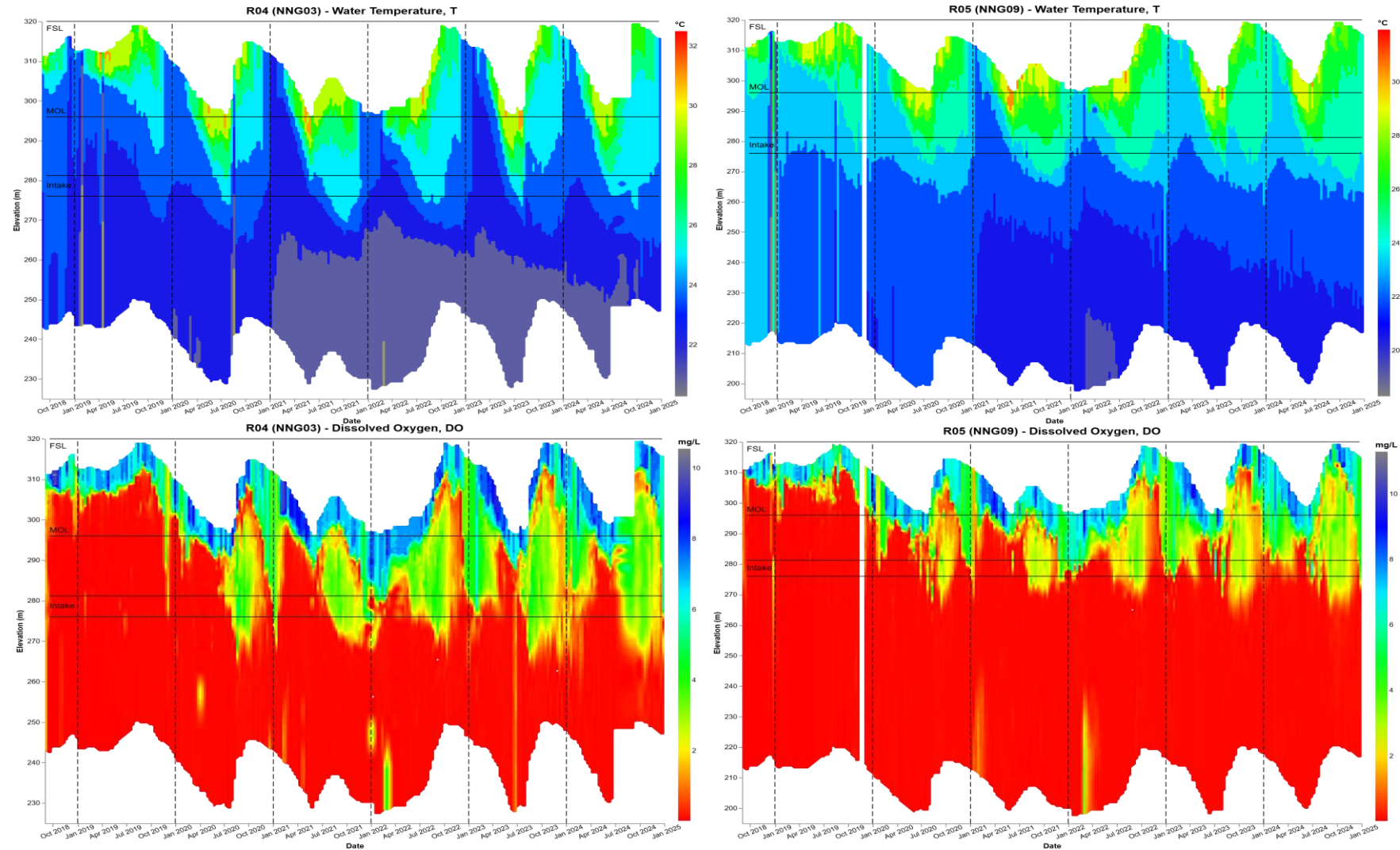


FIGURE 2.9-7: THE STRAIGHT-LINE GRAPH OF MONTHLY AVERAGED DO AND WATER TEMPERATURE AT R04 AND R05

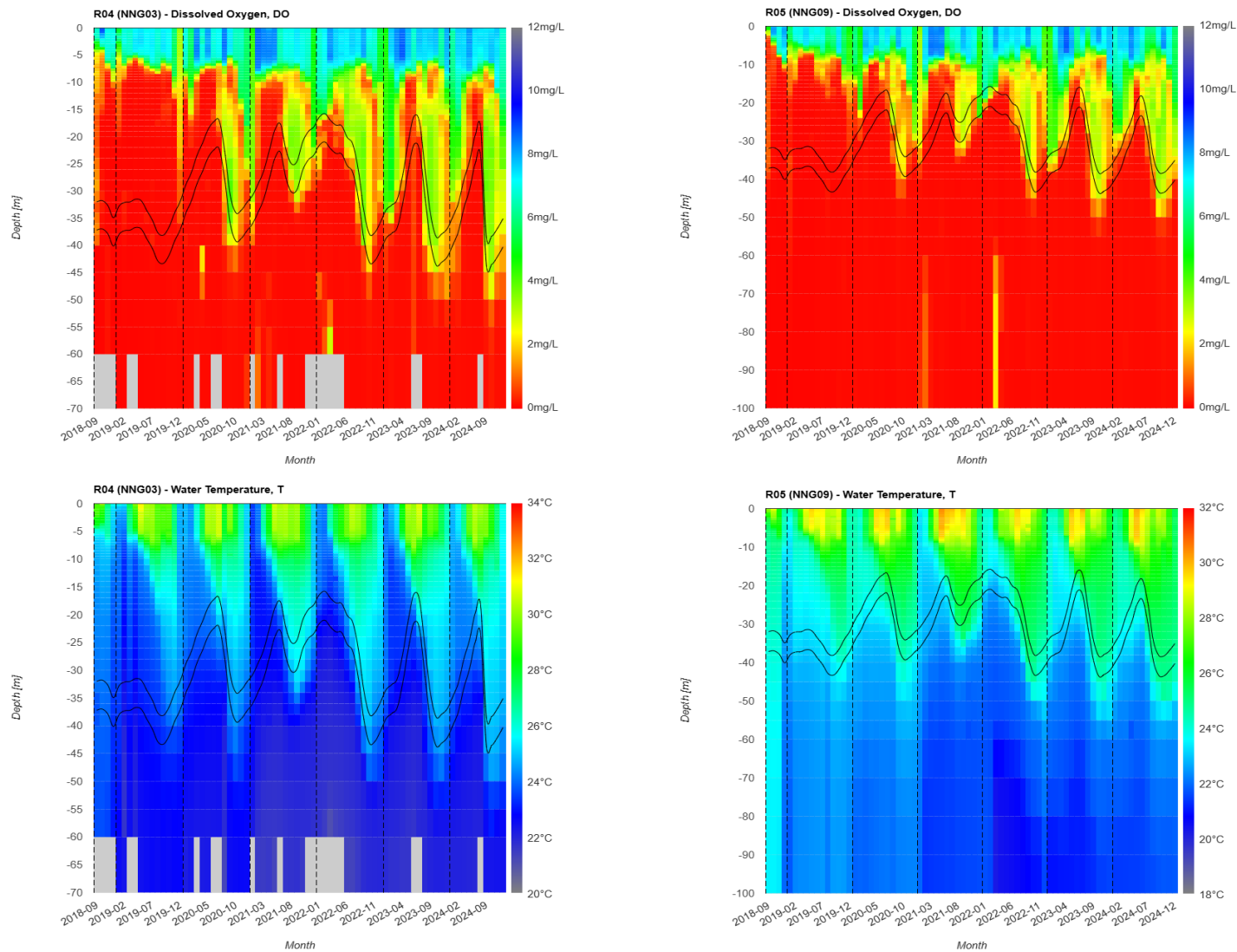


TABLE 2.9-1: DO (MG/L) RESULTS OF SURFACE WATER IN MAIN RESERVOIR, DO (MG/L) RESULTS OF R05 AT INTAKE DEPTH, RE-REGULATION RESERVOIR, NAM NGIEP AND ITS MAIN TRIBUTARIES MONITORED IN Q4 2024**(NATIONAL SURFACE WATER QUALITY STANDARD FOR DISSOLVED OXYGEN: ≥ 6 MG/L)**

Station Code	NNG01	R01	R02	R03	R04	R05 Intake	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
1-Oct-24	7.73													8.43			
8-Oct-24		8.99	8.52	7.94													
9-Oct-24					7.25	3.17	8.19	3.24	3.69								
10-Oct-24										6.01	6.16	6.04	6.13			7.03	6.9
15-Oct-24		7.88	7.51	7.01	7.55												
16-Oct-24						3.02	7.41	3.44	4.89								
30-Oct-24		7.69	6.76	7.63	7.2												
31-Oct-24						3.15	7.68	3.2	3.5								
4-Nov-24	8.27													8.51			
5-Nov-24		8.3	7.36	7.69													
7-Nov-24										5.1	5.05	6.65	7.45			7.5	6.79
8-Nov-24					6.2	2.24	6.39	4.48	4.11								
13-Nov-24		9.47	8.5	9.77													
14-Nov-24						2.57	8.15	4.42	4.02								
20-Nov-24						2.03	7.37	3.37	3.52								
21-Nov-24		7.67	6.14	7.46	7.44												
26-Nov-24		7.5	6.66	8.11	7.47												
27-Nov-24						1.47	6.76	2.93	3.28								

Station Code	NNG01	R01	R02	R03	R04	R05 Intake	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
4-Dec-24		8.83	6.83	8.08	7.75												
5-Dec-24						1.3	6.33	3.24	3.1								
9-Dec-24	7.9													8.71			
10-Dec-24		9.64	8.18	9.13											10.48		
11-Dec-24					7.43	0.7	6.59										
12-Dec-24								3.1	2.05	4.47	5.19	6.14	6.49			7.36	6.76
17-Dec-24		6.13	5.22	5.2	5.83												
18-Dec-24						0.54	5.42	4.26	5.62								
24-Dec-24		7.7	6.05	6.18	6.51												
25-Dec-24						4.08	6.48	4.83	4.67								

Ammonia Nitrogen

In Q4 2024, Ammonia Nitrogen complied with the National Surface Water Quality Standard (<0.2 mg/L) in all monitored stations.

TABLE 2.9-2: AMMONIA NITROGEN (MG/L) RESULTS FOR THE SURFACE WATER IN NAM NGIEP AND ITS MAIN TRIBUTARIES MONITORED IN Q4 2024

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

Station Code	NN G01	R01	R02	R03	R04	R05	R06	R07	NN G05	NN G06	NN G07	NN G08	NC H01	NP H01	NX A01	NHS 01
1-Oct-24	<0.1												<0.1			
8-Oct-24		<0.1		<0.1												
9-Oct-24					<0.1	<0.1										
5-Nov-24		<0.1		<0.1												
8-Nov-24					<0.1	<0.1										
9-Dec-24	<0.1												<0.1			
10-Dec-24		<0.1		<0.1										<0.1		
11-Dec-24					<0.1	<0.1										

Biochemical Oxygen Demand (BOD₅)

Since 2014, the Biochemical Oxygen Demand (BOD₅) values in the Nam Ngiep River and its tributaries have generally been below the detection limit (< 1 mg/L). The results for Q4 2024 indicate that the BOD₅ levels are in compliance with the standard at all stations.

In addition, 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.

TABLE 2.9-3: BOD_5 (MG/L) RESULTS FOR THE SURFACE WATER IN NAM NGIEP AND ITS MAIN TRIBUTARIES MONITORED IN Q4 2024**(NATIONAL SURFACE WATER QUALITY STANDARD FOR BOD_5 : <1.5 MG/L)**

Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
1-Oct-24	1.11												<1			
8-Oct-24		<1		<1												
8-Oct-24 Bottom				<1												
9-Oct-24					<1	<1	<1	<1								
9-Oct-24 Bottom					<1	<1										
10-Oct-24									<1	<1	<1	<1			<1	<1
4-Nov-24	<1												<1			
5-Nov-24		<1		<1												
5-Nov-24 Bottom				<1												
7-Nov-24									<1	<1	<1	<1			<1	<1
8-Nov-24					<1	<1	<1	<1								
8-Nov-24 Bottom					<1	<1										
9-Dec-24	<1												<1			
10-Dec-24		<1		<1										<1		
10-Dec-24 Bottom				5.9												
11-Dec-24					<1	<1										
11-Dec-24 Bottom					<1	<1										
12-Dec-24							<1	<1	<1	<1	<1	<1			<1	<1

Chemical Oxygen Demand (COD)

The COD measurements in Q4 2024 are presented in **Table 2.9-4**.

TABLE 2.9-4: COD (MG/L) RESULTS FOR THE SURFACE WATER IN NAM NGIEP AND ITS MAIN TRIBUTARIES IN Q4 2024**(NATIONAL SURFACE WATER QUALITY STANDARD FOR COD: < 5 MG/L)**

Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
1-Oct-24	48.6												23			
9-Oct-24							8.96	20.4								
10-Oct-24									15.4	6.4	6.4				16.6	17.9
4-Nov-24	<4												<4			
7-Nov-24									<4	<4	5.12	10.2			<4	<4
8-Nov-24							35.8	16								
9-Dec-24	24.4												21.1			
10-Dec-24														38.4		
12-Dec-24							5.12	17.9	33.2	35.8	39.6	14			32	19.2

Faecal Coliform Bacteria

The results of the faecal coliform analyses in Q4 2024 are presented in **Table 2.9-5**.

During the Q4 2024, Faecal coliform was complied with in all stations, except in NNG01 and NCH01 on 01 October 2024, in NN07, NNG08 and NSH01 on 10 October 2024, and in NXA01 on 07 November 2024.

The data indicates that the concentrations of faecal coliform bacteria in the re-regulation reservoir (R06 and R07) are well below the surface water quality standard, however, somewhat elevated compared with the concentrations at R05 in the main reservoir.

TABLE 2.9-5: FAECAL COLIFORMS (MPN/100 ML) RESULTS IN NAM NGIEP AND ITS MAIN TRIBUTARIES IN Q4 2024**(NATIONAL SURFACE WATER QUALITY STANDARD FOR TOTAL COLIFORMS: <1,000 MPN/100 ML)**

Station Code	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
1-Oct-24	1,600												1,600			
9-Oct-24						49	170	220								
10-Oct-24									350	280	1,600	1,600			920	1,600
4-Nov-24	540												49			
7-Nov-24									110	540	240	920			1,600	920
8-Nov-24						5	27	79								
9-Dec-24	240												23			
10-Dec-24														79		
11-Dec-24						0										
12-Dec-24							8	17	79	34	170	170			350	920

Total Coliform Bacteria

The results of measurements for total coliform bacteria are presented in **Table 2.9-6**. The results indicate a similar pattern and same tendency as for faecal coliform bacteria. There were no

exceedances of the National Surface Water Quality Standard (<5,000 MPN/100 mL) for total coliform bacteria.

TABLE 2.9-6: TOTAL COLIFORM (MPN/100 ML) RESULTS IN NAM NGIEP AND ITS MAIN TRIBUTARIES IN Q42024

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

Station Code	NNG 01	R0 1	R0 2	R0 3	R0 4	R0 5	R0 6	R0 7	NNG 05	NNG 06	NNG0 7	NNG0 8	NCH0 1	NPH0 1	NXA0 1	NHS 01
1-Oct-24	1,600												1,600			
9-Oct-24						110	540	220								
10-Oct-24									540	280	1,600	1,600			1,600	1,600
4-Nov-24	110												110			
7-Nov-24									280	1,600	1,600	1,600			1,600	1,600
8-Nov-24						110	790	240								
9-Dec-24	540												540			
10-Dec-24														1,600		
11-Dec-24						240										
12-Dec-24							46	70	540	920	1,600	1,600			1,600	1,600

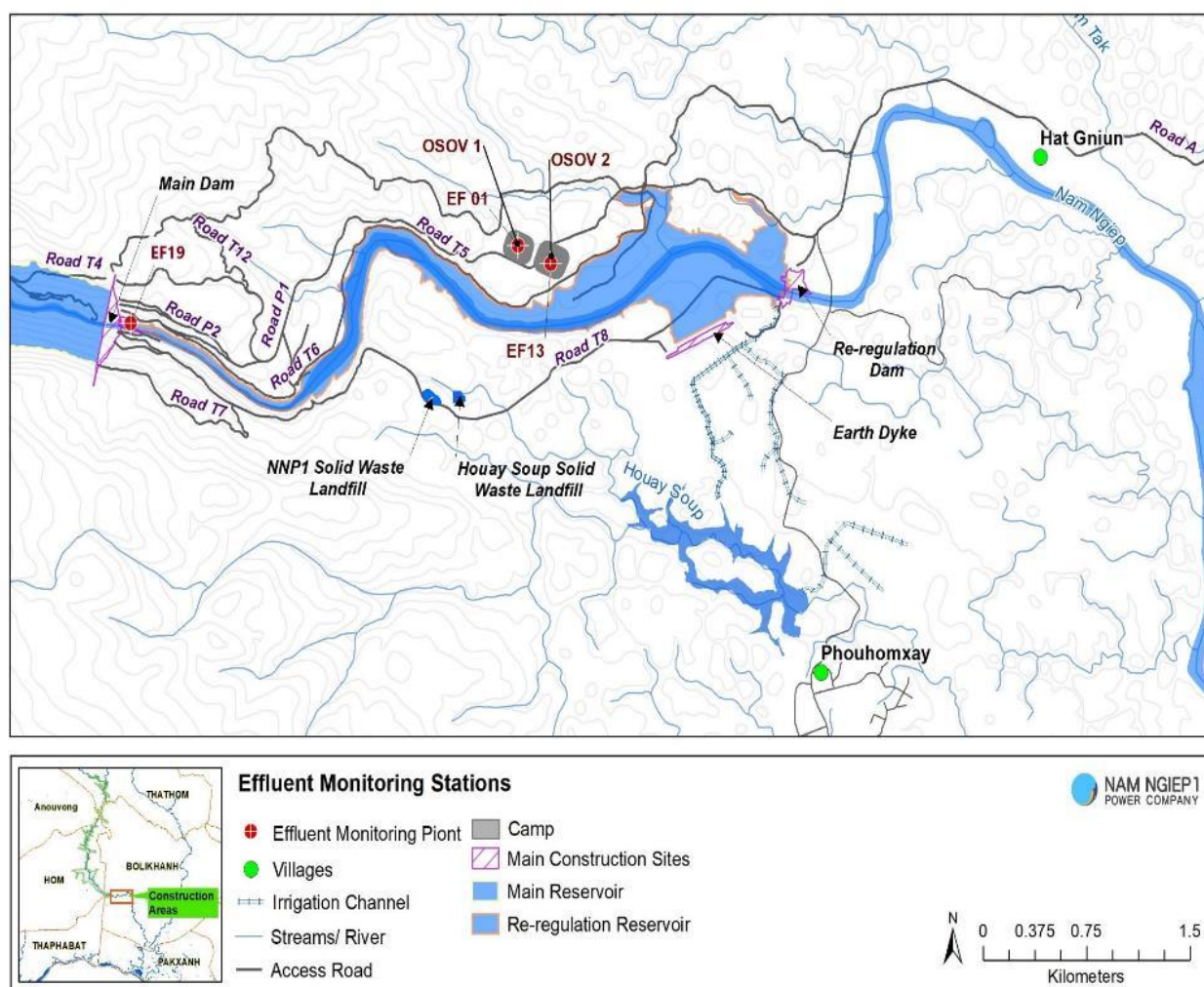
2.9.2 Compliance Monitoring of Effluents from Camps

A total of 03 sites discharged effluents in Q4 2024, including 02 camps (OSOV1 and OSOV2) and at the Wastewater Treatment System of the Main Powerhouse. The effluent monitoring location sites can be found in **Figure 2.9-8**.

The results are described in **Table 2.9-7** and the full data set is in **Appendix 5-2**.

The status of compliance as of 31 December 2024 can be summarized as follows:

- Non-compliance with total nitrogen for the wastewater treatment systems in the Main Powerhouse (EF19) and OSOV2 Camp (EF13);
- Non-compliance with faecal coliform and total coliform at Main Powerhouse (EF19), OSOV1 (EF01) and OSOV2 (EF13).
- Non-compliance with total phosphorus at Main Powerhouse (EF19).

