



Nam Ngiep 1 Hydropower Project

Quarterly Environment Monitoring Report Third Quarter of 2024

July to September 2024

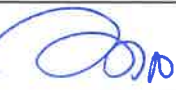
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Table of Contents

EXECUTIVE SUMMARY	10
1 INTRODUCTION	12
2 ENVIRONMENTAL MANAGEMENT AND MONITORING	12
2.1 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)	12
2.2 PROGRESS OF ENVIRONMENTAL MANAGEMENT SYSTEM	16
2.3 ANNUAL ISO14001:2015 INTERNAL AUDIT.....	16
2.4 CONTRACTOR SS-ESMMPs.....	19
2.5 RESULTS OF COMPLIANCE INSPECTIONS AT CONSTRUCTION SITES.....	19
2.6 SITE DECOMMISSIONING AND REHABILITATION	20
2.7 WASTE MANAGEMENT AT THE OPERATION SITES	20
2.7.1 Waste Management at NNP1 Project Sites.....	20
2.7.2 Hazardous Material and Waste Management.....	21
2.7.3 Animal Fodder (Pig Feed) Collection Programme.....	22
2.7.4 Community Solid Waste Management and Recycling Programme	23
2.8 RESERVOIR OPERATIONS	23
2.8.1 Main Reservoir.....	23
2.8.2 Environmental Flow Requirements for the Operation Phase	24
2.9 WATER QUALITY MONITORING	30
2.9.1 Surface Water (River) and Depth Profile Water Quality.....	30
2.9.2 Compliance Monitoring of Effluents from Camps	43
2.9.3 Groundwater Quality Monitoring.....	48
2.9.4 Gravity Fed Water Supply (GFWS) Monitoring.....	51
2.9.5 Landfill Leachate Monitoring.....	53
2.9.6 Water Quality Compliance Monitoring	54
3 WATERSHED AND BIODIVERSITY MANAGEMENT	56
3.1 WATERSHED MANAGEMENT	56
3.1.1 Implementation of Watershed Management Plan	56
3.1.2 Preparation of Annual Implementation Plan (AIP).....	59
3.2 BIODIVERSITY OFFSET MANAGEMENT.....	60
3.2.1 Implementation of Biodiversity Offset Management Plan.....	60
3.2.2 Preparation of Annual Implementation Plan (AIP) 2024.....	66
4 FISHERY MONITORING	66

5	HEALTH AND SAFETY	70
5.1	RELATED TO NNP1PC HEALTH AND SAFETY	70
5.1.1	<i>Health and Safety Training and Emergency Drills in the Project site</i>	<i>71</i>
5.2	RELATED TO COVID-19	72
5.2.1	<i>NNP1PC COVID-19 Measures</i>	<i>72</i>
5.2.2	<i>General situation of COVID-19 in NNP1PC</i>	<i>73</i>
6	EXTERNAL MISSIONS AND VISITS	73
	APPENDICES	74
	APPENDIX 1: THE SITE INSPECTION RESULTS DURING Q3 2024	75
	APPENDIX 2: ENVIRONMENTAL MONITORING CORRECTIVE ACTIONS Q2 2024.....	77
	APPENDIX 3: SITE CODES, LOCATIONS AND MONITORING PARAMETERS OF THE SURFACE WATER QUALITY MONITORING	81
	APPENDIX 4: KEY TRENDS OF WATER QUALITY MONITORING FROM JANUARY 2021 TO END OF SEPTEMBER 2024 (ONLY PARAMETERS THAT EXCEEDED THE STANDARDS)	83
	APPENDIX 5: WATER QUALITY MONITORING DATA	87
	APPENDIX 5-1: SURFACE WATER QUALITY MONITORING – Q3 2024	87
	APPENDIX 5-2: EFFLUENT CAMP MONITORING RESULTS – Q3 2024.....	100
	APPENDIX 5-3: COMMUNITY GROUNDWATER QUALITY MONITORING RESULTS – Q3 2024	103
	APPENDIX 5-4: GRAVITY FED WATER SUPPLY QUALITY MONITORING RESULTS – Q3 2024	105
	APPENDIX 5-5: LANDFILL LEACHATE MONITORING RESULTS – Q3 2024.....	106

Table of Tables

Table 2.1-1: <i>The Details of EMPs 2024 Implementation</i>	13
Table 2.3-1: <i>The Details of Internal Audits in Q3 2024</i>	17
Table 2.3-2: <i>Activity Photos of Internal Audits in Q3 2024</i>	18
Table 2.5-1: <i>STATUS OF ONCs and NCRs REPORT DURING Q3 2024</i>	20
Table 2.7-1: <i>Amounts of Recyclable Waste during Q3 2024</i>	21
Table 2.7-2: <i>Hazardous material and hazardous waste recorded during Q3 2024</i>	21
Table 2.8-1: <i>Summary of EFRs Compliance Monitoring in Q3 2024</i>	24
Table 2.9-1: <i>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 Q3 2024</i>	38
Table 2.9-2: <i>Ammonia Nitrogen (mg/L) results for the surface water in Nam Ngiep and its main tributaries monitored in Q3 2024</i>	40
Table 2.9-3: <i>BOD₅ (mg/L) results for the surface water in Nam Ngiep and its main tributaries monitored in Q2 2024</i>	41
Table 2.9-4: <i>COD (mg/L) results for the surface water in Nam Ngiep and its main tributaries in Q3 2024</i>	42
Table 2.9-5: <i>Faecal coliforms (MPN/100 mL) results in Nam Ngiep and its main tributaries in Q3 2024</i>	42
Table 2.9-6: <i>Total coliform (MPN/100 mL) results in Nam Ngiep and its main tributaries in Q3 2024</i>	43
Table 2.9-7: <i>Results of the Effluent Water Quality Monitoring of the Camps in Q3 2024 (Non-compliance Parameters Only)</i>	44
Table 2.9-8: <i>Compliance Status of Effluent Discharge from the Camps in Q3-2024</i>	46
Table 2.9-9: <i>The Landfill Groundwater Monitoring Result in Q3 2024</i>	51
Table 2.9-10: <i>The GFWS Monitoring Result in Q3 2024</i>	52
Table 2.9-11: <i>Non-compliances relating to water quality monitoring in Q3 2024</i>	54
Table 3.1-1 <i>Annual Implementation Plan Preparation Status</i>	59
Table 3.2-1 <i>Participatory Land Use Plan (plup) data of vangphieng village</i>	60
Table 3.2-2 <i>plup data of Na Gnang village</i>	61
Table 3.2-3 <i>plup data of natan village</i>	63
Table 4-1: <i>Fish Species dominating the Fish Catch in Q3 2024</i>	66
Table 4-2: <i>Threatened Species of Q3 2024 Fish Catch</i>	67
Table 4-3: <i>Main Biodiversity Indicators for Q3 2024</i>	67
Table 4-4: <i>Mean Daily Fish Catch per Household for Q3 from 2015 to 2024</i>	68
Table 4-5: <i>Proportion of the catch reported by main habitats (%) in Q3 2024</i>	69

TABLE 5.1-1: SAFETY INCIDENTS REPORTED DURING THE OPERATION PHASE (SEPTEMBER 2019 TO SEPTEMBER 2024) 70

Table of Figures

Figure 2.5-1: STATUS OF ONCs DURING Q3 2024	20
Figure 2.8-1: Inflow to the Main Reservoir.....	23
Figure 2.8-2: Water Level of the Main Reservoir	24
Figure 2.8-3: Discharge from the Re-regulation Dam during Q3 2024.....	26
Figure 2.8-4: Location map of river depth monitoring points	27
Figure 2.8-5: Hourly Stage Height Fluctuations During Q3 2024	28
Figure 2.8-6: 24-Hour Stage Height Difference (M) during Q3 2024.....	29
Figure 2.8-7: 7-day Stage Height Difference (M) during Q3 2024	29
Figure 2.9-1: Dissolved Oxygen immediately upstream and downstream of the Main Dam ...	30
Figure 2.9-2: Dissolved Oxygen Long Profile Measurement from Immediately Upstream the Main Dam to Lower Nam Ngiep (Q2 2024 and Q3 2024)	30
Figure 2.9-3 Monthly mean concentrations of dissolved oxygen in R05	32
Figure 2.9-4: Main reservoir Dissolved Oxygen at the End of Q3 2024	34
Figure 2.9-5: Water Temperature and Dissolved Oxygen – depth profiles in the Main Reservoir immediately upstream of the main dam (R05)	35
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 – September 2024	36
Figure 2.9-7: The STRAIGHT-LINE graph of Monthly Averaged DO and Water Temperature at R04 and R05	37
Figure 2.9-8: Location of effluent monitoring points	44
Figure 2.9-9: Groundwater Sampling Locations	49
Figure 2.9-10: Overview of Gravity fed water supply	52
Figure 2.9-11: Landfill Leachate Monitoring Location	54
Figure 3.2-1 map of vangphieng village’s plup	61
Figure 3.2-2 map of na gngang village’s plup	63
Figure 3.2-3 map of natan village’s plup	64
FIGURE 4-1: FISH DIVERSITY INDEX (SHANNON) BY FISHING ZONE FROM JULY 2015 TO SEPTEMBER 2024.....	68
Figure 4-2: Mean Daily Fish Catch per Household from July 2015 to September 2024	68
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 Q3 from 2015 to 2024	69
Figure 5.1-1: Number, Type and Frequency of Safety Incidents from September 2019 to 30 September 2024	71
Figure 5.1-2: Representative photos of the safety induction Training and specific training on Annual flooding event during Q3 2024.....	72

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).

During Q3 2024, activities related to ISO14001:2015 implementation continued including the implementation of the four (04) Environmental Management Plans (EMPs). The annual ISO 14001 internal audit was executed which six internal audit teams were established to review 31 work functions across Industrial Areas, Camp Facilities, and the Management System. By September 2024, audits for 19 work functions were completed, identifying no non-compliance issues but noting several opportunities for improvement (OFIs). The remaining audits are expected to conclude by mid-October 2024, with the Management Review Meeting (MRM) scheduled for mid-November 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 findings. The latest inspection confirmed that all hazardous waste has been transferred from the Main Dam Powerhouse to the designated storage facility. However, the crack in OSOV2's wastewater tank, which could lead to untreated wastewater leakage, remained unrepaired. Three Site Inspection Reports (SIRs) were submitted to TD and ADM emphasizing the necessary corrective actions and the implementation timeline.

In Q3 2024, a total of 17.95 m³ solid waste from NNP1 project sites and camps was disposed of at the NNP1 Project Landfill, a decrease of 0.19 m³ compared with Q2 2024. The local contractor maintained routine waste collection and NNP1 landfill management throughout Q3 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 2.7 mg/L and 8.4 mg/L. The monthly mean DO concentration at the intake level decreased from 2.5 mg/L in July 2024 to 1.4 mg/L in August 2024 and then increased to 3.4 mg/L in September 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 1.8 and 9.0 mg/L. During turbine discharge in July and August 2024, the DO levels in Nam Ngiep downstream the Re-regulation Dam were less than 6 mg/L. However, in September 2024, during combination of turbine and gate discharges, DO concentration in Nam Ngiep downstream the Re-regulation Dam were greater than 6 mg/L (complied with the standard).

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) from July to September 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 July to September 2024, the Xaysomboun WRPO has resumed the forest, Totally Protected Zone (TPZ), and reservoir patrolling under the approved AIP 2023. Two reservoir checkpoints were operated by setting up a temporally camp and six staff members have been stationed there in August 2024.

Bolikhamxay Biodiversity Offset Management Unit (BOMU) continued the sub-stations safeguarding from July to September 2024. The Biodiversity Service Provider (BSP-WCS) continued improving the Community Conservation Agreement (CCA) and reviewed the Village Participatory Land Use Plan (PLUP) of Sopkhone, Meungcham, and Phonmeung villages in Xaychamphone district. BSP-WCS and NNP1 Biodiversity Management Team conducted an exchange visit to Nam Et-Phou Louey National Park in Houaphan province in August 2024. BOMU received the AIP2024 first six-month budget from the Bank of Laos (BOL) on 06 September 2024.

The fish species dominating the fish catch by weight in Q3 2024 include *Oreochromis niloticus*, *Clarias batrachus* and three species group of *Poropuntius*, *Hampala* and *Mastacembelus* 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

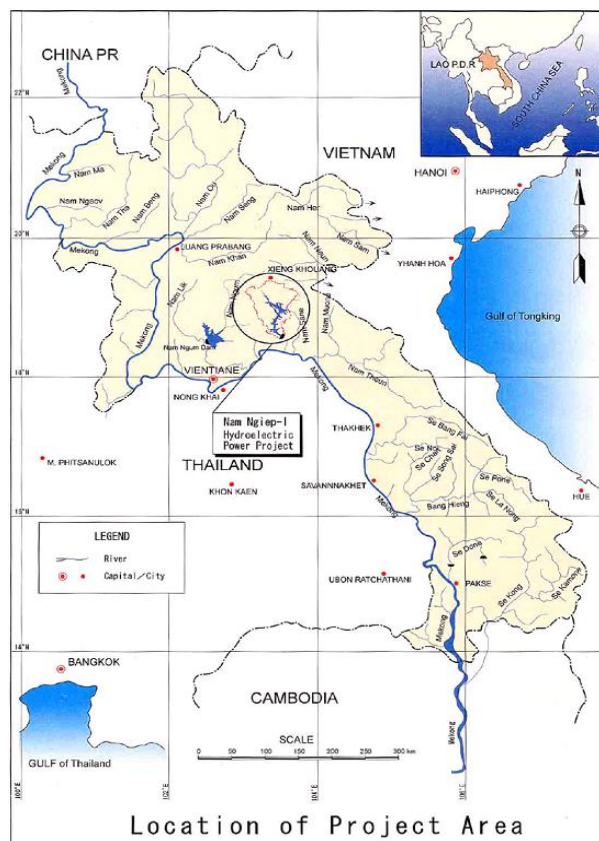
The Nam Ngiep originates in the mountains of Xiengkhouang Province, flowing through Khoun District into Thathom District of Xaysomboun Province, through Hom District and into Bolikhamxay District of Bolikhamxay Province. The Nam Ngiep meets the Mekong River just upstream from Pakxan in Bolikhamxay Province.

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 Q3 2024.

2.1 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

During Q3 2024, activities related to ISO14001:2015 implementation continued. This includes the implementation of the four (04) Environmental Management Plans (EMPs). The EMPs will be executed from August 2024 to July 2025 including 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 2.1-1**.

TABLE 2.1-1: THE DETAILS OF EMPs 2024 IMPLEMENTATION

EMP No.	Activity Description	Key Performance Indicator (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 NNP1PC employees and contractors will be trained in health, safety, and environmental awareness (August 2024 to July 2025)	Aug 2024 – July 2025	Potential Achievement (25% trained). Training program is ongoing. Next review: Dec 2024.
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 (18% increase). Monthly data collection ongoing. Next review: Dec 2024.
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. Note: This EMP was developed based on the results of a SWOT analysis (<i>Strengths, Weaknesses, Opportunities, and Threats</i>) conducted during the 2023 EMS internal audit, which identified that waste management at industrial sites, offices, and accommodations poses significant risks. The primary aim of this EMP is to demonstrate that proper waste separation and recycling processes	Collect and sort HDPE plastic waste to produce four waste bins from August 2024 to July 2025.	Sep 2024 - July 2025	Collection of bottle caps (HDPE) is ongoing, and the progress will be reviewed in Oct 2024 <i>Photos to corrected HDPE waste are shown below this table</i>

EMP No.	Activity Description	Key Performance Indicator (KPI)	Evaluation Date	Implementation Progress
	can result in the creation of useful products. Currently, the HDPE waste is being collected by the subcontractor's staff (Rath Lao Company), who proposed this activity			
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	Potential Achievement (84% survival rate): 168 out of 200 trees. Ongoing care activities. Next review: Dec 2024.

*EMP3 implemented in 2023, continued in 2024 for further success

New EMP for implementation in 2024 and beyond.

EMP03: Photos to corrected HDPE waste:

Collected HDPE Plastic by Ratch



Process of making HDPE



On 3-4 July 2024, 13 members of the ISO 14001:2015 committee from NNP1PC visited Nam Theun 2 Power Company (NT2) to exchange knowledge on Environmental Management System (EMS) Implementation and other relevant matters. The visit was productive, featuring valuable discussions and knowledge sharing among ISO members, as well as site tours of the NT2 environmental laboratory, offices, staff residences, the Public Information Center, powerhouse, and landfill. Key information obtained includes:

- **Induction Training:** Health, Safety, and Environmental induction training is provided 100% to visitors and newcomers.
- **ISO Integration:** NT2 has integrated the ISO system, achieving certification for ISO 14001 (EMS), ISO 45001 (H&S), and ISO 9001 (QMS). They are also in the process of obtaining certification for ISO 37001 (Anti-Bribery), Hydropower Sustainable Certificate (HSC), Hydropower Dam Safety, ISO 27001 (Cyber Security), and the Carbon Footprint Assessment.
- **Management System Cycle:** NT2 shared their annual Integrated Management System cycle, highlighting challenges and modifications based on lessons learned.
- **Management Commitment:** NT2 management at all levels is strongly committed to ISO implementation, fully supporting staff capacity building and team development.
- **System Implementation:** Software usage for various systems (Document control, Procurement, Human resources, financial accounting) and the follow-up of safety and environmental incidents are well-implemented with paperless processes.
- **Hydrometeorological Stations:** There are 26 hydrometeor stations in the NT2 project for inflow monitoring, water forecasting, and water management.

Next Steps:

NNP1's ISO members plan to implement the acquired knowledge and skills in the EMS processes. This includes conducting an internal audit in September 2024 and an external re-certification audit in January 2025.



2.2 PROGRESS OF ENVIRONMENTAL MANAGEMENT SYSTEM

EMO is currently scheduling to carry out of four (04) Environmental Management Plans (EMPs) by August 2024. Including implementing of EMP04-2024 for tree planting at the selected rehabilitation areas.

On 18 July and 30 July 2024, the pits preparation and tree planting event took place as part of the Environmental Management Plan (EMP04-2024) at the selected rehabilitation sites with active participation of NNP1PC staff and contractors. 200 trees of four local species were planted. The plants will be properly cared to ensure that at least 50% of them survive by July 2025 to achieve the EMP:04's KPIs and to establish sustainable vegetation cover in the NNP1PC's rehabilitated areas, ensuring the ecological restoration and long-term resilience of the sites intended for handover to the government.

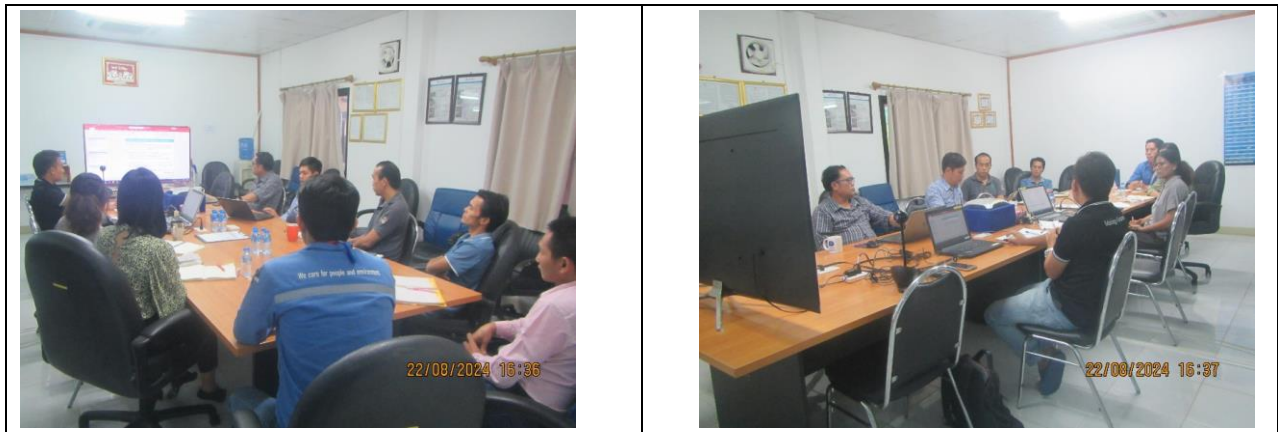
	
Pits preparation for tree planting on 18 Jul 2024	Tree planting event on 30 Jul 2024

On 06 August 2024, HSE induction training was provided for three newcomers (one SMO staff and two Lao Holding State Enterprise staff (LHSE). The training will continue to ensure that the KPIs of the EMP01 are met.



2.3 ANNUAL ISO14001:2015 INTERNAL AUDIT

On 22 August 2024, the ISO14001:2015 meeting was held to prepare for ISO14001:2015 internal audit for 2024, scheduled from mid-September 2024 to October 2024, the meeting covered the review of 2023 and 2024, discussion of findings from 2023 internal audit and results from the 2024 surveillance audit, and preparation and planning for the 2024 ISO 14001:2015 Internal Audit.



Six internal audit teams have been established to review 31 work functions across three key areas: Industrial Areas, Camp Facilities, and Management System. In September 2024, the ISO14001 internal audits were conducted for 19 work functions. No non-compliance issues were found, but some opportunities for improvement (OFIs) were identified and are being summarized by the relevant audit teams. The remaining audits are expected to be completed by mid-Oct 2024, with the Management Review Meeting (MRM) scheduled for mid-Nov 2024. Detailed audit progress is provided in **Table 2.3-1**, and activity photos are shown in **Table 2.3-2**.

Table 2.3-1: The Details of Internal Audits in Q3 2024

Area/Department/Process/Function	Group1	Group2	Group3	Group4	Group5	Group6
Industrial Areas (Powerhouses and Dams) (08 key functions)						
Control rooms						
Dams						
Equipment Storage Rooms						
Chemical & Hazmat Storage Areas						
Reservoirs and Downstream of the Dams						
Transmission Lines (230 kV and 115 kV) and 22kV DL						
Emergency response and preparedness system						
Wastewater treatment systems						
Camps Facilities (11 key functions)						
Wastewater treatment systems, Chlorine Storage (OSOV1, OSOV2)						
Environmental Laboratory						
Clinic (OSOV1)						
Fuel storage and Station						
Security guard houses						
Emergency response and preparedness system						

Area/Department/Process/Function	Group1	Group2	Group3	Group4	Group5	Group6
Project Waste Management and Landfill Operation						
Canteen						
Site decommissioned and rehabilitation						
Watershed and Biodiversity Management						
Resettlement Management						
Management System (12 key functions)						
Management Representative (MR)						
Organization Contexts/Needs and Expectations of Interested Parties/Risks and Opportunities/Legal and Compliance Evaluation						
Compliance Obligation and Compliance Evaluation						
Communication						
DCC						
Incident Investigation/NC/CA/PA						
Internal Audit						
Management Review						
E Objectives, Targets and Programs						
Training						
Procurement Management						
Logistic and transportation						
Status						
	Completed					
	Ongoing					

Table 2.3-2: Activity Photos of Internal Audits in Q3 2024





2.4 CONTRACTOR SS-ESMMPs

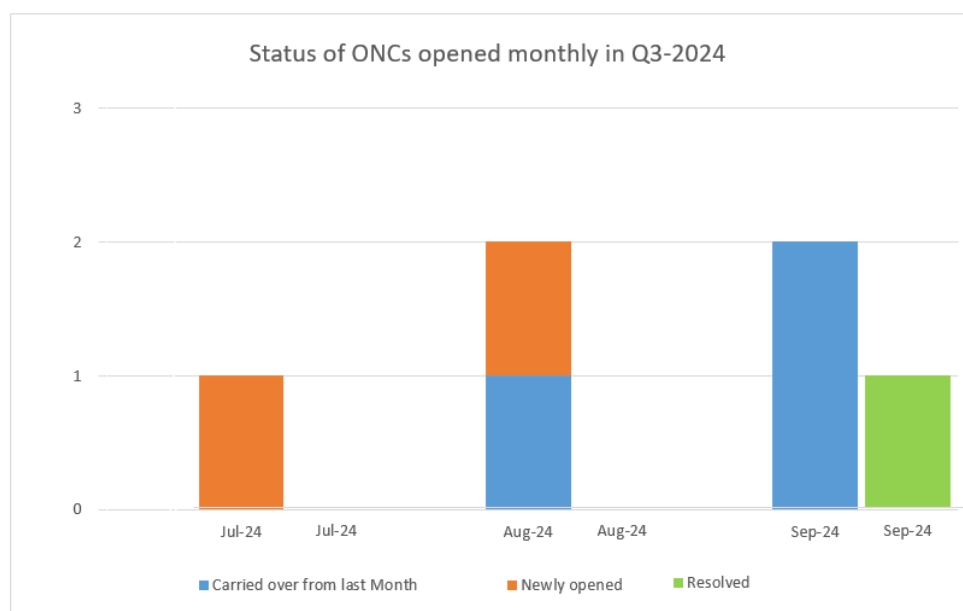
In Q3 2024, no document was submitted to the Environment Management Office (EMO) for review and approval.

2.5 RESULTS OF COMPLIANCE INSPECTIONS AT CONSTRUCTION SITES

During Q3 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 findings. Three Site Inspection Reports (SIRs) were submitted to TD and ADM. During this joint site inspection, several issues were identified, including the lack of regular removal of hazardous waste from the Main Dam Powerhouse to LILAMA10's hazardous material and waste storage facility, and the need to repair the crack in OSOV2's wastewater tank to prevent untreated wastewater leakage. The inspection confirmed that all hazardous waste has been transferred from the Main Dam Powerhouse to the designated storage facility. However, the crack in OSOV2's wastewater tank, which could lead to untreated wastewater leakage, remained unrepaired. The Site Inspection Report (SIR) was submitted to Admin highlighting that this issue has been pending for two months and could be escalated to NCR1 if not rectified before the next monthly joint site inspection in Q4 2024. The delay in repairing OSOV2's wastewater tank was due to delays in proposing the procurement process for the necessary repair work. However, the Administration Department has since engaged a local contractor, finalized the procurement, and completed the repair of the wastewater tank in October 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 Q3 2024 is presented in **Appendix 1**.

TABLE 2.5-1: STATUS OF ONCs AND NCRs REPORT DURING Q3 2024

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

FIGURE 2.5-1: STATUS OF ONCs DURING Q3 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 Q3 2024, a total of 17.95 m³ solid waste from NNP1 project sites and camps was disposed of at the NNP1 Project Landfill, a decrease of 0.19 m³ compared with Q2 2024. The local contractor maintained routine waste collection and NNP1 landfill management throughout Q3 2024.

The amount of recyclable waste managed on site during Q3 2024 is shown in **Table 2.7-1**.

TABLE 2.7-1: AMOUNTS OF RECYCLABLE WASTE DURING Q3 2024

Source and Type of Recyclables		Unit	Carried Over from Q2 2024	Status in Q3 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	46	39	85	70	15
3	Aluminium Can	kg	N/A*	N/A	N/A*	N/A	N/A
4	Paper/Cardboard	kg	41	34	75	68	7
5	Glass	kg	105	68	173	119	54
6	Scrap metal	Kg	0	0	0	0	0
Sub-Total 2		kg	192	141	333	257	76
Grand Total (Sub-Total 1+2)		kg	192	141	333	257	76

*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 Non-available (N/A).

2.7.2 Hazardous Material and Waste Management

The amounts of hazardous waste and hazardous materials that were collected, stored and disposed of during Q3 2024 are shown in **TABLE 2.7-2**.

TABLE 2.7-2: HAZARDOUS MATERIAL AND HAZARDOUS WASTE RECORDED DURING Q3 2024

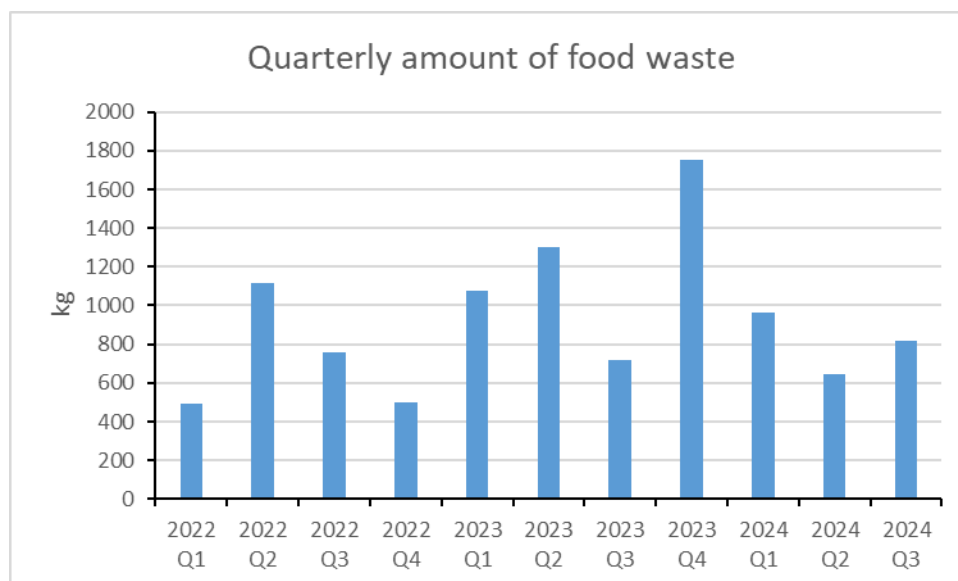
No.	Type of Hazardous Material	Unit	Total in Q3 2024	Used/ Disposed	Remaining
1	Diesel	Litre	19,854	16,850	3,004
2	Gasoline	Litre	1,956	1,550	406
3	Lubricant (Turbine oil)	Litre	34	3	31
4	Colour paint	Litre	39	0	39
5	Thinner	Litre	1	0	1
6	Grease oil	Litre	785	4	781
7	Gear Oil	Litre	33	9	24
8	Chlorine Liquid	Litre	350	100	250
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
13	Empty used oil drum/container (drum 200L)	Unit	53	0	53

No.	Type of Hazardous Material	Unit	Total in Q3 2024	Used/ Disposed	Remaining
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	128	0	128
18	Lead acid batteries	Unit	6	0	6
19	Empty paint and spray cans	Can	128	0	128
20	Halogen/fluorescent bulbs	Unit	497	0	497
21	Empty cartridge (Ink)	Piece	133	0	133
22	Clinic Waste	Kg	3	0	3
23	Expired Chlorine Powder	Kg	65	0	65

2.7.3 Animal Fodder (Pig Feed) Collection Programme

During Q3 2024, local villagers collected 819.5 kg of food waste from the Owner's Site Office and Village (OSOV1's canteen) for feeding their animals. Additionally, food waste management was conducted by Khammany General Service (KGS) routinely. EMO conducted a review with the food service provider and identified one contributing factor that food waste is often mixed with water during disposal, which significantly increases the weight when measured in kilograms. EMO provided instruction to the food service provider to improve their food waste separation practices to ensure more accurate reporting.

If I remember correctly, we discussed food waste once during my last visit. One thing strikes me here: you have a program for reducing the use of paper (which is ok), but there seems to be an enormous amount of food wasted. Just giving the figure for the last quarter does not show much (and is, in my view, not a very good way for providing monitoring information). If you include a graph as the following one, it is immediately clear that there are large differences from one quarter to the next, but there is no progress (in terms of reduction of food waste), and this never seemed to have been a subject worth discussing. I think that there should be an effort for reducing food waste, and with such a graph it would be easy to see whether it does any good.



2.7.4 Community Solid Waste Management and Recycling Programme

Since May 2024, NNP1-EMO has submitted an official response letter to the Bolikhan EMU regarding the handover of community waste management and the Houay Soup Landfill, accepting the EMU request for NNP1PC to allow villagers from Thaheua, HatGnuin, and Phouhomxay to use NNP1PC's landfill. Once filled up, NNP1PC will fix the Houay Soup landfill for shared use. Maintain the access road to the landfill, agreed with the EMU to instruct the head of HatGnuin village to dismantle the recycling waste bank building and use the materials for village works and agreed for the EMU to take over a waste compaction machine to support waste management in the Bolikhan district.

During a meeting with the Department of Natural Resources and Inspection, Ministry of Natural Resources and Environment (DNRI-MONRE) on 17 June 2024, NNP1-EMO also reported this handover process, which the DNRI agreed with and had no further comments.

2.8 RESERVOIR OPERATIONS

2.8.1 Main Reservoir

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

During Q3 2024, the mean daily inflow to the main reservoir was 330 m³/s. The minimum daily inflow was 143 m³/s, maximum daily inflow was recorded at 649 m³/s, and 25th percentile of 275 m³/s and 75th percentile of 387 m³/s. As indicated in **Figure 2.8-1**, the inflow during Q3 2024 was higher compared to the same period in 2023.

The water level in the main reservoir increased with 17.75 m from El. 302.20 m asl (01 July 2024) to 31.98 m asl (30 September 2024).

FIGURE 2.8-1: INFLOW TO THE MAIN RESERVOIR

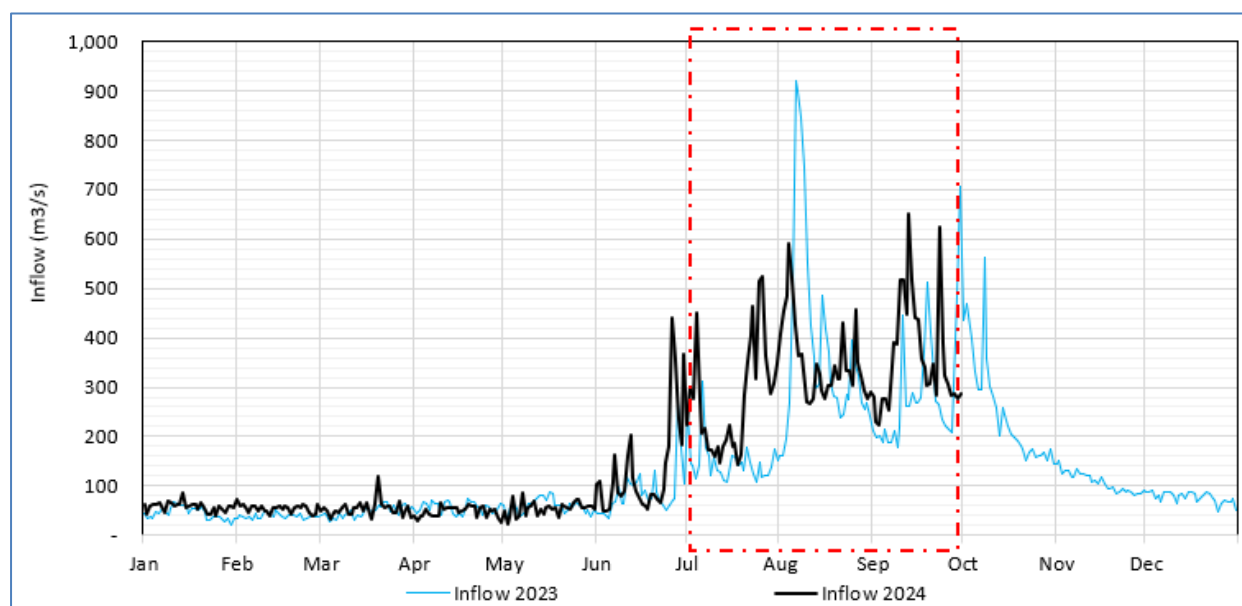
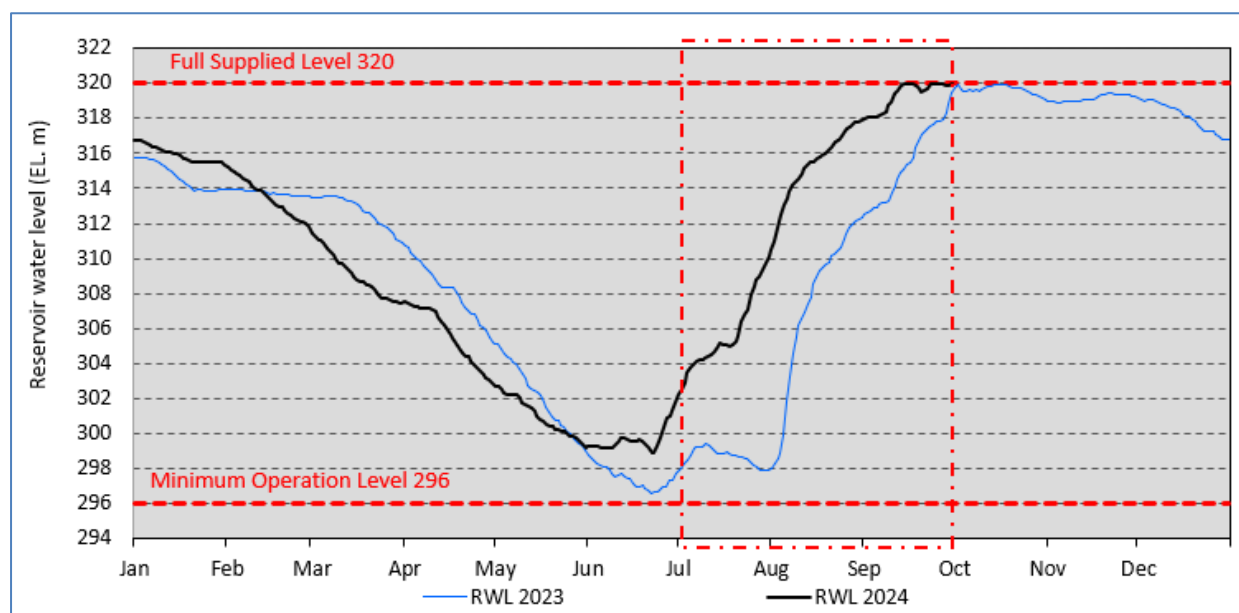


FIGURE 2.8-2: WATER LEVEL OF THE MAIN RESERVOIR

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 Q3 2024 are summarized in **Table 2.8-1**.

TABLE 2.8-1: SUMMARY OF EFRs COMPLIANCE MONITORING IN Q3 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 Q3 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 2023, at the beginning of the dry season, NNP1PC conducted interviews with inhabitants

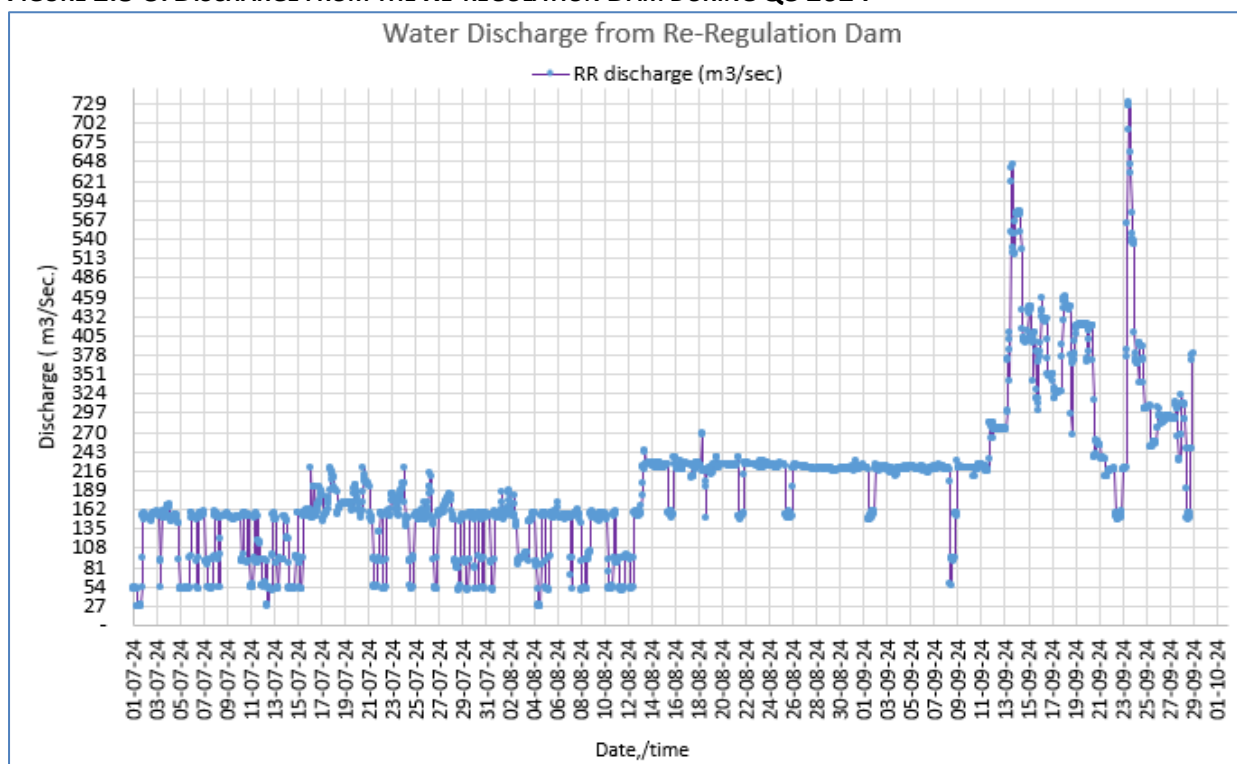
No	EFRs in the Downstream of the Re-regulation dam	EFRs compliance
		who use boats to gather and assess any complaints about boat navigation difficulties, there were no complaints from inhabitants and no damage observed. NNP1PC has consulted with the Environmental and social specialist who recommended 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 nine instances of non-compliance for hourly
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)	There was one instance of non-compliance for 24-hour fluctuation
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)	2207 out of 220 data records of 7-day fluctuations comply

2.8.2.1 Minimum Flow Requirements

The discharge monitoring data for the re-regulation dam during Q3 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 Q3 2024, the mean discharge from the re-regulation dam was about 128 m³/s in July 2024 and about 176 m³/s and 288 m³/s in August and September 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 Q3 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).

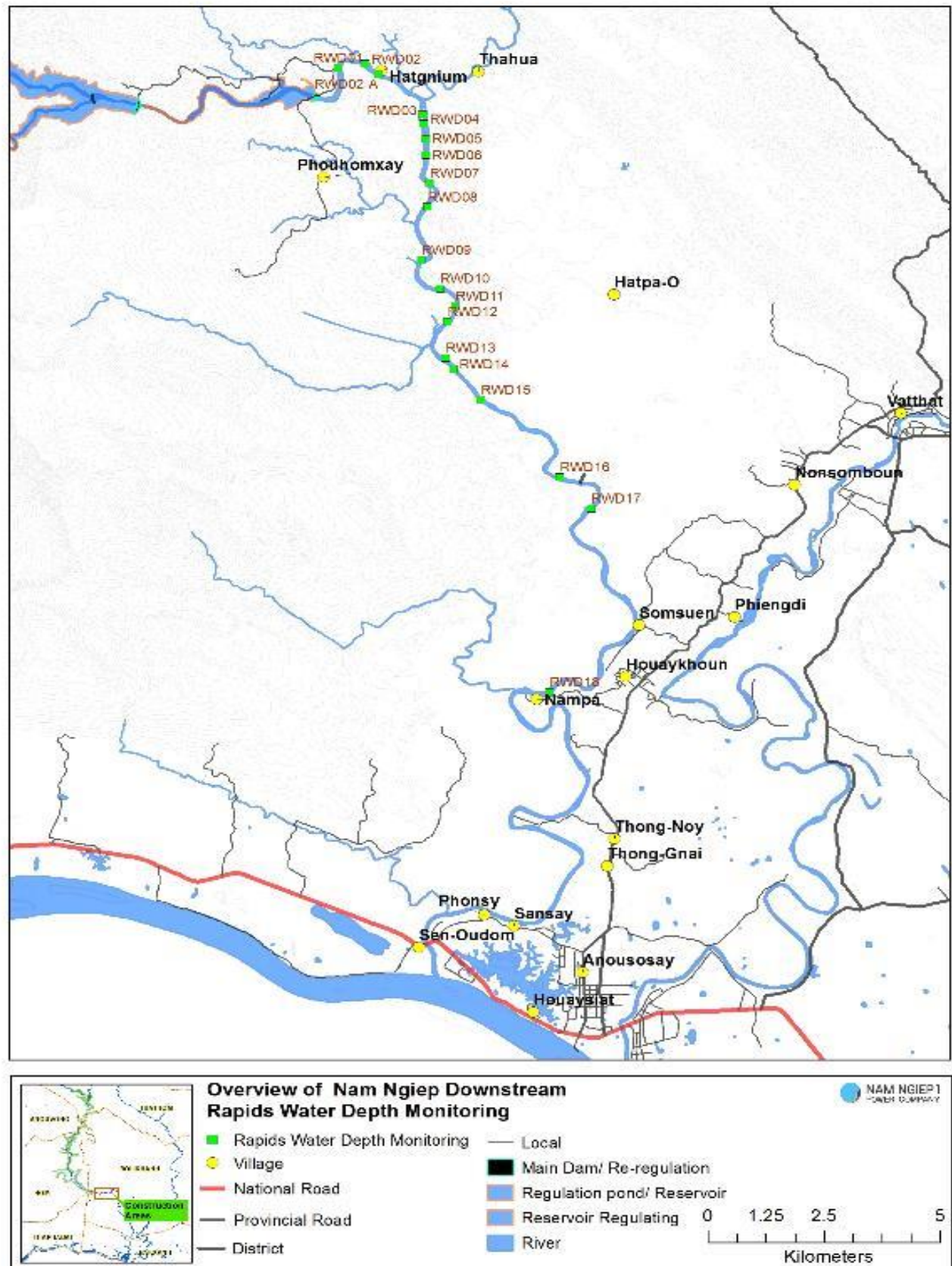
Starting in December 2020, the water depths have been measured across the river channel where visual observations or boat navigation indicate shallow waters to ensure that the measurements represent the river thalweg.

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 Q3 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:

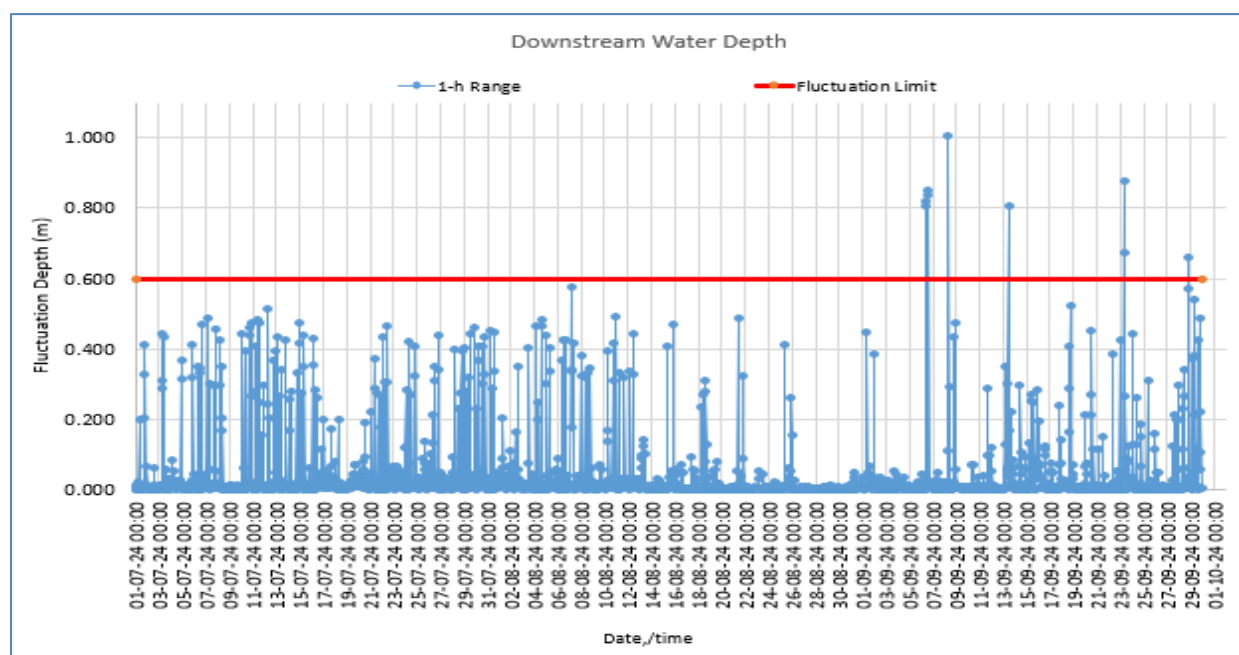
1. A requirement on the rate of change which is set at a maximum of 0.6 m per hour (calculated from the hourly water level recordings).
2. Requirements on the range in fluctuations over 24-hour periods and 7-day periods respectively, which is set at a maximum of 1.7 m for both periods. In other words, 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 Q3 2024, the maximum allowed rate of change of 0.6 m over 1-hour was complied with for all hourly periods, except September 2024, due to significant water spilling from the Main Dam and large water discharges from the Re-regulation Dam. As of now, no complaints have been received, and no damage has been observed. The results are presented in **Figure 2.8-5**.

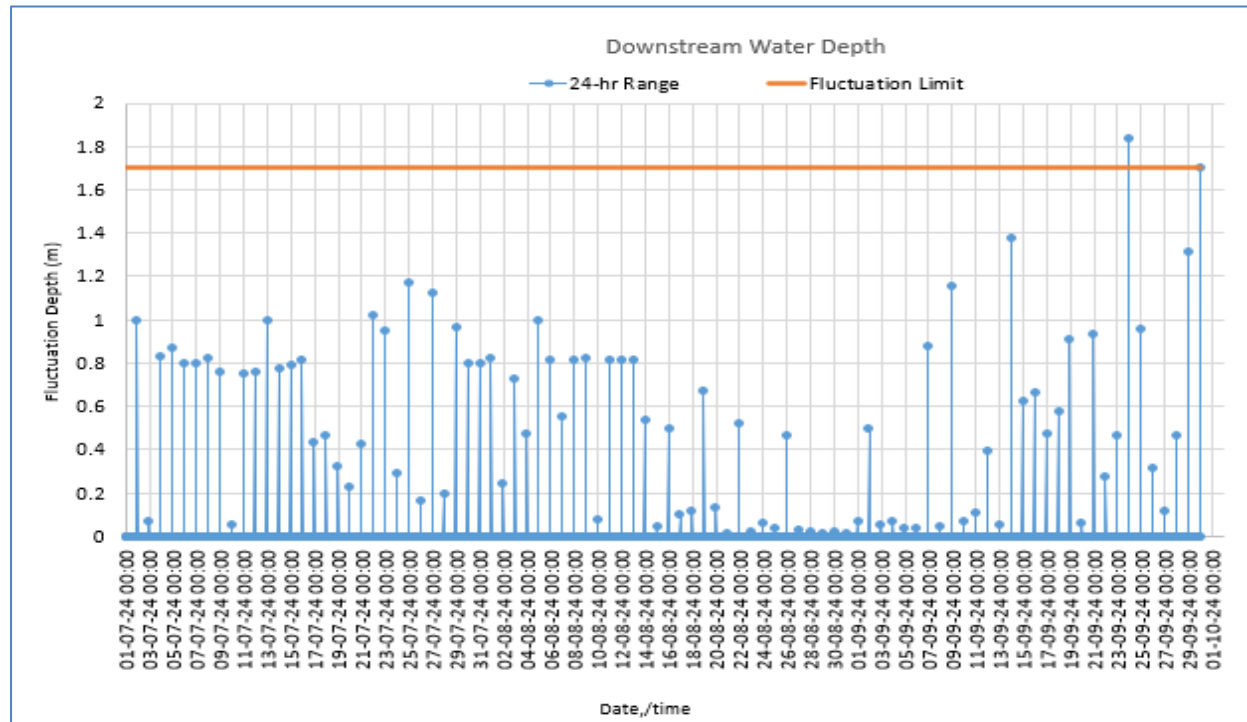
FIGURE 2.8-5: HOURLY STAGE HEIGHT FLUCTUATIONS DURING Q3 2024



During Q3 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), except a record on 23 September 2024.

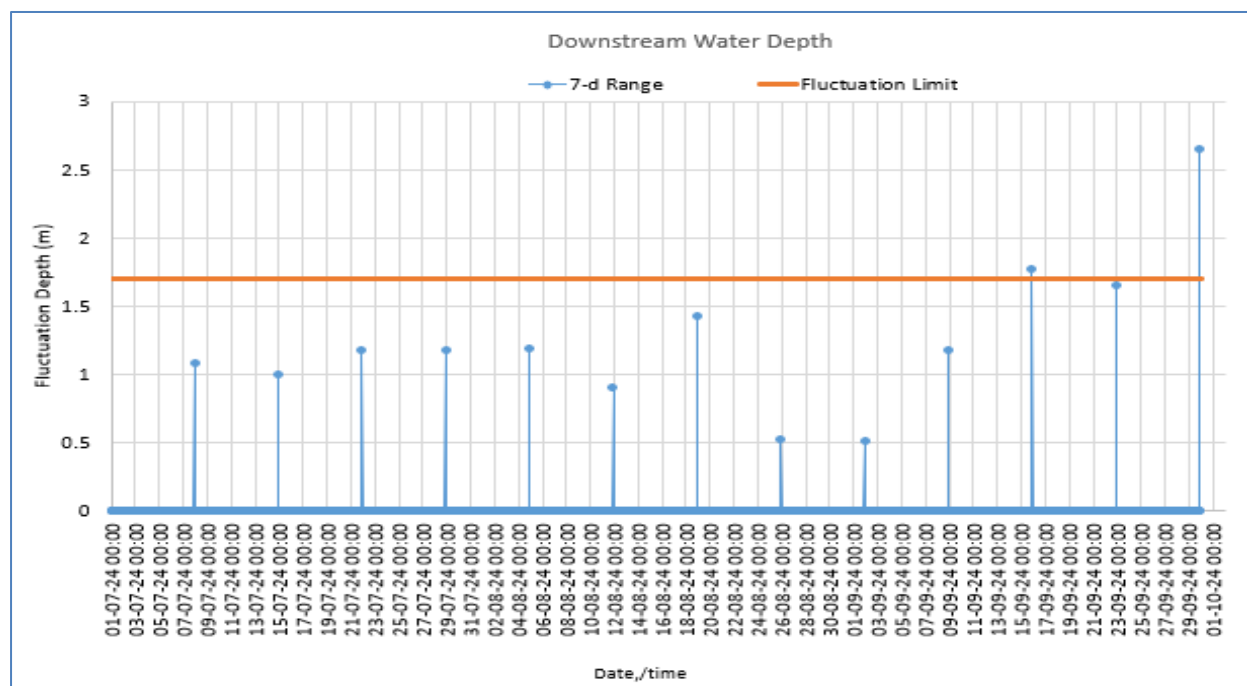
The results of the monitoring are presented in **Figure 2.8-6**.