FIGURE 2.9-8: LOCATION OF EFFLUENT MONITORING POINTS**TABLE 2.9-7: RESULTS OF THE EFFLUENT WATER QUALITY MONITORING OF THE CAMPS IN Q4 2024 (NON-COMPLIANCE PARAMETERS ONLY)**

Date	Parameters (Unit)	Guideline	Site Name	OSO V1 (Owner's Site Office and Village)	OSO V2 (ESD Camp)	Main Powerhouse
			Station Code	EF01	EF13	EF19
02-Oct-24	Total Nitrogen (mg/L)	<10.0		5	21.0	45.0
14-Oct-24	Total Nitrogen (mg/L)	<10.0		<5	18.0	45.0
01-Nov-24	Total Nitrogen (mg/L)	<10.0		<5	19.00	16.70
12-Nov-24	Total Nitrogen (mg/L)	<10.0		5.57	16.70	40.80
13-Dec-24	Total Nitrogen (mg/L)	<10.0		5.3	21.4	13.0

		Site Name	OSOV1 (Owner's Site Office and Village)	OSOV2 (ESD Camp)	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameters (Unit)	Guideline			
02-Oct-24	Total Phosphorus (mg/L)	<2	1.25	1.25	5.6
14-Oct-24	Total Phosphorus (mg/L)	<2	1.1	1.26	6.2
01-Nov-24	Total Phosphorus (mg/L)	<2	0.8	1.20	6.50
12-Nov-24	Total Phosphorus (mg/L)	<2	0.81	1.18	7.62
13-Dec-24	Total Phosphorus (mg/L)	<2	1.4	1.4	7.7
02-Oct-24	Total coliform (MPN/100 mL)	<400	1,600	8	0
14-Oct-24	Total coliform (MPN/100 mL)	<400	1,600	0	1,600
01-Nov-24	Total coliform (MPN/100 mL)	<400	170	1,600	0
12-Nov-24	Total coliform (MPN/100 mL)	<400	220	110	0
13-Dec-24	Total coliform (MPN/100 mL)	<400	1,600	1,600	1,600
02-Oct-24	Faecal Coliform (MPN/100 mL)	<400	1,600	2	0
14-Oct-24	Faecal Coliform (MPN/100 mL)	<400	920	0	1,600
01-Nov-24	Faecal Coliform (MPN/100 mL)	<400	33	1,600	0
12-Nov-24	Faecal Coliform (MPN/100 mL)	<400	170	27	0
13-Dec-24	Faecal Coliform (MPN/100 mL)	<400	1,600	23	130

TABLE 2.9-8: COMPLIANCE STATUS OF EFFLUENT DISCHARGE FROM THE CAMPS IN Q4-2024

Site	ID	WWTS	Key Non-Compliance Issues ¹ in Q4-2024	Corrective Actions
OSOV 1 (Owner's Site Office and Village)	EF01	- Septic tanks (kitchen and black water) and wetland (grey water), discharge: 70 m³/day. - The effluent from this site flows into the Re-regulation Reservoir.	- Faecal coliform (<400 MPN/100 mL): Non-compliance in 3 out of 5 samplings. Q4 mean 865 MPN/100 mL. - Total coliform (<400 MPN/100 mL): Non-compliance in 3 out of 5 samplings. Q4 mean 1,038 MPN/100 mL.	Carried out routine maintenance of the Wastewater Treatment System including cleaning all 17 septic tanks, inspecting the air blowers and maintaining wetland system.
OSOV 2 (ESD Camp)	EF13	- Septic tanks (kitchen and black water) and SBR with chlorination system. - The effluent from this site is led into a ditch connected to the Re-regulation reservoir, however,	- Total nitrogen (<10 mg/L): Non-compliance in all 5 samplings. Q4 mean 19.2 mg/L. - Faecal coliform (<400 MPN/100 mL): Non-compliance in 1 out of 5 samplings. Q4 mean 330 MPN/100 mL. - Total coliform (<400 MPN/100 mL): Non-compliance in 2 out of 5 samplings. Q4 mean 664 MPN/100 mL.	The installed WWTS does not eliminate nitrogen or phosphorus. However, there is no concern given the low effluent quantity, which is completely absorbed in the soil within a distance of less than 300 m before reaching the re-regulation pond.

¹ The values in brackets indicate the applicable standard

Site	ID	WWTS	Key Non-Compliance Issues ¹ in Q4-2024	Corrective Actions
		due to low quantities of effluent, the liquid is absorbed in the soil before reaching the reservoir.		Cleaning all septic tanks and closely monitoring the residual chlorine content and chlorination dosage adjustment.
Main Powerhouse	EF19	- Septic tanks (grey and black water), biofilm tank and chlorination tank. - The effluent from this site flows into the tailrace of the Main Powerhouse and then into the Re-regulation Reservoir.	- Faecal coliform (<400 MPN/100 mL): Non-compliance in 1 out of 5 samplings. Q4 mean 346 MPN/100 mL. - Total coliform (<400 MPN/100 mL): Non-compliance in 2 out of 5 samplings. Q4 mean 640 MPN/100 mL. - Total nitrogen (<10 mg/L): Non-compliance in all 5 samplings. Q4 mean 32.1 mg/L. - Total Phosphorus (<2 mg/L): Non-compliance in all 5 samplings. Q4 mean 6.7 mg/L.	As above

2.9.3 Groundwater Quality Monitoring

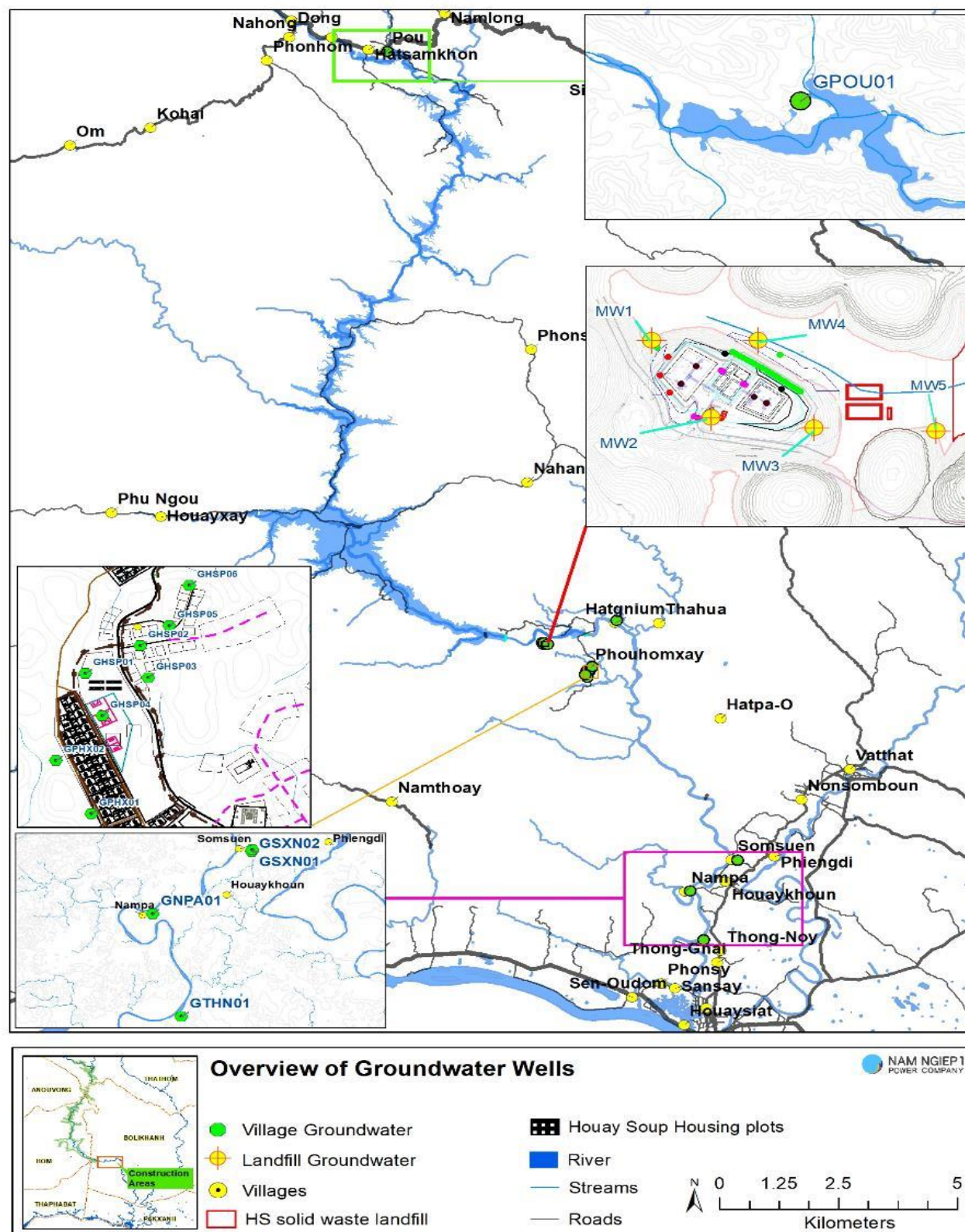
During Q4 2024, five of seven boreholes at Somseun, Nam Pa and Thong Noy and Pou Villages (two boreholes) have been monitored for the following parameters:

- a. *Monthly*: pH, DO (%), DO (mg/L), Conductivity ($\mu\text{S}/\text{cm}$), Temperature ($^{\circ}\text{C}$), Turbidity (NTU), Faecal Coliform (MPN/100 mL) and *E. coli* (MPN/100 mL);
- b. *Annually (Not This Quarter)*: 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).

Note that during Q4 2024, the water pumps of two boreholes (GPHX01 and GPHX02) at Phouhomxay Village were broken. Therefore, no water sampling taken. The groundwater sampling locations are displayed in **Figure 2.9-9** and the groundwater monitoring data is presented in **Appendix 5-3**.

In addition, the Social Management Office (SMO) informed the EMO that these two boreholes will no longer be used, as villagers rely on gravity-fed water supply as their primary source. Therefore, the GPHX01 and GPHX02 will be removed from the EMO's routine monitoring starting from January 2025.

FIGURE 2.9-9: GROUNDWATER SAMPLING LOCATIONS



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

Phouhomxay Village: No water quality monitoring data reported because the water pumps were broken.

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

Somseun Village: all monitored parameters complied with the standard, except faecal coliform in October 2024.

Nampa Village: all monitored parameters complied with the standard, except faecal coliform in November 2024.

Pou Village: all monitored parameters complied with the standard, except faecal coliform (Q4 2024) and *E. coli* bacteria (October 2024).

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.

There are two types of water supply systems in Lao PDR:

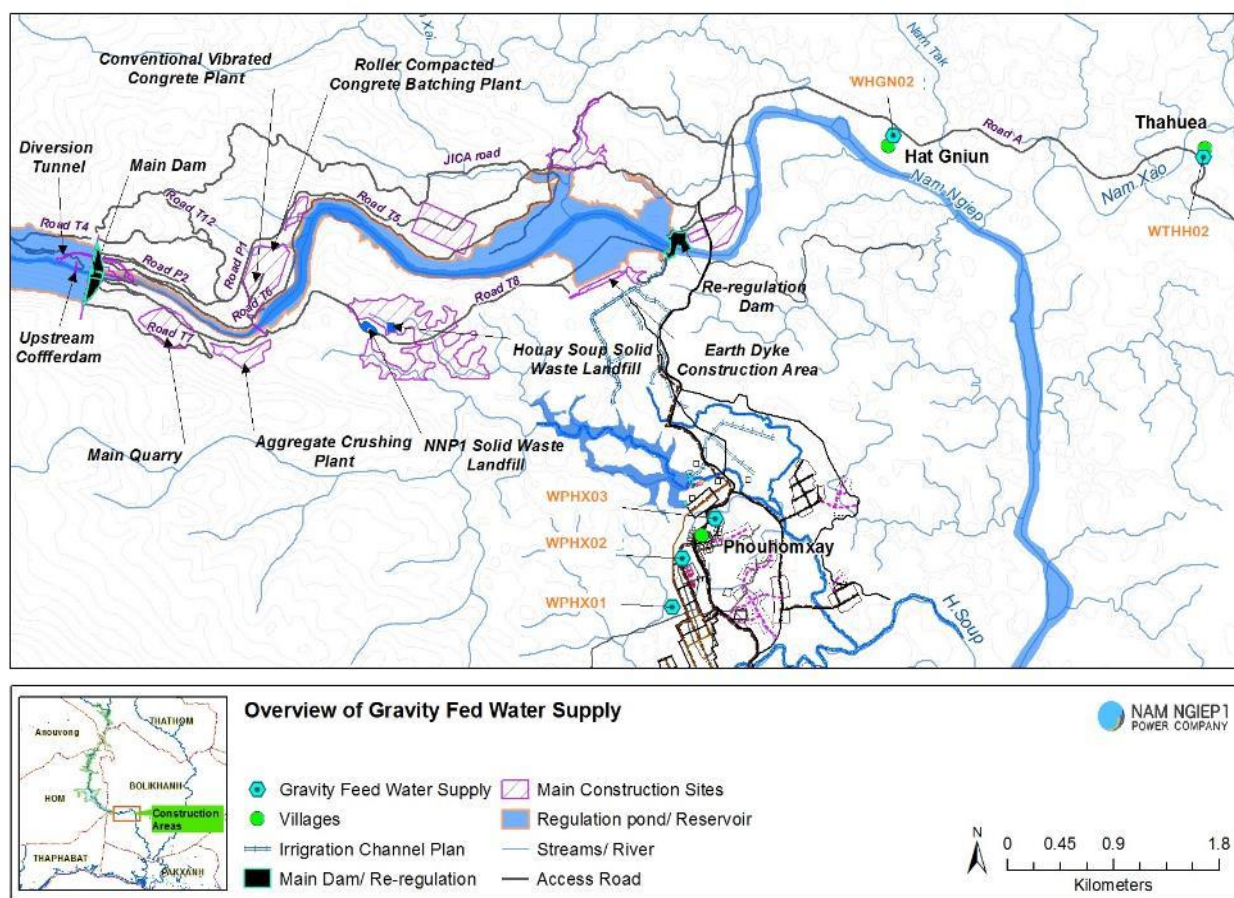
- (A) Nam Papa systems (water supply)** – water from natural water sources that has gone through a treatment process to become clean and safe water in compliance with the drinking water quality standards. These systems are managed by the Department of Water Supply, Ministry of Public Works and Transport; and
- (B) Nam Sa-at Systems (domestic water supply)** – provide water to rural areas that are not connected to Nam Papa systems. Nam Sa-at systems include gravity fed systems and boreholes with motorised pumps or hand pumps. These systems are managed by the Centre for Environmental Health and Water Supply (Nam Sa-at) under the Department of Hygiene and Health Promotion, Ministry of Health.

The community water supply systems related to the NNP1 hydropower project are under Nam Sa-at system with the monitoring requirements identify in the Minister's Decision on the Water Quality Standard Management for Drinking and Domestic Use, No. 561/MoH dated 27 February 2014.

The issue of bacterial contamination in the communities' water supply have been investigated by ESD team together with the respective local authorities and the villagers to find the likely root causes. A series of actions have been taken to prevent the contamination according to the Water Safety Plans (WSP); however, the Project, Nam Sa-at (GOL) and the villagers considered that disinfection treatment processes (e.g., chlorination, ceramic filtration) would not be sustainable and cost effective in a long run. It is well understood and agreed with the villagers that the water shall be boiled before drinking as mentioned above. It is also noted that boiling of water from domestic water supply (Nam Sa-at) systems before drinking is a general practice in the rural areas of Lao PDR.

2.9.4 Gravity Fed Water Supply (GFWS) Monitoring

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

FIGURE 2.9-10: 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 2.9-9**. The full set of data is presented in **Appendix 5-4**.

TABLE 2.9-9: THE GFWS MONITORING RESULT IN Q4 2024

Date	Parameter (Unit)	Site Name	Tha Heua Village	Hat Gniun Village	Phouhomxay Village	
		Station	WTHH02	WHGN02	WPHX02	WPHX03
		Guideline				
18-Jul-24	Faecal Coliform (MPN/100 mL)	0	2	4.5	4.5	2
19-Aug-24		0	70	49	220	130
24-Sep-24			7	17		
25-Sep-24		0			11	14
18-Jul-24	E. Coli Bacteria (MPN/100 mL)	0	2	0	0	0
19-Aug-24			17	22	22	7.8
24-Sep-24		0	5	7.8		
25-Sep-24		0			6.8	7.8

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

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

Phouhomxay Village (WPHX02-tap water at primary school; and **WPHX03**-tap water at a villager's house): all parameters complied with the standard, except faecal coliform and *E. coli* in the Q4 2024 samples. Note here that during sampling of tap water in Phouhomxay Village, surface water from Houay Soup Stream was still supplied into the system.

As observed in the field during water sample collection, livestock is roaming around in the water intake areas which may have contributed to the presence of Faecal Coliform Bacteria and *E. coli* in GFWS samples. According to the 2019 site condition survey, it is not feasible to fence off the upstream water course due to cattle having access from all directions along the stream. The villagers generally use tap water for washing and cleaning. They were informed about the monitoring results and were advised to prevent the bacterial contamination by removing livestock from the intake areas and boil water before drinking. The advice to boil the water 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.

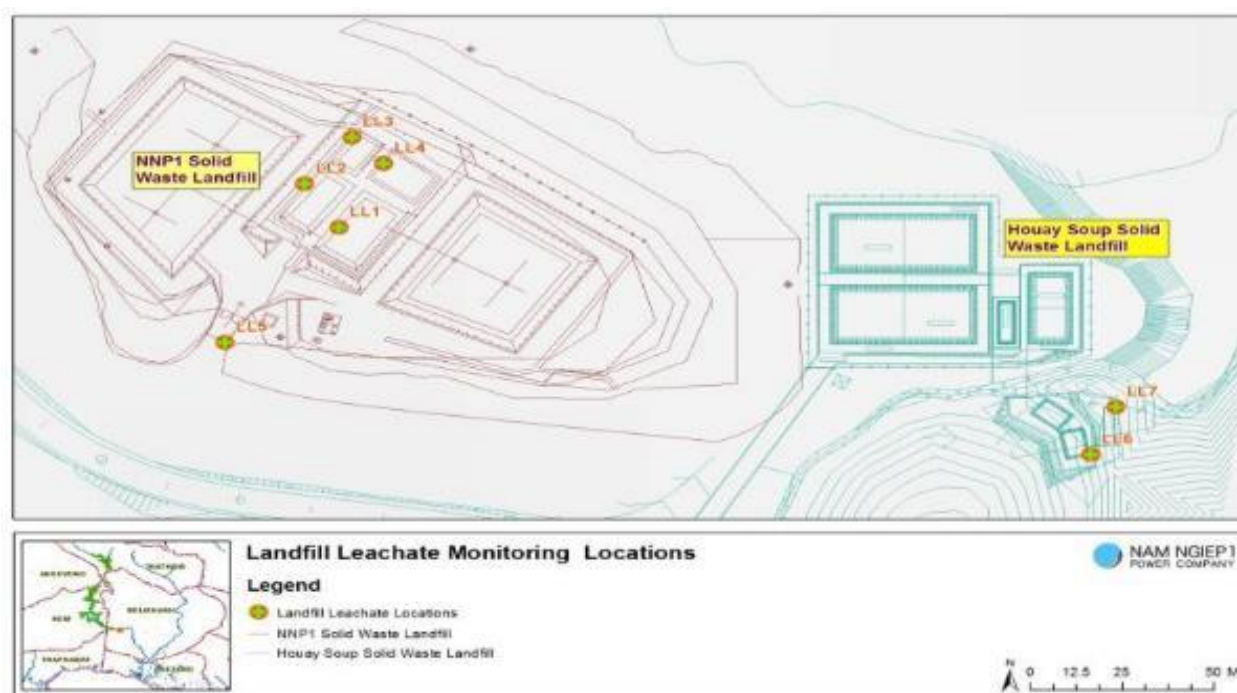
As mentioned in **section 2.9.3**, the gravity fed system is a domestic water supply managed by the Centre for Environmental Health and Water Supply (Nam Sa-at) under the Department of Hygiene and Health Promotion, Ministry of Health. It is well understood and agreed with the villagers that the water shall be boiled before drinking.

For Phouhomxay Village, the villagers requested NNP1PC and the District Water Supply Office during a meeting in March 2022 to reuse the Gravity Fed System (GFS) as a main supply and reserve the existing ground water supply system for times when the GFS would have to be repaired. The water from the gravity fed system needs to be boiled before drinking, but may be used directly for other purposes such as washing, feeding animals, watering the garden, and other households' activities.

In addition, to ensure sufficient water quantity, the ESD will work with the District Water Supply Office to improve the water intake of the GFS under NNP1PC's Corporate Social Responsibility (CSR). For the presence of bacteria, the community confirmed that they will boil water before drinking. It is also noted that boiling domestic water supply (Nam Sa-at) before drinking is a general practice in the rural areas of Lao PDR.

2.9.5 Landfill Leachate Monitoring

The landfill leachate treatment systems at NNP1 Project landfill (LL4 – last pond) and Houay Soup landfill (LL6 – last pond) are monitored to control the functioning of the treatment process and ensure compliance with effluent standards. The monitoring locations are presented in the **Figure 2.9-11**.