FIGURE 2.8-6: 24-HOUR STAGE HEIGHT DIFFERENCE (M) DURING Q3 2024



During Q3 2024, the maximum difference in stage height of 1.7 m over 7-days was complied with for all 7-day periods, except two 7-days recorded on 15 and 29 September 2024. The results are presented in **Figure 2.8-7**.

FIGURE 2.8-7: 7-DAY STAGE HEIGHT DIFFERENCE (M) DURING Q3 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 Q3 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 Q3 2023, Q2 2024 and Q3 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

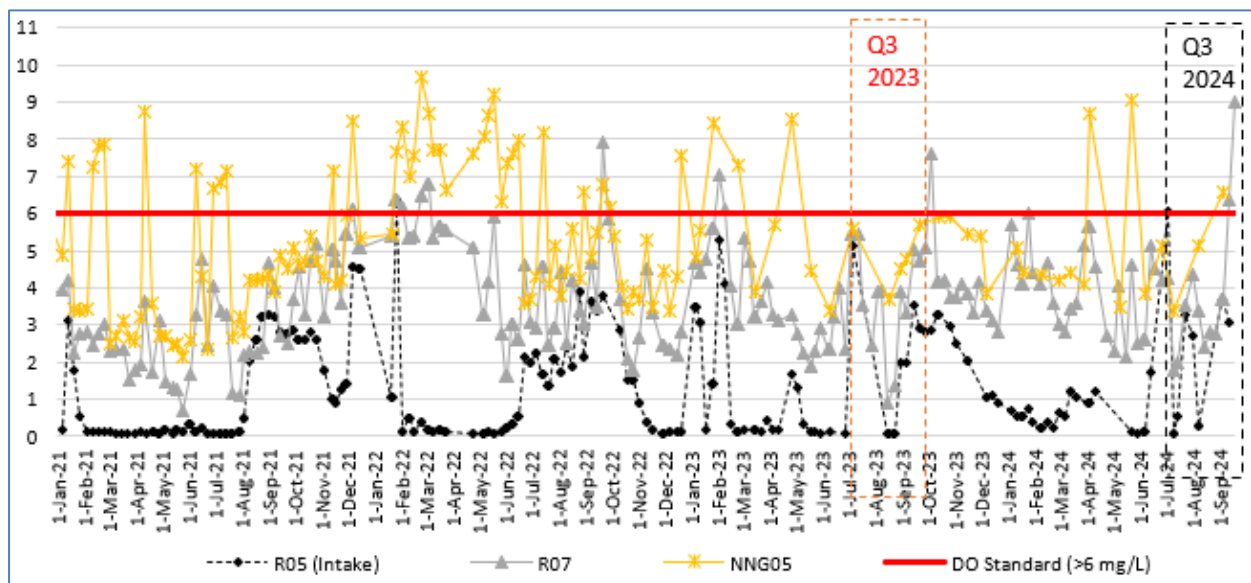
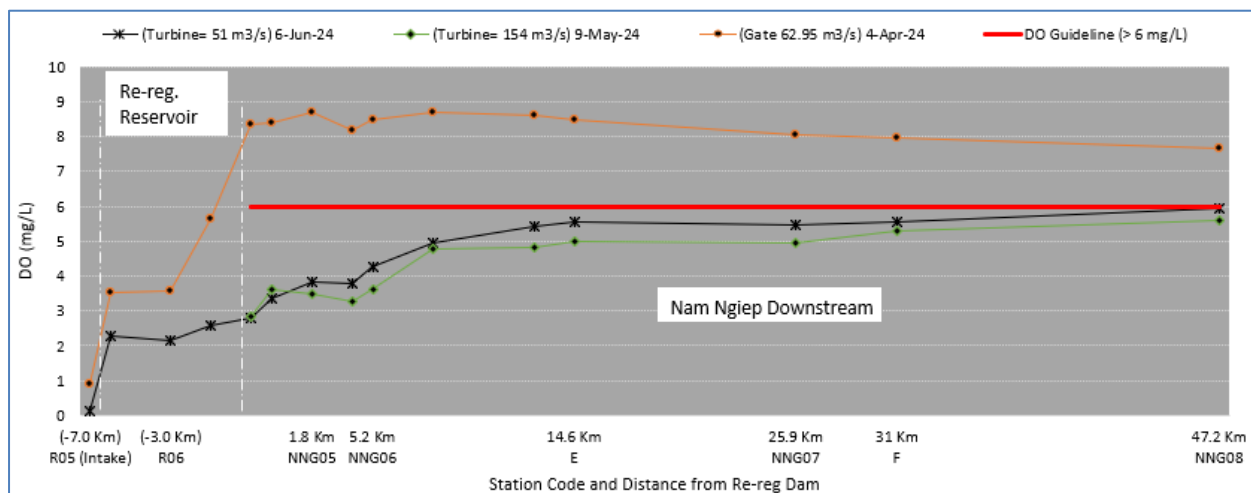
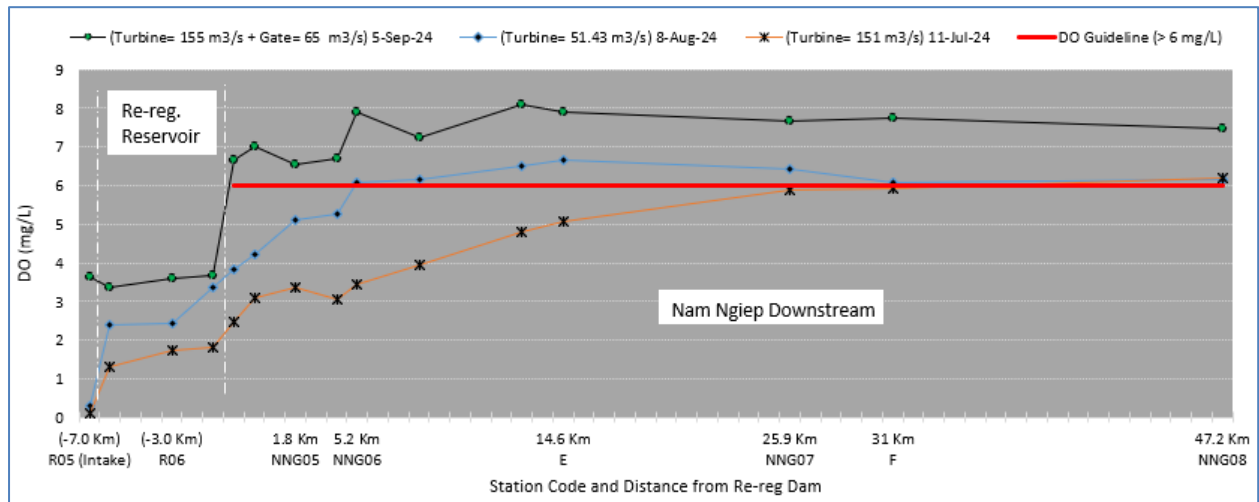


FIGURE 2.9-2: DISSOLVED OXYGEN LONG PROFILE MEASUREMENT FROM IMMEDIATELY UPSTREAM THE MAIN DAM TO LOWER NAM NGIEP (Q2 2024 AND Q3 2024)





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 September 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.

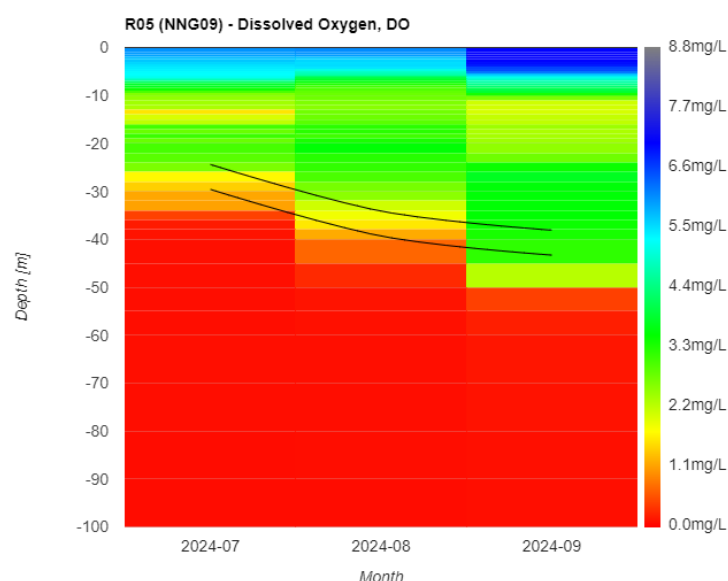
The depth profile monitoring during Q3 2024 indicates formation of thermoclines and oxyclines in the main reservoir at the monitored stations at different depths.

At R05, when comparing Q3 2024 with Q3 2023, overall, the thermocline and oxycline show similar patterns.

Figure 2.9-5 shows the DO and water temperature depth profiles for Q3 2023, Q2 2024 and Q3 2024 at R05. The profiles for Q2 2024 and Q3 2024 show decreasing water temperatures, formation of no distinct thermocline in the water column but formation of an oxycline occurred at 6.0 m – 12 m depths. The profiles for Q3 2024 indicate that oxygen depletion (about 2 mg/L DO) is found at about 28 m below surface in July 2024 gradually increasing to a depth of about 50 m in September 2024. Compared to Q3 2023, there are no obvious improvements in the DO levels.

The monthly mean DO concentration at the intake level varied from 2.5 mg/L in July 2024, 1.4 mg/L in August 2024 and 3.3 mg/L in September 2024. Anoxic levels were found at decreasing depths from about 36 m in July 2024 (just below the intake sill) to 50 m in August 2024 (about 10 m below the intake sill) and to a depth of about 55 m in September 2024 (about 10 m below the intake sill; intake level indicated by the two black lines in the graph), however 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 10 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 Q3 2024, DO concentrations varied between 4.6 mg/L and 10 mg/L with an average of 7.8 mg/L in the upper 3.5 m and at depths from 4 m to about 38 m below surface the DO varied between 1.5 mg/L and 9.4 mg/L. No anoxic conditions were found during the mission.

At R01, the mean DO concentration throughout the quarter was about 7.7 mg/L over the entire water column with no measurements below 5.5 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 varied from 2.8 mg/L in July, 2.4 mg/L in August to 7.0 mg/L in September 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. However, there was water release through spillway at the main dam in September 2024 and this could cause the increased DO concentration 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 Q3 2024.

Downstream Stations

During Q3 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**, periods with turbine discharge (July and August 2024) resulted in DO concentrations varied between 3 mg/L and 5 mg/L over the first 5 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. However, during combination of turbine and gate discharges in September 2024, the DO concentration in all Nam Ngiep downstream stations were about 7 mg/L and complied with the Standard.

No dead fish was observed in Nam Ngiep downstream during Q3 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 Q3 2024

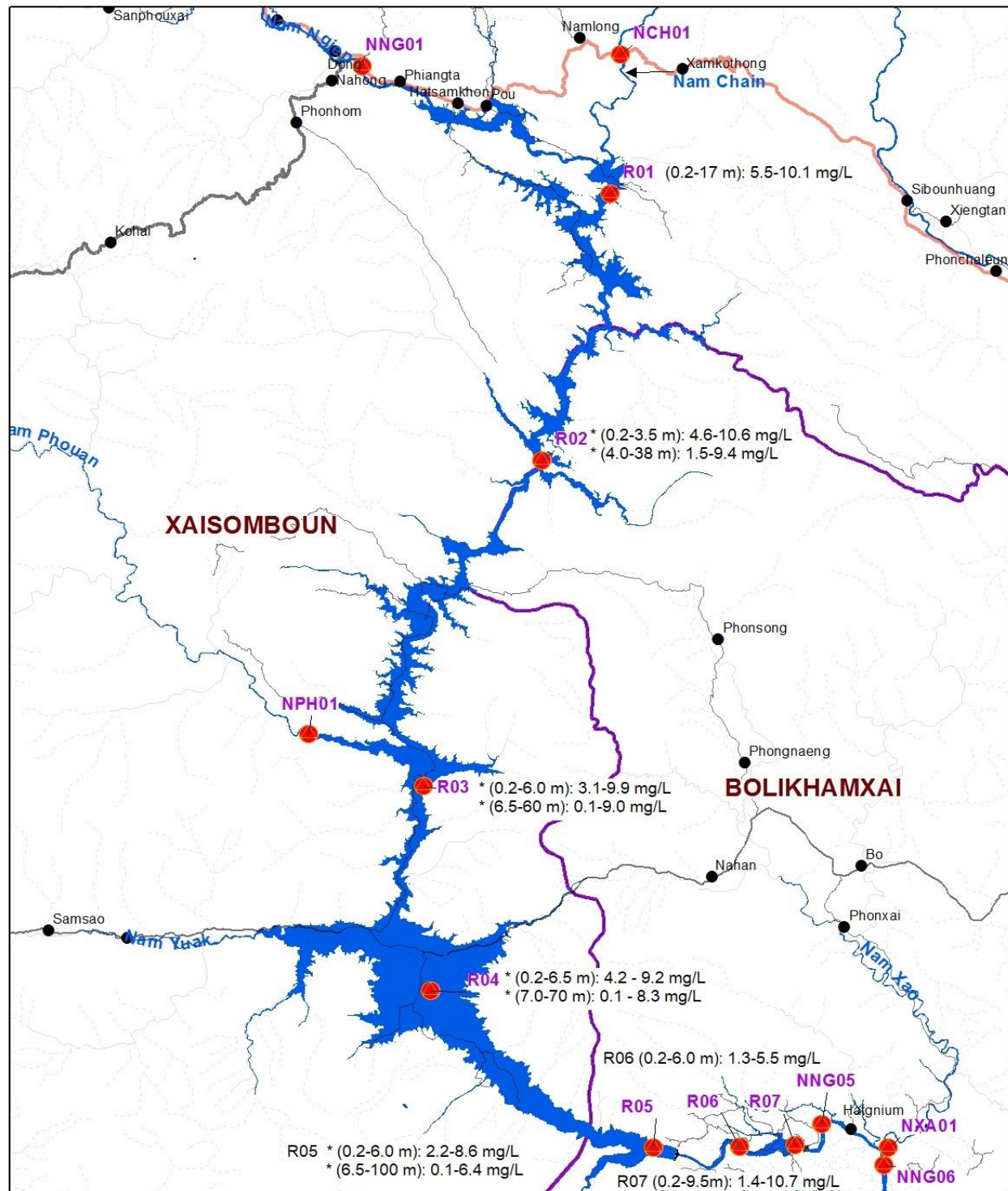


FIGURE 2.9-5: WATER TEMPERATURE AND DISSOLVED OXYGEN – DEPTH PROFILES IN THE MAIN RESERVOIR IMMEDIATELY UPSTREAM OF THE MAIN DAM (R05)

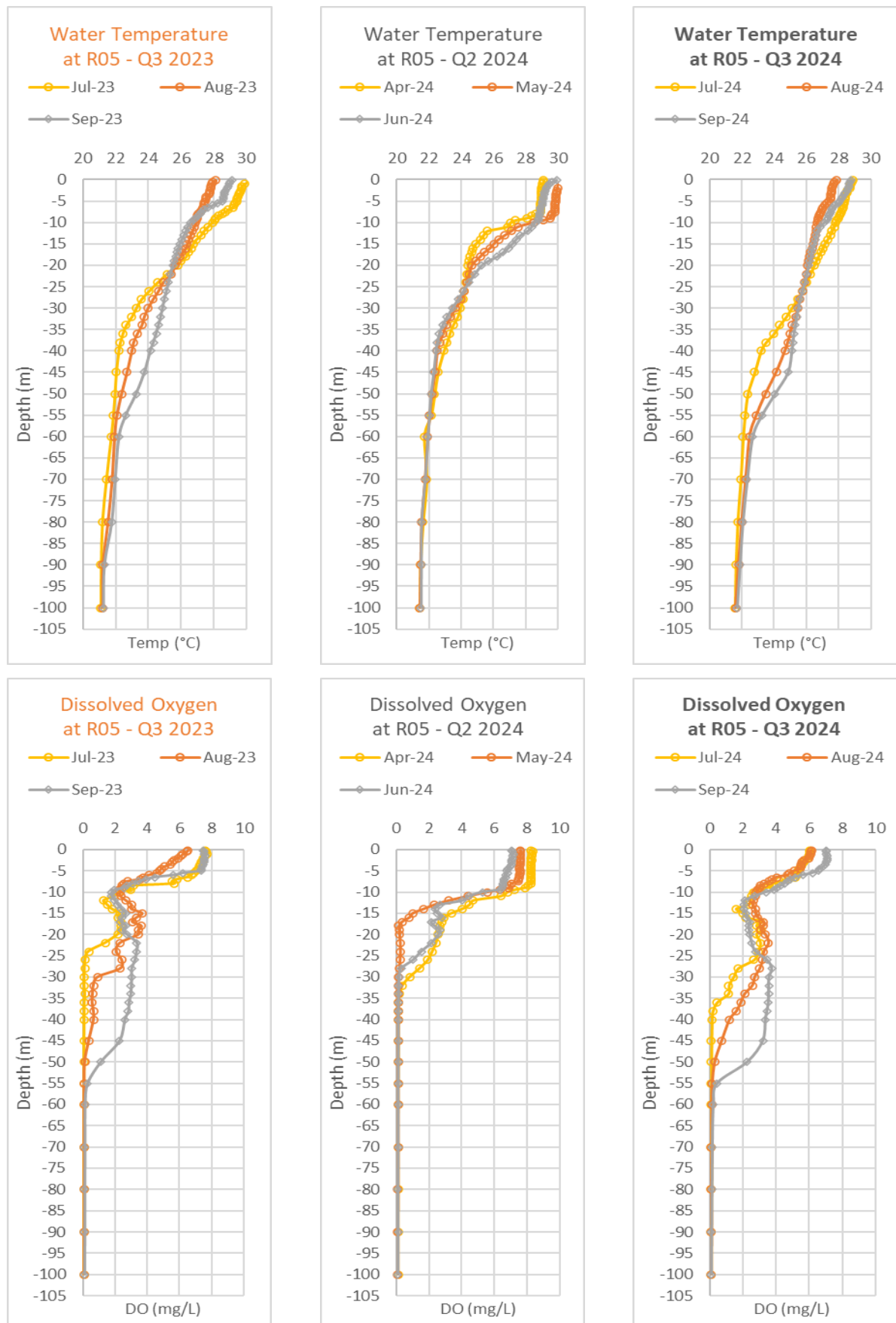


FIGURE 2.9-6: WATER TEMPERATURE AND DO DEPTH PROFILES IN THE MAIN RESERVOIR (R04 - R05), WITH POSITION OF INTAKE AT THE ACTUAL WATER LEVEL DURING SEPTEMBER 2018 – SEPTEMBER 2024

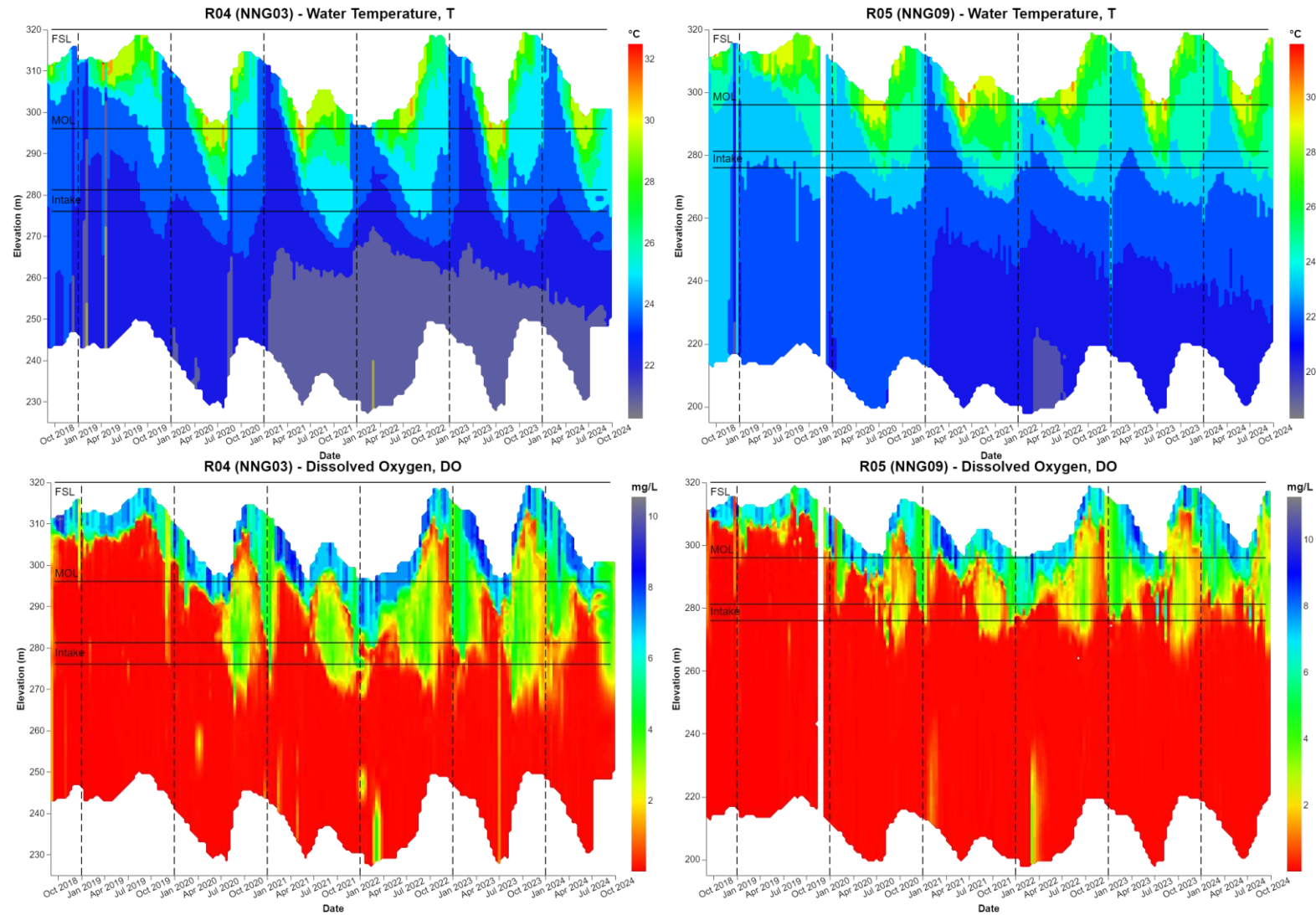


FIGURE 2.9-7: THE STRAIGHT-LINE GRAPH OF MONTHLY AVERAGED DO AND WATER TEMPERATURE AT R04 AND R05

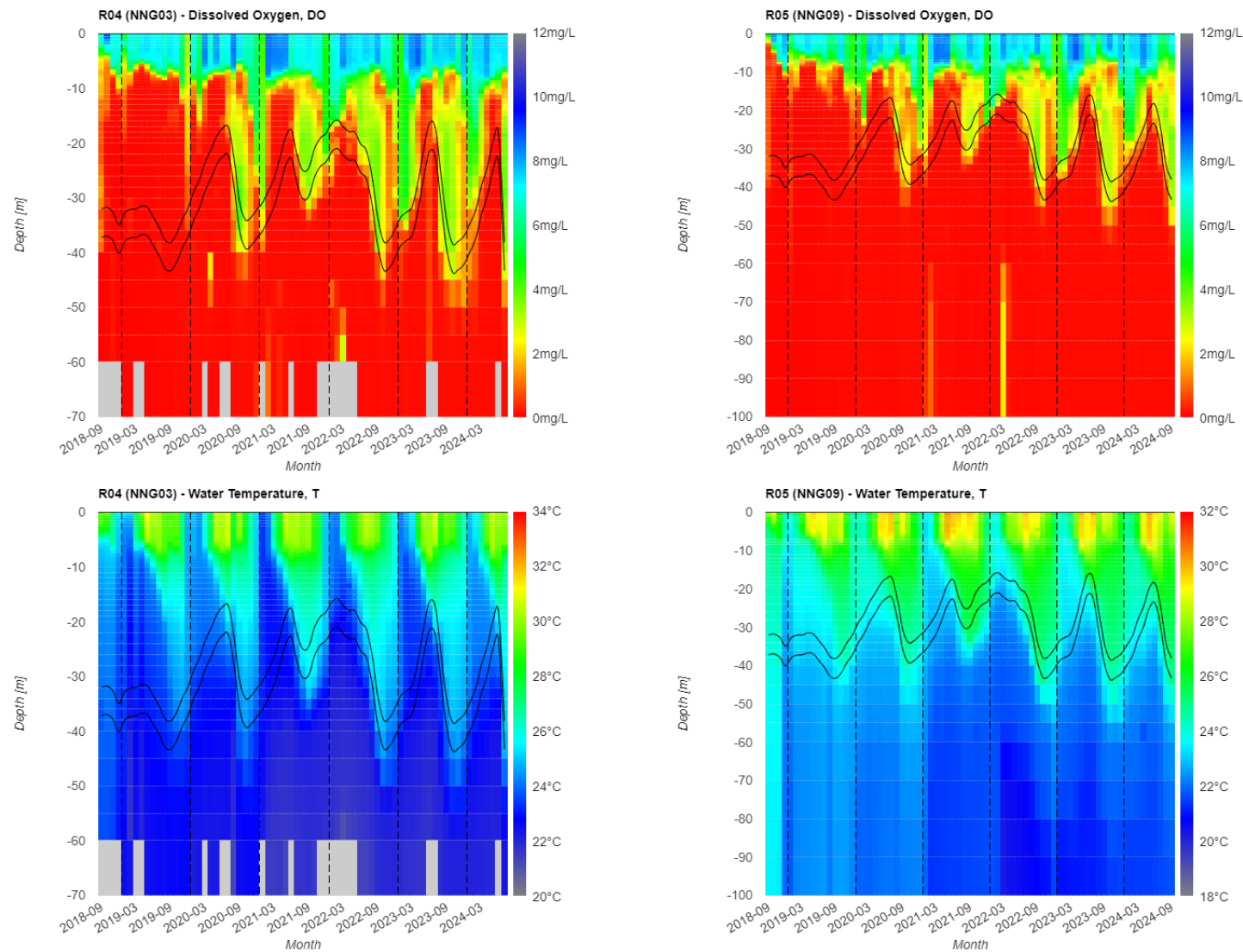


TABLE 2.9-1: DO (MG/L) RESULTS OF SURFACE WATER IN MAIN RESERVOIR, DO (MG/L) RESULTS OF R05 AT INTAKE DEPTH, RE-REGULATION RESERVOIR, NAM NGIEP AND ITS MAIN TRIBUTARIES MONITORED IN Q3 2024**(NATIONAL SURFACE WATER QUALITY STANDARD FOR DISSOLVED OXYGEN: ≥ 6 MG/L)**

Station Code	NNG01	R01	R02	R03	R04	R05 Intake	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
2-Jul-24		8.55	8.3	8.14													
3-Jul-24					6.95	6.06	6.08	4.12	4.27								
8-Jul-24	7.49													8.03			
9-Jul-24		8.3	8.7	8.08											9.01		
10-Jul-24					7.52	0.1	7.02	1.73	1.8								
11-Jul-24										3.37	3.44	5.9	6.19			6.84	6.37
15-Jul-24					6.93	0.56	6.38	1.69	2.01								
16-Jul-24		7.85	8.61	8.23													
23-Jul-24					9.13	3.28	7.94	2.97	3.54								
24-Jul-24		7.29	8.34	7.83													
30-Jul-24		10.14	10.13	9.45													
31-Jul-24					8.18	2.73	2.66	4.86	4.36								
5-Aug-24	9.69													10.36			
6-Aug-24		7.57	6.82	7.21											6.95		
7-Aug-24					7.85	0.3	6.74	2.44	3.38								
8-Aug-24										5.13	6.07	6.42	6.15			7.44	7.21
14-Aug-24		6.88	7.84	7.96													
15-Aug-24					7.58	1.14	6.5	2.15	2.38								
21-Aug-24					8.18	1.42	4.81	2.67	2.8								

Station Code	NNG01	R01	R02	R03	R04	R05 Intake	R05	R06	R07	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
22-Aug-24		8.05	8.85	9.39													
27-Aug-24		8.26	9.7	9.68													
28-Aug-24					8.5	2.8	6.45	2.66	2.78								
2-Sep-24	8.06													8.48			
3-Sep-24		7.1	6.99	7.09													
4-Sep-24					8.17	3.64	8.4	3.6	3.69								
5-Sep-24										6.56	7.91	7.66	7.47			8.57	8.13
11-Sep-24		7.1	6.44	6.77													
12-Sep-24					6.46	3.08	5.61	7.38	6.39								
18-Sep-24								9.07	8.99								

Ammonia Nitrogen

In Q3 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 Q3 2024

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

Station Code	NNG 01	R01	R02	R03	R04	R05	R06	R07	NNG 05	NNG 06	NNG 07	NNG 08	NCH 01	NPH 01	NXA 01	NHS 01
8-Jul-24	<0.1												<0.1			
9-Jul-24		<0.1		<0.1										<0.1		
10-Jul-24					<0.1	<0.1										
5-Aug-24	<0.1												<0.1			
6-Aug-24		<0.1		<0.1										<0.1		
7-Aug-24					<0.1	<0.1										
2-Sep-24	<0.1												<0.1			
3-Sep-24		<0.1		<0.1												
4-Sep-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 Q3 2024 indicate that the BOD₅ levels are in compliance with the standard at all stations, except NNG01 (Nam Ngiep River upstream of the main reservoir during May 2024).

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 Q2 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
8-Jul-24	<1												<1			
9-Jul-24		<1		<1										<1		
9-Jul-24 Bottom				<1												
10-Jul-24					<1	<1	<1	<1								
10-Jul-24 Bottom					<1	<1										
11-Jul-24									<1	<1	<1	<1			<1	<1
5-Aug-24	1.31												<1			
6-Aug-24		<1		<1										<1		
6-Aug-24 Bottom				<1												
7-Aug-24					<1	<1	<1	<1								
7-Aug-24 Bottom					<1	<1										
8-Aug-24									<1	<1	<1	<1			<1	<1
2-Sep-24	<1												<1			
3-Sep-24		<1		<1												
3-Sep-24 Bottom				5.2												
4-Sep-24					<1	<1	<1	<1								
4-Sep-24 Bottom					<1	<1										
5-Sep-24									<1	<1	<1	<1			<1	<1

Chemical Oxygen Demand (COD)

The COD measurements in Q3 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 Q3 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
8-Jul-24	17.9												20.4			
9-Jul-24														12.8		
10-Jul-24							25.6	15.4								
11-Jul-24									48.6	19.2	21.8	24.3			16.6	15.4
5-Aug-24	5.12												10.2			
6-Aug-24														21.8		
7-Aug-24							5.12	<4								
8-Aug-24									14.1	19.2	8.96	21.8			<4	26.8
2-Sep-24	21.8												40.9			
4-Sep-24							8.96	20.4								
5-Sep-24									19.2	25.6	30.7	56.3			64	90.8

Faecal Coliform Bacteria

The results of the faecal coliform analyses in Q3 2024 are presented in **Table 2.9-5**.

The standard for Faecal coliform was complied with in all stations in August 2024, and on 8 July, 11 July and 05 September 2024. Non compliances were found in NNG01 on 08 July and 02 September 2024, in NN06 on 05 September 2024, NNG08 on 11 July and 05 September 2024 and in NCH01, NPH01 and NHS01 for July 2024.

TABLE 2.9-5: FAECAL COLIFORMS (MPN/100 ML) RESULTS IN NAM NGIEP AND ITS MAIN TRIBUTARIES IN Q3 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
8-Jul-24	1,600												240			
9-Jul-24														1,600		
11-Jul-24									33	130	220	1,600			1,600	1,600
5-Aug-24	220												540			
6-Aug-24														170		
8-Aug-24									21	140	70	49			130	17
2-Sep-24	1,600												1,600			
5-Sep-24									49	1,600	920	1,600			1,600	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 Q3 2024

(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
8-Jul-24	1,600												1,600			
9-Jul-24													1,600			
11-Jul-24									540	540	540	1,600			1,600	1,600
5-Aug-24	280												920			
6-Aug-24														280		
8-Aug-24									70	170	94	70			220	26
2-Sep-24	1,600												1,600			
5-Sep-24									350	1,600	1,600	1,600			1,600	1,600

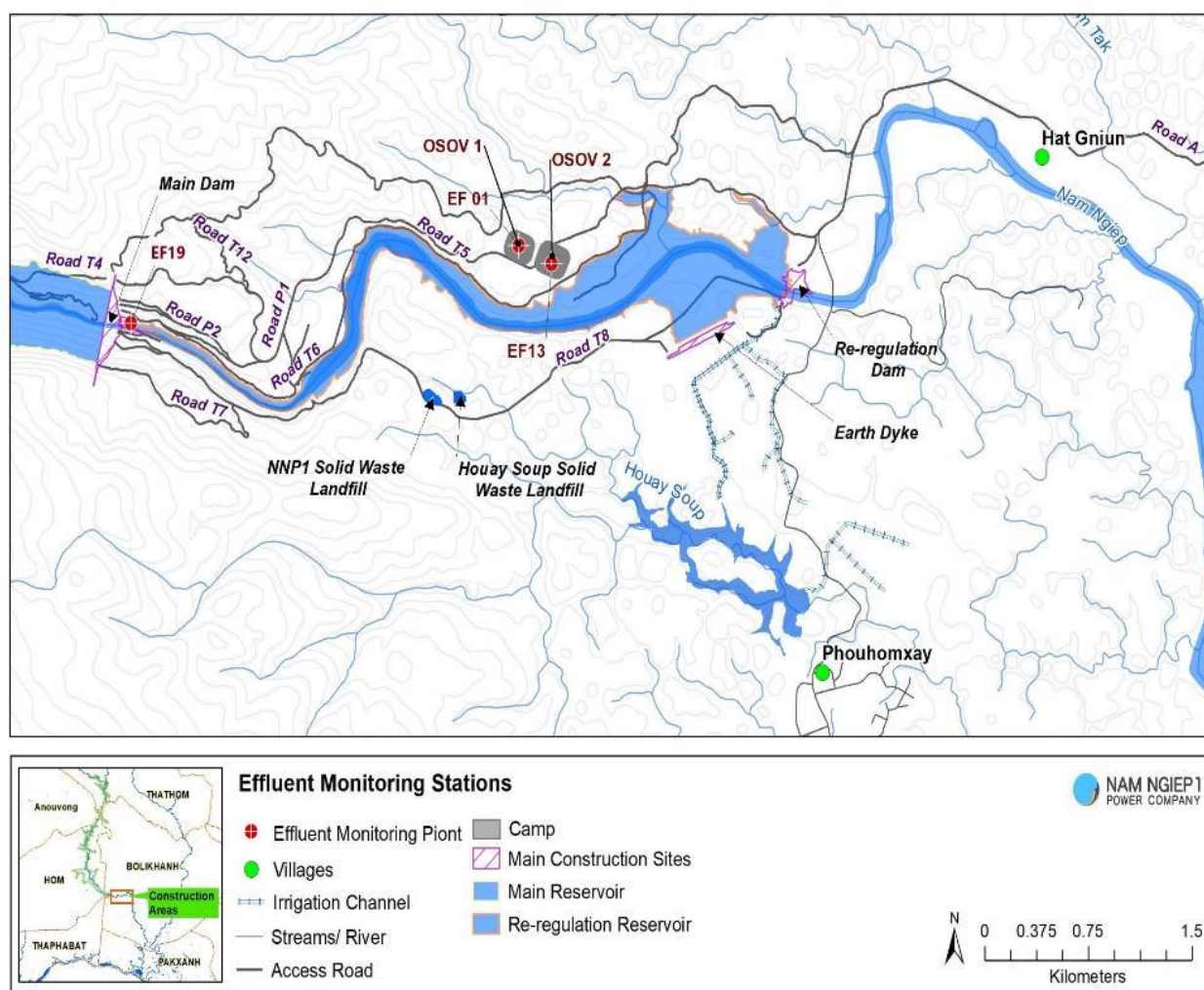
2.9.2 Compliance Monitoring of Effluents from Camps

A total of 03 sites discharged effluents in Q3 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 30 September 2024 can be summarized as follows:

- Non-compliance with Total Nitrogen for 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).

FIGURE 2.9-8: LOCATION OF EFFLUENT MONITORING POINTS**TABLE 2.9-7: RESULTS OF THE EFFLUENT WATER QUALITY MONITORING OF THE CAMPS IN Q3 2024 (NON-COMPLIANCE PARAMETERS ONLY)**

		Site Name	OSO V1	OSO V 2	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
17-Jul-24	COD (mg/L)	<125	46.9	56.3	214
25-Jul-24	COD (mg/L)	<125	44.8	20.4	80
01-Aug-24	COD (mg/L)	<125	11.5	32.0	32
12-Aug-24	COD (mg/L)	<125	70.4	34.6	58
06-Sep-24	COD (mg/L)	<125	51.2	44.8	40
16-Sep-24	COD (mg/L)	<125	60.8	7.7	32
17-Jul-24	Total Nitrogen (mg/L)	<10.0	4.0	16.6	76.3
25-Jul-24	Total Nitrogen (mg/L)	<10.0	2.2	10.7	8.4
01-Aug-24	Total Nitrogen (mg/L)	<10.0	5.4	16.2	38.0
12-Aug-24	Total Nitrogen (mg/L)	<10.0	7.0	23.0	7.0

		Site Name	OSOV1	OSOV 2	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
06-Sep-24	Total Nitrogen (mg/L)	<10.0	5.4	22.6	48.8
16-Sep-24	Total Nitrogen (mg/L)	<10.0	1.7	9.6	16.0
17-Jul-24	Total Phosphorus (mg/L)	<2	0.88	1.2	8.0
25-Jul-24	Total Phosphorus (mg/L)	<2	0.96	0.7	0.6
01-Aug-24	Total Phosphorus (mg/L)	<2	1.31	1.1	5.7
12-Aug-24	Total Phosphorus (mg/L)	<2	0.97	0.5	6.8
06-Sep-24	Total Phosphorus (mg/L)	<2	1	1.8	6.9
16-Sep-24	Total Phosphorus (mg/L)	<2	1.06	0.7	5.1
17-Jul-24	Faecal Coliform (MPN/100 mL)	<400	540	2	540
25-Jul-24	Faecal Coliform (MPN/100 mL)	<400	350	70	350
01-Aug-24	Faecal Coliform (MPN/100 mL)	<400	110	1,600	0
12-Aug-24	Faecal Coliform (MPN/100 mL)	<400	220	350	0
06-Sep-24	Faecal Coliform (MPN/100 mL)	<400	33	460	0
16-Sep-24	Faecal Coliform (MPN/100 mL)	<400	1,600	130	0
17-Jul-24	Total coliform (MPN/100 mL)	<400	1,600	130	1,600
25-Jul-24	Total coliform (MPN/100 mL)	<400	3,500	110	920
01-Aug-24	Total coliform (MPN/100 mL)	<400	1,600	1,600	0
12-Aug-24	Total coliform (MPN/100 mL)	<400	260	1,600	0
06-Sep-24	Total coliform (MPN/100 mL)	<400	1,700	3,500	0
16-Sep-24	Total coliform (MPN/100 mL)	<400	3,500	1,600	0

TABLE 2.9-8: COMPLIANCE STATUS OF EFFLUENT DISCHARGE FROM THE CAMPS IN Q3-2024

Site	ID	WWTS	Key Non-Compliance Issues ¹ in Q3-2024	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 2 out of 6 samplings. Q3 mean 476 MPN/100 mL. - Total coliform (<400 MPN/100 mL): Non-compliance in 5 out of 6 samplings. Q3 mean 2,027 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 5 out of 6 samplings. Q3 mean 16.5 mg/L. - Faecal coliform (<400 MPN/100 mL): Non-compliance in 2 out of 6 samplings. Q3 mean 435 MPN/100 mL. - Total coliform (<400 MPN/100 mL): Non-compliance in 4 out of 6 samplings. Q3 mean 1,423 MPN/100 mL. -	The installed WWTS does not eliminate nitrogen or phosphorus. However, there is no concern given the low discharge 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 Q3-2024	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 6 samplings. Q3 mean 148 MPN/100 mL. - Total coliform (<400 MPN/100 mL): Non-compliance in 2 out of 6 samplings. Q3 mean 420 MPN/100 mL. - Total nitrogen (<10 mg/L): Non-compliance in 4 out of 6 samplings. Q3 mean 32.4 mg/L. - Total Phosphorus (<2 mg/L): Non-compliance in 5 out of 6 samplings. Q3 mean 5.5 mg/L.	As above

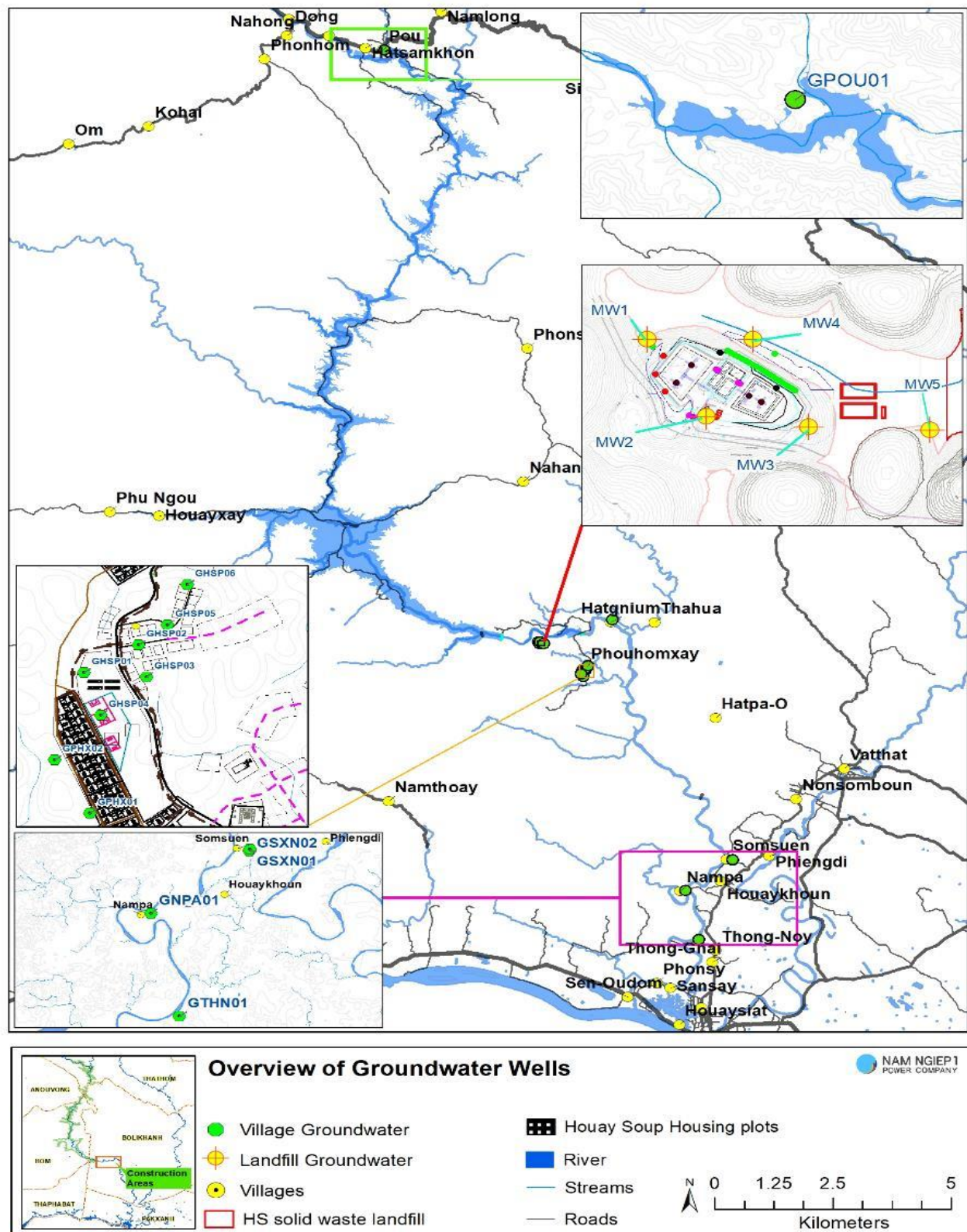
2.9.3 Groundwater Quality Monitoring

During Q3 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 Q3 2024, the water pumps of two boreholes (GPHX01 and GPHX02) at Phouhomxay Village were broken. 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. The groundwater sampling locations are displayed in **Figure 2.9-9** and the groundwater monitoring data is presented in **Appendix 5-3**.

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. 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.

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

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

Nampa Village: all monitored parameters complied with the standard.

Pou Village: all monitored parameters complied with the standard, except faecal coliform (Q3 2024) and *E. coli* Bacteria (July 2024) in borehole GPOU02.

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.

In September 2024, NNP1PC carried out landfill groundwater monitoring at NNP1 Solid Waste Landfill. Monitoring was performed at three monitoring wells due to water sampling tool being stuck in monitoring well MW2 and at Houay Soup Solids Waste Landfill (one monitoring well).

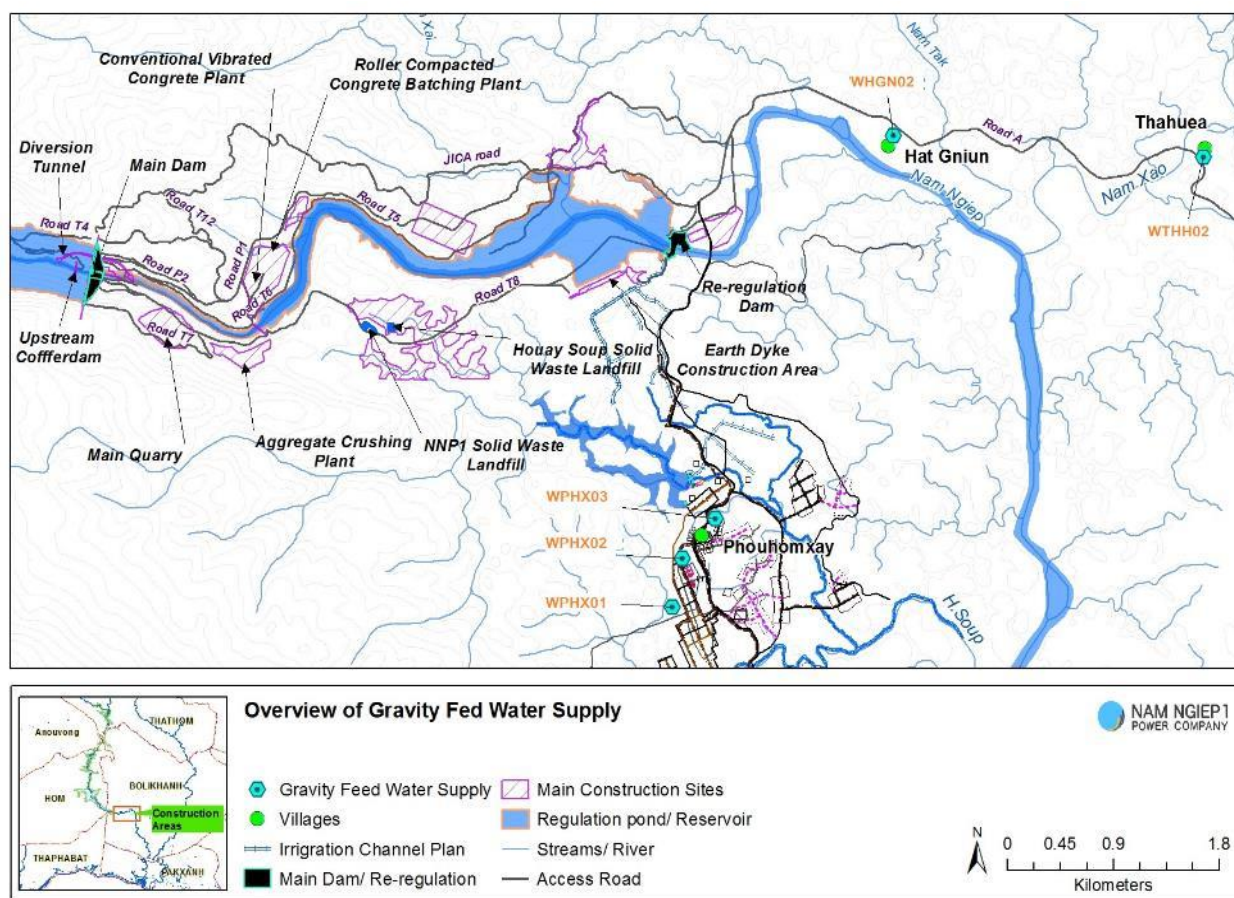
The lead concentration exceeded the groundwater quality standard in monitoring wells MW1, MW3, MW4 and MW5. However, this is likely due to the natural background level. Lead has been detected in both upstream and downstream wells, and leachate from the treatment ponds did not contain lead. The landfills are HDPE lined to prevent leachate and the boreholes are not accessible to staff or villagers.

Table 2.9-9: The Landfill Groundwater Monitoring Result in Q3 2024

		Site Name	NNP1 Landfill				Houay Soup Landfill
			MW1	MW2	MW3	MW4	MW5
Date	Parameter (Unit)	Guideline					
10-Sep-24	pH		6.91		6.79	6.88	6.98
10-Sep-24	Sat. DO (%)		77.7		50.7	30	67.9
10-Sep-24	DO (mg/L)		6.33		4.11	2.4	5.42
10-Sep-24	Conductivity (µS/cm)		118		272	146	120
10-Sep-24	Temperature (°C)		25.87		26.01	26.64	27.08
10-Sep-24	Turbidity		6.22		15	4	17.2
10-Sep-24	Lead (mg/L)	<0.01	0.498		0.238	0.18	0.223
10-Sep-24	Faecal Coliform (MPN/100ml)		0		6.8	0	6.8
10-Sep-24	E. coli (MPN/100ml)		0		4.5	0	4.5
10-Sep-24	NH ₃ -N (mg/L)		<0.1		<0.1	<0.1	<0.1
10-Sep-24	Total Nitrogen (mg/L)		<5		<5	<5	<5
10-Sep-24	Copper (mg/L)	<1	<0.1		<0.1	<0.1	<0.1
10-Sep-24	Total Petroleum (mg/L)		<1		<1	<1	<1
10-Sep-24	Water level (m)		14.3		20.6	17.3	8.4

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

TABLE 2.9-10: THE GFWS MONITORING RESULT IN Q3 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 Q3 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.

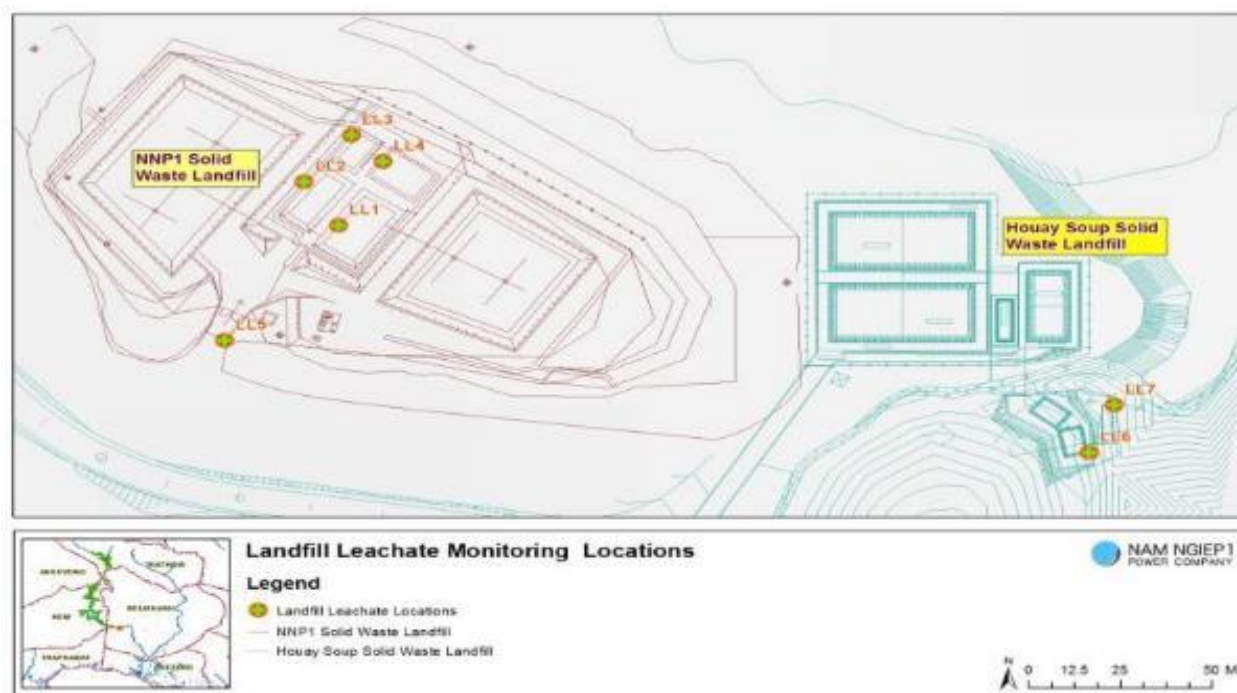
As mentioned in **section 2.9.3**, the gravity fed system is a domestic water supply managed by the Centre for Environmental Health and Water Supply (Nam Sa-at) under the Department of Hygiene and Health Promotion, Ministry of Health. It is well understood and agreed with the villagers that the water 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 Q3 2024 indicate compliance with the applicable standards for all monitored parameters, except for faecal coliform and total coliform for both NNP1 Landfill Leachate (last leachate pond) and Houay Soup Landfill Leachate (last leachate pond) for August and September 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 Q3 2024 are summarized in **Table 2.9-11**.