FIGURE 2.9-11: LANDFILL LEACHATE MONITORING LOCATION

The monitoring results in Q4 2024 indicate compliance with the applicable standards for all monitored parameters, except for faecal coliform (October 2024) and total coliform (October and November 2024) in NNP1 Landfill Leachate (last leachate pond) and total coliform in Houay Soup Landfill Leachate (last leachate pond) for November 2024. However, there has not been any discharge to the environment from the leachate systems during this reporting period. The monitoring data can be found in **Appendix 5-5**.

2.9.6 Water Quality Compliance Monitoring

The water quality non-compliance issues in Q4 2024 are summarized in **Table 2.9-10**.

TABLE 2.9-10: NON-COMPLIANCES RELATING TO WATER QUALITY MONITORING IN Q4 2024

No	Non-compliance Issues	Corrective Actions	Status
1	During turbine discharge (November and December 2024), Dissolved Oxygen (DO) in the Nam Ngiep River downstream the Re-regulation Dam was lower than the National Surface Water Quality Standard (6 mg/L)	- NNP1PC has continued implementing the water quality monitoring program and discussed the results with the LTA during the May 2023 visit; - LTA recommended to maintain the monitoring program, and concluded that other measures aiming at an improvement, like e.g. the possibility of artificial re-aeration of the water in the re-regulation pond for increasing oxygen content, are not required.	- Closely monitoring

No	Non-compliance Issues	Corrective Actions	Status
2	Effluents discharged from the Wastewater Treatment Systems (WWTS) at OSOV1, OSOV2 and the Main Dam exceeded the National Effluent Standard Guideline for some parameters	In October, November and December 2024, EMO, ADM and TD conducted a monthly joint inspection for the operation and maintenance of the WWTS: - All 17 septic tanks and air blowers at OSOV1 were randomly checked by the ADM staff and they are functioning properly. - Wetland maintenance at OSOV1 including weeding and replacing dead reeds and fixing the fence have been completed. - Closely monitor the residual chlorine content and chlorination dosage adjustment for the effluents of OSOV2 and the Main Powerhouse WWTS.	- Closely monitoring the system operation and maintenance.
3	Groundwater quality monitored for the communities (Thong Noy and Som Seun Villages) were not in compliance with the National Groundwater Quality Standard for drinking purpose on Faecal Coliform and <i>E.coli</i> parameters	- A full inspection of the water supply systems in Som Seun, Nam Pa and Thong Noy Village was conducted in September 2020 by NNP1PC team including consultations with the Village Water Use Committee (VWUC) and also interviews with some consumers (detailed in Q4 2020 Report). - Potential contamination sources of coliform were identified and recommendations on operation and maintenance of the water supply system were provided to the involved parties. - The villagers were informed about the monitoring results and were advised to boil water before drinking 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 were advised and encouraged to boil water before drinking. - Continue to monitor.
4	Gravity Fed Water Supply monitored for the communities (Thahuea, Hat Gniun, and Phouhomxay Village) were not	- Site observations were conducted during the routine water sampling, it was observed that livestock was roaming around the water intake areas and faeces from livestock and birds may contribute to the presence of bacterial contamination. It is not feasible to	- The villagers generally use tap water for washing and cleaning, and were

No	Non-compliance Issues	Corrective Actions	Status
	complied with the National Drinking Water Quality Standard on Faecal Coliform and <i>E.coli</i> parameters.	fence off the upstream water course due to cattle having access from all directions along the stream. The villagers were informed about the monitoring results and were advised to boil water before drinking.	encouraged to boil water before drinking. - Continue monitoring.
5	Landfill leachate monitoring for NNP1 Landfill indicated non-compliance with the Effluent Standard for faecal coliform and total coliform and effluent leachate from Houay Soup Landfill did not comply with the Effluent Standard for total coliform	- The leachate is still contained in the leachate ponds without being discharged to the environment. - Continue monitoring.	- Continue monitoring.

3 WATERSHED AND BIODIVERSITY MANAGEMENT

3.1 WATERSHED MANAGEMENT

3.1.1 Implementation of Watershed Management Plan

3.1.1.1 Xaysomboun Watershed and Reservoir Protection Office (WRPO)

a) Fishery Co-Management Plan (FCMP):

On 19 November 2024, XSB WRPO held an approval meeting for the Fishery Co-management Plan (FCMP) and associated regulations, chaired by the Vice Governor of Xaysomboun Province as head of XSB WRPC and with participants from the relevant provincial and district offices. In Dec 2024, XSB WRPO has finalized FCMP and issued committee establishment agreement to view regulations to align with legal provisions. The plan has been submitted to the Provincial Assembly Office and the XSB Provincial Governor for endorsement. It is expected that the plan will be disseminated by Q1 2025.

b) Construction of Reservoir Checkpoints:

The construction of two reservoir checkpoints resumed on 6 December 2024 and the construction is expected to be completed by March 2025. EMO is following up with XSB WRPO on staff deployment to these checkpoints. However, no timeline has been provided.

c) Patrolling:

From October to December 2024, XSB WRPO resumed patrols under the approved AIP 2023. The patrols included six TPZs and two reservoir patrols. The results of this patrolling work are expected to be presented and discussed in the January 2025 monthly meeting. XSB WRPO field sub-office has been operated since May 2024 by two Hom DAFO, two military soldiers and one police officer. However, there was no representative from the XSB provincial level. The solar panel designated for the field sub-office has still not been installed as of December 2024.

3.1.1.2 Bolikhamxay Watershed and Reservoir Protection Office (WRPO)

In Q4 2024, BLX WRPO did not carry out any patrolling due to they have not received allocated funds from the FPF-DOF-MAF under the approved AIP 2024.

3.1.1.3 NNP1PC EMO**a) Livelihood Activity Programs**

On 29-30 October 2024, NNP1 EMO and BSP-WCS in collaboration with Hom DAFO and DONRE organized a consultation meeting with village authorities in PhouNgou and Houayxay villages. The purpose of the meeting was to discuss and gather information on natural resources and village agriculture land use, as part of the NNP1 WMP. The key outputs included proposing the relevant local government offices, in corroboration with NNP1PC to establish management regulations for the palm seed sustainable collection (Non-timber Forest Product) for selling to the middle man, and proposing revision of PLUP due to most villagers and PAP return back to use previously compensated land for agricultural activities, particularly grassland, cassava, rubber tree and rice farming. BSP-WCS is in the process of finalizing all information with a full report. However, NNP1 EMO has not received such report from BSP-WCS as of the end of December 2024.

On 13-14 November 2024, Thathom DAFO in collaboration with NNP1 EMO conducted training for pilot households in Nahong and Phonhom villages, Thathom District. This is one of the agricultural extension activities under component 6 of the WMP. The training focuses on techniques for greenhouse vegetable cultivation, soil improvement, composting and use of plant-based pesticides.

On 19-21 November 2024, NNP1 EMO and Hom DAFO organized a study tour for representatives of the orange farmer groups and village authorities from PhouNgou and Houayxay villages in Longcheng District, Xaysomboun Province. The study tour focused on orange plantation, maintenance techniques and market distribution. Additionally, Longcheng DAFO provided a guideline book on orange plantation technique to Hom DAFO and the farmer group representatives and NNP1 EMO.

On 26 November 2024, Thathom Trade and Commercial Office, in collaboration with NNP1 EMO held a consultation meeting with Nahong village authorities to review and revise the handicraft group regulations prior to submission to the Governor of Thathom District for approval. On 29 November 2024, the Governor of Thathom District approved the handicraft group regulations. The dissemination of the regulations is expected to be included in the plan for 2025.

On 17 December 2024, NNP1 EMO, Hom DAFO in collaboration with Hom Trade and Commerce Office held a contract negotiation meeting with pineapple buyers and pineapple

farmers in PhouNgou Village, chaired by the head of Hom District Trade and Commerce Office, with participants from buyers, village authorities, pineapple farmers, Hom DONRE and Administration Office. The key outcome included issuing official buying-selling contractor and unit price agreement among buyers and pineapple farmer groups for reference, and submitting it to the Commercial Office and Governor of Hom District for acknowledgement by January 2025.

On 19 December 2024, Thathom District Agriculture and Forestry Office held their annual meeting to report on progress of implementation in 2024 and their plan for 2025. The meeting was chaired by the head of Thathom DAFO, with participants from Thathom Trade and Commerce Office, Women Union Office, and Administration Office. The results of discussion included proposing to NNP1 to consider and support weave group establishment and ratan plantation activities to be included in the plan 2025.



Photo of consultation meeting with village authorities in PhouNgou and Houayxay villages



Training on techniques for greenhouse vegetable cultivation, soil improvement, composting and plan-based pesticides in Nahong and Phonhom villages

	
Knowledge exchange among orange farmer groups in Longcheng District, Xaysomboun Province	Consultation meeting with village authorities to review and revise the handicraft group regulations in Nahong village, Thathom District.
	
Contract negotiation meeting with buyer representatives and pineapple farmer group in PhouNgou village, Hom District.	Annual meeting and plan 2025 with Thathom District DAFO, Trade and Commercial Office

b) NNP1 Watershed TPZs encroachment resolution

On 19 November 2024, the Vice Governor of Xaysomboun Province as head of XSB WRPC assigned XSB PAFO in collaboration with Vice Governor of Hom, Anouvong and Thathom District, along with DAFOs to discuss strategies for resolving forest encroachment related with agricultural activities inside NNP1 watershed TPZs. The key outcome of the discussions included:

- Agreed to utilize remaining patrol budget under the previous AIPs for campaigns, education, information gathering and prosecuting violators starting from December 2024 to January 2025;
- Hom, Anouvong and Thathom districts to submit their workplan and budget to XSB WRPO for XSB Vice Governor' for review and approval by the first week of December 2024.

However, the tree districts were unable to finalize and submit their respective plans to XSB WRPO as end of December 2024, due to urgent internal assignments.



Strategy discussion among XSB PAFO, Vice Governor of Hom, Anouvong and Thathom Districts, and DAFOs for resolving forest encroachment inside NNP1 watershed TPZs

3.1.2 Preparation of Annual Implementation Plan (AIP)

TABLE 3.1-1 provides an overview of the progress in preparing the Annual Implementation Plans (AIP) for 2023 and 2024 by Xaysomboun WRPO and Bolikhamxay WRPO and highlights of fund preparation, approvals, and transfer status.

TABLE 3.1-1 ANNUAL IMPLEMENTATION PLAN PREPARATION STATUS

Watershed and Reservoir Protection Office (WRPO)	Preparation of Annual Implementation Plan (AIP) 2023	Preparation of Annual Implementation Plan (AIP) 2024
Xaysomboun WRPO	- On 25 January 2024, NNP1PC transferred funds to the FPF-DoF-MAF; - On 25 March 2024, Xaysomboun WRPO received 2,648,370,000 LAK from the fund under the approved AIP 2023. Status: Complete	- Xaysomboun WRPO did not confirm the AIP2024 preparation during the joint ADB-IAP-LTA mission on 24 January 2024. - During the monthly meeting with Xaysomboun WRPO on 12 March 2024, NNP1 EMO proposed to postpone the discussion on the AIP 2024 preparation until the Xaysomboun WRPO has a clear plan to address outstanding issues. Note: NNP1 EMO also pointed out the risk in fund utilization because more than 3 billion LAK remain in the budget from the AIP 2020, 2022, and 2023. The Head of Xaysomboun WRPO agreed with the proposal. Status: AIP 2024 of XSB WRPO was suspended due to the long delay with financial report submission and outstanding issues.

Bolikhamxay WRPO	On 20 October 2023, Bolikhamxay WRPO received the last two-quarter funds under the approved AIP 2023 from the FPF DOF-MAF with a total of 583,688,000 LAK, of which 163,490,000 LAK is from the NNP1 NNL source and 420,198,000 is from the GOL CA source. Status: Complete	- On 4 January 2024, the Bolikhamxay WRPO finalized their AIP2024, NNP1 EMO submitted it to ADB and IAP on the same day. - On 4 February and 5 March 2024, the IAP and ADB approved Bolikhamxay WRPO AIP2024 respectively. - On 28 March 2024, BLX WRPO submitted the fund disbursement request letter to FPF-DOF-MAF. NNP1 EMO received the fund request letter from FPF-DOF-MAF on 1 July 2024 and transferred fund to FPF-DOF-MAF account on 17 July 2024. However, BLX WRPO has not received funds as of the end of Q4 2024. Status: Pending
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3.2 BIODIVERSITY OFFSET MANAGEMENT

3.2.1 Implementation of Biodiversity Offset Management Plan

Progresses on the implementation of activities by component in Q4 2024 are described below:

a. Component 1 - Spatial Planning and Regulation

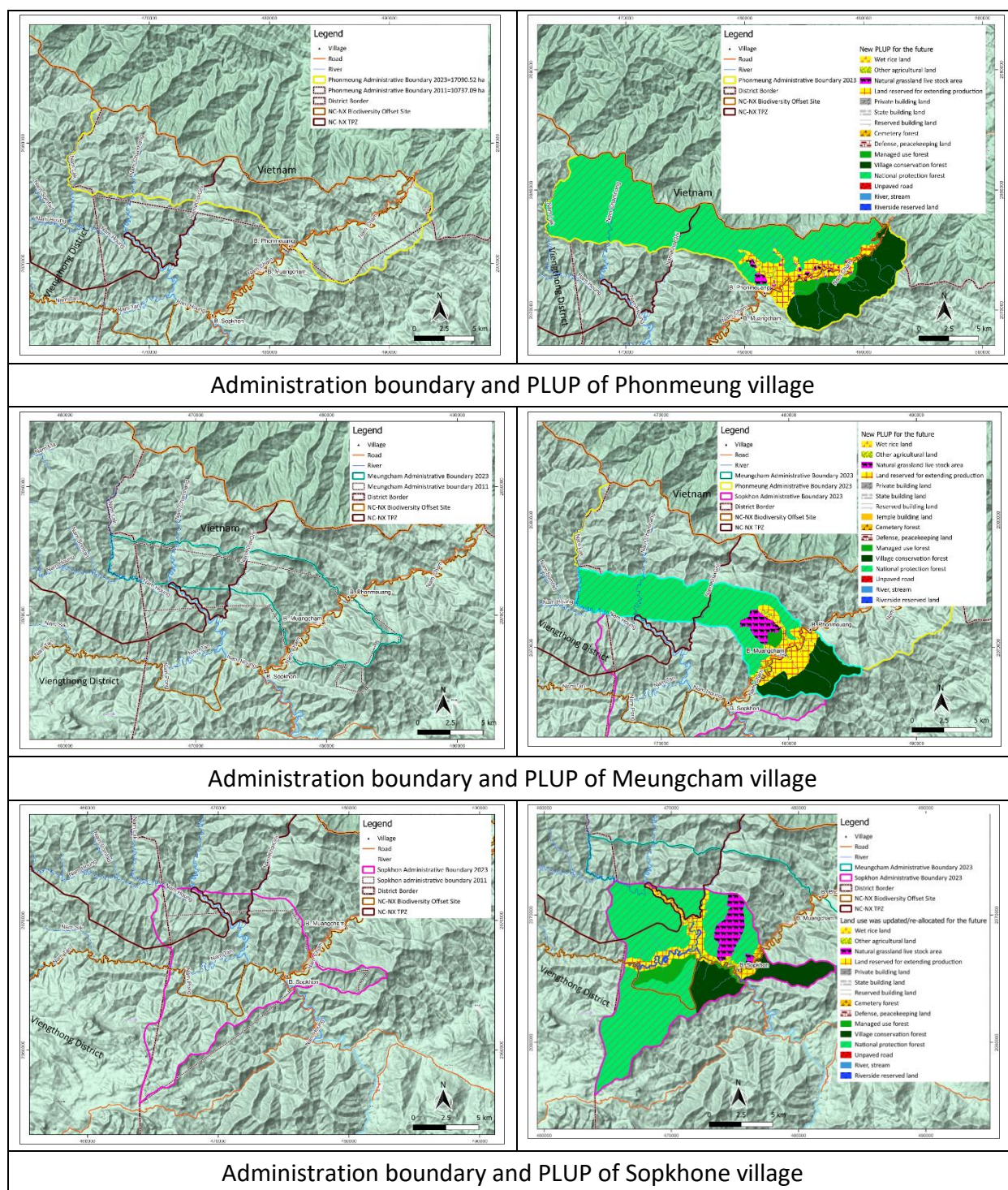
Village Participatory Land Use Plan (PLUP) updating

BOMU, BSP-WCS, NNP1-EMO and relevant offices of Xaychamphone District conducted a field visit from 1-20 October 2024, to review and update the Participatory Land Use Plan (PLUP) of Sopkhone, Meungcham, and Phonmeung villages in Xaychamphone District. The data and report are under preparation by BSP-WCS and expected to be approved by the District Governor in Q1 2025. The updated PLUP data is presented **Table 3.2-1**.

TABLE 3.2-1 VILLAGES UPDATED PLUP FIGURES

No	Land type	Phonmeung		Meungcham		Sopkhone	
		Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)
1	Agriculture Land	1,602.10	9.37	1,634.33	18.34	1,949.22	14.99
2	Building Land	17.83	0.10	24.34	0.27	12.57	0.10
3	Forest Land	15,051.08	88.07	7,054.68	79.16	10,604.45	81.53
4	Transportation Land	54.37	0.32	25.84	0.29	19.35	0.15
5	Industrial Land	-	-	-	-	-	-
6	Water Land	350.22	2.05	165.25	1.85	413.75	3.18
7	Cultural Land	8.52	0.05	6.56	0.07	6.82	0.05
8	Land for national defense	6.40	0.04	0.49	0.01	0.53	0.00
Total:		17,090.52	100.00	8,911.49	100.00	13,006.69	100.00

FIGURE 3.2-1 UPDATED VILLAGE ADMINISTRATION BOUNDARY AND PLUP



Nam Chouan-Nam Xang (NC-NX) management regulation evaluation

The Bolikhamxay Provincial Assembly with participation of BOMU, BSP-WCS, and NNP1 EMO conducted an evaluation of the NC-NX management regulations which were approved by the Bolikhamxay Provincial Governor on 31 October 2018. The evaluation was carried out across all six NC-NX villages from 26 November to 1 December 2024.

BOMU presented the evaluation report in the Bolikhamxay Provincial Assembly meeting on 27 December 2024, and it was noted that some articles of the regulations, particularly the reference legislation and total area figures of the offset site will be updated within Q1 2025.

FIGURE 3.2-2 NC-NX REGULATION EVALUATION PHOTOS



NC-NX regulation evaluation meeting in Vangphieng village



NC-NX regulation evaluation meeting in Na Gngang village



NC-NX regulation evaluation meeting in Natan village

b. Component 2 – Enforcement

BOMU conducted monthly patrolling in October, November and December 2024. The patrolling and law enforcement results are presented in

Table 3.2-2.