TABLE 2.9-11: NON-COMPLIANCES RELATING TO WATER QUALITY MONITORING IN Q3 2024

No	Non-compliance Issues	Corrective Actions	Status
1	During turbine discharge (July and August 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 July, August and September 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/encouraged to boil water before drinking. - Continue to monitor.
4	Gravity Fed Water Supply monitored for the communities (Thaheua, 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 both NNP1 and Houay Soup Landfills were not complied with the Effluent Standard for faecal coliform and total coliform.	- The leachate is still contained in the leachate ponds without being discharged to the environment. - Continue monitoring.	- Continue monitoring.
6	Non-compliance on lead parameter in Landfill groundwater.	- 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) Approval of the Fishery Co-Management Plan (FCMP):

Following the discussion among XSB WRPO and NNP1 EMO on the approval meeting of Fishery Co-Management Plan and regulation in July 2024, the XSB WRPO informed to NNP1 EMO that the meeting was postponed to the mid-September 2024 due to internal scheduling conflicts. However, the meeting was postponed again due to unavailability of XSB Vice Governor and staff performance constraints within the XSB PAFO during September 2024. The meeting is expected to take place in the last quarter of 2024.

b) Construction of Reservoir Checkpoints:

The head of XSB WRPO informed NNP1 EMO that the construction work of two reservoir checkpoints were pause due to the slippery road condition during rainy season. Material delivery expected to commence after rainy season. However, these two reservoir checkpoints were operational in August 2024 by establishing a temporally camp with six staff members stationed there. This operation was demobilized in early September 2024, without any replacement staff. There is still no satisfactory explanation from the XSB WRPO regarding the demobilization of six staff from the checkpoints without providing replacements. This matter requires further follow-up.

c) Patrolling:

From August to September 2024, XSB WRPO resumed patrols under the approved AIP 2023, which included one forest, six TPZs and two reservoir patrols. The result of these patrolling work is expected to be presented and discussed in the monthly meeting scheduled for Q4 of 2024. XSB WRPO also informed NNP1 EMO that the Vice Governor of Hom District has assigned five staff members to the field sub-office on 30 April 2024 including two Hom DAFO, two militaries 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 September 2024.

3.1.1.2 Bolikhamxay Watershed and Reservoir Protection Office (WRPO)

The next patrol plan is on hold and will resume once funding is received from the FPF-DoF-MAF under the approved AIP 2024.

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

On 8 August 2024, NNP1 EMO conducted a reservoir monitoring and identified a landslide near the first proposed reservoir checkpoint location. NNP1 EMO coordinated with XSB WRPO and BSP-WCS for an inspection and assessment of the site stability. In addition, NNP1 Technical Division (NNP1 TD) has also been informed. BSP-WCS requested XSB WRPO reservoir patrol team to assess the area and if site instability is confirmed then a new checkpoint location needs to be surveyed.

On 27 and 29 August 2024, NNP1 EMO handed over material and equipment to Thathom and Hom District Agriculture and Forestry Offices (DAFOs) respectively.

On 12 September 2024, NNP1 EMO in collaboration with Hom District Agriculture and Forestry Office (DAFO) held a market survey consultation meeting with Hom District relevant offices, village authorities and producer groups of PhouNgou and Houayxai villages. On 24 September 2024, NNP1 EMO met with the head of Hom District Trade and Commercial Office (DTCO) to discuss the market survey and contract negotiation aimed at identifying potential local buyers for pineapple farmers in these villages.

On 25 September 2024, NNP1 EMO in collaboration with Thathom District Agriculture and Forestry Office monitored progress of greenhouse vegetable construction in Nahong and Phonhom villages.



A landslide occurred nearly with the proposed reservoir checkpoint location



The handover of material and equipment to Thathom and Hom District Agriculture and Forestry Office on 27 and 29 August 2024



A meeting with Hom District Trade and Commercial Office on 24 September 2024 to identify potential local buyers for Pine apple farmers.



The follow up of greenhouse vegetable construction on 25 September 2024

b) No Net Loss (NNL) within the NNP1 Watershed:

Following the NNP1PC's letter to DEB-MEM on 25 June 2024, a site visit mission was conducted by DEB's leadership from 19-22 August 2024. The mission included a visit to NNP1 watershed and reservoir areas on 20 August 2024, followed by a meeting in Xaysomboun Province on 21 August 2024. The meeting, led by Department of Energy Business Ministry of Energy and Mine (DEB-MEM) and chaired by the Xaysomboun Provincial Vice Governor, included participants from key ministries, provincial and district offices with a total of 41 participants. The key outcomes of the mission are as follows:

- The MOU for Boualaiy Mungkonethong Company' mining exploration has expired, and the company may return the land to the government if no minerals are found.
- The Nam Phouan Hydropower Project' MOU, signed in 2011 before NNP1's CA in 2013, would require a high-level government decision to halt development, though removal of the project seems unlikely.

- NNP1PC and ADB are encouraged to explore alternatives, including revisiting baseline data for No Net Loss (NNL) objectives to possibly include the project such as Nam Phoun hydropower project and mineral extraction within the watershed.
- It is suggested that further livelihood activities be developed for communities near the watershed to reduce their reliance on natural resources, with strict enforcement measures to be implemented later.
- DEB-MEM should address delays in fund transfers from central to provincial levels by coordinating with FPF-DoF-MAF.

3.1.2 Preparation of Annual Implementation Plan (AIP)

The following table provides an overview of the progress in preparing the Annual Implementation Plans (AIP) for 2023 and 2024 by Xaysomboun WRPO and Bolikhamxay WRPO. Detailed highlights of fund preparation, approvals, and transfer statuses are shown in **TABLE 3.1-1**.

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	– The 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: No Progress
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	– 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.

Watershed and Reservoir Protection Office (WRPO)	Preparation of Annual Implementation Plan (AIP) 2023	Preparation of Annual Implementation Plan (AIP) 2024
	NNL source and 420,198,000 is from the GOL CA source. Status: Complete	– 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 Q3 of 2024. Status: Pending

3.2 BIODIVERSITY OFFSET MANAGEMENT

3.2.1 Implementation of Biodiversity Offset Management Plan

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

a. Component 1 - Spatial Planning and Regulation

The Participatory Land Use Plan (PLUP) of Vangphieng, Na Gngang and Natan villages of Viengthong district were approved by Viengthong District Governor on 17 July 2024.

TABLE 3.2-1 PARTICIPATORY LAND USE PLAN (PLUP) DATA OF VANGPHIENG VILLAGE

No.	Types of Land Use	Area (ha)	Percentage (%)
I	Agriculture Land	4,550.79	8.44
1	Land reserved for extending production	1,983.50	3.68
2	Livestock raising and grazing land	2,464.49	4.57
3	Wet rice land	102.8	0.19
II	Building Land	22.89	0.04
1	Private building land	13	0.02
2	Reserve building land	6.93	0.01
3	Village office	0.2	0.0004
4	School	2.76	0.01
III	Forest Land	49,071.30	90.99
1	National Protection Forest	48,617.26	90.15
2	Village Managed Use Forest	454.04	0.84
IV	Road Land	27.71	0.05
1	Unpaved road	27.71	0.05
V	Water Land	231.82	0.43
1	River, stream	49.01	0.09
2	Riverside reserve land	182.81	0.34
VI	Cultural Land	7.62	0.01

No.	Types of Land Use	Area (ha)	Percentage (%)
1	Cemetery land	2.92	0.01
2	Temple	4.7	0.01
VII	Industrial Land	5.75	0.01
1	Extended land for industrialization	5.75	0.01
VIII	Defense and peace keeping Land	9.92	0.02
1	Old military land	8.43	0.02
Total		53,927.80	100

FIGURE 3.2-1 MAP OF VANGPHIENG VILLAGE'S PLUP

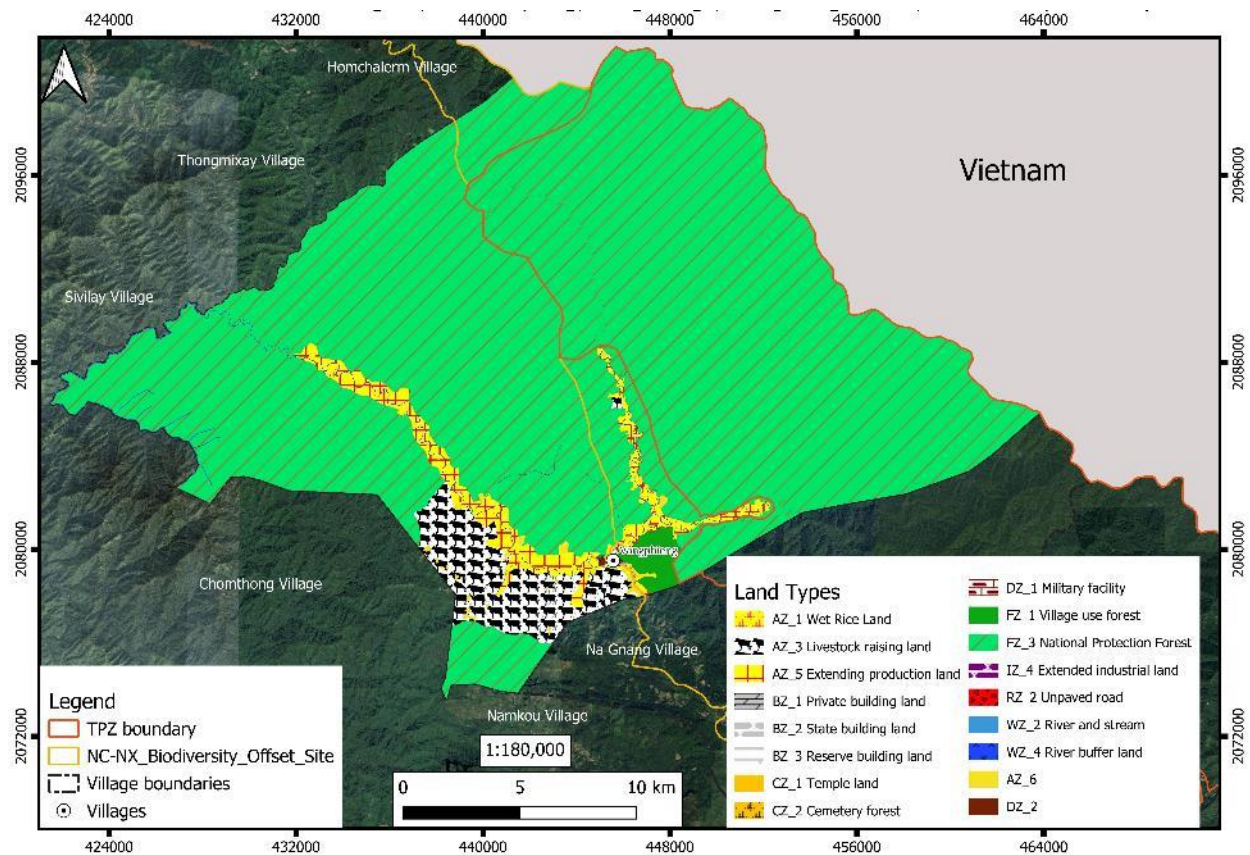


TABLE 3.2-2 PLUP DATA OF NA GNANG VILLAGE

No.	Types of land use	Area (ha)	Percentage (%)
I	Agriculture Land	5,105.79	22.79
1	Land reserved for extending production	1,551.40	6.92
2	Livestock raising, grazing land	3,452.83	15.41
3	Wet rice land	101.56	0.45
II	Building Land	34.83	0.16
1	Private building land	23.07	0.10

No.	Types of land use	Area (ha)	Percentage (%)
2	Reserve building land	6.82	0.03
3	Village office	0.05	0.0002
4	Health care center	0.20	0.0009
5	School	4.22	0.02
6	Market	0.47	0.002
III	Forest land	17,198.07	76.75
1	National Protection Forest	16,772.84	74.85
2	Village Managed Use Forest	205.47	0.92
3	Village Conservation Forest	173.87	0.78
4	Coniferous Forest	45.89	0.20
IV	Road Land	26.98	0.12
1	Unpaved road	26.40	0.12
2	Transportation station land	0.58	0.0026
V	Water Land	39.18	0.17
1	River, stream	10.46	0.05
2	Fish conservation reserve	0.06	0.0003
3	Riverside reserve land	28.66	0.13
VI	Cultural land	2.69	0.01
1	Cemetery land	2.57	0.01
2	Sacred Forest	0.09	0.0004
3	Pond	0.03	0.0001
VII	Industrial Land	-	-
1	Extended land for industrialization		
VIII	Defence and peace keeping Land	0.20	0.001
1	Police facility (village cluster police office)	0.20	0.0009
Total		22,407.74	100

FIGURE 3.2-2 MAP OF NA GNANG VILLAGE'S PLUP

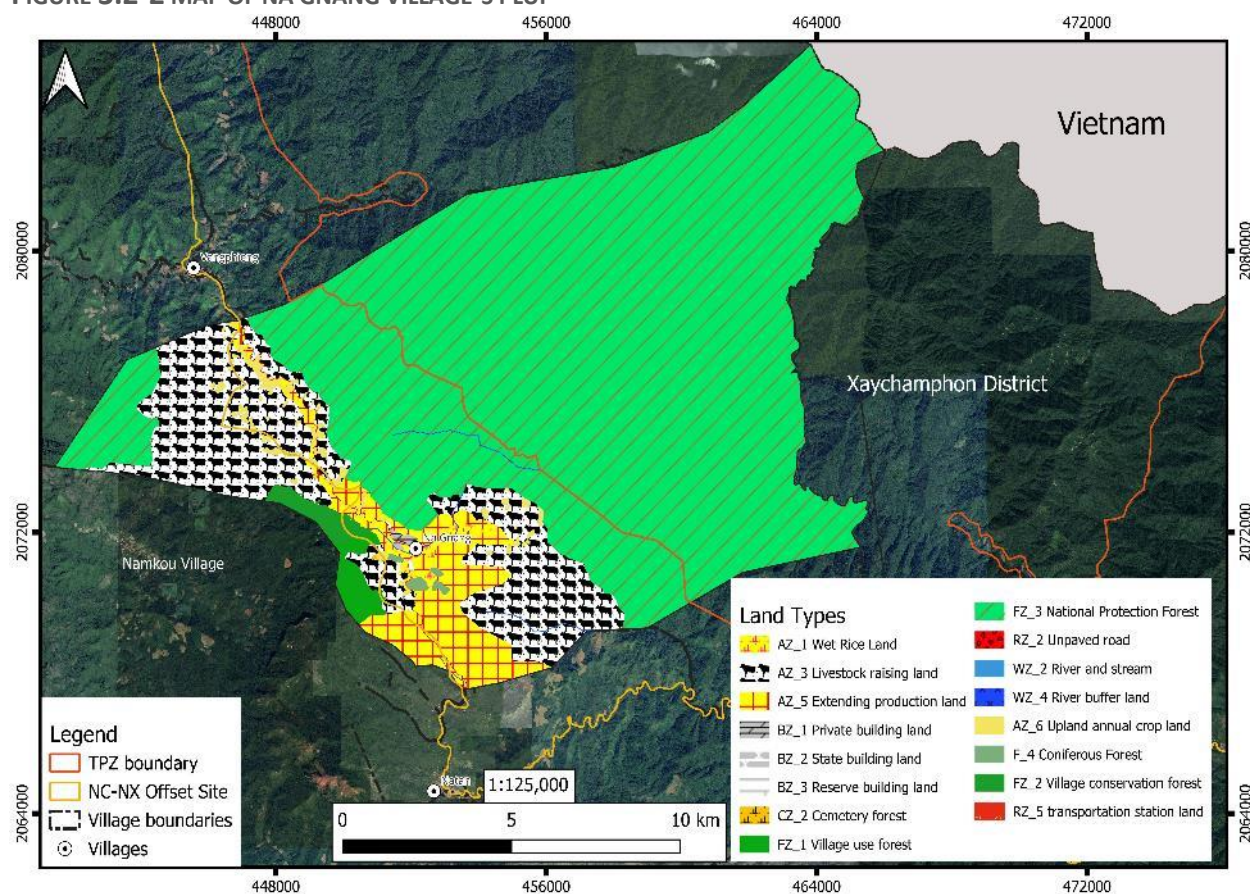
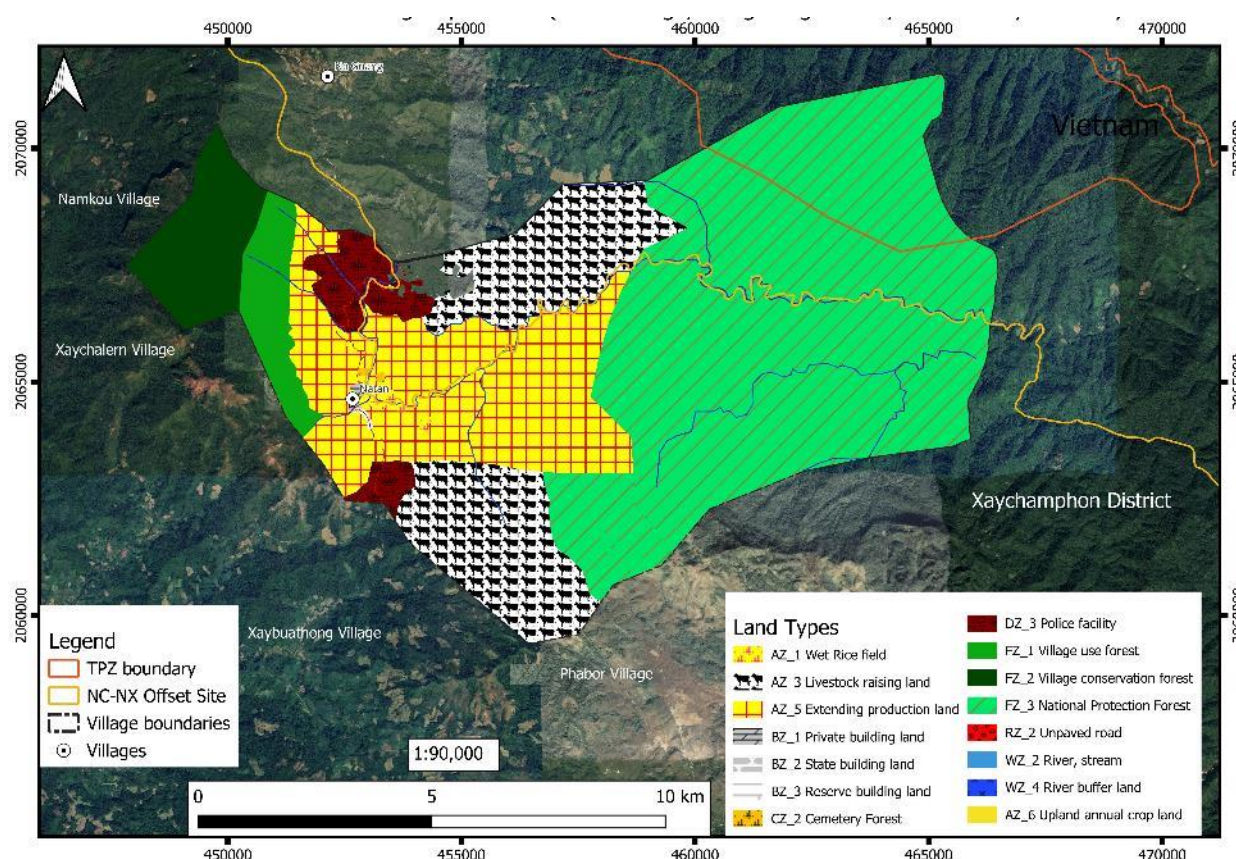


TABLE 3.2-3 PLUP DATA OF NATAN VILLAGE

No.	Types of Land Use	Area (ha)	Percentage (%)
I	Agriculture Land	4,246.33	35.53
1	Land reserved for extending production	2,173.89	18.192
2	Rotation annual crop land	102.15	0.855
3	Livestock raising, grazing Land	1,926.78	16.124
4	Wet rice land	43.51	0.364
II	Building Land	17.10	0.14
1	Private building land	9.35	0.078
2	Reserve building land	6.57	0.055
3	Village office	0.20	0.002
4	School	0.98	0.008
III	Forest Land	7,123.30	59.61
1	National Protection Forest	6,062.31	50.731
2	Village Managed Use Forest	411.91	3.447
3	Village Conservation Forest	649.08	5.432
IV	Road Land	12.45	0.10
1	Unpaved road	12.45	0.104
V	Water Land	137.00	1.15
1	River, stream	29.61	0.248
2	Riverside reserve land	107.29	0.898

No.	Types of Land Use	Area (ha)	Percentage (%)
3	Fish conservation reserve	0.10	0.001
VI	Cultural Land	7.53	0.06
1	Cemetery Forest	3.88	0.032
2	Sacred Forest	3.65	0.031
VII	Industrial Land	-	0
1	Industrial land		
VIII	Defense and peace keeping Land	406.09	3.40
1	Military land	406.09	3.398
Total		11,949.80	100

FIGURE 3.2-3 MAP OF NATAN VILLAGE'S PLUP



BSP-WCS has reviewed and presented the Participatory Land Use Plan (PLUP) data of Sopkhone, Meungcham and Phonmeung villages of Xaychamphone District, which were conducted by the Lao Landscape and Livelihood Project (LLL). The review highlighted the need for additional social-economic data and identified overlaps between some agricultural with NC-NX Totally Protected Zone (TPZ) that require reassessment and revision. A field work to gather the necessary data is scheduled from 1-20 October 2024.

b. Component 2 – Enforcement

There was no field patrolling from July to September 2024 because BOMU did not receive the AIP2024 fund from the Bank of Laos (BOL). However, safeguarding of the sub-stations was carried out in July, August and September 2024.

BSP-WCS and NNP1 Biodiversity Management Team conducted an exchange visit to Nam Et-Phou Louey National Park (NEPL NP) from 19-24 August 2024, with the purpose to obtain lessons learned, particularly on the patrolling and law enforcement. The lessons learned from the exchange visit were shared to BOMU during the monthly meeting on 26-27 September 2024. BOMU, BSP-WCS and NNP1 agreed on several strategies to improve the patrolling and law enforcement effectiveness as follows:

- 1) Focus more patrolling on areas where high risk of illegal activities and threats are anticipated. Two patrols per month (8 days per patrol) will be strategized in each month based on the patrol areas suitability to reduce loadings of the patrol team members. Additionally, different timing of the field patrolling will be also strategized to minimize the gaps of poachers entering the TPZ when patrol teams travel for monthly reporting;
- 2) Additional field data (such as: hunting tracks, NTFP, salt lick, high value tree, etc.) must be collected by patrol team. This information is very useful for the monthly patrol planning in order to suppress offenders;
- 3) BOMU to create an informant network in the village level to report on illegal activities in order to be able to arrest offenders;
- 4) BOMU to establish a patrol mobile team for each district to immediately respond to all cases of illegal activities;
- 5) Patrol team members must play a key role in the monthly patrolling planning;
- 6) Na Gnang sub-station will be withdrawn starting from November 2024 and four patrol teams will be stationed at Nam Ma and Nam San sub-stations;
- 7) The performance-based incentive (three million Kip per month) will be applied to NC-NX patrolling teams from Oct-Dec 2024 as a trial. If it is effective then will continue in 2025;
- 8) Enhance coordination and cooperation with relevant offices associated with the law enforcement prosecution;
- 9) Ensure the budget availability to maintain continuation of the monthly patrolling.

c. Component 3 – Conservation Outreach

BSP-WCS presented the contents and materials for the school outreach program during the monthly meeting on 3 September 2024. However, some contents and materials require further improvement. BSP-WCS and BOMU continued improving the contents and materials as of the end of third quarter 2024. The meeting with relevant parties to discuss and finalize the materials is further postponed to the last quarter of 2024.

d. Component 4 – Conservation linked livelihood

▪ Community Conservation Agreement (CCA):

BSP-WCS presented two different concepts of the CCA during the monthly meeting on 3 September 2024 as follows:

- 1) Payments for ecosystem service: The payments cover the village development fund, per-diem, and administration costs for protecting a designated village forest area, with periodic evaluations on its effectiveness will be conducted by PAFO, DAFO, funders, and village authorities;
- 2) Village development fund: The fund operates as a revolving fund for villages, allowing poor families to borrow the fund for their development activities and return with minimal interests. This model was implemented by the LENS2 project in Vangphieng and Na Gnang villages and continues to operate up to date.

Due to the limited CCA budget, BOMU, BSP-WCS and NNP1 EMO agreed to implement the second concept, which the village development fund will be provided. The fund amount of each village shall be provided based on the following criteria:

- 1) Number of populations;
- 2) Number of villager's area overlapped by NC-NX TPZ;
- 3) Priority of the selected activities.

BSP-WCS continued improving the draft CCA as of the end of September 2024 and expects to be finalized within October, while the implementation will take place from November 2024.

▪ Snare removal

There was no snare removal in September 2024 because the team members were busy with their farming and heavy rains also pose risk of high-water levels and landslides. The snare removal team will resume the monthly snare removal from 10-22 October 2024.

e. Component 6 – Monitoring and reporting

The data and report for 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 the third quarter of 2024.

3.2.2 Preparation of Annual Implementation Plan (AIP) 2024

- BOMU received the first six-months fund from the Bank of Laos (BOL) on 6 September 2024 with a total amount of 1,357,401,000 LAK (450,963,000 LAK of CA budget and 906,438,000 LAK of NNL budget), while the budget for a pick-up procurement (1,120,000,000 LAK) and the contingency (115,199,000 LAK) is retained at BOL.
- The budget for the pick-up will be transferred directly by BOL to the supplier once the procurement document is ready, while the contingency can be added if the allocated budget for the pick-up is deficient. The remaining contingency can be disbursed to BOMU later as an activity budget.

4 FISHERY MONITORING

Three species groups and two species dominated the fish catch by weight in Q3 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 Q3 2024

Species	Lao Name	Fish Catch (kg)	IUCN Red List Classification
<i>Oreochromis niloticus</i>	ປານິນ	852	LC (exotic)
<i>Poropuntius normani</i> , <i>Poropuntius laoensis</i> , <i>Poropuntius carinatus</i>	ປາຈາດ	238	LC
<i>Hampala dispar</i> , <i>Hampala macrolepidota</i>	ປາສຸດ	189.7	LC
<i>Mastacembelus armatus</i> , <i>Mastacembelus favus</i>	ປາຫຼາດ	162.6	LC

Species	Lao Name	Fish Catch (kg)	IUCN Red List Classification
<i>Clarias batrachus</i>	ປາດູກ	131.5	LC

The recorded catch of Threatened species (IUCN Red List classification) in Q3 2024 are presented in **Table 4-2**. The list includes three species are classified as Vulnerable species (VU).

Table 4-2: Threatened Species of Q3 2024 Fish Catch

Species	Lao Name	Fish Catch (kg)	IUCN Red List Classification
<i>Cirrhinus cirrhosus</i>	ປາແກງ/ປານວນຈັນ	10	VU
<i>Scaphognathops bandanensis</i>	ປາປຽນ/ປາວຽນໄຟ	54.4	VU
<i>Tor sinensis</i>	ປາແດງ	27.1	VU

Species abundance and occurrence is based on the 7-day reported catch from the DCL survey in Q3 2024. The catch is divided in 3 areas including above the main dam, below the main dam and Mekong area. Main biodiversity indicators in Q3 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 Q3 2024

Biodiversity Indicators	Mekong	Below dam	Above dam
Total species and groups	34	47	44
Single species	26	33	30
Species groups	8	14	14
Top 15 species (% total catch weight)	89.10%	78.68%	93.47%
Proportion for species groups	29.61%	49.85%	31.69%
Diversity index (Shannon)	2.7803	3.1377	2.3600

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

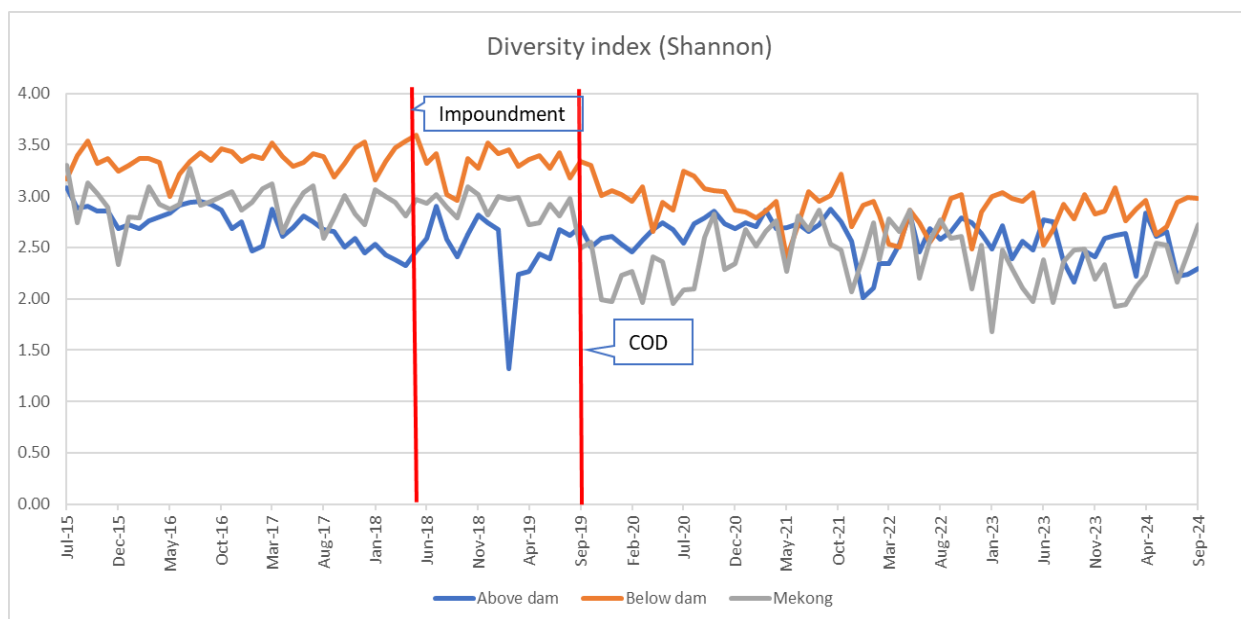


FIGURE 4-1: FISH DIVERSITY INDEX (SHANNON) BY FISHING ZONE FROM JULY 2015 TO SEPTEMBER 2024

The mean daily fish catch per household from July 2015 to September 2024 is displayed in **Figure 4-2** and the mean fish catch per household per fishing day for Q3 from 2015 to 2024 are shown in **Table 4-4**.

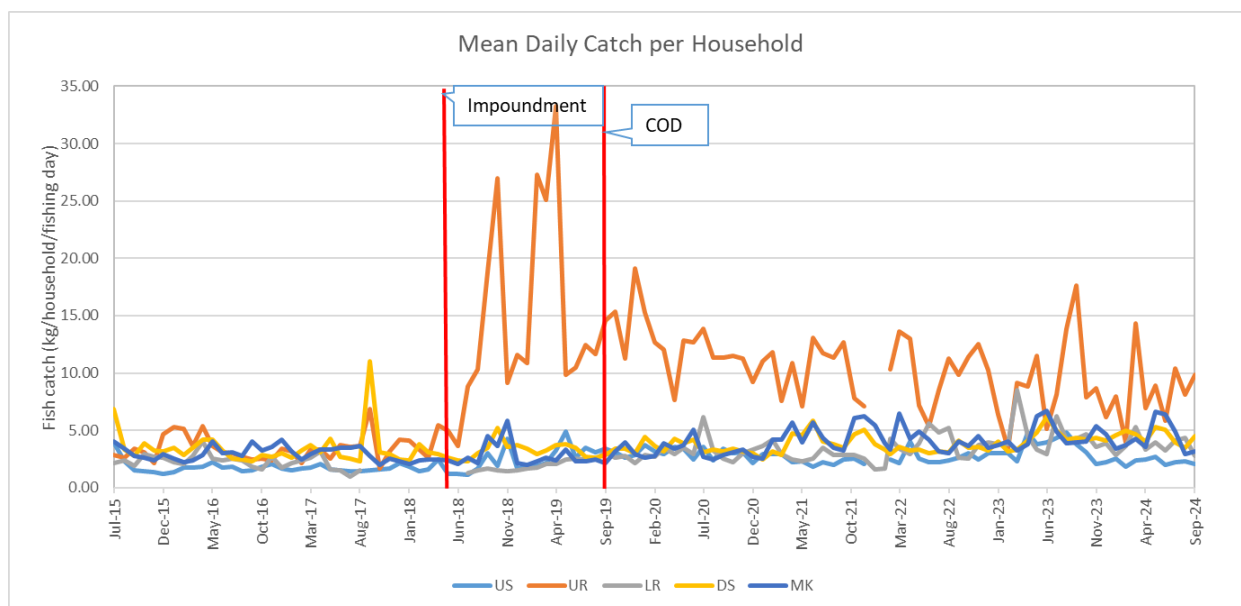


FIGURE 4-2: MEAN DAILY FISH CATCH PER HOUSEHOLD FROM JULY 2015 TO SEPTEMBER 2024

TABLE 4-4: MEAN DAILY FISH CATCH PER HOUSEHOLD FOR Q3 FROM 2015 TO 2024

Fishing Zone	Q3 2015 (kg)	Q3 2016 (kg)	Q3 2017 (kg)	Q3 2018 (kg)	Q3 2019 (kg)	Q3 2020 (kg)	Q3 2021 (kg)	Q3 2022 (kg)	Q3 2023 (kg)	Q3 2024 (kg)
Upstream	2.56	1.59	1.49	1.94	3.31	3.12	2.21	2.40	4.31	2.19
Upper reservoir	2.94	2.71	4.71	12.64	12.90	12.20	11.92	9.87	13.18	9.43

Fishing Zone	Q3 2015 (kg)	Q3 2016 (kg)	Q3 2017 (kg)	Q3 2018 (kg)	Q3 2019 (kg)	Q3 2020 (kg)	Q3 2021 (kg)	Q3 2022 (kg)	Q3 2023 (kg)	Q3 2024 (kg)
Lower reservoir	2.16	2.24	1.24	1.49	2.67	3.97	3.05	4.21	4.89	3.73
Downstream	4.32	2.42	5.31	2.93	2.73	3.20	3.79	3.46	4.51	4.00
Mekong	3.38	3.30	3.32	3.08	2.30	2.67	3.70	3.40	4.24	3.67

The survey results in Q3 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 are the reservoir, tributaries and streams, and Mekong respectively. The proportion of fishing habitats in Q3 2024 are displayed in **Table 4-5**.

Table 4-5: Proportion of the catch reported by main habitats (%) in Q3 2024

Habitats	US	UR	LR	DS	MK
Mekong	0.0%	0.0%	0.0%	1.6%	73.7%
Nam Ngiep	45.5%	11.7%	0.0%	51.7%	4.7%
Nam Xan	0.0%	0.0%	0.0%	0.0%	0.0%
Reservoir	0.0%	80.6%	27.1%	0.0%	0.0%
Tributary and stream	43.9%	5.6%	68.8%	46.7%	0.5%
Wetland	10.6%	2.0%	4.1%	0.0%	21.1%
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 Q3 from 2015 to 2024 are shown in **Figure 4-3**.

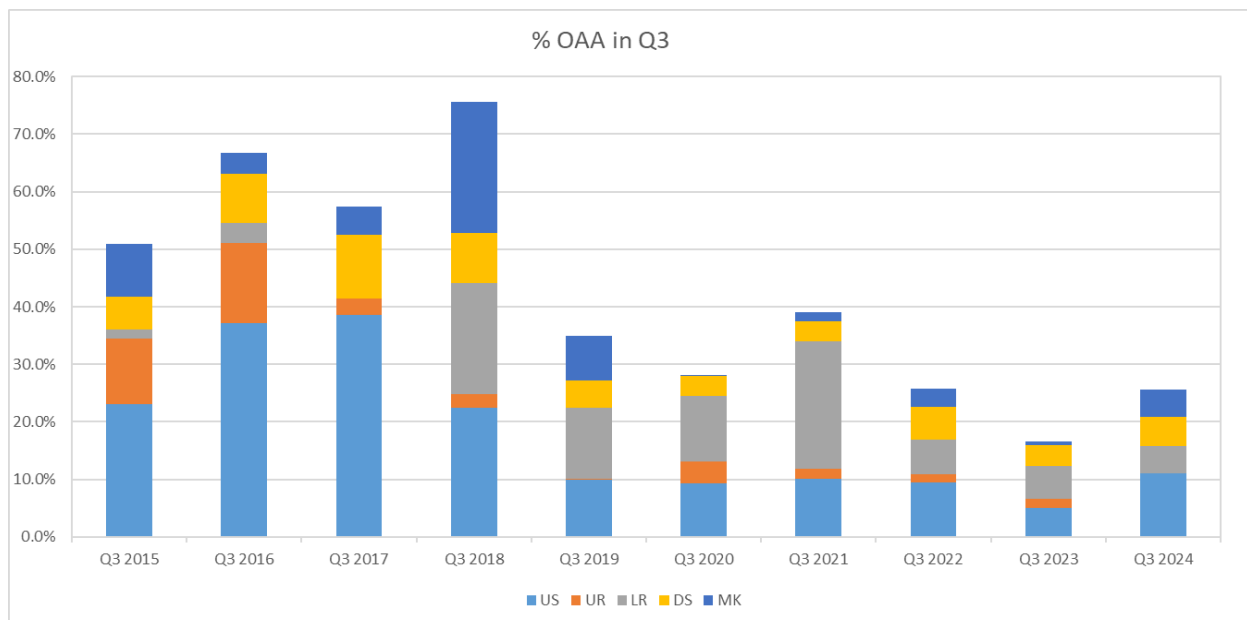


FIGURE 4-3: PROPORTION OF OAA TO THE TOTAL REPORTED KILOGRAM (KG) OF FISH AND OAA FOR A 7-DAY PERIOD BY FISHING ZONE IN Q3 FROM 2015 TO 2024

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 September 2024) are provided in **TABLE 5.1-1**.

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

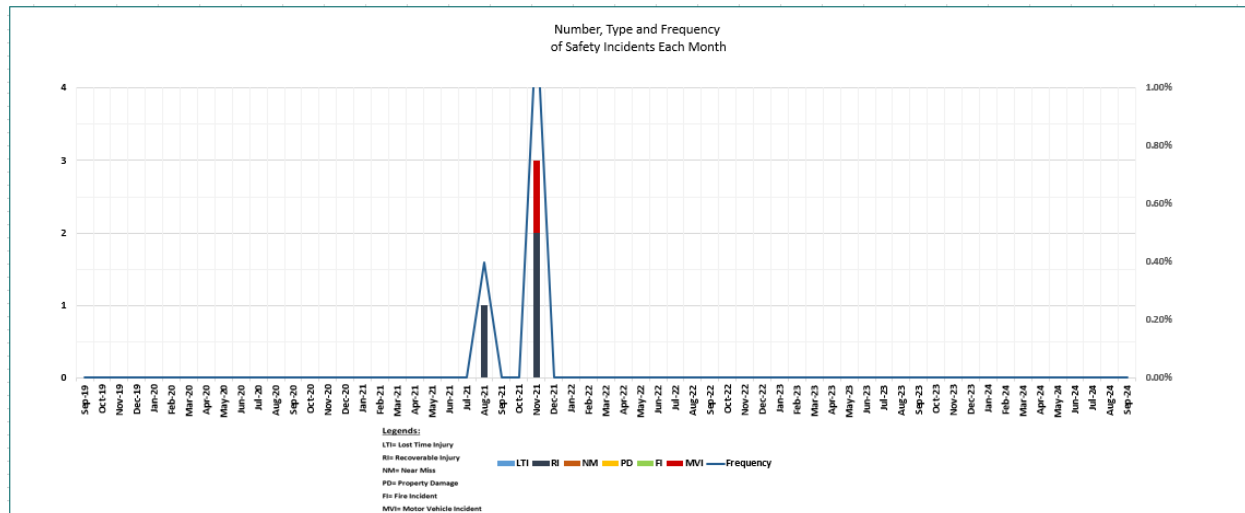
Type of Incidents	LTI	RI	NM	PD	FI	MVI	Total
No. of Incidents in Q3, 2024	0	0	0	0	0	0	0
Cumulative Total Incidents to 30 September 2024	0	3	0	0	0	1	4

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 Q3 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: 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 30 SEPTEMBER 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 Q3 2024.

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

Safety inductions were conducted in Q3 2024 for newcomer staffs and contractors, and one specific training on Annual flooding event. 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 Q3 2024.





FIGURE 5.1-2: REPRESENTATIVE PHOTOS OF THE SAFETY INDUCTION TRAINING AND SPECIFIC TRAINING ON ANNUAL FLOODING EVENT DURING Q3 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

From 19 to 22 August 2024, a site visit was conducted by the leadership of DEB. The visit included an inspection of the NNP1 watershed and reservoir areas, followed by a meeting in Xaysomboun Province on 21 August 2024. For a detailed summary of the discussion outcomes, please refer to **section 3.1.1.3, point b)** on No Net Loss (NNL) within the NNP1 Watershed

APPENDICES

APPENDIX 1: THE SITE INSPECTION RESULTS DURING Q3 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. •During the previous joint monthly site inspection, it was observed that the OSOV2's wastewater tank (chlorination tank) had developed a crack, causing a small amount of wastewater leaking into the environment. Since then, the cracks have significantly expanded. •During this joint monthly site inspection, 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 repair the crack in the OSOV2's wastewater tank to prevent untreated wastewater from leaking into the environment. •Repair the cracked: ADM was instructed to immediately repair and seal the crack to ensure structural integrity. •Recalibrate the automatic wastewater pump: 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. •Set inspection and maintenance schedule: Establish a regular inspection and maintenance schedule for all wastewater tanks and pumps to identify and address potential issues before they escalate.	Urgently	19-Sep-24	Pending (Note: This Observation of Non-Compliance (ONC) has been pending since 26 July 2024 and may potentially be escalated to the Non-Compliance Report level 1 (NCR1) by next monthly joint site inspection)

No	Issue ID	Inspection Date	Site Name	Issue/Description	Action Required/Recommendation	Deadline	Latest Follow-up Date	Status
2	ON-TD-0017	28-Aug-24	Main Dam Powerhouse	• During this joint monthly inspection, it was observed that hazardous waste, including oil-contaminated textiles and absorbent pads, were improperly managed. Waste bin were full and some hazardous waste bags were place on the floor. This poses potential environmental and safety risks in the workplace. • Notably, this issue was also identified during the previous joint site inspection in July 2024, indicating a lack of corrective action.	• TD was recommended to promptly and regularly transfer hazardous waste to the LILAMA 10's hazardous material and waste storage facility. This action is urgently required. • Additionally, waste bins should be regularly emptied, and hazardous waste should never be placed on the floor. Establish a routine inspection and follow-up schedule to ensure compliance.	Urgently	19-Sep-24	Resolved (The corrective action was verified and accepted)

APPENDIX 2: ENVIRONMENTAL MONITORING CORRECTIVE ACTIONS Q2 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, land owner and SMO/ESD completed the MoM to use the private land to use as a village muster point which is suitable elevation for Emergency Level 4 , the access road to the point has been improved and ables access during both rainy and dry seasons.
		Thaheua: 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 nearby emergency muster point, while the emergency muster point clearance and access road improvement has 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 drill of HGN and TH were completed on 15 and 16 August 2024. The participant still remaining low compare 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 on 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 completed study, as the flooded area is the same as Re-regulation dam breach area 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),	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)
		but also leading to massive sheet erosion.			
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 planned to hand over the irrigation system to local authorities or the water user group was initially set for 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

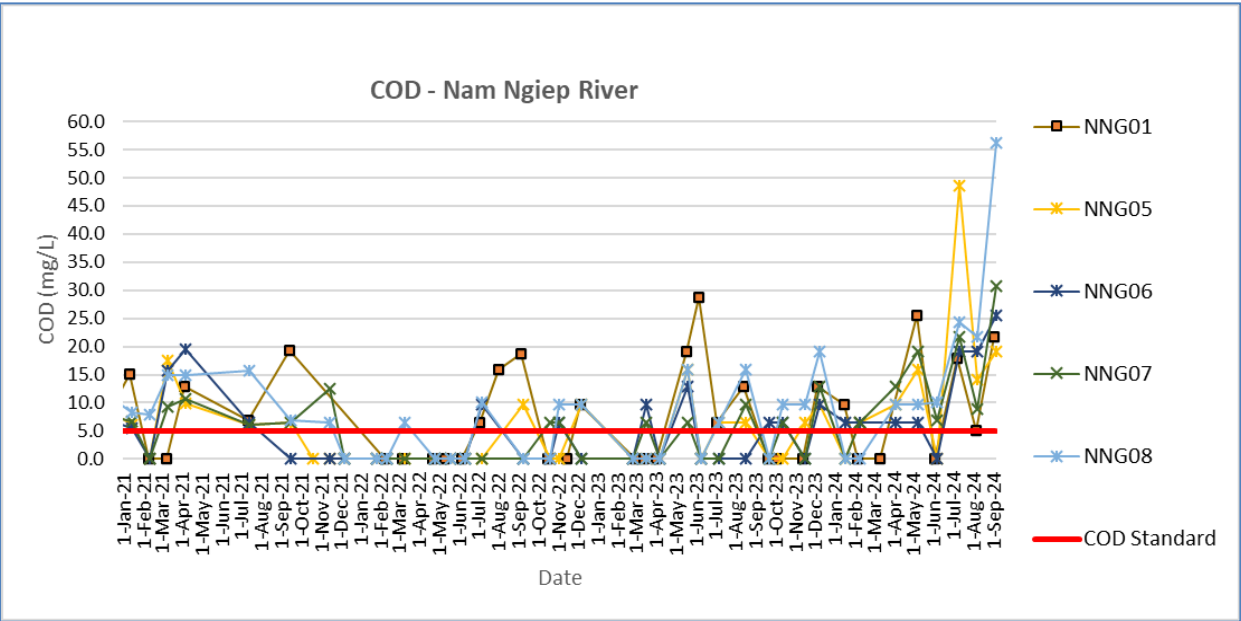
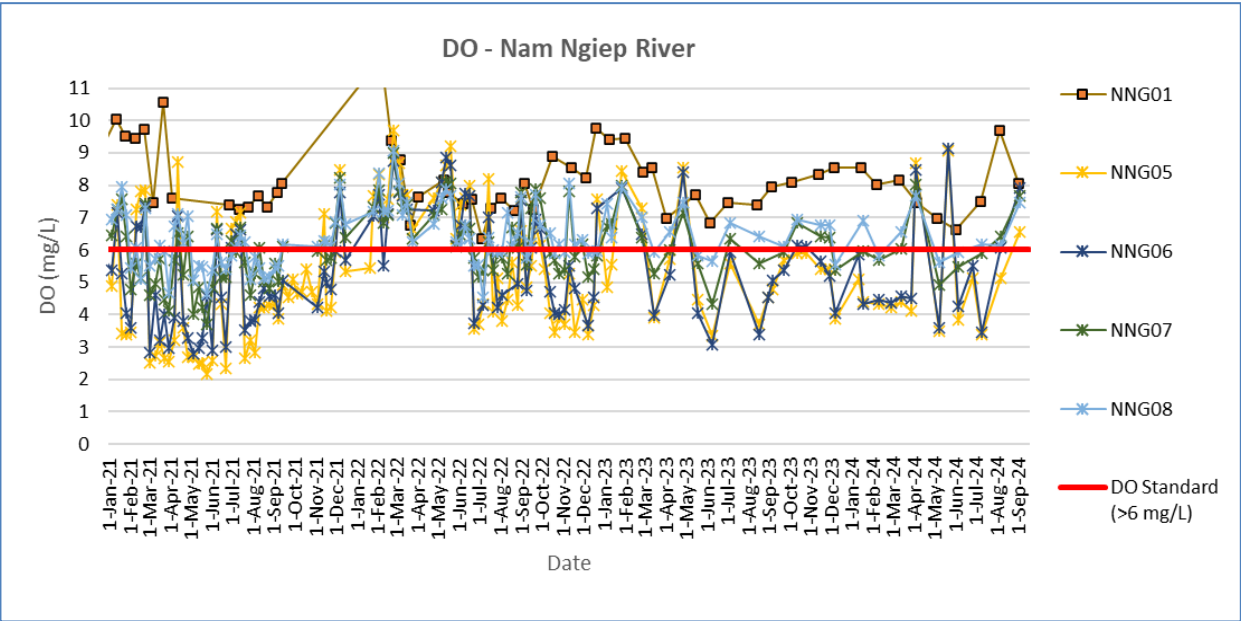
Site Code	Location station	Zone
NNG01	Nam Ngiep Upstream of Phiengta Village	Upstream Project Construction Site
R01	Main reservoir upstream main dam approx. 50 Km.	
R02	Main reservoir upstream main dam approx. 35 Km.	
NNG02/R03	Nam Ngiep Upstream of Nam Phouan Confluence / Main reservoir upstream main 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

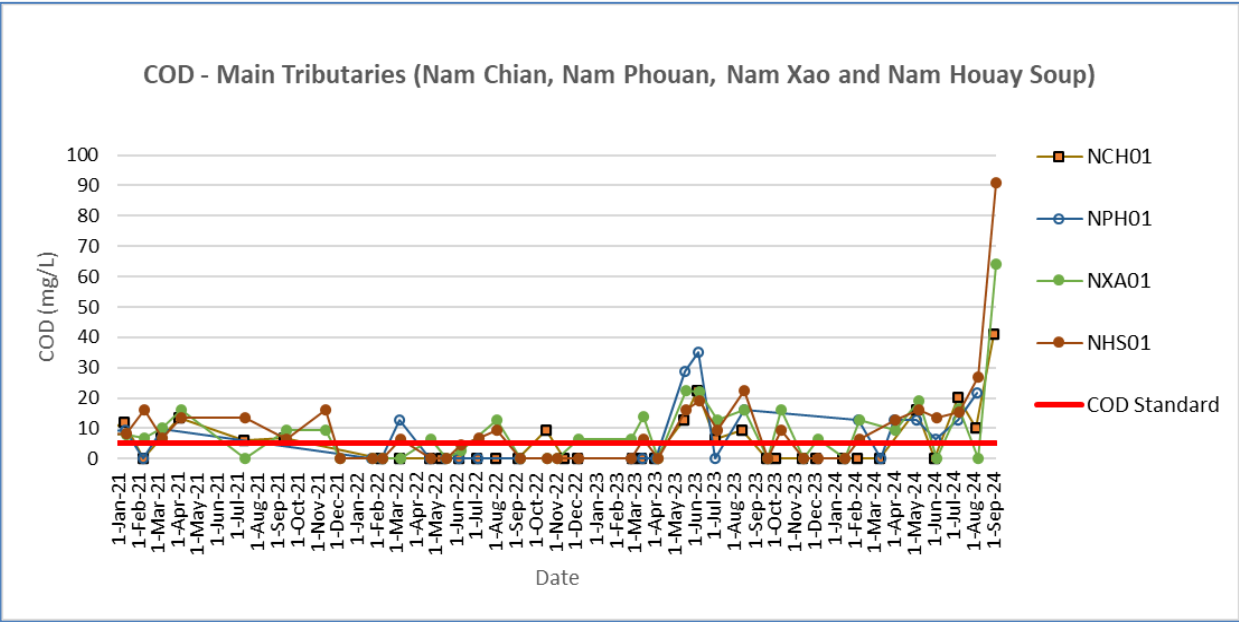
Frequency of Monitoring	Parameters (Unit)	Monitoring Sites
Weekly	pH, DO (%), DO (mg/L), Conductivity ($\mu\text{S}/\text{cm}$), Temperature ($^{\circ}\text{C}$), Turbidity (NTU).	- Main Reservoir: R01, R02, R03, R04, R05; - Re-regulation Reservoir: R06 and R07.
Monthly	pH, DO (%), DO (mg/L), Conductivity ($\mu\text{S}/\text{cm}$), 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 SEPTEMBER 2024
(ONLY PARAMETERS THAT EXCEEDED THE STANDARDS)**