TABLE 3.2-2 PATROLLING AND LAW ENFORCEMENT RESULTS IN THE FOURTH QUARTER 2024

Team	Patrol days	Distance (Km)	Observations			Law enforcement	
			Hunting	Fishing	NTPF collection	People fined	People received written warnings
1	92	615		1	8	1	3
2	104	384	4				
3	91	422	2	2	2		
4	92	461	4	1	1		
Total	379	1,882	10	4	11	1	3

FIGURE 3.2-3 MAP OF PATROLLING TRACK RECORDS IN THE FOURTH QUARTER 2024

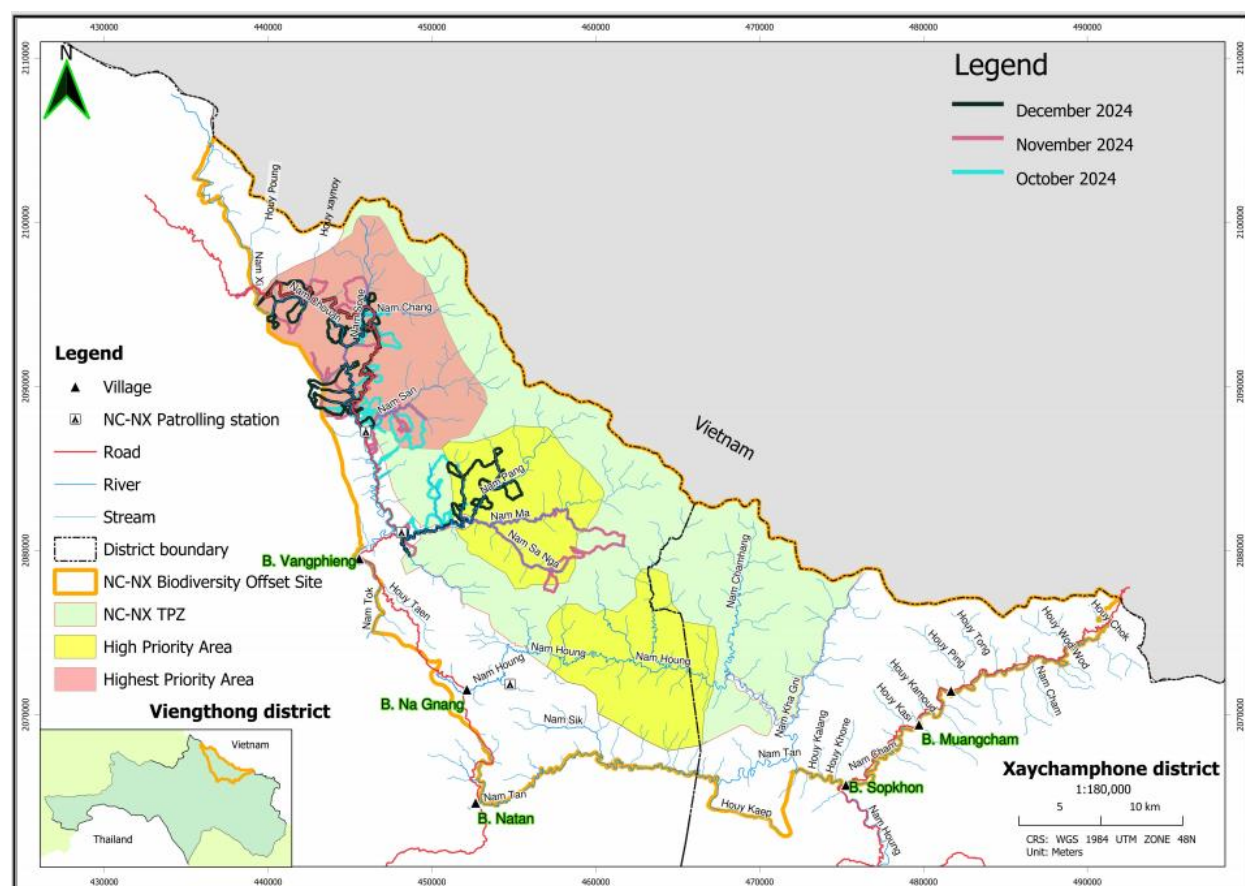


FIGURE 3.2-4 MAP OF PATROLLING THREAT RECORDS IN THE FOURTH QUARTER 2024

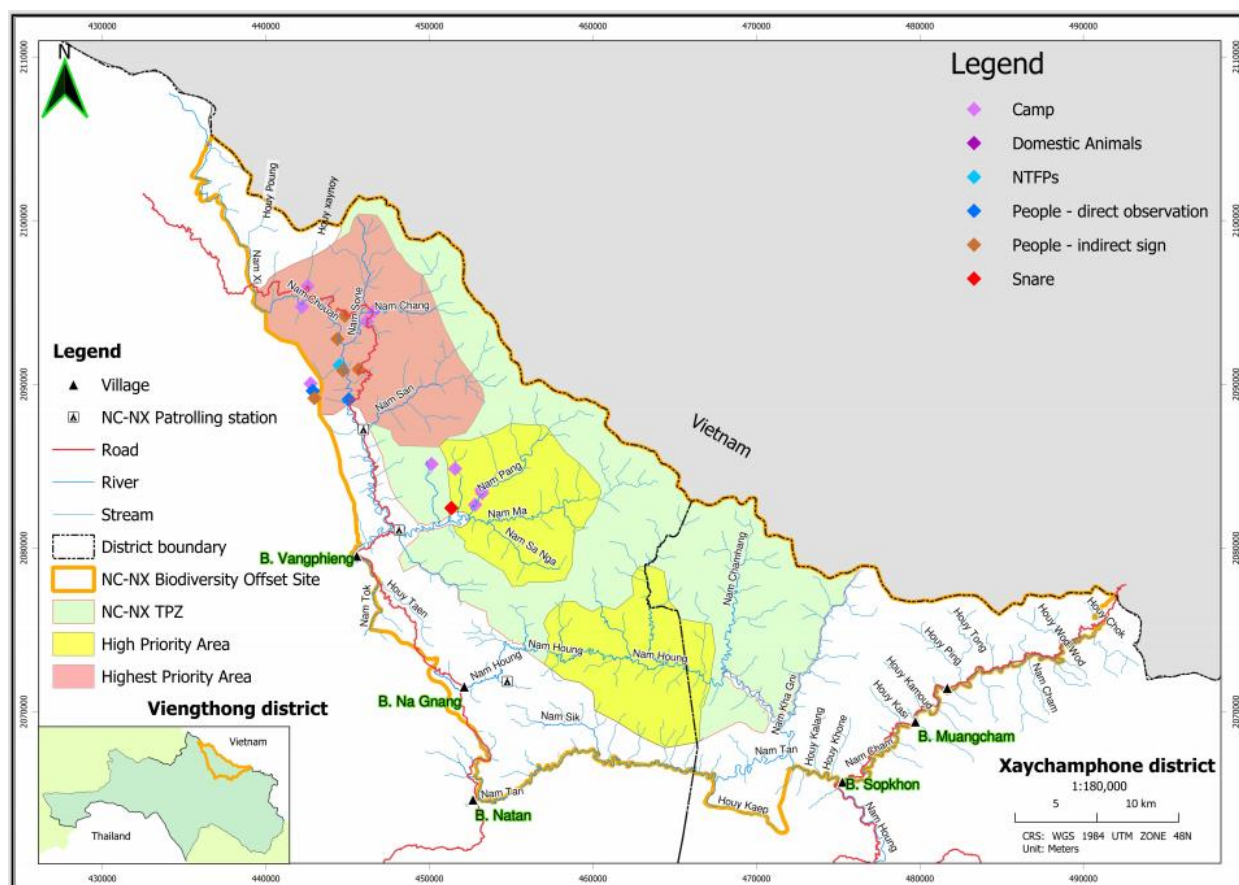


FIGURE 3.2-5 PHOTOS FOR MONTHLY PATROLLING IN THE FOURTH QUARTER 2024



	
NTFP collection camp was seen and demolished in November 2024	Stack of berberines observed in November 2024
	
NTFP collection camp was seen and demolished in December 2024	Giving written warnings to NTFP collectors in December 2024

c. Component 3 – Conservation Outreach

There were no outreach activities during the reporting period, as BSP-WCS and BOMU continued improving and preparing the contents and materials for the school outreach activity as of the end of December 2024. The meeting with relevant parties to discuss and finalize the materials is further postponed to Q1 2025.

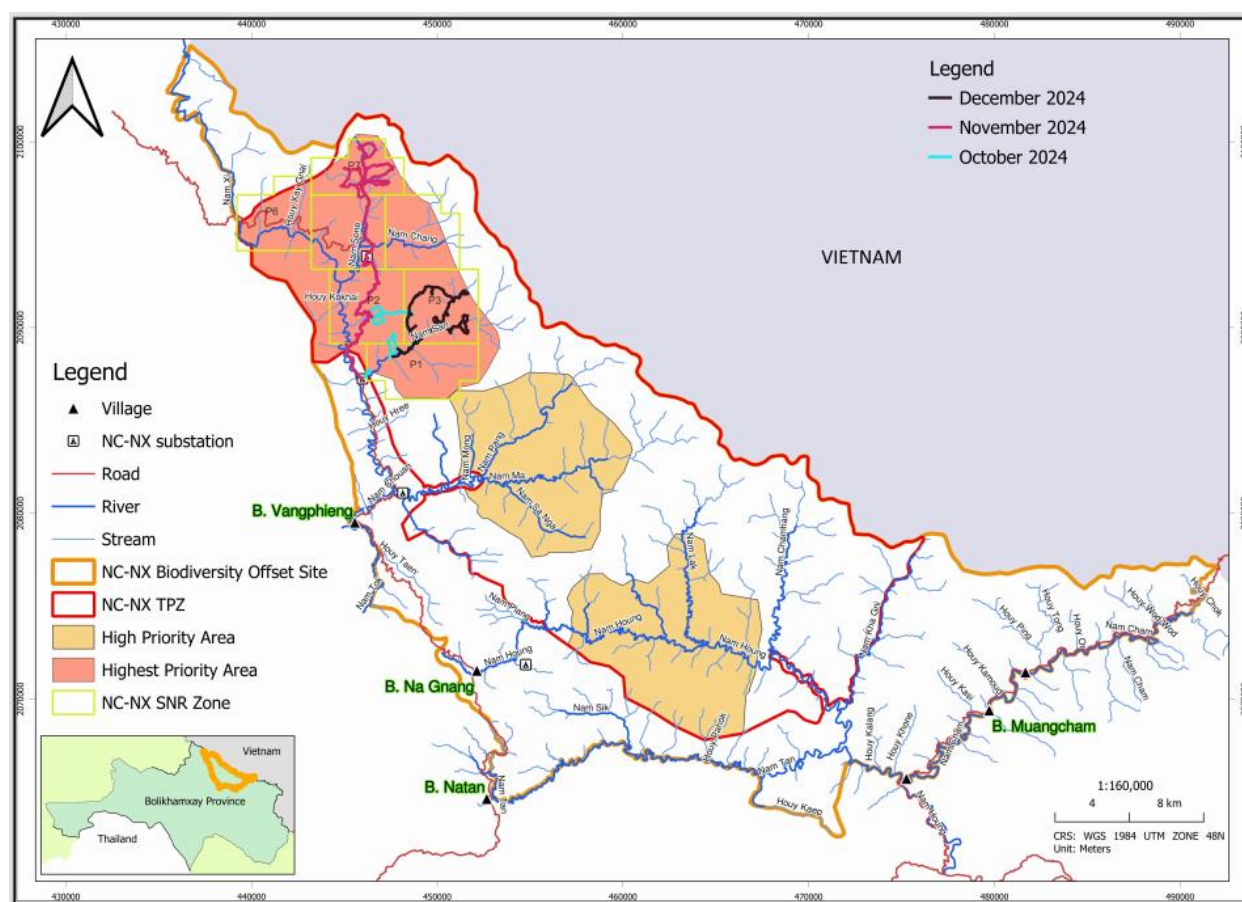
d. Component 4 – Conservation linked livelihood

Community Conservation Agreement (CCA)

BSP-WCS shared the revised draft CCA on 28 October 2024 and it was discussed during the monthly meeting on 12 November 2024. However, it was noted that the payment condition remains unclear. BSP-WCS continued working on the draft as of the end of December 2024.

Snare removal

The snare removal team conducted monthly snare removal in October, November and December 2024 in the TPZ highest priority area. The team did not observe and record any snares or other threats throughout the field patrolling.

FIGURE 3.2-6 MAP OF SNARE REMOVAL TRACK RECORDS IN THE FOURTH QUARTER 2024

e. Component 5 – Coordination and collaboration

BOMU and Pu Mat National Park of Vietnam organized the annual exchange meeting at Bolikhamxay PAFO on 23 October 2024. The official minutes of meeting (cooperation agreement) was shared on 11 December 2024 and summarized as follows:

- Both parties agree to seek opportunities in encouraging, attracting and proposing assistance from international organizations and individuals for forest protection and scientific research, especially for the wildlife ecological survey project by camera traps along the joint boundary between NC-NX offset site of Bolikhamxay PAFO and Pu Mat National Park of Nghe An Province.
- Both parties agree to cooperate on joint forest and biodiversity management; maintain the information exchange and support systems regarding the management of forest and biodiversity for each party regularly; exchange lessons learnt, support the use techniques of equipment, forest management tools, scientific research, prepare necessary documents to propose for the ASEAN heritage park, etc. Each party can seek, exchange and use information mentioned above for the technical work of each party.
- Both parties will cooperate and collaborate with border militaries of the two countries who are based in the area for patrolling to suppress hunting, trading, transporting and using of protected/prohibited wildlife species illegally along the joint boundary of Laos and Vient Nam within management area of each party. Both parties agree to conduct a joint patrolling in January 2025, together protecting the forest along the border between the two countries in

NC-NX offset site of Bolikhamxay province and Pu Mat National Park of Nghe An province. Pu Mat will be responsible for the food for both teams during the joint patrolling.

- Bolikhamxay PAFO of Lao PDR and Pu Mat National Park, Nghe An province of Viet Nam agree in appointing representatives for the exchange visit and exchange of lessons learnt in the management of forest and biodiversity one time per year. In 2025, Bolikhamxay PAFO will visit Pu Mat National Park.

FIGURE 3.2-7 PHOTOS OF EXCHANGE MEETING BETWEEN BOMU AND PU MAT NATIONAL PARK



f. Component 6 – Monitoring and reporting

The data and report on the camera trap survey which was carried out from November 2023 to February 2024, the gibbon survey from December 2023 to January 2024 and the otter survey from April to June 2024 are being analysed and prepared by BSP-WCS as of the end of Q4 2024.

3.2.2 Preparation of Annual Implementation Plan (AIP) 2025

BOMU, BSP-WCS and NNP1 EMO discussed the list of NC-NX AIP2025 activities during the monthly meeting on 13 November 2024. It was agreed that all the pending activities under the AIP2023 and AIP2024 will be carried over to 2025, while the remaining budget amounts will be deducted from the AIP2025 budget.

BOMU submitted the draft AIP2025 to NNP1 and BSP-WCS on 11 December 2024. NNP1 reverted back to BOMU on 18 December 2024 with some comments for further revisions. The plan is being revised by BOMU as of the end of December 2024.

4 FISHERY MONITORING

Four species groups and one species dominated the fish catch by weight in Q4 2024 as listed in **Table 4-1**. All species are classified as Least Concern (LC) according to the IUCN Red List of Threatened Species¹ and *Oreochromis niloticus* is an exotic species.

TABLE 4-1: FISH SPECIES DOMINATING THE FISH CATCH IN Q4 2024

Species	Lao Name	Fish Catch (kg)	IUCN Red List Classification
<i>Oreochromis niloticus</i>	ປານິນ	272.3	LC (exotic)
<i>Poropuntius normani</i> , <i>Poropuntius laoensis</i> , <i>Poropuntius carinatus</i>	ປາຈາດ	260.7	LC

Species	Lao Name	Fish Catch (kg)	IUCN Red List Classification
<i>Mastacembelus armatus</i> , <i>Mastacembelus favus</i>	ປາຫຼາດ	171.7	LC
<i>Hampala dispar</i> , <i>Hampala macrolepidota</i>	ປາສຸດ	141.9	LC
<i>Barbonymus gonionotus</i> , <i>Hypsibarbus malcolmi</i> , <i>Hypsibarbus vernayi</i> , <i>Hypsibarbus wetmorei</i>	ປາປາກ	154.5	LC

The recorded catch of Threatened species (IUCN Red List classification) in Q4 2024 are presented in **Table 4-2**. The list includes three species are classified as Vulnerable species (VU).

TABLE 4-2: THREATENED SPECIES OF Q4 2024 FISH CATCH

Species	Lao Name	Fish Catch (kg)	IUCN Red List Classification
<i>Cirrhinus cirrhosus</i>	ປາແກງ/ປານວນຈັນ	4.5	VU
<i>Scaphognathops bandanensis</i>	ປາປ່ຽນ/ປາວຽນໄຟ	53.5	VU
<i>Tor sinensis</i>	ປາແດງ	22	VU

Species abundance and occurrence is based on the 7-day reported catch from the DCL survey in Q4 2024. The catch is divided in 3 areas including above the main dam, below the main dam and Mekong area. Main biodiversity indicators in Q4 2024 for above dam, below dam and Mekong area are presented in **Table 4-3** and the Shannon biodiversity index has been calculated (the higher the value, the higher the diversity of species).

TABLE 4-3: MAIN BIODIVERSITY INDICATORS FOR Q4 2024

Biodiversity Indicators	Mekong	Below dam	Above dam
Total species and groups	29	54	41
Single species	23	37	28
Species groups	6	17	13
Top 15 species (% total catch weight)	97.04%	80.28%	90.58%
Proportion for species groups	32.32%	54.53%	46.27%
Diversity index (Shannon)	2.1722	3.0780	2.7165

Figure 4-1 shows fish diversity index (Shannon) for above dam, below dam and Mekong area from July 2015 to December 2024.

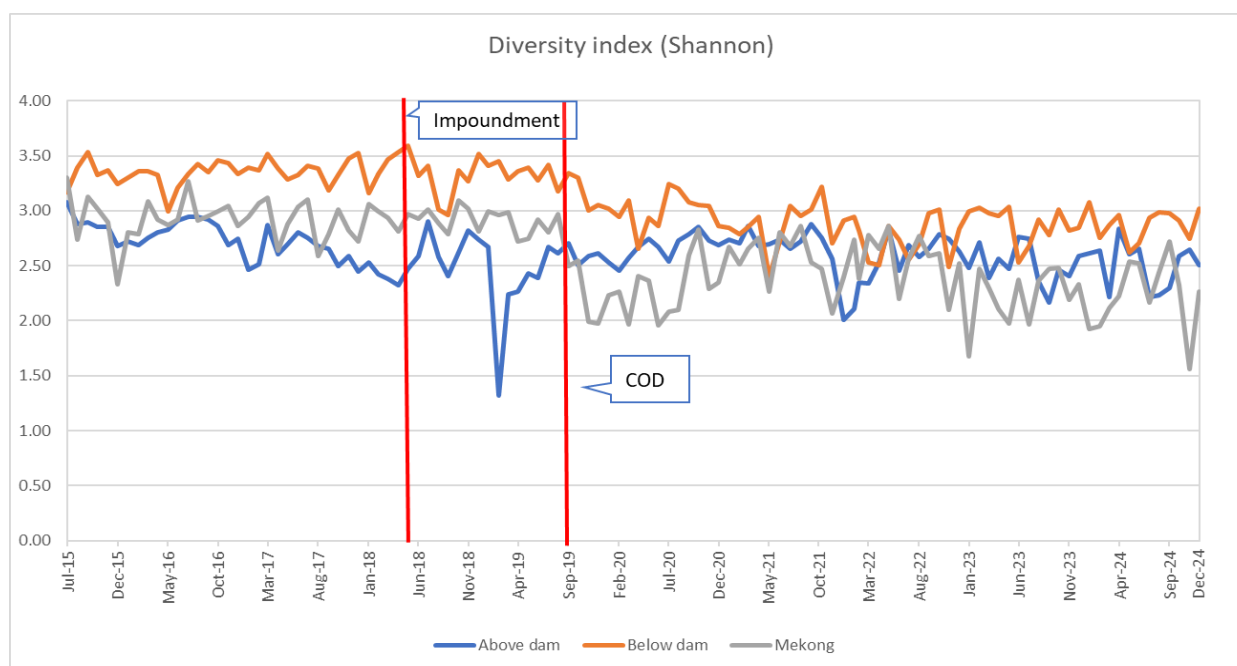


Figure 4-1: Fish Diversity Index (Shannon) by Fishing Zone from July 2015 to December 2024

The mean daily fish catch per household from July 2015 to December 2024 is displayed in **Figure 4-2** and the mean fish catch per household per fishing day for Q4 from 2015 to 2024 are shown in **Table 4-4**.

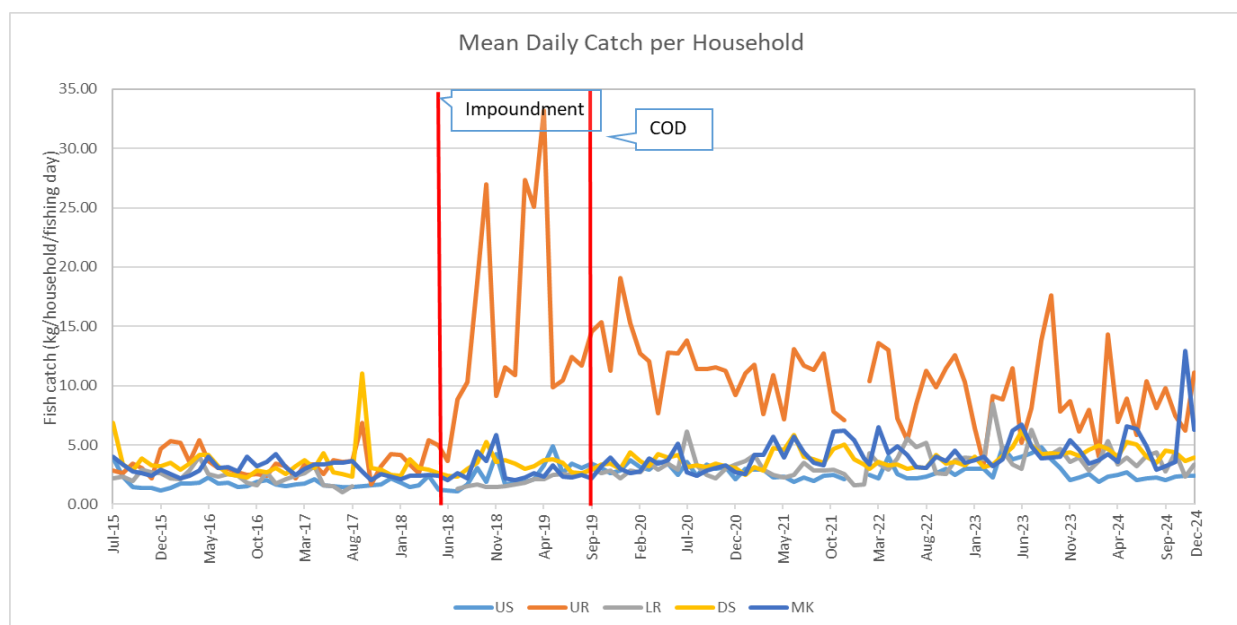


FIGURE 4-2: MEAN DAILY FISH CATCH PER HOUSEHOLD FROM JULY 2015 TO DECEMBER 2024

Table 4-4: MEAN DAILY FISH CATCH PER HOUSEHOLD FOR Q4 FROM 2015 TO 2024

Fishing Zone	Q42015 (kg)	Q4 2016 (kg)	Q4 2017 (kg)	Q4 2018 (kg)	Q4 2019 (kg)	Q4 2020 (kg)	Q4 2021 (kg)	Q4 2022 (kg)	Q4 2023 (kg)	Q4 2024 (kg)
Upstream	1.32	1.86	1.79	2.60	2.85	2.74	2.29	2.83	2.45	2.38
Upper reservoir	3.29	2.80	3.03	15.90	15.23	10.67	7.46	11.42	7.56	8.27

Fishing Zone	Q42015 (kg)	Q4 2016 (kg)	Q4 2017 (kg)	Q4 2018 (kg)	Q4 2019 (kg)	Q4 2020 (kg)	Q4 2021 (kg)	Q4 2022 (kg)	Q4 2023 (kg)	Q4 2024 (kg)
Lower reservoir	2.75	2.03	NA	1.48	2.52	2.85	2.34	3.42	4.06	3.34
Downstream	3.45	2.85	2.82	4.18	3.27	3.23	4.51	3.44	4.23	3.98
Mekong	2.65	3.67	2.29	3.89	3.36	3.03	5.91	3.89	4.68	7.58

The survey results in Q4 2024 indicate that Nam Ngiep is the main fishing habitat for the upstream and downstream zones, while the main fishing habitat for the upper reservoir, lower reservoir and Mekong zones is reservoir, tributaries and streams, and Mekong respectively. The proportion of fishing habitats in Q4 2024 are displayed in **Table 4-5**.