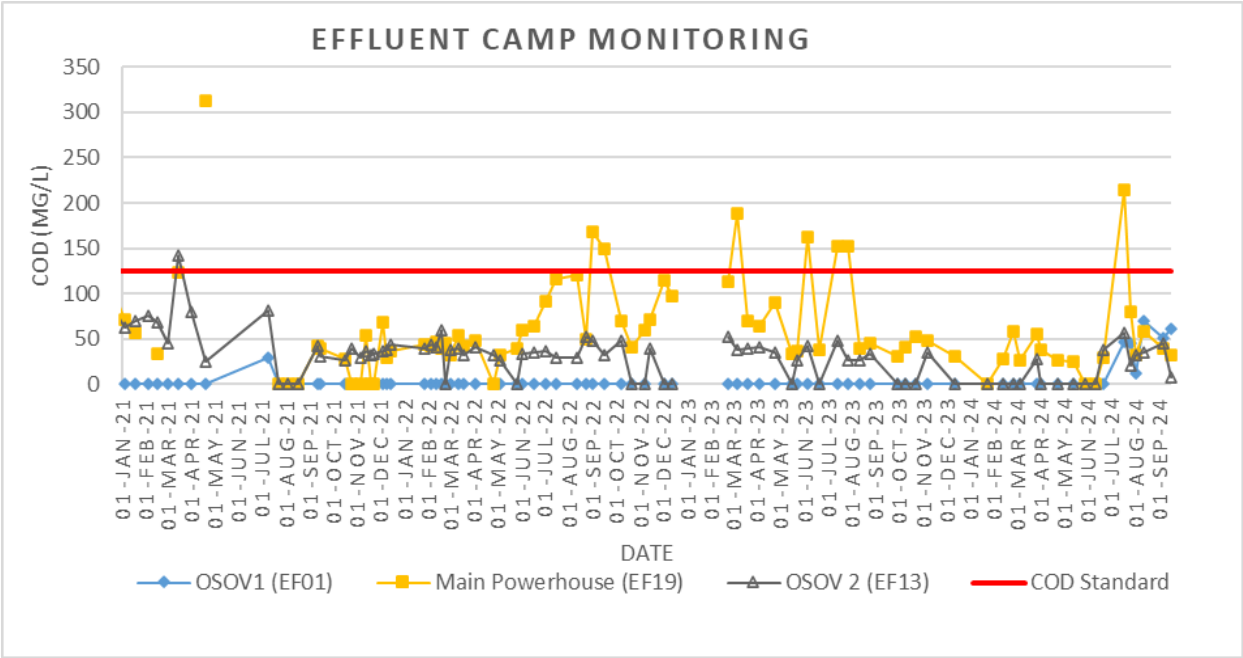
Nam Ngiep Surface Water

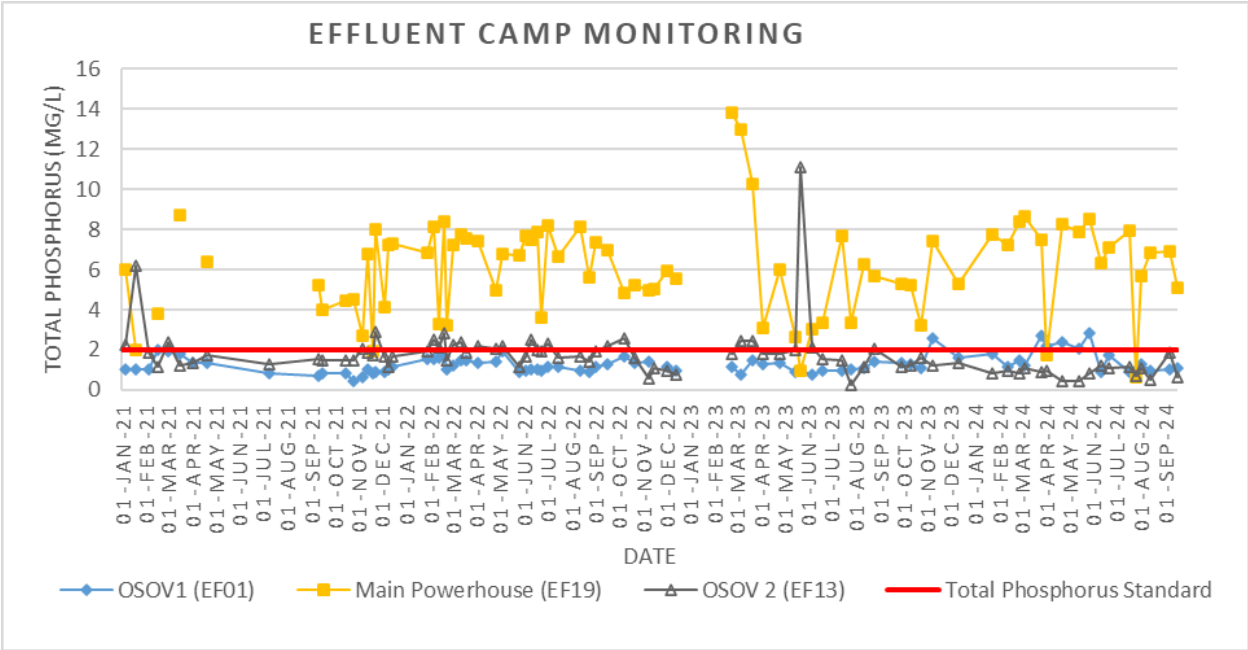
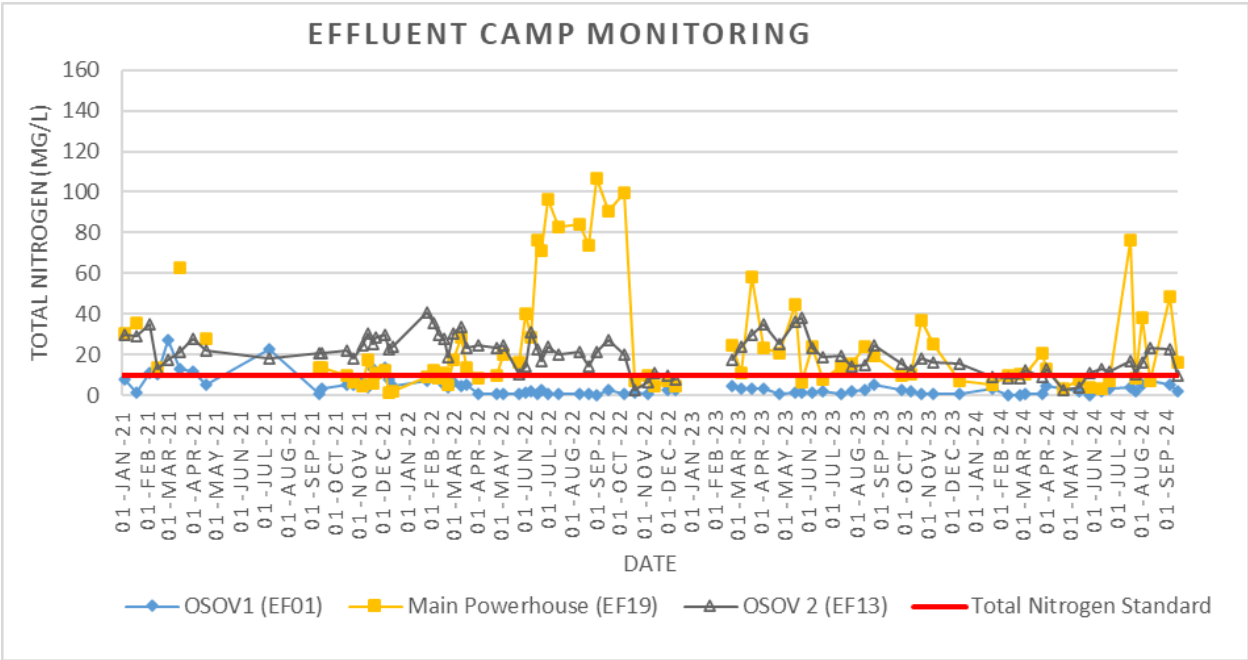


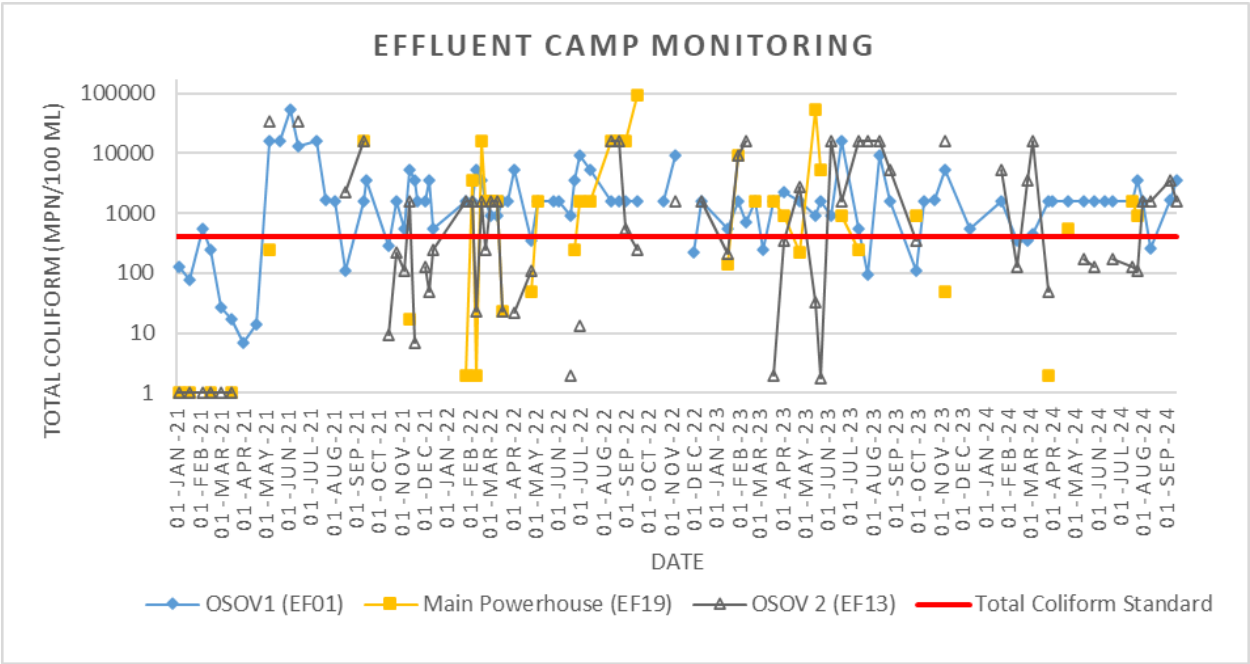
Key Water Quality Parameters for the Nam Ngiep Tributaries: Nam Chian, Nam Phouan, Nam Xao, Nam Houay Soup



Camps' Effluent Water Quality Trends (Since January 2021 – September 2024)







APPENDIX 5: WATER QUALITY MONITORING DATA

APPENDIX 5-1: SURFACE WATER QUALITY MONITORING – Q3 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	NHS01
Date	Parameters (Unit)	Guideline																
2-Jul-24	pH	5.0 - 9.0		6.87	6.74	6.63												
3-Jul-24	pH	5.0 - 9.0					6.7	6.79	6.45	6.58								
8-Jul-24	pH	5.0 - 9.0	6.89											6.71				
9-Jul-24	pH	5.0 - 9.0		6.88	6.68	6.63									6.85			
10-Jul-24	pH	5.0 - 9.0					6.58	6.6	6.59	6.74								
11-Jul-24	pH	5.0 - 9.0									6.5	6.81	6.92	6.98		7.11	7.02	
15-Jul-24	pH	5.0 - 9.0					6.47	6.42	6.58	6.61								
16-Jul-24	pH	5.0 - 9.0		6.78	6.79	6.68												
23-Jul-24	pH	5.0 - 9.0					6.62	6.68	6.81	6.89								
24-Jul-24	pH	5.0 - 9.0		6.98	6.6	6.55												
30-Jul-24	pH	5.0 - 9.0		6.6	6.55	6.69												
31-Jul-24	pH	5.0 - 9.0					6.5	6.48	6.7	6.87								
5-Aug-24	pH	5.0 - 9.0	6.72											6.78				
6-Aug-24	pH	5.0 - 9.0		6.91	6.63	6.58									6.95			
7-Aug-24	pH	5.0 - 9.0					6.48	6.57	6.69	6.74								
8-Aug-24	pH	5.0 - 9.0									6.63	6.84	6.7	6.85		7.05	6.93	
14-Aug-24	pH	5.0 - 9.0		6.91	6.67	6.6												
15-Aug-24	pH	5.0 - 9.0					6.54	6.48	6.74	6.78								
21-Aug-24	pH	5.0 - 9.0					6.7	6.68	6.59	6.64								
22-Aug-24	pH	5.0 - 9.0		6.81	6.7	6.67												
27-Aug-24	pH	5.0 - 9.0		6.6	6.53	6.48												
28-Aug-24	pH	5.0 - 9.0					6.68	6.73	6.74	6.77								
2-Sep-24	pH	5.0 - 9.0	6.91											6.8				
3-Sep-24	pH	5.0 - 9.0		6.83	6.77	6.75												
4-Sep-24	pH	5.0 - 9.0					6.75	6.9	6.9	6.97								
5-Sep-24	pH	5.0 - 9.0									6.9	6.96	7.11	7.3		7.15	7.22	

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						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-Sep-24	pH	5.0 - 9.0		7.09	7.03	6.88												
12-Sep-24	pH	5.0 - 9.0					6.86	7.03	7.14	7.18								
18-Sep-24	pH	5.0 - 9.0							7.02	6.72								
2-Jul-24	Sat. DO (%)			103.6	108.5	107.2												
3-Jul-24	Sat. DO (%)						90.9	77.5	51	53.7								
8-Jul-24	Sat. DO (%)		94.6											99.5				
9-Jul-24	Sat. DO (%)			102.7	117.2	109.2									110.4			
10-Jul-24	Sat. DO (%)						100.1	91.8	21.4	22.6								
11-Jul-24	Sat. DO (%)										40.7	42.2	72.8	76.2			86.4	79.6
15-Jul-24	Sat. DO (%)						94.5	85	20.8	25.2								
16-Jul-24	Sat. DO (%)			95.8	114	109.8												
23-Jul-24	Sat. DO (%)						120.4	102.9	36.7	43.7								
24-Jul-24	Sat. DO (%)			86.6	108.9	102.5												
30-Jul-24	Sat. DO (%)			120.5	132.3	122.1												
31-Jul-24	Sat. DO (%)						105.6	33.6	60.75	54.5								
5-Aug-24	Sat. DO (%)		119.1												122.6			
6-Aug-24	Sat. DO (%)			90.8	89.5	93.3										104.3		
7-Aug-24	Sat. DO (%)						101.2	85.7	29.8	42								
8-Aug-24	Sat. DO (%)										63.1	75.5	80.1	76.3			93.6	88.9
14-Aug-24	Sat. DO (%)			83.7	101.5	104.6												
15-Aug-24	Sat. DO (%)						99.2	83.3	26.2	29.4								
21-Aug-24	Sat. DO (%)						106.6	60.6	32.4	33.7								
22-Aug-24	Sat. DO (%)			98.3	115.4	122.8												
27-Aug-24	Sat. DO (%)			100.9	127.7	127.6												
28-Aug-24	Sat. DO (%)						110.5	82.5	32.4	34.2								
2-Sep-24	Sat. DO (%)		100.1												101.3			
3-Sep-24	Sat. DO (%)			95.8	94.5	97.7												
4-Sep-24	Sat. DO (%)						109.8	110.6	43.9	45.3								
5-Sep-24	Sat. DO (%)										80	97.9	94.8	92.6			108.3	103.1

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						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-Sep-24	Sat. DO (%)			85.5	84.1	88.9												
12-Sep-24	Sat. DO (%)						84.1	71.5	90.8	81.8								
18-Sep-24	Sat. DO (%)								112.9	111.4								
2-Jul-24	DO (mg/L)	>6.0		8.55	8.3	8.14												
3-Jul-24	DO (mg/L)	>6.0					6.95	6.08	4.12	4.27								
8-Jul-24	DO (mg/L)	>6.0	7.49											8.03				
9-Jul-24	DO (mg/L)	>6.0		8.3	8.7	8.08									9.01			
10-Jul-24	DO (mg/L)	>6.0					7.52	7.02	1.73	1.8								
11-Jul-24	DO (mg/L)	>6.0									3.37	3.44	5.9	6.19			6.84	6.37
15-Jul-24	DO (mg/L)	>6.0					6.93	6.38	1.69	2.01								
16-Jul-24	DO (mg/L)	>6.0		7.85	8.61	8.23												
23-Jul-24	DO (mg/L)	>6.0					9.13	7.94	2.97	3.54								
24-Jul-24	DO (mg/L)	>6.0		7.29	8.34	7.83												
30-Jul-24	DO (mg/L)	>6.0		10.14	10.13	9.45												
31-Jul-24	DO (mg/L)	>6.0					8.18	2.66	4.86	4.36								
5-Aug-24	DO (mg/L)	>6.0	9.69												10.36			
6-Aug-24	DO (mg/L)	>6.0		7.57	6.82	7.21										6.95		
7-Aug-24	DO (mg/L)	>6.0					7.85	6.74	2.44	3.38								
8-Aug-24	DO (mg/L)	>6.0									5.13	6.07	6.42	6.15			7.44	7.21
14-Aug-24	DO (mg/L)	>6.0		6.88	7.84	7.96												
15-Aug-24	DO (mg/L)	>6.0					7.58	6.5	2.15	2.38								
21-Aug-24	DO (mg/L)	>6.0					8.18	4.81	2.67	2.8								
22-Aug-24	DO (mg/L)	>6.0		8.05	8.85	9.39												
27-Aug-24	DO (mg/L)	>6.0		8.26	9.7	9.68												
28-Aug-24	DO (mg/L)	>6.0					8.5	6.45	2.66	2.78								
2-Sep-24	DO (mg/L)	>6.0	8.06												8.48			
3-Sep-24	DO (mg/L)	>6.0		7.1	6.99	7.09												
4-Sep-24	DO (mg/L)	>6.0					8.17	8.4	3.6	3.69								
5-Sep-24	DO (mg/L)	>6.0									6.56	7.91	7.66	7.47			8.57	8.13

		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-Sep-24	DO (mg/L)	>6.0		7.1	6.44	6.77												
12-Sep-24	DO (mg/L)	>6.0					6.46	5.61	7.38	6.39								
18-Sep-24	DO (mg/L)	>6.0							9.07	8.99								
2-Jul-24	Conductivity (µs/cm)			88	92	79												
3-Jul-24	Conductivity (µs/cm)						77	77	68	68								
8-Jul-24	Conductivity (µs/cm)		106											35				
9-Jul-24	Conductivity (µs/cm)			67	89	77									87			
10-Jul-24	Conductivity (µs/cm)						76	74	86	85								
11-Jul-24	Conductivity (µs/cm)										86	94	96	66		200	21	
15-Jul-24	Conductivity (µs/cm)						75	75	82	83								
16-Jul-24	Conductivity (µs/cm)			90	90	77												
23-Jul-24	Conductivity (µs/cm)						75	74	76	75								
24-Jul-24	Conductivity (µs/cm)			79	84	79												
30-Jul-24	Conductivity (µs/cm)			71	86	76												
31-Jul-24	Conductivity (µs/cm)						74	81	80	77								
5-Aug-24	Conductivity (µs/cm)		99											32				
6-Aug-24	Conductivity (µs/cm)			69	85	76									80			
7-Aug-24	Conductivity (µs/cm)						76	78	83	78								
8-Aug-24	Conductivity (µs/cm)										66	97	79	70		134	17	
14-Aug-24	Conductivity (µs/cm)			90	81	75												
15-Aug-24	Conductivity (µs/cm)						75	77	85	85								
21-Aug-24	Conductivity (µs/cm)						74	79	84	83								
22-Aug-24	Conductivity (µs/cm)			100	81	73												
27-Aug-24	Conductivity (µs/cm)			103	79	73												
28-Aug-24	Conductivity (µs/cm)						74	76	81	81								
2-Sep-24	Conductivity (µs/cm)		112											31				
3-Sep-24	Conductivity (µs/cm)			81	77	70												
4-Sep-24	Conductivity (µs/cm)						70	70	76	76								
5-Sep-24	Conductivity (µs/cm)										76	94	79	78		128	22	

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						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-Sep-24	Conductivity (µs/cm)			79	73	67												
12-Sep-24	Conductivity (µs/cm)						68	69	73	72								
18-Sep-24	Conductivity (µs/cm)								73	72								
2-Jul-24	Temperature (°C)			24.97	29.29	29.81												
3-Jul-24	Temperature (°C)						29.37	28.28	26.34	27.24								
8-Jul-24	Temperature (°C)		27.38											26.24				
9-Jul-24	Temperature (°C)			26.19	30.98	31.09									25.7			
10-Jul-24	Temperature (°C)						30.16	29.25	26.11	26.72								
11-Jul-24	Temperature (°C)										25.74	25.82	26.08	25.96			27.26	26.61
15-Jul-24	Temperature (°C)						31.74	30.44	26.04	26.96								
16-Jul-24	Temperature (°C)			25.44	30.03	30.43												
23-Jul-24	Temperature (°C)						29.73	28.78	25.95	26.15								
24-Jul-24	Temperature (°C)			24.04	29.21	29.51												
30-Jul-24	Temperature (°C)			23.96	29.14	28.93												
31-Jul-24	Temperature (°C)						28.61	27.57	26.43	26.08								
5-Aug-24	Temperature (°C)		25.73												23.78			
6-Aug-24	Temperature (°C)			24.63	29.64	28.64										24.29		
7-Aug-24	Temperature (°C)						28.29	27.71	25.47	26.31								
8-Aug-24	Temperature (°C)										25.86	26.42	26.59	26.38			27.15	26.08
14-Aug-24	Temperature (°C)			25.3	28.93	29.48												
15-Aug-24	Temperature (°C)						29.34	28.07	25.32	26.12								
21-Aug-24	Temperature (°C)						29.08	27.37	25.09	25								
22-Aug-24	Temperature (°C)			25.76	29.13	29.24												
27-Aug-24	Temperature (°C)			25.53	29.66	29.76												
28-Aug-24	Temperature (°C)						28.99	28.22	25.37	25.75								
2-Sep-24	Temperature (°C)		26.36												24.3			
3-Sep-24	Temperature (°C)			31.33	31.37	32.11												
4-Sep-24	Temperature (°C)						30.82	29.72	25.33	25.84								
5-Sep-24	Temperature (°C)										25.43	26.4	26.18	26.32			27.39	27.67

		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																
11-Sep-24	Temperature (°C)			24.71	29.2	29.53												
12-Sep-24	Temperature (°C)						29.09	27.84	25.9	25.99								
18-Sep-24	Temperature (°C)								26.26	26.28								
2-Jul-24	Turbidity (NTU)			144	4.67	2.81												
3-Jul-24	Turbidity (NTU)						3.21	3.41	8.21	9.14								
8-Jul-24	Turbidity (NTU)		75.5											28.2				
9-Jul-24	Turbidity (NTU)			80.4	2.99	2.35									56.3			
10-Jul-24	Turbidity (NTU)						3.06	2.29	4.58	4.81								
11-Jul-24	Turbidity (NTU)										5.23	16.6	38.8	52.4			96.5	50.7
15-Jul-24	Turbidity (NTU)						2.38	1.82	7.43	6.6								
16-Jul-24	Turbidity (NTU)			72.4	2.25	2.14												
23-Jul-24	Turbidity (NTU)						2.4	2.14	10.4	11.1								
24-Jul-24	Turbidity (NTU)			1505	4.4	2.36												
30-Jul-24	Turbidity (NTU)			101	2.73	2.5												
31-Jul-24	Turbidity (NTU)						4.7	2.8	9.67	8.93								
5-Aug-24	Turbidity (NTU)		159												32.7			
6-Aug-24	Turbidity (NTU)			85.7	3.61	4.31										68.1		
7-Aug-24	Turbidity (NTU)						2.58	2.8	11.6	11.3								
8-Aug-24	Turbidity (NTU)										14.1	45.1	43.5	27.1			95.5	33.5
14-Aug-24	Turbidity (NTU)			100	3	2.41												
15-Aug-24	Turbidity (NTU)						2.2	1.87	16.4	15.6								
21-Aug-24	Turbidity (NTU)						2.8	1.92	14.4	14.8								
22-Aug-24	Turbidity (NTU)			67	2.15	2.3												
27-Aug-24	Turbidity (NTU)			180	2.5	2.19												
28-Aug-24	Turbidity (NTU)						2.62	1.87	11.1	10.1								
2-Sep-24	Turbidity (NTU)		157												23.7			
3-Sep-24	Turbidity (NTU)			8	2.11	2.06												
4-Sep-24	Turbidity (NTU)						2.07	2.02	9.11	9.28								
5-Sep-24	Turbidity (NTU)										8.29	187	54.3	28.3			308	10.1

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						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-Sep-24	Turbidity (NTU)			204	3.4	3.03												
12-Sep-24	Turbidity (NTU)						2.76	2.05	6.76	8.78								
18-Sep-24	Turbidity (NTU)								5.28	6.14								
8-Jul-24	TSS (mg/L)		63.61											14.26				
9-Jul-24	TSS (mg/L)			62.35		<5									41.8			
10-Jul-24	TSS (mg/L)						<5	<5	<5	<5								
11-Jul-24	TSS (mg/L)										<5	7.4	26.43	46.03			52.3	26.88
5-Aug-24	TSS (mg/L)		153.39												18.8			
6-Aug-24	TSS (mg/L)			48.38		<5										95.21		
7-Aug-24	TSS (mg/L)						<5	<5	<5	<5								
8-Aug-24	TSS (mg/L)										8.5	25.3	27.6	10.6			64.35	<5
2-Sep-24	TSS (mg/L)		116.36												12.6			
3-Sep-24	TSS (mg/L)			<5		<5												
4-Sep-24	TSS (mg/L)						<5	<5	<5	<5								
5-Sep-24	TSS (mg/L)										<5	142.85	40.85	17.95			259	7.5
8-Jul-24	BOD ₅ (mg/L)	<1.5	<1												<1			
9-Jul-24	BOD ₅ (mg/L)	<1.5		<1		<1										<1		
10-Jul-24	BOD ₅ (mg/L)	<1.5					<1	<1	<1	<1								
11-Jul-24	BOD ₅ (mg/L)	<1.5									<1	<1	<1	<1			<1	<1
5-Aug-24	BOD ₅ (mg/L)	<1.5	1.31												<1			
6-Aug-24	BOD ₅ (mg/L)	<1.5		<1		<1										<1		
7-Aug-24	BOD ₅ (mg/L)	<1.5					<1	<1	<1	<1								
8-Aug-24	BOD ₅ (mg/L)	<1.5									<1	<1	<1	<1			<1	<1
2-Sep-24	BOD ₅ (mg/L)	<1.5	<1												<1			
3-Sep-24	BOD ₅ (mg/L)	<1.5		<1		<1												
8-Jul-24	COD (mg/L)	<5.0	17.9												20.4			
9-Jul-24	COD (mg/L)	<5.0														12.8		
10-Jul-24	COD (mg/L)	<5.0							25.6	15.4								
11-Jul-24	COD (mg/L)	<5.0									48.6	19.2	21.8	24.3			16.6	15.4

		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																
5-Aug-24	COD (mg/L)	<5.0	5.12											10.2				
6-Aug-24	COD (mg/L)	<5.0													21.8			
7-Aug-24	COD (mg/L)	<5.0						5.12	<4									
8-Aug-24	COD (mg/L)	<5.0								14.1	19.2	8.96	21.8			<4	26.8	
2-Sep-24	COD (mg/L)	<5.0	21.8											40.9				
4-Sep-24	COD (mg/L)	<5.0						8.96	20.4									
5-Sep-24	COD (mg/L)	<5.0								19.2	25.6	30.7	56.3			64	90.8	
8-Jul-24	NH ₃ -N (mg/L)	<0.2	<0.1											<0.1				
9-Jul-24	NH ₃ -N (mg/L)	<0.2		<0.1		<0.1									<0.1			
10-Jul-24	NH ₃ -N (mg/L)	<0.2					<0.1	<0.1										
5-Aug-24	NH ₃ -N (mg/L)	<0.2	<0.1											<0.1				
6-Aug-24	NH ₃ -N (mg/L)	<0.2		<0.1		<0.1									<0.1			
7-Aug-24	NH ₃ -N (mg/L)	<0.2					<0.1	<0.1										
2-Sep-24	NH ₃ -N (mg/L)	<0.2	<0.1											<0.1				
3-Sep-24	NH ₃ -N (mg/L)	<0.2		<0.1		<0.1												
4-Sep-24	NH ₃ -N (mg/L)	<0.2					<0.1	<0.1										
8-Jul-24	NO ₃ -N (mg/L)	<5.0	0.42											0.2				
9-Jul-24	NO ₃ -N (mg/L)	<5.0		0.4		<0.05									0.15			
10-Jul-24	NO ₃ -N (mg/L)	<5.0					<0.05	<0.05										
5-Aug-24	NO ₃ -N (mg/L)	<5.0	0.29											0.2				
6-Aug-24	NO ₃ -N (mg/L)	<5.0		0.36		0.15									0.16			
7-Aug-24	NO ₃ -N (mg/L)	<5.0					0.15	0.18										
2-Sep-24	NO ₃ -N (mg/L)	<5.0	0.22											0.1				
3-Sep-24	NO ₃ -N (mg/L)	<5.0		0.06		<0.05												
4-Sep-24	NO ₃ -N (mg/L)	<5.0					<0.05	<0.05										
8-Jul-24	Faecal coliform (MPN/100 mL)	<1,000	1,600											240				
9-Jul-24	Faecal coliform (MPN/100 mL)	<1,000													1,600			
11-Jul-24	Faecal coliform (MPN/100 mL)	<1,000								33	130	220	1,600			1,600	1,600	
5-Aug-24	Faecal coliform (MPN/100 mL)	<1,000	220											540				