Table 4-5: PROPORTION OF THE CATCH REPORTED BY MAIN HABITATS (%) IN Q4 2024

Habitats	US	UR	LR	DS	MK
Mekong	0.0%	0.0%	0.0%	3.7%	97.6%
Nam Ngiep	50.4%	16.7%	0.0%	47.9%	1.1%
Nam Xan	0.0%	0.0%	0.0%	0.0%	0.0%
Reservoir	1.0%	76.7%	7.2%	0.0%	0.0%
Tributary and stream	47.8%	5.6%	92.3%	44.4%	0.0%
Wetland	0.7%	1.1%	0.5%	4.1%	1.2%
Others	0.0%	0.0%	0.0%	0.0%	0.0%

Total reported fish and other aquatic animal (OAA) catch (proportion of OAA) for the same 7-day period in Q4 from 2015 to 2024 are shown in **Figure 4-3**.

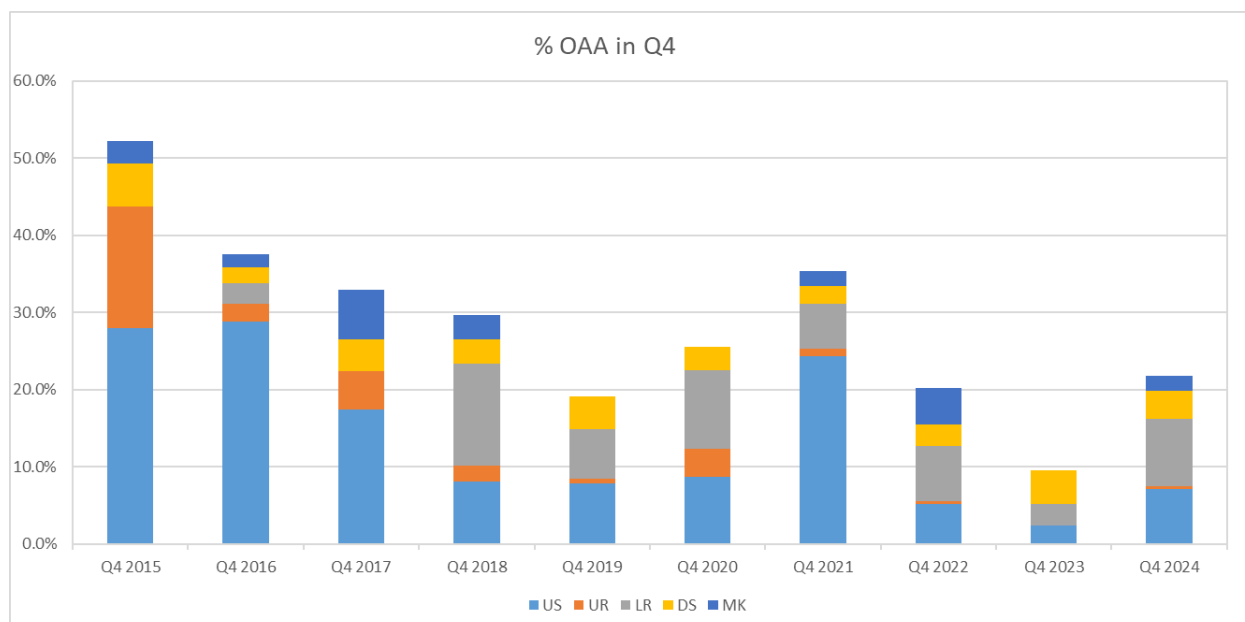


FIGURE 4-3: PROPORTION OF OAA TO THE TOTAL REPORTED KILOGRAM (KG) OF FISH AND OAA FOR A 7-DAY PERIOD BY FISHING ZONE IN Q4 FROM 2015 TO 2024

5 Health and Safety

5.1 RELATED TO NNP1PC HEALTH AND SAFETY

A summary of the safety incidents reported during the Construction Phase (up to the end of August 2019) are provided in the *Q4 2020 Environmental Monitoring Report (October to December 2020)*.

A summary of the safety incidents reported during the Operation Phase (September 2019 to December 2024) are provided in **TABLE 5.1-1**.

TABLE 5.1-1: SAFETY INCIDENTS REPORTED DURING THE OPERATION PHASE (SEPTEMBER 2019 TO DECEMBER 2024)

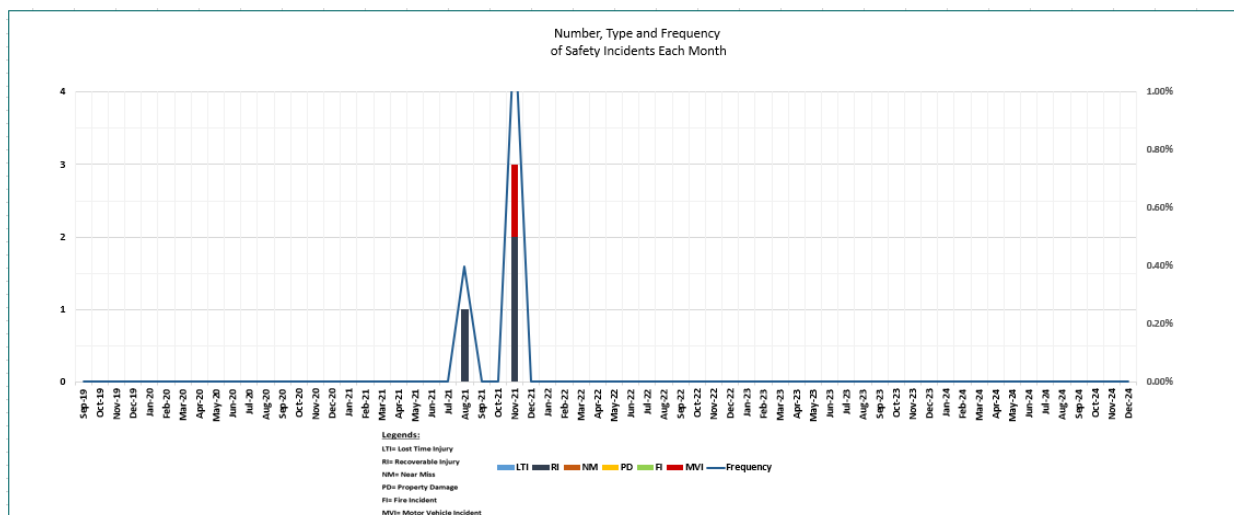
Type of Incidents	LTI	RI	NM	PD	FI	MVI	Total
No. of Incidents in Q4, 2024	0	0	0	0	0	0	0
Cumulative Total Incidents to 31 December 2024	0	3	0	0	0	1	4

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 accident reported in Q4 2024.

The histogram below in **Figure 5.1-1** shows the number of reported incidents in each month since the start of the Operation Phase (September 2019) with the colour indicating the type of incident including near misses. 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.



■ LTI ■ RI ■ NM ■ PD ■ FI ■ MVI — Frequency

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

FIGURE 5.1-1: NUMBER, TYPE AND FREQUENCY OF SAFETY INCIDENTS FROM SEPTEMBER 2019 TO 31 DECEMBER 2024

The second histogram in **Figure 5.1-1** shows the number of persons who were injured, or lost their lives in the reported Lost Time Incidents.

Since Q4 of 2021, two cases of Recordable Injury (RI) and one case of Motor Vehicle Incident (MVI) have been recorded.

There were no health and safety incidents in Q4 2024.

5.1.1 Health and Safety Training and Emergency Drills in the Project site

Safety inductions were conducted in Q4 2024 for newcomer staffs and contractors. The main objectives of the safety induction are to let staffs, contractors and local labours understand the general measures for safety and assistance, including awareness of high slopes, sharp bamboo or trees, dangers from snakes, bees and wasps, dehydration while working in heat weather, safe condition of hand tools, communication each other while working in difference level of ground while doing the work.

No emergency drill was conducted in Q4 2024.





FIGURE 5.1-2: REPRESENTATIVE PHOTOS OF THE SAFETY INDUCTION TRAINING DURING Q4 2024

5.2 RELATED TO COVID-19

The country officially opened in September 2022. However, NNP1PC still encourages COVID-19 countermeasures which include basic precautions of personal hygiene practices by frequent washing hands with alcohol-based gel, mask wearing in the workplace as well as avoiding mass gathering.

5.2.1 NNP1PC COVID-19 Measures

General Instructions:

- All staff are requested to strictly follow preventative measures against COVID-19 such as:
 - keeping physical distance of at least 1 meter from others, even if they do not appear to be sick;
 - avoiding the 3Cs, spaces that are closed, crowded or involve close contact;
 - wearing a properly fitted mask when physical distancing is not possible and in poorly ventilated settings;
 - cleaning the hands frequently with alcohol-based hand rub or soap and water;

- covering the mouth and nose with a bent elbow or tissue when you cough or sneeze. Dispose of used tissues immediately and clean hands regularly; and
- self-isolating until recovery in case of any symptoms or tested positive for COVID-19.
- A disposable medical face mask will be provided for each staff every day and more as appropriate upon agreement by the supervisor for high-risk staff who need to be working with local communities/contact with external stakeholders. Appropriate disposal in the bin is required to avoid possible infection.

Specific Instructions:

Contractors inside and outside the Project areas are required to implement the followings at all times:

- (A) All contractors' personnel are required to strictly follow preventative measures against COVID-19 such as:
 - getting vaccinated as soon as possible following Governmental guidance on vaccination;
 - keeping physical distance of at least 1 meter from others, even if they do not appear to be sick;
 - avoiding the 3Cs, spaces that are closed, crowded or involve close contact;
 - wearing a properly fitted mask when physical distancing is not possible and in poorly ventilated settings;
 - cleaning your hands frequently with alcohol-based hand rub or soap and water;
 - covering your mouth and nose with a bent elbow or tissue when you cough or sneeze. Dispose of used tissues immediately and clean hands regularly; and
 - self-isolating until recovery in case of any symptoms or tested positive for COVID-19.
- (B) Relevant Division shall ensure that all contractors' personnel working for the NNP1 Project are regularly checked for body temperatures and use of face masks/hand gel in their camps and working places.
- (C) Contractors' personnel in OSOV1 or OSOV2 have to continuously check their body temperature using a thermometer provided at the entrance of OSOV1 and OSOV2 at least once a day.
- (D) If a contractors' personnel is found to have any symptoms of COVID-19 (i.e. dry cough, high fever, difficult breathing, sweats, chills, headaches), high temperature or flulike symptoms, the contractor shall inform NNP1PC of relevant information immediately.

5.2.2 General situation of COVID-19 in NNP1PC

There was no case COVID-19 infection in the third quarter 2024.

6 External missions and visits

There was no external mission during the reporting period.

APPENDICES

APPENDIX 1: THE SITE INSPECTION RESULTS DURING Q4 2024

No	Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow-up Date	Status
1	ON-ADM-0016	26-Jul-24	OSOV2	The OSOV2's wastewater tank (chlorination tank) had continued to crack, resulting in minimal portion of wastewater, still undergoing treatment, leaking into the environment. The crack has expanded significantly since previous inspections. No progress has been made in repairing the crack. Additionally, untreated wastewater was found overflowing from the anaerobic tank, indicating improper adjustment if the automatic wastewater pump.	ADM was instructed to (i) repair the crack in the OSOV2's wastewater tank to prevent untreated wastewater from leaking into the environment; and (ii) to inspect and recalibrate the automatic wastewater pump to ensure proper operation. This may involve adjusting the float switch or sensor that triggers the pump to activate when wastewater levels reach a certain point. ADM shall also establish a regular inspection and maintenance schedule for all wastewater tanks and pumps to identify and address potential issues before they escalate.	Urgently	23-Oct-24	Resolved (The corrective action was verified and accepted)
2	ON-TD-0018	23-Oct-24	SCI's Workshop	During this joint site inspection, it was observed that the SCI workshop lacked temporary toilet, waste bins, and proper roofing for the hazardous material and waste storage area.	TD will follow up and coordinate to SCI contractor to provide temporary toilet, waste bins, and install proper roofing for hazardous material and waste storage area.	Within Oct 2024	24-Dec-24	Resolved (The corrective action was verified and accepted)

No	Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow-up Date	Status
3	ON-TD-0019	28-Nov-24	SCI's Explosive Storage	A joint site inspection found several hunting tools, including snares, a handmade fishing gun, and a fishing net, inside the guardhouse. Five army personnel guarding the explosive storage admitted ownership of the items. Despite receiving prior HSE induction, their actions breached the NNP1PC Code of Conduct: "Trade in Wild Animals and Plants: Project staff are expressly forbidden from hunting, taking, selling or buying any plant or animal, or product from any plant or animal, protected under Lao law. Any staff found in possession of a protected animal or plant, or reported as being in possession of any part of such a plant or animal, shall be brought before the Lao authorities for investigation. Any individual proven to be trading, killing, taking or consuming such plants or animals shall be dismissed immediately". Additionally, this violates NNP1PC's Environmental Management Measures (ESMMP-CP, Vol. III, Sub-plan 09: Biodiversity Management, Section 09.10), which prohibit all project staff, including service personnel, from harvesting forest products or hunting any wildlife, both terrestrial and aquatic.	The army was instructed to remove all hunting tools immediately; TD and EMO have reported the issue to their contractor (SCI) for close monitoring and verification; TD and EMO will arrange a refresher HSE training for all involved personnel by December 2024. Note: If this issue persists, SCI will issue at least an NCR Level 2, and the offending personnel may be immediately dismissed from the project.	Immediately	12-Dec-24	Resolved (The corrective action was verified and accepted)

APPENDIX 2: ENVIRONMENTAL MONITORING CORRECTIVE ACTIONS Q4 2024

No	Aspect	Issue Description	Corrective Action Requests	Requested Timeline	Corrective Actions by NNP1PC (As of September 2024)
1	EAP	Hat Gniun: Muster point cannot be reached (private property), too far from village, access road flood-prone, may not be passable during rainy season: no realistic EAP for this village.	Identify realistic muster point (check suitability of two hills identified during May 2023 site visit). Conditions: sufficient elevation, as close as possible to village, accessible. Make muster point accessible (clear vegetation if required, no fences).	Q2 2024	<u>In progress:</u> - During July to September 2024, the DDMC represented by the Special Taskforce, HGN village authorities, landowner and SMO/ESD completed the MoM to use the private land as a village muster point due to its suitable elevation for Emergency Level 4 , the access road to the point has been improved facilitating access during both dry and wet seasons.
		Thahuea: suitable muster point identified, but not accessible due to dense vegetation.	Make accessible (clear overgrown path, keep open by regular cutting).	Q2 2024	<u>In progress:</u> The emergency evacuation drill was carried out on 16 August 2024 at the place near the emergency muster point. The emergency muster point clearance and access road improvement has been completed by the end of September 2024.
			Both villages: carry out drill under realistic conditions (i.e., people actually reaching identified muster point). Situation Jan. 2024 Both villages: try to increase participation in drills (ideally: minimum of one person from each household).	Ongoing	<u>In progress:</u> - The emergency evacuation drills of HGN and TH were completed on 15 and 16 August 2024. The participation was low compared to the total village population.

No	Aspect	Issue Description	Corrective Action Requests	Requested Timeline	Corrective Actions by NNP1PC (As of September 2024)
		Houay Soup Noy dam (irrigation reservoir): spillway sufficient for evacuating even exceptional flood. Village not threatened in case of a dam break, however, people in the demonstration farm or working in the fields would be at risk.	Confirm statements about spillway and exposure of village; check with Technical LTA. Include warning system and evacuation plan for farm and fields in EAP. Situation Jan.2024 Muster point identified. Maps of flood risk indicate that the village is not directly at risk from floods related to dam break. Opinion of Technical LTA on dimension and sufficiency of spillway not received yet.	Next Site Visit of Techn. LTA	<u>In progress:</u> - The inundation map in case of the irrigation dam break was created and is being studied. - The statement of evacuation plan in the EAP in case of the Dyke Break will be confirmed as the potential flood is in the same area in case of the irrigation dam break. Following a discussion with LTA during their visit in January 2024. The LTA observed that: • Muster point identified. Maps of flood risk indicate that the village is not directly at risk from floods related to dam break. • Opinion of Technical LTA on dimension and sufficiency of spillway not received yet. - People in the Agriculture Extension and Demonstration Centre will be warned about the flood risks - During July to September 2024, the map of Houay Soup Noy irrigation dam flooding area has been completed, and as the flooded area is the same as the area for Re-regulation dam breach, the emergency drill for farmers and staffs who are working at the demonstration centre is required to implement for the upcoming rainy season of 2025.

No	Aspect	Issue Description	Corrective Action Requests	Requested Timeline	Corrective Actions by NNP1PC (As of September 2024)
2	Critical water depth	In Nam Ngiep downstream of the dam minimum water depth of 0.5 m cannot be kept during conditions of minimum flow. Identified as “not a problem”.	Confirm: if users of respective sites agree that there is no such problem, make official statement and stop monitoring. If there is a problem, take measures (deepening of passage, removal of barrier) and confirm effectiveness.	End of dry season 2024	<u>In progress:</u> In accordance with the LTA’ recommendation, NNP1PC (EMO and TD) has closely monitored water depth in the thalweg of the Nam Ngiep River downstream the reregulation dam when the discharge is approx. 27 m³/s to: - Monthly interviews were conducted with the downstream residents, who use boats. - During the interviews in this quarter there were no concerns about boat navigation. - NNP1PC has consulted with the Environmental and social specialist who recommended that revisions to the monitoring programme should be made as part of ESMMP-OP update which will be commenced from Q4 2024 to Q1 2025.
3	Fisheries Management Plan	Still no Fisheries Management Plan. Main issue seems to be lack of commitment from Xaysomboun Province	Undertake every effort required for solving this issue.	Q2 2024	<u>Follow-up:</u> See 3.1.1, point a) for the progress of the FCMP approval.
4	Watershed Management Plan	Excessive slash-and-burn activity around reservoir. Critical issue for biodiversity (NNL), but also leading to massive sheet erosion.	Reinforce activities for protecting the watershed area (land use, fishing) according to contractual requirements.	Q2 2024	<u>Follow-up:</u> See 3.1.1.3, point b). No Net Loss (NNL) within the NNP1 Watershed.

No	Aspect	Issue Description	Corrective Action Requests	Requested Timeline	Corrective Actions by NNP1PC (As of September 2024)
5	Irrigation system	Section with Category A damage.	Make reinforcement as soon as possible, before collapse of the section.	Issue solved	Completed: - The observed damages were repaired in April 2024.
		Pump for providing irrigation water; installation work started.	Confirm operation of pump	Issue solved	In progress: - NNP1PC originally planned to hand over the irrigation system to local authorities or the water user group in June 2024. - However, the handover was postponed to October 2024 to allow for the completion of the refurbishment of 79 individual sliding gates. - In addition, the District Agriculture and Forestry Office must fully inspect and confirm satisfaction with the system's quality before the final handover takes place.