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						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																
6-Aug-24	Faecal coliform (MPN/100 mL)	<1,000														170		
8-Aug-24	Faecal coliform (MPN/100 mL)	<1,000									21	140	70	49			130	17
2-Sep-24	Faecal coliform (MPN/100 mL)	<1,000	1,600												1,600			
5-Sep-24	Faecal coliform (MPN/100 mL)	<1,000									49	1,600	920	1,600			1,600	920
8-Jul-24	Total Coliform (MPN/100 mL)	<5,000	1,600												1,600			
9-Jul-24	Total Coliform (MPN/100 mL)	<5,000													1,600			
11-Jul-24	Total Coliform (MPN/100 mL)	<5,000									540	540	540	1,600			1,600	1,600
5-Aug-24	Total Coliform (MPN/100 mL)	<5,000	280												920			
6-Aug-24	Total Coliform (MPN/100 mL)	<5,000														280		
8-Aug-24	Total Coliform (MPN/100 mL)	<5,000									70	170	94	70			220	26
2-Sep-24	Total Coliform (MPN/100 mL)	<5,000	1,600												1,600			
5-Sep-24	Total Coliform (MPN/100 mL)	<5,000									350	1,600	1,600	1,600			1,600	1,600
8-Jul-24	TKN		<5												<5			
9-Jul-24	TKN			<5		<5										<5		
10-Jul-24	TKN						<5	<5										
5-Aug-24	TKN		<5												<5			
6-Aug-24	TKN															<5		
2-Sep-24	TKN		<5												<5			
3-Sep-24	TKN			<5		<5												
4-Sep-24	TKN						<5	<5										
30-Jul-24	Secchi Disk (m)				2	2.2												
31-Jul-24	Secchi Disk (m)						2.8	3	1.2	1.5								
6-Aug-24	Secchi Disk (m)					3.75												
7-Aug-24	Secchi Disk (m)						3	3.3	1.2	1.5								
22-Aug-24	Secchi Disk (m)			0.5	3	2.8	3	3.3	1.2	1.5								
27-Aug-24	Secchi Disk (m)				2.8	3												
28-Aug-24	Secchi Disk (m)						2.7	3.5	1	1.4								
3-Sep-24	Secchi Disk (m)			1	3	2.8												
11-Sep-24	Secchi Disk (m)				2	2.8												

		River Name	Nam Ngiep												Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
		Zone	Location Refer to Construction Sites												Location Refer to Construction Sites			
			Upstream/Main Reservoir						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-Sep-24	Secchi Disk (m)																	
8-Jul-24	TOC (mg/L)		3.97											5.14				
9-Jul-24	TOC (mg/L)														3.97			
10-Jul-24	TOC (mg/L)							4.38	3.61									
11-Jul-24	TOC (mg/L)									3.55	3.27	4.25	5.81			4.94	6.03	
5-Aug-24	TOC (mg/L)		3.18											5.21				
6-Aug-24	TOC (mg/L)														3			
7-Aug-24	TOC (mg/L)							4.62	3.84									
8-Aug-24	TOC (mg/L)									3.92	3.38	4.16	4.02			3.57	5.63	
2-Sep-24	TOC (mg/L)		4.88											5.25				
4-Sep-24	TOC (mg/L)							4.18	4.7									
5-Sep-24	TOC (mg/L)									4.29	4.85	5.22	4.41			5.43	6.05	
8-Jul-24	Total Phosphorus (mg/L)		0.24											0.47				
9-Jul-24	Total Phosphorus (mg/L)			0.29		0.35									0.36			
10-Jul-24	Total Phosphorus (mg/L)						0.29	<0.15										
5-Aug-24	Total Phosphorus (mg/L)		<0.15											<0.15				
6-Aug-24	Total Phosphorus (mg/L)			<0.15		<0.15									<0.15			
7-Aug-24	Total Phosphorus (mg/L)						0.25	<0.15										
2-Sep-24	Total Phosphorus (mg/L)		<0.15											<0.15				
3-Sep-24	Total Phosphorus (mg/L)			<0.15		<0.15												
4-Sep-24	Total Phosphorus (mg/L)						<0.15	<0.15										
8-Jul-24	Total Dissolved Phosphorus (mg/L)		0.18											0.39				
9-Jul-24	Total Dissolved Phosphorus (mg/L)			0.31		0.31									0.2			
10-Jul-24	Total Dissolved Phosphorus (mg/L)						0.31	<0.15										
5-Aug-24	Total Dissolved Phosphorus (mg/L)		<0.15											<0.15				
6-Aug-24	Total Dissolved Phosphorus (mg/L)			<0.15											<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																
7-Aug-24	Total Dissolved Phosphorus (mg/L)					<0.15	<0.15											
2-Sep-24	Total Dissolved Phosphorus (mg/L)		<0.15											<0.15				
3-Sep-24	Total Dissolved Phosphorus (mg/L)			<0.15		<0.15												
4-Sep-24	Total Dissolved Phosphorus (mg/L)					<0.15	<0.15											
9-Jul-24	Turbidity (NTU)-bottom					3.86												
10-Jul-24	Turbidity (NTU)-bottom						21.1	3.16										
6-Aug-24	Turbidity (NTU)-bottom					160												
7-Aug-24	Turbidity (NTU)-bottom						3.78	2.3										
3-Sep-24	Turbidity (NTU)-bottom					12.6												
4-Sep-24	Turbidity (NTU)-bottom						2.87	2.62										
9-Jul-24	TSS (mg/L)-bottom					20												
10-Jul-24	TSS (mg/L)-bottom						33.13	18.68										
6-Aug-24	TSS (mg/L)-bottom					47.66												
7-Aug-24	TSS (mg/L)-bottom						17.17	<5										
3-Sep-24	TSS (mg/L)-bottom					31.11												
4-Sep-24	TSS (mg/L)-bottom						28.57	13.21										
9-Jul-24	BOD ₅ (mg/L)-bottom					<1												
10-Jul-24	BOD ₅ (mg/L)-bottom						<1	<1										
6-Aug-24	BOD ₅ (mg/L)-bottom					<1												
7-Aug-24	BOD ₅ (mg/L)-bottom						<1	<1										
3-Sep-24	BOD ₅ (mg/L)-bottom					5.24												
4-Sep-24	BOD ₅ (mg/L)-bottom						<1	<1										
9-Jul-24	NH ₃ -N (mg/L)-bottom					<0.1												
10-Jul-24	NH ₃ -N (mg/L)-bottom						<0.1	<0.1										
6-Aug-24	NH ₃ -N (mg/L)-bottom					<0.1												
7-Aug-24	NH ₃ -N (mg/L)-bottom						<0.1	<0.1										

		River Name	Nam Ngiep											Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup	
		Zone	Location Refer to Construction Sites											Location Refer to Construction Sites				
			Upstream/Main Reservoir					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																
3-Sep-24	NH ₃ -N (mg/L)-bottom					<0.1												
4-Sep-24	NH ₃ -N (mg/L)-bottom						<0.1	<0.1										
9-Jul-24	NO ₃ -N (mg/L)-bottom					<0.05												
10-Jul-24	NO ₃ -N (mg/L)-bottom						<0.05	<0.05										
6-Aug-24	NO ₃ -N (mg/L)-bottom					0.23												
7-Aug-24	NO ₃ -N (mg/L)-bottom						0.1	0.23										
3-Sep-24	NO ₃ -N (mg/L)-bottom					<0.05												
4-Sep-24	NO ₃ -N (mg/L)-bottom						<0.05	<0.05										
9-Jul-24	TKN-bottom					<5												
10-Jul-24	TKN-bottom						<5	<5										
6-Aug-24	TKN-bottom					<5												
7-Aug-24	TKN-bottom						13	<5										
3-Sep-24	TKN-bottom					<5												
4-Sep-24	TKN-bottom						<5	<5										
9-Jul-24	Total Dissolved Phosphorus (mg/L)-bottom					0.28												
10-Jul-24	Total Dissolved Phosphorus (mg/L)-bottom						<0.15	0.31										
6-Aug-24	Total Dissolved Phosphorus (mg/L)-bottom					<0.15												
7-Aug-24	Total Dissolved Phosphorus (mg/L)-bottom						<0.15	<0.15										
3-Sep-24	Total Dissolved Phosphorus (mg/L)-bottom					<0.15												
4-Sep-24	Total Dissolved Phosphorus (mg/L)-bottom						<0.15	<0.15										
9-Jul-24	Total Phosphorus (mg/L)-bottom					0.22												
10-Jul-24	Total Phosphorus (mg/L)-bottom						0.24	0.31										
6-Aug-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																
7-Aug-24	Total Phosphorus (mg/L)-bottom					<0.15	0.33											
3-Sep-24	Total Phosphorus (mg/L)-bottom				<0.15													
4-Sep-24	Total Phosphorus (mg/L)-bottom					<0.15	<0.15											
9-Jul-24	Chlorophyll-A			1.69	1.14													
10-Jul-24	Chlorophyll-A					1.39	0.28											
6-Aug-24	Chlorophyll-A			2.47	1.47													
7-Aug-24	Chlorophyll-A																	
3-Sep-24	Chlorophyll-A			7.57	9.25													
4-Sep-24	Chlorophyll-A					10.5	7.24											

APPENDIX 5-2: EFFLUENT CAMP MONITORING RESULTS – Q3 2024

		Site Name	OSOV1	OSOV 2	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
17-Jul-24	pH	6.0 - 9.0	6.8	6.95	6.99
25-Jul-24	pH	6.0 - 9.0	6.72	6.44	6.74
01-Aug-24	pH	6.0 - 9.0	7	7.05	6.92
12-Aug-24	pH	6.0 - 9.0	6.84	6.93	6.52
06-Sep-24	pH	6.0 - 9.0	6.95	6.92	7.19
16-Sep-24	pH	6.0 - 9.0	6.6	6.96	6.93
17-Jul-24	Sat. DO (%)		34.5	81.8	10.8
25-Jul-24	Sat. DO (%)		30.9	91	79.3
01-Aug-24	Sat. DO (%)		26.9	77	55.2
12-Aug-24	Sat. DO (%)		32	55	63.5
06-Sep-24	Sat. DO (%)		37.1	53	28.7
16-Sep-24	Sat. DO (%)		44.2	84.7	47.5
17-Jul-24	DO (mg/L)		2.64	6.32	0.81
25-Jul-24	DO (mg/L)		2.44	7.16	6.05
01-Aug-24	DO (mg/L)		2.11	6.08	4.25
12-Aug-24	DO (mg/L)		3.48	4.32	4.87
06-Sep-24	DO (mg/L)		285	4.09	2.15
16-Sep-24	DO (mg/L)		3.4	6.54	3.66
17-Jul-24	Conductivity (µs/cm)		303	450	1690
25-Jul-24	Conductivity (µs/cm)		236	333	1045
01-Aug-24	Conductivity (µs/cm)		340	440	1115
12-Aug-24	Conductivity (µs/cm)		325	348	1064
06-Sep-24	Conductivity (µs/cm)		351	557	1123
16-Sep-24	Conductivity (µs/cm)		289	311	816
17-Jul-24	Temperature (°C)		29.09	28.67	30.39
25-Jul-24	Temperature (°C)		27.56	27.62	29.11
01-Aug-24	Temperature (°C)		27.56	27.43	28.91
12-Aug-24	Temperature (°C)		28.44	27.6	28.93
06-Sep-24	Temperature (°C)		29.74	28.81	30.3
16-Sep-24	Temperature (°C)		28.92	28.62	28.76
17-Jul-24	Turbidity (NTU)		1.79	9.13	41.8
25-Jul-24	Turbidity (NTU)		2.69	7.41	12.3
01-Aug-24	Turbidity (NTU)		2.2	10.6	7.71
12-Aug-24	Turbidity (NTU)		2.69	10.4	12.2
06-Sep-24	Turbidity (NTU)		1.88	10.9	10
16-Sep-24	Turbidity (NTU)		2.86	6.05	9.36
17-Jul-24	TSS (mg/L)	<50	5.67	7.64	28.12
25-Jul-24	TSS (mg/L)	<50	<5	<5	8.23

		Site Name	OSOV1	OSOV 2	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
01-Aug-24	TSS (mg/L)	<50	7.41	11.11	6.79
12-Aug-24	TSS (mg/L)	<50	<5	6.38	11.34
06-Sep-24	TSS (mg/L)	<50	5.8	13.2	10
16-Sep-24	TSS (mg/L)	<50	<5	<5	7.05
17-Jul-24	BOD ₅ (mg/L)	<30	10.69	27.69	16.51
25-Jul-24	BOD ₅ (mg/L)	<30	<6	<6	<6
01-Aug-24	BOD ₅ (mg/L)	<30	8.25	11.8	<6
12-Aug-24	BOD ₅ (mg/L)	<30	<6	7.35	<6
06-Sep-24	BOD ₅ (mg/L)	<30	14.45	19.22	<6
16-Sep-24	BOD ₅ (mg/L)	<30	12.48	11.31	<6
17-Jul-24	COD (mg/L)	<125	46.9	56.3	214
25-Jul-24	COD (mg/L)	<125	44.8	20.4	80
01-Aug-24	COD (mg/L)	<125	11.5	32.0	32
12-Aug-24	COD (mg/L)	<125	70.4	34.6	58
06-Sep-24	COD (mg/L)	<125	51.2	44.8	40
16-Sep-24	COD (mg/L)	<125	60.8	7.7	32
17-Jul-24	NH ₃ -N (mg/L)	<10.0	0.15	0.5	0.5
25-Jul-24	NH ₃ -N (mg/L)	<10.0	0.11	0.4	0.5
01-Aug-24	NH ₃ -N (mg/L)	<10.0	<0.1	0.2	0.2
12-Aug-24	NH ₃ -N (mg/L)	<10.0	0.1	0.3	0.3
06-Sep-24	NH ₃ -N (mg/L)	<10.0	<0.1	0.6	0.3
16-Sep-24	NH ₃ -N (mg/L)	<10.0	<0.1	0.2	0.6
17-Jul-24	Total Nitrogen (mg/L)	<10.0	4.0	16.6	76.3
25-Jul-24	Total Nitrogen (mg/L)	<10.0	2.2	10.7	8.4
01-Aug-24	Total Nitrogen (mg/L)	<10.0	5.4	16.2	38.0
12-Aug-24	Total Nitrogen (mg/L)	<10.0	7.0	23.0	7.0
06-Sep-24	Total Nitrogen (mg/L)	<10.0	5.4	22.6	48.8
16-Sep-24	Total Nitrogen (mg/L)	<10.0	1.7	9.6	16.0
17-Jul-24	Total Phosphorus (mg/L)	<2	0.88	1.2	8.0
25-Jul-24	Total Phosphorus (mg/L)	<2	0.96	0.7	0.6
01-Aug-24	Total Phosphorus (mg/L)	<2	1.31	1.1	5.7
12-Aug-24	Total Phosphorus (mg/L)	<2	0.97	0.5	6.8
06-Sep-24	Total Phosphorus (mg/L)	<2	1	1.8	6.9
16-Sep-24	Total Phosphorus (mg/L)	<2	1.06	0.7	5.1
17-Jul-24	Faecal Coliform (MPN/100 mL)	<400	540	2	540
25-Jul-24	Faecal Coliform (MPN/100 mL)	<400	350	70	350
01-Aug-24	Faecal Coliform (MPN/100 mL)	<400	110	1,600	0

		Site Name	OSOV1	OSOV 2	Main Powerhouse
		Station Code	EF01	EF13	EF19
Date	Parameter (Unit)	Guideline in the CA			
12-Aug-24	Faecal Coliform (MPN/100 mL)	<400	220	350	0
06-Sep-24	Faecal Coliform (MPN/100 mL)	<400	33	460	0
16-Sep-24	Faecal Coliform (MPN/100 mL)	<400	1,600	130	0
17-Jul-24	Total coliform (MPN/100 mL)	<400	1,600	130	1,600
25-Jul-24	Total coliform (MPN/100 mL)	<400	3,500	110	920
01-Aug-24	Total coliform (MPN/100 mL)	<400	1,600	1,600	0
12-Aug-24	Total coliform (MPN/100 mL)	<400	260	1,600	0
06-Sep-24	Total coliform (MPN/100 mL)	<400	1,700	3,500	0
16-Sep-24	Total coliform (MPN/100 mL)	<400	3,500	1,600	0
17-Jul-24	Oil & Grease (mg/L)	<10.0	<2	<2	2.5
25-Jul-24	Oil & Grease (mg/L)	<10.0	<2	<2	<2
01-Aug-24	Oil & Grease (mg/L)	<10.0	<2	<2	<2
12-Aug-24	Oil & Grease (mg/L)	<10.0	<2	<2	<2
06-Sep-24	Oil & Grease (mg/L)	<10.0	<2	7.8	<2
16-Sep-24	Oil & Grease (mg/L)	<10.0	<2	<2	<2

APPENDIX 5-3: COMMUNITY GROUNDWATER QUALITY MONITORING RESULTS – Q3 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							
08-Jul-24	pH	6.5 - 9.2						6.54	6.35
18-Jul-24	pH	6.5 - 9.2			6.59	6.66	6.4		
05-Aug-24	pH	6.5 - 9.2						6.65	6.6
19-Aug-24	pH	6.5 - 9.2			6.62	6.58	6.4		
02-Sep-24	pH	6.5 - 9.2						6.88	6.86
24-Sep-24	pH	6.5 - 9.2			6.5	6.6	6.66		
08-Jul-24	Sat. DO (%)							88.5	76.8
18-Jul-24	Sat. DO (%)				89	101	77.8		
05-Aug-24	Sat. DO (%)							106.5	123.6
19-Aug-24	Sat. DO (%)				87.1	82.9	81		
02-Sep-24	Sat. DO (%)							90.4	103.6
24-Sep-24	Sat. DO (%)				88.8	94.7	76.5		
08-Jul-24	DO (mg/l)							6.94	6.08
18-Jul-24	DO (mg/l)				6.99	7.97	6.02		
05-Aug-24	DO (mg/l)							8.49	9.94
19-Aug-24	DO (mg/l)				6.9	6.58	6.42		
02-Sep-24	DO (mg/l)							7.14	8.24
24-Sep-24	DO (mg/l)				7.11	7.54	6.06		
08-Jul-24	Conductivity (µS/cm)							23	255
18-Jul-24	Conductivity (µS/cm)				513	505	336		
05-Aug-24	Conductivity (µS/cm)							23	234
19-Aug-24	Conductivity (µS/cm)				426	512	291		
02-Sep-24	Conductivity (µS/cm)							23	236
24-Sep-24	Conductivity (µS/cm)				355	408	270		
08-Jul-24	Temperature (°C)							27.87	27.63
18-Jul-24	Temperature (°C)				27.71	27.46	28.8		
05-Aug-24	Temperature (°C)							26.97	26.44
19-Aug-24	Temperature (°C)				26.68	27.26	27.17		
02-Sep-24	Temperature (°C)							27.47	27.1

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							
24-Sep-24	Temperature (°C)				26.64	26.88	27.26		
08-Jul-24	Turbidity (NTU)	<20						7.06	2.82
18-Jul-24	Turbidity (NTU)	<20			1.29	1.14	1.92		
05-Aug-24	Turbidity (NTU)	<20						12.4	5.38
19-Aug-24	Turbidity (NTU)	<20			1.94	1.31	2.04		
02-Sep-24	Turbidity (NTU)	<20						3.34	1.19
24-Sep-24	Turbidity (NTU)	<20			1.81	3.07	3.99		
08-Jul-24	Fecal coliform (MPN/100ml)	0							140
18-Jul-24	Fecal coliform (MPN/100ml)	0			0	0	9.3		
05-Aug-24	Fecal coliform (MPN/100ml)	0						0	4.5
19-Aug-24	Fecal coliform (MPN/100ml)	0			0	0	11		
02-Sep-24	Fecal coliform (MPN/100ml)	0						0	4.5
24-Sep-24	Fecal coliform (MPN/100ml)	0			4.5	0	280		
08-Jul-24	E.coli Bacteria (MPN/100ml)	0						0	4.5
18-Jul-24	E.coli Bacteria (MPN/100ml)	0			0	0	2		
05-Aug-24	E.coli Bacteria (MPN/100ml)	0						0	0
19-Aug-24	E.coli Bacteria (MPN/100ml)	0			0	0	17		
02-Sep-24	E.coli Bacteria (MPN/100ml)	0						0	0
24-Sep-24	E.coli Bacteria (MPN/100ml)	0			0	0	170		

APPENDIX 5-4: GRAVITY FED WATER SUPPLY QUALITY MONITORING RESULTS – Q3 2024

		Site Name	Thaheua Village	Hat Gnuin Village	Phouhomxay Village	
		Station	WTHH02	WHGN02	WPHX02	WPHX03
Date	Parameter (Unit)	Guideline				
18-Jul-24	pH	6.5 - 8.5	6.81	6.93	6.8	6.88
19-Aug-24	pH	6.5 - 8.5	6.8	6.73	6.77	6.84
24-Sep-24	pH	6.5 - 8.5	6.77	6.82		
25-Sep-24	pH	6.5 - 8.5			6.73	6.79
18-Jul-24	Sat. DO (%)		97.5	108.9	104.4	98.8
19-Aug-24	Sat. DO (%)		91	80.1	89.6	92.2
24-Sep-24	Sat. DO (%)		95.8	110.2		
25-Sep-24	Sat. DO (%)				111.3	107.1
18-Jul-24	DO (mg/L)		7.58	8.46	7.87	7.73
19-Aug-24	DO (mg/L)		7.26	6.3	6.97	7.33
24-Sep-24	DO (mg/L)		7.76	8.82		
25-Sep-24	DO (mg/L)				8.87	8.67
18-Jul-24	Conductivity (µS/cm)	<1,000	48	104	10	9
19-Aug-24	Conductivity (µS/cm)	<1,000	38	67	11	10
24-Sep-24	Conductivity (µS/cm)	<1,000	32	44		
25-Sep-24	Conductivity (µS/cm)	<1,000			9	8
18-Jul-24	Temperature (°C)	<35	28.55	28.37	30.1	28.13
19-Aug-24	Temperature (°C)	<35	27.01	27.72	28.32	27.07
24-Sep-24	Temperature (°C)	<35	25.95	26.67		
25-Sep-24	Temperature (°C)	<35			26.88	26.03
18-Jul-24	Turbidity (NTU)	<10	5.09	5.07	2.86	3.35
19-Aug-24	Turbidity (NTU)	<10	7.04	2.77	3.02	3.7
24-Sep-24	Turbidity (NTU)	<10	5.73	3.76		
25-Sep-24	Turbidity (NTU)	<10			1.77	4.33
18-Jul-24	Faecal Coliform (MPN/100 mL)	0	2	4.5	4.5	2
19-Aug-24	Faecal Coliform (MPN/100 mL)	0	70	49	220	130
24-Sep-24	Faecal Coliform (MPN/100 mL)	0	7	17		
25-Sep-24	Faecal Coliform (MPN/100 mL)	0			11	14
18-Jul-24	E.coli Bacteria (MPN/100 mL)	0	2	0	0	0
19-Aug-24	E.coli Bacteria (MPN/100 mL)	0	17	22	22	7.8
24-Sep-24	E.coli Bacteria (MPN/100 mL)	0	5	7.8		
25-Sep-24	E.coli Bacteria (MPN/100 mL)	0			6.8	7.8

APPENDIX 5-5: LANDFILL LEACHATE MONITORING RESULTS – Q3 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	Discharge Point
			Station	LL1	LL2	LL3	LL4	LL5	LL6	LL7
Date	Parameter (Unit)	Guideline								
17-Jul-24	pH	6.0-9.0					6.28		6.54	
1-Aug-24	pH	6.0-9.0					6.85		6.55	
10-Sep-24	pH	6.0-9.0					7.12		7.04	
17-Jul-24	Sat. DO (%)						143		123	
1-Aug-24	Sat. DO (%)						132.9		92.5	
10-Sep-24	Sat. DO (%)						113.6		100.8	
17-Jul-24	DO (mg/L)						10.21		9.13	
1-Aug-24	DO (mg/L)						10.41		7.26	
10-Sep-24	DO (mg/L)						8.83		7.77	
17-Jul-24	Conductivity (µS/cm)						82		155	
1-Aug-24	Conductivity (µS/cm)						80		150	
10-Sep-24	Conductivity (µS/cm)						94		139	
17-Jul-24	Temperature (°C)						31.33		30.98	
1-Aug-24	Temperature (°C)						28.06		27.87	
10-Sep-24	Temperature (°C)						28.41		28.81	
17-Jul-24	Turbidity (NTU)						55.3		16.6	
1-Aug-24	Turbidity (NTU)						56.8		26.4	
10-Sep-24	Turbidity (NTU)						51.8		13.5	
17-Jul-24	BOD5 (mg/L)	<30					12.63		13.24	
1-Aug-24	BOD5 (mg/L)	<30					17.46		17.04	
10-Sep-24	BOD5 (mg/L)	<30					6.24		<6	
17-Jul-24	COD (mg/L)	<125					67.8		26.8	
1-Aug-24	COD (mg/L)	<125					44.8		19.2	
10-Sep-24	COD (mg/L)	<125					101		14.1	
17-Jul-24	Faecal Coliform (MPN/100mL)	<400					350		350	
1-Aug-24	Faecal Coliform (MPN/100mL)	<400					330		920	

Date	Parameter (Unit)	Guideline	Site Name	NNP1 Landfill Leachate					Houay Soup Landfill	
			Location	Pond No.01	Pond No.02	Pond No.03	Pond No.04	Discharge Point	Last pond	Discharge Point
			Station	LL1	LL2	LL3	LL4	LL5	LL6	LL7
10-Sep-24	Faecal Coliform (MPN/100mL)	<400					1,600		130	
17-Jul-24	Total Coliform (MPN/100mL)	<400					1,600		1,600	
1-Aug-24	Total Coliform (MPN/100mL)	<400					35,000		35,000	
10-Sep-24	Total Coliform (MPN/100mL)	<400					1,600		920	
17-Jul-24	Total Nitrogen (mg/L)	<10					2.24		7.3	
1-Aug-24	Total Nitrogen (mg/L)	<10					<5		93.2	
10-Sep-24	Total Nitrogen (mg/L)	<10					<5		<5	
17-Jul-24	Lead (mg/L)	<0.2					<0.01		<0.01	
1-Aug-24	Lead (mg/L)	<0.2					<0.01		<0.01	
10-Sep-24	Lead (mg/L)	<0.2					<0.01		<0.01	
17-Jul-24	Copper (mg/L)						<0.1		<0.1	
1-Aug-24	Copper (mg/L)						<0.1		<0.1	
10-Sep-24	Copper (mg/L)						<0.1		<0.1	
17-Jul-24	Iron (mg/L)						1.69		1.6	
1-Aug-24	Iron (mg/L)						0.65		0.52	
10-Sep-24	Iron (mg/L)						0.4		0.36	
17-Jul-24	Ammonia nitrogen (mg/L)	<10					<0.1		<0.1	
1-Aug-24	Ammonia nitrogen (mg/L)	<10					<0.1		<0.1	
10-Sep-24	Ammonia nitrogen (mg/L)	<10					<0.1		<0.1	
17-Jul-24	Oil & Grease (mg/L)	<10					<2		<2	
1-Aug-24	Oil & Grease (mg/L)	<10					<2		<2	
10-Sep-24	Oil & Grease (mg/L)	<10					<2		<2	