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

SITE CODES AND LOCATION STATION FOR SURFACE WATER QUALITY MONITORING

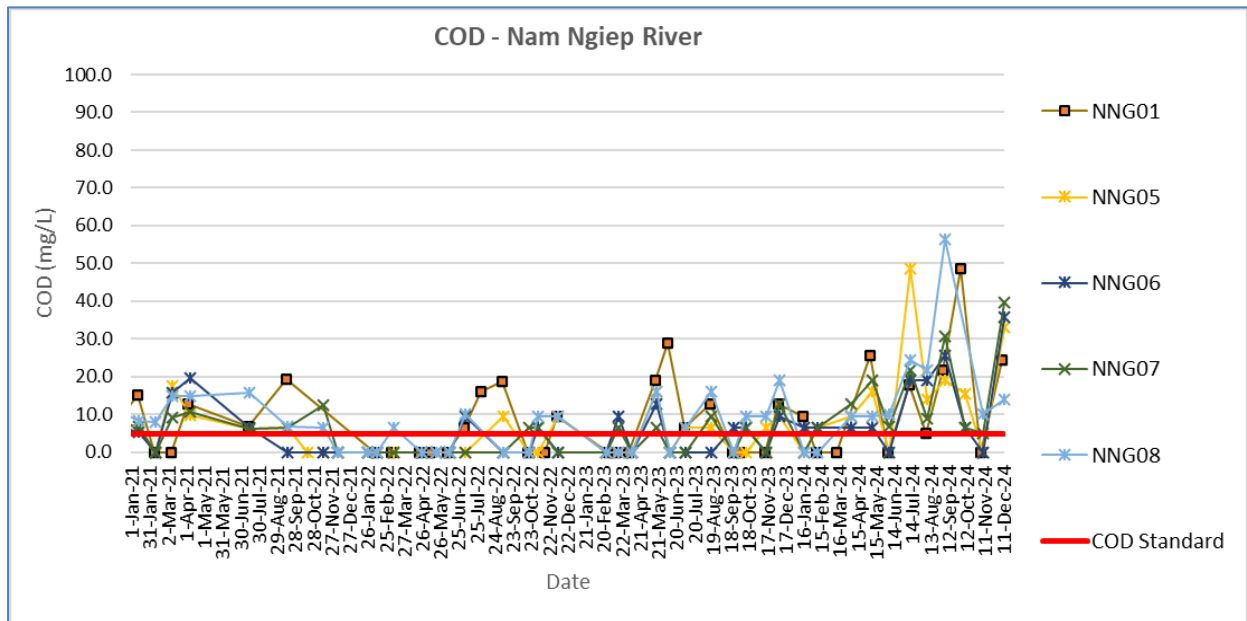
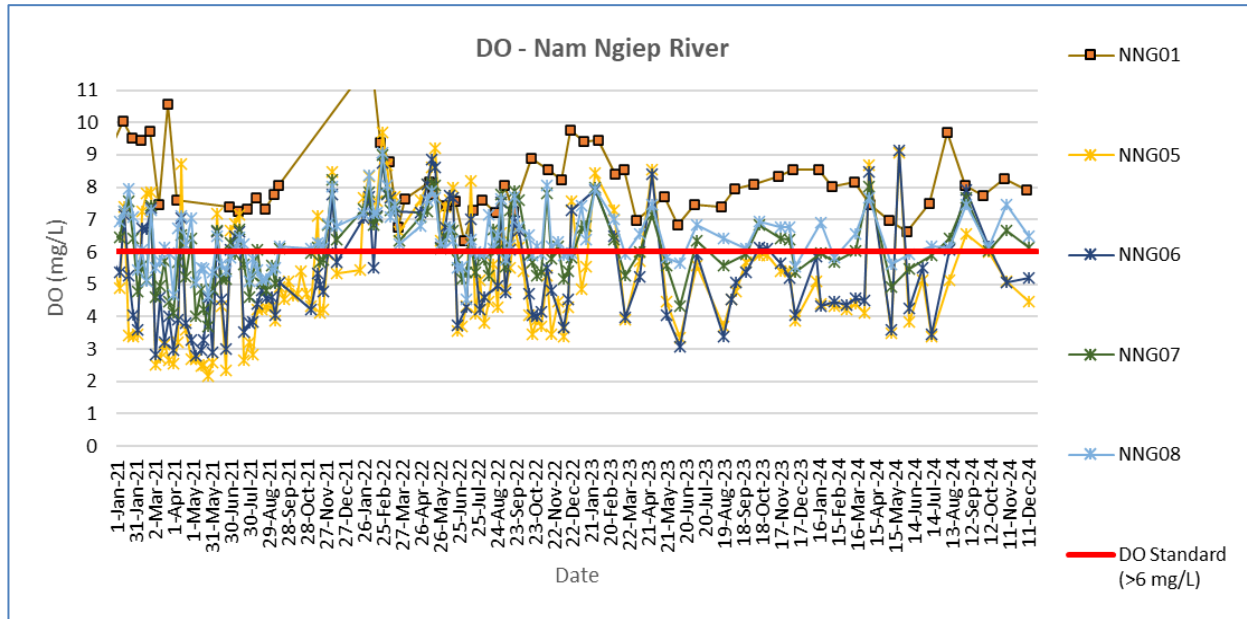
Site Code	Location station	Zone
NNG01	Nam Ngiep Upstream of Phiengta Village	Upstream Project Construction Site
R01	Main reservoir upstream main dam approx. 50 Km.	
R02	Main reservoir upstream main dam approx. 35 Km.	
NNG02/R03	Nam Ngiep Upstream of Nam Phouan Confluence / Main reservoir upstream main dam approx. 21 Km.	
NNG03/R04	Nam Ngiep Downstream of Sopyouak Village/ 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 Hat Gniun Village	Downstream Project Construction Site
NNG06	Nam Ngiep Downstream of Nam Xao Confluence	
NNG07	Nam Ngiep at Somsuen Village	
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

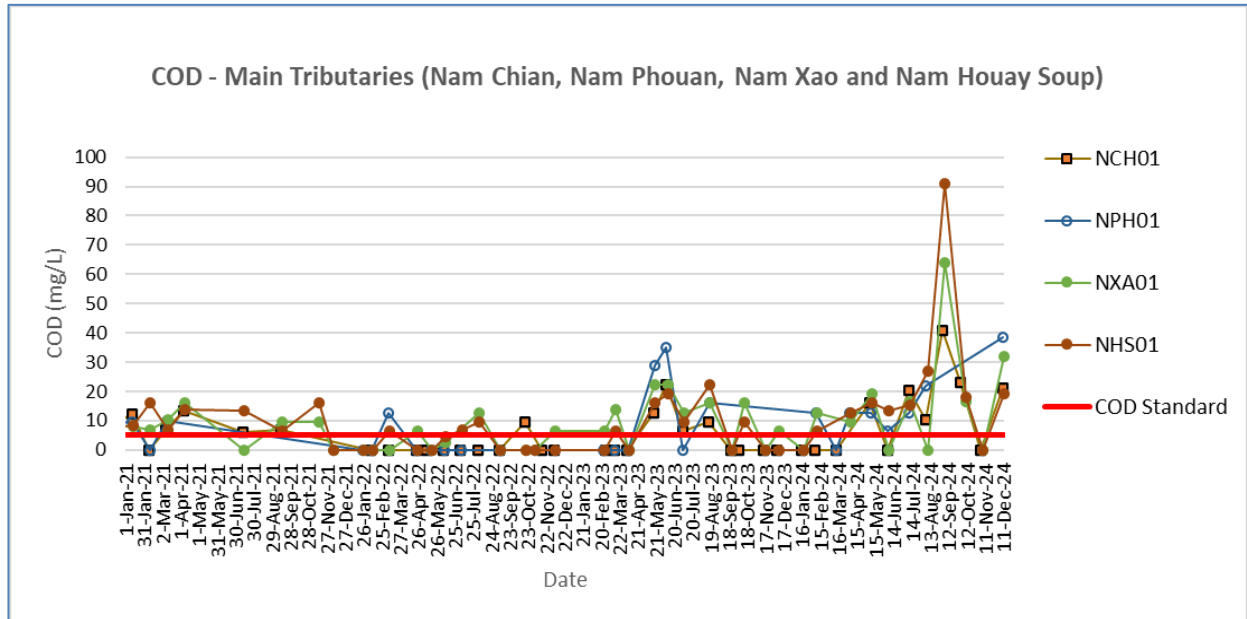
Frequency of Monitoring	Parameters (Unit)	Monitoring Sites
Weekly	pH, DO (%), DO (mg/L), Conductivity ($\mu\text{S}/\text{cm}$), Temperature ($^{\circ}\text{C}$), Turbidity (NTU).	- Main Reservoir: R01, R02, R03, R04, R05; - Re-regulation Reservoir: R06 and R07.
Monthly	pH, DO (%), DO (mg/L), Conductivity ($\mu\text{S}/\text{cm}$), Temperature ($^{\circ}\text{C}$), Turbidity (NTU).	- NNG01, NCH01, NPH01, NNG05, NNG06, NNG07, NNG08, NXA01 and NHS01
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), Chlorophyll a, TOC and TKN.	As per ESMMP-OP. Noted: Hydrogen sulphide and Phytoplankton biomass remained in the analysis program for Q1 2023, but they were no longer monitored starting from Q2 2023.

APPENDIX 4: KEY TRENDS OF WATER QUALITY MONITORING FROM JANUARY 2021 TO END OF DECEMBER 2024 (ONLY PARAMETERS THAT EXCEEDED THE STANDARDS)

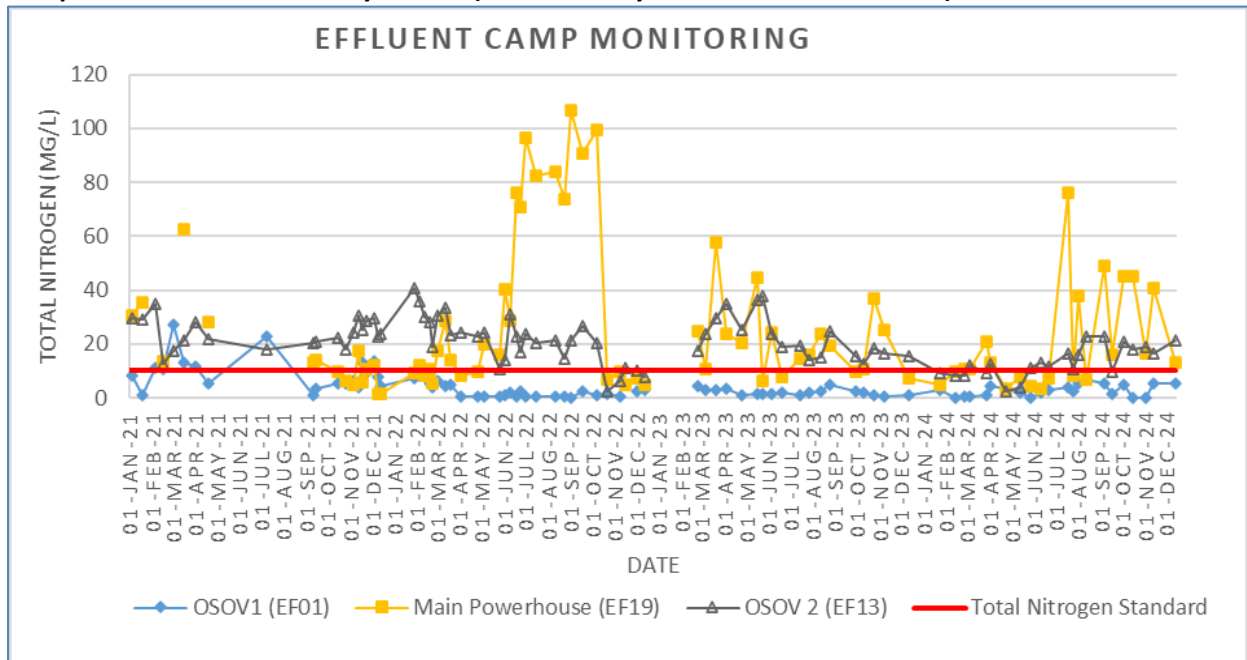
Nam Ngiep Surface Water

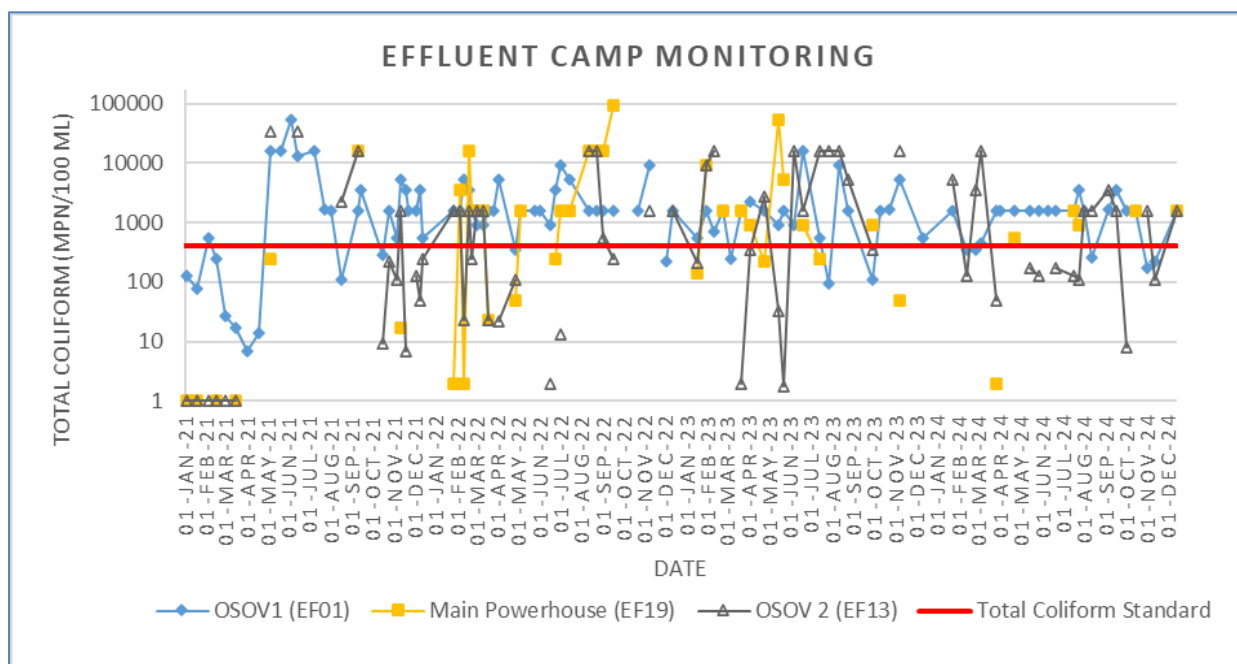
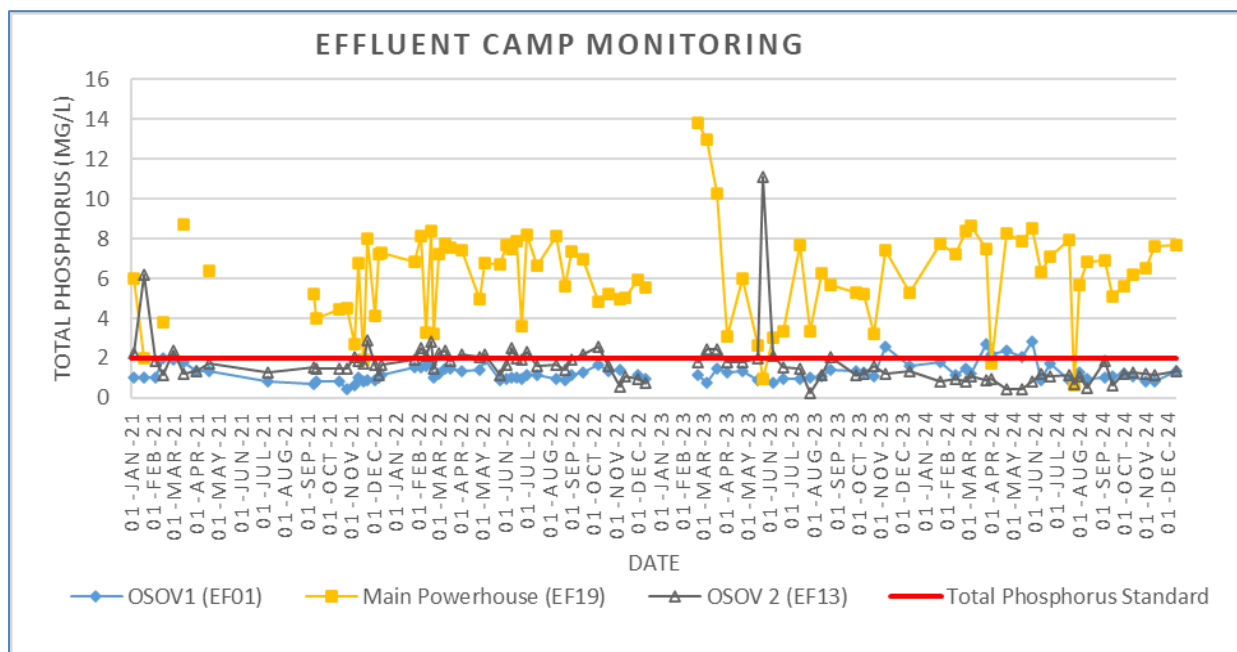


Key Water Quality Parameters for the Nam Ngiep Tributaries: Nam Chian, Nam Phouan, Nam Xao, Nam Houay Soup



Camps' Effluent Water Quality Trends (Since January 2021 to December 2024)





APPENDIX 5: WATER QUALITY MONITORING DATA
APPENDIX 5-1: SURFACE WATER QUALITY MONITORING – Q4 2024

		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						Re-Regulation Reservoir/Within		Downstream				Tributaries Upstream		Tributaries Downstream	
			Station Code	NNG01	R01	R02	R03	R04	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01
Date	Parameters (Unit)	Guideline																
1-Oct-24	pH	5.0 - 9.0	6.39											6.36				
8-Oct-24	pH	5.0 - 9.0		6.91	6.59	6.46												
9-Oct-24	pH	5.0 - 9.0					6.72	6.96	7.05	7.13								
10-Oct-24	pH	5.0 - 9.0									6.85	7.27	7.37	7.3			7.08	7.31
15-Oct-24	pH	5.0 - 9.0		7.28	7.05	7.22	6.84											
16-Oct-24	pH	5.0 - 9.0						7.17	7.47	7.55								
30-Oct-24	pH	5.0 - 9.0		7.44	6.74	7.24	6.58											
31-Oct-24	pH	5.0 - 9.0						6.87	6.98	7.09								
4-Nov-24	pH	5.0 - 9.0	6.63											6.52				
5-Nov-24	pH	5.0 - 9.0		7.35	6.94	6.76												
7-Nov-24	pH	5.0 - 9.0									7.04	7.42	7.3	7.54			7.17	7.4
8-Nov-24	pH	5.0 - 9.0					6.74	7.54	7.3	7.42								
13-Nov-24	pH	5.0 - 9.0		6.69	6.86	6.98												
14-Nov-24	pH	5.0 - 9.0						7.3	7.85	7.85								
20-Nov-24	pH	5.0 - 9.0						7.07	7.61	7.38								
21-Nov-24	pH	5.0 - 9.0		7.1	6.86	6.87	7.27											
26-Nov-24	pH	5.0 - 9.0		7.17	7.16	7.06	7.04											
27-Nov-24	pH	5.0 - 9.0						7.19	7.33	7.45								
4-Dec-24	pH	5.0 - 9.0		7.57	7.54	7.49	6.84											
5-Dec-24	pH	5.0 - 9.0						7.35	7.51	7.59								
9-Dec-24	pH	5.0 - 9.0	7.13											7.19				
10-Dec-24	pH	5.0 - 9.0		7.43	7.35	7.3									7.1			
11-Dec-24	pH	5.0 - 9.0					7.16	7.02										
12-Dec-24	pH	5.0 - 9.0							7.5	7.44	7.44	7.2	7.68	7.78			7.61	7.47
17-Dec-24	pH	5.0 - 9.0		7.76	7.52	7.55	7.13										7.61	7.47
18-Dec-24	pH	5.0 - 9.0						7.49	7.68	7.75							7.61	7.47

		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						Re-Regulation Reservoir/Within		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																
24-Dec-24	pH	5.0 - 9.0		7.51	7.32	7.34	6.94									7.61	7.47	
25-Dec-24	pH	5.0 - 9.0						7.47	7.72	7.66						7.61	7.47	
1-Oct-24	Sat. DO (%)		95.4											102.3				
8-Oct-24	Sat. DO (%)			119.7	113.1	104.9												
9-Oct-24	Sat. DO (%)						95.1	106	39.2	44.8								
10-Oct-24	Sat. DO (%)										73.2	75.2	71.1	75.6		88	85.6	
15-Oct-24	Sat. DO (%)			106.2	100.1	95.2	87.7											
16-Oct-24	Sat. DO (%)							95.9	41.4	60								
30-Oct-24	Sat. DO (%)			98.2	87.4	99.9	92.7											
31-Oct-24	Sat. DO (%)							97.8	38.9	42.5								
4-Nov-24	Sat. DO (%)		97.5											97.6				
5-Nov-24	Sat. DO (%)			105.3	94.5	98.7												
7-Nov-24	Sat. DO (%)										61.4	61.2	81.2	90.8		90.1	83.5	
8-Nov-24	Sat. DO (%)						76.6	80.1	55.1	51.1								
13-Nov-24	Sat. DO (%)			119.7	109.2	124.5												
14-Nov-24	Sat. DO (%)							101.8	53.8	48.8								
20-Nov-24	Sat. DO (%)							92.5	40.9	43								
21-Nov-24	Sat. DO (%)			98.5	78.2	94.7	93.8											
26-Nov-24	Sat. DO (%)			95.3	84.7	103.9	94											
27-Nov-24	Sat. DO (%)							84.8	35.3	40								
4-Dec-24	Sat. DO (%)			111.8	87	101.6	96.7											
5-Dec-24	Sat. DO (%)							77.9	39.3	37.8								
9-Dec-24	Sat. DO (%)		94.3											104.8				
10-Dec-24	Sat. DO (%)			121.5	102.4	113.7									123.1			
11-Dec-24	Sat. DO (%)						92.3	82										
12-Dec-24	Sat. DO (%)								37.4	24.5	44.2	62.3	74.3	79.2		87.1	76.8	
17-Dec-24	Sat. DO (%)			74.2	62.1	64.6	71.2											
18-Dec-24	Sat. DO (%)							65.7	51.6	67.2								
24-Dec-24	Sat. DO (%)			91.7	73.1	75.5	78.4											

		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						Re-Regulation Reservoir/Within		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																
25-Dec-24	Sat. DO (%)						77.8	58	56.4									
1-Oct-24	DO (mg/L)	>6.0	7.73											8.43				
8-Oct-24	DO (mg/L)	>6.0		8.99	8.52	7.94												
9-Oct-24	DO (mg/L)	>6.0					7.25	8.19	3.24	3.69								
10-Oct-24	DO (mg/L)	>6.0									6.01	6.16	6.04	6.13			7.03	6.9
15-Oct-24	DO (mg/L)	>6.0		7.88	7.51	7.01	7.55											
16-Oct-24	DO (mg/L)	>6.0						7.41	3.44	4.89								
30-Oct-24	DO (mg/L)	>6.0		7.69	6.76	7.63	7.2											
31-Oct-24	DO (mg/L)	>6.0						7.68	3.2	3.5								
4-Nov-24	DO (mg/L)	>6.0	8.27											8.51				
5-Nov-24	DO (mg/L)	>6.0		8.3	7.36	7.69												
7-Nov-24	DO (mg/L)	>6.0									5.1	5.05	6.65	7.45			7.5	6.79
8-Nov-24	DO (mg/L)	>6.0					6.2	6.39	4.48	4.11								
13-Nov-24	DO (mg/L)	>6.0		9.47	8.5	9.77												
14-Nov-24	DO (mg/L)	>6.0						8.15	4.42	4.02								
20-Nov-24	DO (mg/L)	>6.0						7.37	3.37	3.52								
21-Nov-24	DO (mg/L)	>6.0		7.67	6.14	7.46	7.44											
26-Nov-24	DO (mg/L)	>6.0		7.5	6.66	8.11	7.47											
27-Nov-24	DO (mg/L)	>6.0						6.76	2.93	3.28								
4-Dec-24	DO (mg/L)	>6.0		8.83	6.83	8.08	7.75											
5-Dec-24	DO (mg/L)	>6.0						6.33	3.24	3.1								
9-Dec-24	DO (mg/L)	>6.0	7.9											8.71				
10-Dec-24	DO (mg/L)	>6.0		9.64	8.18	9.13									10.48			
11-Dec-24	DO (mg/L)	>6.0					7.43	6.59										
12-Dec-24	DO (mg/L)	>6.0							3.1	2.05	4.47	5.19	6.14	6.49			7.36	6.76
17-Dec-24	DO (mg/L)	>6.0		6.13	5.22	5.2	5.83											
18-Dec-24	DO (mg/L)	>6.0						5.42	4.26	5.62								
24-Dec-24	DO (mg/L)	>6.0		7.7	6.05	6.18	6.51											
25-Dec-24	DO (mg/L)	>6.0						6.48	4.83	4.67								

		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						Re-Regulation Reservoir/Within		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-Oct-24	Conductivity (µs/cm)		77											27				
8-Oct-24	Conductivity (µs/cm)			64	60	54												
9-Oct-24	Conductivity (µs/cm)						54	55	62	62								
10-Oct-24	Conductivity (µs/cm)										65	65	65	65		124	19	
15-Oct-24	Conductivity (µs/cm)			63	63	55	55											
16-Oct-24	Conductivity (µs/cm)							55	64	63								
30-Oct-24	Conductivity (µs/cm)			64	62	57	55											
31-Oct-24	Conductivity (µs/cm)							54	63	63								
4-Nov-24	Conductivity (µs/cm)		87											28				
5-Nov-24	Conductivity (µs/cm)			64	66	55												
7-Nov-24	Conductivity (µs/cm)										65	67	71	72		155	58	
8-Nov-24	Conductivity (µs/cm)						55	54	64	63								
13-Nov-24	Conductivity (µs/cm)			64	67	56												
14-Nov-24	Conductivity (µs/cm)							54	64	64								
20-Nov-24	Conductivity (µs/cm)							54	66	65								
21-Nov-24	Conductivity (µs/cm)			65	65	56	55											
26-Nov-24	Conductivity (µs/cm)			65	65	57	55											
27-Nov-24	Conductivity (µs/cm)							54	66	66								
4-Dec-24	Conductivity (µs/cm)			66	65	56	55											
5-Dec-24	Conductivity (µs/cm)							55	66	65								
9-Dec-24	Conductivity (µs/cm)		120											107				
10-Dec-24	Conductivity (µs/cm)			66	64	56									55			
11-Dec-24	Conductivity (µs/cm)						54	55										
12-Dec-24	Conductivity (µs/cm)								67	67	67	67	71	72		212	44	
17-Dec-24	Conductivity (µs/cm)			68	69	58	56											
18-Dec-24	Conductivity (µs/cm)							56	63	63								
24-Dec-24	Conductivity (µs/cm)			68	69	59	59											
25-Dec-24	Conductivity (µs/cm)							60	62	63								
1-Oct-24	Temperature (°C)		25.89											24.95				

		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						Re-Regulation Reservoir/Within		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-Oct-24	Temperature (°C)			30.46	30.05	29.71												
9-Oct-24	Temperature (°C)						29.36	28.64	25.37	25.92								
10-Oct-24	Temperature (°C)										25.39	25.42	25.7	25.93			26.82	26.39
15-Oct-24	Temperature (°C)			30.76	30.43	31.41	29.18											
16-Oct-24	Temperature (°C)							28.62	25.3	25.94								
30-Oct-24	Temperature (°C)			28.16	28.66	29.82	28.42											
31-Oct-24	Temperature (°C)							27.83	25.27	25.31								
4-Nov-24	Temperature (°C)		23.65											22.13				
5-Nov-24	Temperature (°C)			27.58	28.16	28.26												
7-Nov-24	Temperature (°C)										25.03	25.09	25.44	25.36			24.6	25.91
8-Nov-24	Temperature (°C)						27.08	26.94	25.95	26.34								
13-Nov-24	Temperature (°C)			27.98	28.19	27.85												
14-Nov-24	Temperature (°C)							26.75	25.29	25.83								
20-Nov-24	Temperature (°C)							27.02	25.12	25.61								
21-Nov-24	Temperature (°C)			28.16	27.96	27.6	27.22											
26-Nov-24	Temperature (°C)			27.72	27.63	28.38	27.09											
27-Nov-24	Temperature (°C)							26.86	25.11	25.29								
4-Dec-24	Temperature (°C)			27.53	27.93	27.07	26.54											
5-Dec-24	Temperature (°C)							25.99	25.12	25.46								
9-Dec-24	Temperature (°C)		24.1											24.7				
10-Dec-24	Temperature (°C)			27.1	26.92	26.59									23.25			
11-Dec-24	Temperature (°C)						26.45	26.52										
12-Dec-24	Temperature (°C)								24.83	24.81	25.07	24.68	25	25.41			23.8	21.73
17-Dec-24	Temperature (°C)			24.95	26.01	26.76	25.57											
18-Dec-24	Temperature (°C)							25.23	25	24.94								
24-Dec-24	Temperature (°C)			24.1	24.78	25.58	24.76											
25-Dec-24	Temperature (°C)							24.61	24.59	24.57								
1-Oct-24	Turbidity (NTU)		420											33.7				
8-Oct-24	Turbidity (NTU)			3.2	2.26	2.9												

		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						Re-Regulation Reservoir/Within		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-Oct-24	Turbidity (NTU)					2.23	1.99	7.05	6.74									
10-Oct-24	Turbidity (NTU)									6.95	7.05	7.76	8.95			17.1	5.64	
15-Oct-24	Turbidity (NTU)			2.9	2.54	2.24	2.25											
16-Oct-24	Turbidity (NTU)							2.35	7.24	5.51								
30-Oct-24	Turbidity (NTU)			3.86	2.62	3.27	3.26											
31-Oct-24	Turbidity (NTU)							2.34	4.13	3.98								
4-Nov-24	Turbidity (NTU)		17.4											8.22				
5-Nov-24	Turbidity (NTU)			3.44	2.6	2.19												
7-Nov-24	Turbidity (NTU)									3.42	3.77	5.99	7.76			8.36	3.6	
8-Nov-24	Turbidity (NTU)					2.64	2.14	3.23	3.1									
13-Nov-24	Turbidity (NTU)			3.7	2.04	2.16												
14-Nov-24	Turbidity (NTU)							2.09	3.37	3.03								
20-Nov-24	Turbidity (NTU)							1.2	1.84	1.85								
21-Nov-24	Turbidity (NTU)			4.85	1.38	1.57	1.61											
26-Nov-24	Turbidity (NTU)			2.63	2.51	1.34	2.46											
27-Nov-24	Turbidity (NTU)							1.04	1.58	2.56								
4-Dec-24	Turbidity (NTU)			3.67	1.23	1.43	1.69											
5-Dec-24	Turbidity (NTU)							1.87	1.65	1.44								
9-Dec-24	Turbidity (NTU)		20.2											3.12				
10-Dec-24	Turbidity (NTU)			7	1.42	1.47									6.83			
11-Dec-24	Turbidity (NTU)						1.96	1.32										
12-Dec-24	Turbidity (NTU)								1.59	1.6	1.88	2.48	3.99	6.19		4.69	6.57	
17-Dec-24	Turbidity (NTU)			24.95	26.01	26.76	25.57											
18-Dec-24	Turbidity (NTU)							25.23	25	24.94								
24-Dec-24	Turbidity (NTU)			4.44	1.72	1.12	1.18											
25-Dec-24	Turbidity (NTU)							1.05	1.31	1.23								
1-Oct-24	TSS (mg/L)		410.9											21.42				
8-Oct-24	TSS (mg/L)			<5		<5												
9-Oct-24	TSS (mg/L)					<5	<5	<5	<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						Re-Regulation Reservoir/Within		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-Oct-24	TSS (mg/L)									<5	<5	<5	5.9			9.63	<5	
4-Nov-24	TSS (mg/L)		<5											<5				
5-Nov-24	TSS (mg/L)			<5		<5												
7-Nov-24	TSS (mg/L)									<5	<5	5.47	5.69			<5	<5	
8-Nov-24	TSS (mg/L)						<5	<5	<5	<5								
9-Dec-24	TSS (mg/L)		16.73											<5				
10-Dec-24	TSS (mg/L)			<5		<5									7.86			
11-Dec-24	TSS (mg/L)						<5	<5										
12-Dec-24	TSS (mg/L)								<5	<5	<5	<5	8.13			<5	5.4	
1-Oct-24	BOD ₅ (mg/L)	<1.5	1.11											<1				
8-Oct-24	BOD ₅ (mg/L)	<1.5		<1		<1												
9-Oct-24	BOD ₅ (mg/L)	<1.5					<1	<1	<1	<1								
10-Oct-24	BOD ₅ (mg/L)	<1.5								<1	<1	<1	<1			<1	<1	
4-Nov-24	BOD ₅ (mg/L)	<1.5	<1											<1				
5-Nov-24	BOD ₅ (mg/L)	<1.5		<1		<1												
7-Nov-24	BOD ₅ (mg/L)	<1.5								<1	<1	<1	<1			<1	<1	
8-Nov-24	BOD ₅ (mg/L)	<1.5					<1	<1	<1	<1								
9-Dec-24	BOD ₅ (mg/L)	<1.5	<1											<1				
10-Dec-24	BOD ₅ (mg/L)	<1.5		<1		<1									<1			
11-Dec-24	BOD ₅ (mg/L)	<1.5					<1	<1										
12-Dec-24	BOD ₅ (mg/L)	<1.5							<1	<1	<1	<1	<1			<1	<1	
1-Oct-24	COD (mg/L)	<5.0	48.6											23				
9-Oct-24	COD (mg/L)	<5.0							8.96	20.4								
10-Oct-24	COD (mg/L)	<5.0									15.4	6.4	6.4			16.6	17.9	
4-Nov-24	COD (mg/L)	<5.0	<4											<4				
7-Nov-24	COD (mg/L)	<5.0									<4	<4	5.12	10.2		<4	<4	
8-Nov-24	COD (mg/L)	<5.0							35.8	16								
9-Dec-24	COD (mg/L)	<5.0	24.4											21.1				
10-Dec-24	COD (mg/L)	<5.0													38.4			

		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						Re-Regulation Reservoir/Within		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-Dec-24	COD (mg/L)	<5.0						5.12	17.9	33.2	35.8	39.6	14			32	19.2	
1-Oct-24	NH ₃ -N (mg/L)	<0.2	<0.1											<0.1				
8-Oct-24	NH ₃ -N (mg/L)	<0.2		<0.1		<0.1												
9-Oct-24	NH ₃ -N (mg/L)	<0.2					<0.1	<0.1										
5-Nov-24	NH ₃ -N (mg/L)	<0.2		<0.1		<0.1												
8-Nov-24	NH ₃ -N (mg/L)	<0.2					<0.1	<0.1										
9-Dec-24	NH ₃ -N (mg/L)	<0.2	<0.1											<0.1				
10-Dec-24	NH ₃ -N (mg/L)	<0.2		<0.1		<0.1									<0.1			
11-Dec-24	NH ₃ -N (mg/L)	<0.2					<0.1	<0.1										
1-Oct-24	NO ₃ -N (mg/L)	<5.0	0.45											0.24				
8-Oct-24	NO ₃ -N (mg/L)	<5.0		0.31		<0.05												
9-Oct-24	NO ₃ -N (mg/L)	<5.0					<0.05	<0.05										
5-Nov-24	NO ₃ -N (mg/L)	<5.0		0.06		<0.05												
8-Nov-24	NO ₃ -N (mg/L)	<5.0					3.75	<0.05										
9-Dec-24	NO ₃ -N (mg/L)	<5.0	0.42											0.14				
10-Dec-24	NO ₃ -N (mg/L)	<5.0		<0.05		<0.05									0.05			
11-Dec-24	NO ₃ -N (mg/L)	<5.0					<0.05	<0.05										
1-Oct-24	Faecal coliform (MPN/100 mL)	<1,000	1,600											1,600				
9-Oct-24	Faecal coliform (MPN/100 mL)	<1,000						49	170	220								
10-Oct-24	Faecal coliform (MPN/100 mL)	<1,000									350	280	1,600	1,600		920	1,600	
4-Nov-24	Faecal coliform (MPN/100 mL)	<1,000	540											49				
7-Nov-24	Faecal coliform (MPN/100 mL)	<1,000									110	540	240	920		1,600	920	
8-Nov-24	Faecal coliform (MPN/100 mL)	<1,000						5	27	79								
9-Dec-24	Faecal coliform (MPN/100 mL)	<1,000	240											23				
10-Dec-24	Faecal coliform (MPN/100 mL)	<1,000													79			
11-Dec-24	Faecal coliform (MPN/100 mL)	<1,000						0										
12-Dec-24	Faecal coliform (MPN/100 mL)	<1,000							8	17	79	34	170	170		350	920	
1-Oct-24	Total Coliform (MPN/100 mL)	<5,000	1,600											1,600				
9-Oct-24	Total Coliform (MPN/100 mL)	<5,000						110	540	220								

		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						Re-Regulation Reservoir/Within		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-Oct-24	Total Coliform (MPN/100 mL)	<5,000								540	280	1,600	1,600			1,600	1,600	
4-Nov-24	Total Coliform (MPN/100 mL)	<5,000	110											110				
7-Nov-24	Total Coliform (MPN/100 mL)	<5,000								280	1,600	1,600	1,600			1,600	1,600	
8-Nov-24	Total Coliform (MPN/100 mL)	<5,000						11	79	240								
9-Dec-24	Total Coliform (MPN/100 mL)	<5,000	540											540				
10-Dec-24	Total Coliform (MPN/100 mL)	<5,000													1,600			
11-Dec-24	Total Coliform (MPN/100 mL)	<5,000						240										
12-Dec-24	Total Coliform (MPN/100 mL)	<5,000							46	70	540	920	1,600	1,600			1,600	1,600
1-Oct-24	TKN		<5											<5				
8-Oct-24	TKN			<5		<5												
9-Oct-24	TKN						<5	<5										
5-Nov-24	TKN			<5		<5												
8-Nov-24	TKN						<5	<5										
9-Dec-24	TKN		<5											<5				
10-Dec-24	TKN			<5		<5									<5			
11-Dec-24	TKN						<5	<5										
8-Oct-24	Secchi Disk (m)			2	3.4	3.1												
9-Oct-24	Secchi Disk (m)						3.25	3.5	1.8	2								
15-Oct-24	Secchi Disk (m)			2.4	2.8	3.25	3.25											
16-Oct-24	Secchi Disk (m)							3.5	2	2.2								
30-Oct-24	Secchi Disk (m)			1.8	3	2.9	2.75											
31-Oct-24	Secchi Disk (m)							3.2	3	3.4								
1-Oct-24	TOC (mg/L)		6.33											4.33				
9-Oct-24	TOC (mg/L)								4.18	1.7								
10-Oct-24	TOC (mg/L)										1.78	1.42	1.7	2.14			1.26	3.45
4-Nov-24	TOC (mg/L)		3.38											4.9				
7-Nov-24	TOC (mg/L)										2.61	2.9	2.61	2.77			2.75	3.55
8-Nov-24	TOC (mg/L)																	
9-Dec-24	TOC (mg/L)		3.13											2.75				

		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						Re-Regulation Reservoir/Within		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-Dec-24	TOC (mg/L)														3.06			
12-Dec-24	TOC (mg/L)							3.38	3.25	3.16	3.21	3.32	3.17			3.32	4.45	
4-Oct-24	Total Phosphorus (mg/L)		<0.15											<0.15				
5-Oct-24	Total Phosphorus (mg/L)			<0.15		<0.15												
8-Oct-24	Total Phosphorus (mg/L)					<0.15	<0.15											
5-Nov-24	Total Phosphorus (mg/L)			<0.15		<0.15												
8-Nov-24	Total Phosphorus (mg/L)					<0.15	<0.15											
9-Dec-24	Total Phosphorus (mg/L)		<0.15											<0.15				
10-Dec-24	Total Phosphorus (mg/L)			<0.15		<0.15									<0.15			
11-Dec-24	Total Phosphorus (mg/L)					0.22	<0.15											
1-Oct-24	Total Dissolved Phosphorus (mg/L)		<0.15											<0.15				
8-Oct-24	Total Dissolved Phosphorus (mg/L)			<0.15		<0.15												
9-Oct-24	Total Dissolved Phosphorus (mg/L)					<0.15	<0.15											
5-Nov-24	Total Dissolved Phosphorus (mg/L)			<0.15		<0.15												
8-Nov-24	Total Dissolved Phosphorus (mg/L)					<0.15	0.15											
9-Dec-24	Total Dissolved Phosphorus (mg/L)		<0.15											<0.15				
10-Dec-24	Total Dissolved Phosphorus (mg/L)			<0.15		<0.15									<0.15			
11-Dec-24	Total Dissolved Phosphorus (mg/L)					<0.15	<0.15											
8-Oct-24	Turbidity (NTU)-bottom					6.73												
9-Oct-24	Turbidity (NTU)-bottom						2.49	3.21										
5-Nov-24	Turbidity (NTU)-bottom					5.23												
8-Nov-24	Turbidity (NTU)-bottom						2.96	3.69										
10-Nov-24	Turbidity (NTU)-bottom					12.1												
11-Nov-24	Turbidity (NTU)-bottom						1.32	3.3										

		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						Re-Regulation Reservoir/Within		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-Oct-24	TSS (mg/L)-bottom				24.4													
9-Oct-24	TSS (mg/L)-bottom					24.28	15.6											
5-Nov-24	TSS (mg/L)-bottom				27.82													
8-Nov-24	TSS (mg/L)-bottom					18.06	20.51											
10-Dec-24	TSS (mg/L)-bottom				33.12													
11-Dec-24	TSS (mg/L)-bottom					30.54	19.6											
8-Oct-24	BOD ₅ (mg/L)-bottom				<1													
9-Oct-24	BOD ₅ (mg/L)-bottom					<1	<1											
5-Nov-24	BOD ₅ (mg/L)-bottom				<1													
8-Nov-24	BOD ₅ (mg/L)-bottom					<1	<1											
10-Dec-24	BOD ₅ (mg/L)-bottom				5.93													
11-Dec-24	BOD ₅ (mg/L)-bottom					<1	<1											
9-Oct-24	Total Coliform (MPN/100 mL)-bottom						13											
8-Nov-24	Total Coliform (MPN/100 mL)-bottom						33											
11-Dec-24	Total Coliform (MPN/100 mL)-bottom						170											
9-Oct-24	Faecal coliform (MPN/100 mL)-bottom						2											
8-Nov-24	Faecal coliform (MPN/100 mL)-bottom						17											
11-Dec-24	Faecal coliform (MPN/100 mL)-bottom						0											
8-Oct-24	NH ₃ -N (mg/L)-bottom				<0.1													
9-Oct-24	NH ₃ -N (mg/L)-bottom					<0.1	<0.1											
5-Nov-24	NH ₃ -N (mg/L)-bottom				0.24													
8-Nov-24	NH ₃ -N (mg/L)-bottom					0.27	<0.1											
10-Dec-24	NH ₃ -N (mg/L)-bottom				0.11													
11-Dec-24	NH ₃ -N (mg/L)-bottom					<0.1	<0.1											
8-Oct-24	NO ₃ -N (mg/L)-bottom				<0.05													

		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						Re-Regulation Reservoir/Within		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-Oct-24	NO ₃ -N (mg/L)-bottom					<0.05	<0.05											
5-Nov-24	NO ₃ -N (mg/L)-bottom				<0.05													
8-Nov-24	NO ₃ -N (mg/L)-bottom					0.75	0.1											
10-Dec-24	NO ₃ -N (mg/L)-bottom				<0.05													
11-Dec-24	NO ₃ -N (mg/L)-bottom					<0.05	<0.05											
8-Oct-24	TKN-bottom				<5													
9-Oct-24	TKN-bottom					<5	<5											
5-Nov-24	TKN-bottom				<5													
8-Nov-24	TKN-bottom					<5	<5											
10-Dec-24	TKN-bottom				<5													
11-Dec-24	TKN-bottom					<5	<5											
8-Oct-24	Total Dissolved Phosphorus (mg/L)-bottom				<0.15													
9-Oct-24	Total Dissolved Phosphorus (mg/L)-bottom					<0.15	<0.15											
5-Nov-24	Total Dissolved Phosphorus (mg/L)-bottom				<0.15													
8-Nov-24	Total Dissolved Phosphorus (mg/L)-bottom					<0.15	<0.15											
10-Dec-24	Total Dissolved Phosphorus (mg/L)-bottom				<0.15													
11-Dec-24	Total Dissolved Phosphorus (mg/L)-bottom					<0.15	<0.15											
8-Oct-24	Total Phosphorus (mg/L)-bottom				<0.15													
9-Oct-24	Total Phosphorus (mg/L)-bottom					<0.15	<0.15											
5-Nov-24	Total Phosphorus (mg/L)-bottom				<0.15													
8-Nov-24	Total Phosphorus (mg/L)-bottom					<0.15	<0.15											
10-Dec-24	Total Phosphorus (mg/L)-bottom				<0.15													

		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						Re-Regulation Reservoir/Within		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-Dec-24	Total Phosphorus (mg/L)-bottom					<0.15	<0.15											
8-Oct-24	Chlorophyll-A-bottom				6.9													
9-Oct-24	Chlorophyll-A-bottom					1.6	2.95											
5-Nov-24	Chlorophyll-A-bottom			2.49														
8-Nov-24	Chlorophyll-A-bottom					4.55	8.26											
10-Dec-24	Chlorophyll-A-bottom				6.11													
11-Dec-24	Chlorophyll-A-bottom					0.92	2.17											
8-Oct-24	Chlorophyll-A			2.49	0.94													
9-Oct-24	Chlorophyll-A					0.69	0.89											
5-Nov-24	Chlorophyll-A			0.48	0.52													
8-Nov-24	Chlorophyll-A																	
10-Dec-24	Chlorophyll-A			2.25	1.32													
11-Dec-24	Chlorophyll-A					2.61	0.95											

APPENDIX 5-2: EFFLUENT CAMP MONITORING RESULTS – Q4 2024

		Site Name	OSOV1	OSOV 2	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
02-Oct-24	pH	6.0 - 9.0	6.82	6.79	6.94
14-Oct-24	pH	6.0 - 9.0	7.09	6.96	7.26
01-Nov-24	pH	6.0 - 9.0	6.45	7.12	6.89
12-Nov-24	pH	6.0 - 9.0	6.89	6.79	6.95
13-Dec-24	pH	6.0 - 9.0	6.87	7.63	6.97
02-Oct-24	Sat. DO (%)		46.7	69.2	20.4
14-Oct-24	Sat. DO (%)		49.5	88.3	41.6
01-Nov-24	Sat. DO (%)		46.7	32.3	54.3
12-Nov-24	Sat. DO (%)		46.5	93.8	75.1
13-Dec-24	Sat. DO (%)		60.3	96.5	71.6
02-Oct-24	DO (mg/L)		3.7	5.42	1.61
14-Oct-24	DO (mg/L)		3.83	6.91	3.16
01-Nov-24	DO (mg/L)		3.68	2.53	3.93
12-Nov-24	DO (mg/L)		3.8	7.5	5.68
13-Dec-24	DO (mg/L)		4.95	7.89	5.49
02-Oct-24	Conductivity (µs/cm)		273	397	748
14-Oct-24	Conductivity (µs/cm)		296	425	783
01-Nov-24	Conductivity (µs/cm)		282	402	854
12-Nov-24	Conductivity (µs/cm)		282	347	821
13-Dec-24	Conductivity (µs/cm)		325	377	766
02-Oct-24	Temperature (°C)		28.9	27.89	27.93
14-Oct-24	Temperature (°C)		28.58	27.89	29.79
01-Nov-24	Temperature (°C)		27.73	28.43	29.96
12-Nov-24	Temperature (°C)		25.71	26.78	29.73
13-Dec-24	Temperature (°C)		25.37	25.54	29.06
02-Oct-24	Turbidity (NTU)		3.08	10.7	13.9
14-Oct-24	Turbidity (NTU)		2.76	10.1	6.35
01-Nov-24	Turbidity (NTU)		2.18	11.7	7.76
12-Nov-24	Turbidity (NTU)		2.2	8.93	8.14
13-Dec-24	Turbidity (NTU)		2.59	12.4	4.44
02-Oct-24	TSS (mg/L)	<50	<5	12.89	10.68
14-Oct-24	TSS (mg/L)	<50	<5	8.4	5.55
01-Nov-24	TSS (mg/L)	<50	<5	11.76	11.42
12-Nov-24	TSS (mg/L)	<50	<5	8.83	10.32
13-Dec-24	TSS (mg/L)	<50	<5	15.14	10.79
02-Oct-24	BOD ₅ (mg/L)	<30	<6	<6	<6
14-Oct-24	BOD ₅ (mg/L)	<30	<6	<6	<6
01-Nov-24	BOD ₅ (mg/L)	<30	<6	9.96	<6
12-Nov-24	BOD ₅ (mg/L)	<30	<6	<6	<6
13-Dec-24	BOD ₅ (mg/L)	<30	<6	6.84	<6
02-Oct-24	COD (mg/L)	<125	37.1	37.1	49

		Site Name	OSOV1	OSOV 2	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
14-Oct-24	COD (mg/L)	<125	12.8	66.1	51
01-Nov-24	COD (mg/L)	<125	12.8	<4	26
12-Nov-24	COD (mg/L)	<125	<4	25.6	46
13-Dec-24	COD (mg/L)	<125	32	38.4	58
02-Oct-24	NH ₃ -N (mg/L)	<10.0	<0.1	<0.1	<0.1
14-Oct-24	NH ₃ -N (mg/L)	<10.0	0.12	0.6	0.5
01-Nov-24	NH ₃ -N (mg/L)	<10.0	<0.1	0.6	0.6
12-Nov-24	NH ₃ -N (mg/L)	<10.0	<0.1	0.6	0.6
13-Dec-24	NH ₃ -N (mg/L)	<10.0	0.17	0.6	0.6
02-Oct-24	Total Nitrogen (mg/L)	<10.0	5.0	21.0	45.0
14-Oct-24	Total Nitrogen (mg/L)	<10.0	<5	18.0	45.0
01-Nov-24	Total Nitrogen (mg/L)	<10.0	<5	19.0	16.7
12-Nov-24	Total Nitrogen (mg/L)	<10.0	5.6	16.7	40.8
13-Dec-24	Total Nitrogen (mg/L)	<10.0	5.3	21.4	13.0
02-Oct-24	Total Phosphorus (mg/L)	<2	1.25	1.3	5.6
14-Oct-24	Total Phosphorus (mg/L)	<2	1.1	1.3	6.2
01-Nov-24	Total Phosphorus (mg/L)	<2	0.8	1.2	6.5
12-Nov-24	Total Phosphorus (mg/L)	<2	0.81	1.2	7.6
13-Dec-24	Total Phosphorus (mg/L)	<2	1.36	1.4	7.7
02-Oct-24	Faecal Coliform (MPN/100 mL)	<400	1,600	2	0
14-Oct-24	Faecal Coliform (MPN/100 mL)	<400	920	0	1,600
01-Nov-24	Faecal Coliform (MPN/100 mL)	<400	33	1,600	0
12-Nov-24	Faecal Coliform (MPN/100 mL)	<400	170	27	0
13-Dec-24	Faecal Coliform (MPN/100 mL)	<400	1,600	23	130
02-Oct-24	Total coliform (MPN/100 mL)	<400	1,600	8	0
14-Oct-24	Total coliform (MPN/100 mL)	<400	1,600	0	1,600
01-Nov-24	Total coliform (MPN/100 mL)	<400	170	1,600	0
12-Nov-24	Total coliform (MPN/100 mL)	<400	220	110	0
13-Dec-24	Total coliform (MPN/100 mL)	<400	1,600	1,600	1,600
02-Oct-24	Oil & Grease (mg/L)	<10.0	<2	<2	<2
14-Oct-24	Oil & Grease (mg/L)	<10.0	<2	5.4	<2
01-Nov-24	Oil & Grease (mg/L)	<10.0	<2	<2	<2
12-Nov-24	Oil & Grease (mg/L)	<10.0	<2	<2	<2
13-Dec-24	Oil & Grease (mg/L)	<10.0	<2	<2	<2

APPENDIX 5-3: COMMUNITY GROUNDWATER QUALITY MONITORING RESULTS – Q4 2024

Month Year	Parameter (Unit)	Site Name	Phouhomxay Village		Somseun Village	NamPa Village	ThongNoy Village	Pou Village	
		Station	GPHX01	GPHX02	GSXN01	GNPA01	GTHN01	GPOU01	GPOU02
		Guideline							
01-Oct-24	pH	6.5 - 9.2						6.58	6.89
22-Oct-24	pH	6.5 - 9.2			6.99	7.04	6.87		
04-Nov-24	pH	6.5 - 9.2						6.82	6.98
18-Nov-24	pH	6.5 - 9.2							
19-Nov-24	pH	6.5 - 9.2			6.99	7.17	7.2		
09-Dec-24	pH	6.5 - 9.2						7.21	7.28
16-Dec-24	pH	6.5 - 9.2			7.19	7.26	7.22		
01-Oct-24	Sat. DO (%)							89.4	99.8
22-Oct-24	Sat. DO (%)				82.5	80.2	74.8		
04-Nov-24	Sat. DO (%)							84.5	94.5
18-Nov-24	Sat. DO (%)								
19-Nov-24	Sat. DO (%)				81.2	83.8	101		
09-Dec-24	Sat. DO (%)							83.4	87.3
16-Dec-24	Sat. DO (%)				74.6	82.3	73.2		
01-Oct-24	DO (mg/l)							7.11	7.98
22-Oct-24	DO (mg/l)				6.61	6.48	6.05		
04-Nov-24	DO (mg/l)							6.89	7.65
18-Nov-24	DO (mg/l)								
19-Nov-24	DO (mg/l)				6.53	6.74	8.05		
09-Dec-24	DO (mg/l)							6.77	7.15
16-Dec-24	DO (mg/l)				6.11	6.81	6.02		
01-Oct-24	Conductivity (µS/cm)							21	246
22-Oct-24	Conductivity (µS/cm)				350	399	312		
04-Nov-24	Conductivity (µS/cm)							19	235
18-Nov-24	Conductivity (µS/cm)								
19-Nov-24	Conductivity (µS/cm)				344	386	297		
09-Dec-24	Conductivity (µS/cm)							19	186
16-Dec-24	Conductivity (µS/cm)				352	374	327		
01-Oct-24	Temperature (°C)							27.02	26.77
22-Oct-24	Temperature (°C)				28.23	27.96	28.22		
04-Nov-24	Temperature (°C)							25.59	26.06
18-Nov-24	Temperature (°C)								
19-Nov-24	Temperature (°C)				26.43	26.52	27.04		
09-Dec-24	Temperature (°C)							26.01	25.46

Month Year	Parameter (Unit)	Site Name	Phouhomxay Village		Somseun Village	NamPa Village	ThongNoy Village	Pou Village	
		Station	GPHX01	GPHX02	GSXN01	GNPA01	GTHN01	GPOU01	GPOU02
		Guideline							
16-Dec-24	Temperature (°C)				25.14	25.04	24.59		
01-Oct-24	Turbidity (NTU)	<20						6.79	4.35
22-Oct-24	Turbidity (NTU)	<20			1.32	1.23	1.66		
04-Nov-24	Turbidity (NTU)	<20						4.05	2.92
18-Nov-24	Turbidity (NTU)	<20							
19-Nov-24	Turbidity (NTU)	<20			0.44	0.48	1		
09-Dec-24	Turbidity (NTU)	<20						3.89	1.18
16-Dec-24	Turbidity (NTU)	<20			0.67	0.5	1.4		
01-Oct-24	Fecal coliform (MPN/100ml)	0						4.5	22
22-Oct-24	Fecal coliform (MPN/100ml)	0			2	0	14		
04-Nov-24	Fecal coliform (MPN/100ml)	0						0	13
18-Nov-24	Fecal coliform (MPN/100ml)	0							
19-Nov-24	Fecal coliform (MPN/100ml)	0			0	7.8	33		
09-Dec-24	Fecal coliform (MPN/100ml)							13	49
16-Dec-24	Fecal coliform (MPN/100ml)	0			0	0	14		
01-Oct-24	E.coli Bacteria (MPN/100ml)	0						4.5	22
22-Oct-24	E.coli Bacteria (MPN/100ml)	0			0	0	11		
04-Nov-24	E.coli Bacteria (MPN/100ml)	0						0	0
18-Nov-24	E.coli Bacteria (MPN/100ml)	0							
19-Nov-24	E.coli Bacteria (MPN/100ml)	0			0	0	4.5		
09-Dec-24	E.coli Bacteria (MPN/100ml)							0	0
16-Dec-24	E.coli Bacteria (MPN/100ml)	0			0	0	4.5		

APPENDIX 5-4: GRAVITY FED WATER SUPPLY QUALITY MONITORING RESULTS – Q4 2024

		Site Name	Thaheua Village	Hat Gnuin Village	Phouhomxay Village	
		Station	WTHH02	WHGN02	WPHX02	WPHX03
Date	Parameter (Unit)	Guideline				
22-Oct-24	pH	6.5 - 8.5	6.8	7.03	7.07	7.12
18-Nov-24	pH	6.5 - 8.5	7.08	7.01	6.89	6.96
16-Dec-24	pH	6.5 - 8.5	7.44	7.4	7.45	7.37
22-Oct-24	Sat. DO (%)		84.8	85.2	80.7	83.6
18-Nov-24	Sat. DO (%)		84.2	88.1	84.4	86.6
16-Dec-24	Sat. DO (%)		87.3	88.1	84.8	86.4
22-Oct-24	DO (mg/L)		6.84	6.9	6.3	6.44
18-Nov-24	DO (mg/L)		6.77	6.86	6.71	6.81
16-Dec-24	DO (mg/L)		7.51	7.42	7.16	7.34
22-Oct-24	Conductivity (µS/cm)	<1,000	40	53	7	6
18-Nov-24	Conductivity (µS/cm)	<1,000	44	61	10	9
16-Dec-24	Conductivity (µS/cm)	<1,000	43	66	11	11
22-Oct-24	Temperature (°C)	<35	27.4	29.64	28.17	28.91
18-Nov-24	Temperature (°C)	<35	26.4	28.27	27.23	27.75
16-Dec-24	Temperature (°C)	<35	22.88	23.98	23.71	23.56
22-Oct-24	Turbidity (NTU)	<10	3.57	3.4	2.2	1.39
18-Nov-24	Turbidity (NTU)	<10	2.56	3.24	1.05	1.54
16-Dec-24	Turbidity (NTU)	<10	2.71	1.29	0.95	1.06
22-Oct-24	Faecal Coliform (MPN/100 mL)	0	14	6.8	22	11
18-Nov-24	Faecal Coliform (MPN/100 mL)	0	23	63	63	49
16-Dec-24	Faecal Coliform (MPN/100 mL)	0	27	22	22	130
22-Oct-24	E.coli Bacteria (MPN/100 mL)	0	11	6.8	11	11
18-Nov-24	E.coli Bacteria (MPN/100 mL)	0	11	4.5	11	11
16-Dec-24	E.coli Bacteria (MPN/100 mL)	0	11	4.5	17	22

APPENDIX 5-5: LANDFILL LEACHATE MONITORING RESULTS – Q4 2024

		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
			Station	LL1	LL2	LL3	LL4	LL5	Discharged Point
			Guideline	LL6	LL7				
Date	Parameter (Unit)	Guideline							
2-Oct-24	pH	6.0-9.0					7.07		6.93
1-Nov-24	pH	6.0-9.0					6.86		6.65
2-Oct-24	Sat. DO (%)						90.4		74
1-Nov-24	Sat. DO (%)						109		115.9
2-Oct-24	DO (mg/L)						6.86		5.65
1-Nov-24	DO (mg/L)						8.26		8.99
2-Oct-24	Conductivity (µS/cm)						70		113
1-Nov-24	Conductivity (µS/cm)						77		108
2-Oct-24	Temperature (°C)						29.92		29.33
1-Nov-24	Temperature (°C)						29.87		28.46
2-Oct-24	Turbidity (NTU)						50.3		16.8
1-Nov-24	Turbidity (NTU)						5.96		28.2
2-Oct-24	BOD5 (mg/L)	<30					11.04		<6
1-Nov-24	BOD5 (mg/L)	<30					<6		<6
2-Oct-24	COD (mg/L)	<125					78		21.8
1-Nov-24	COD (mg/L)	<125					25.6		38.4
2-Oct-24	Faecal Coliform (MPN/100mL)	<400					540		140
1-Nov-24	Faecal Coliform (MPN/100mL)	<400					350		170
2-Oct-24	Total Coliform (MPN/100mL)	<400					1,600		140
1-Nov-24	Total Coliform (MPN/100mL)	<400					1,600		920
2-Oct-24	Total Nitrogen (mg/L)	<10					<5		<5
1-Nov-24	Total Nitrogen (mg/L)	<10					5		<5
2-Oct-24	Lead (mg/L)	<0.2					<0.01		0.01
1-Nov-24	Lead (mg/L)	<0.2					<0.01		<0.01
2-Oct-24	Copper (mg/L)						<0.1		<0.1
1-Nov-24	Copper (mg/L)						<0.1		<0.1

Date	Parameter (Unit)	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
		Guideline							
2-Oct-24	Iron (mg/L)					0.56		0.54	
1-Nov-24	Iron (mg/L)					1.22		0.12	
2-Oct-24	Ammonia nitrogen (mg/L)	<10				<0.1		<0.1	
1-Nov-24	Ammonia nitrogen (mg/L)	<10				<0.1		0.16	
2-Oct-24	Oil & Grease (mg/L)	<10				<2		<2	
1-Nov-24	Oil & Grease (mg/L)	<10				<2		<2	