Environmental and Social Monitoring Report

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Nam Ngiep 1 Hydropower Project
(Lao People's Democratic Republic)

Quarterly Monitoring Report 2015 – Q4 Environmental

Prepared by Nam Ngiep 1 Power Company Limited for the Asian Development Bank

NAM NGIEP 1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Fourth Quarter Monitoring Report

(4th QMR)

Environment

October to December 2015

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ABBREVIATIONS / ACRONYMS

ADB	Asian Development Bank
BAC	Biodiversity Advisory Committee
BMSP	Biodiversity Management Sub-Plan
BOD	Biochemical Oxygen Demand
BRP	Biomass Removal Plan
CA	Concession Agreement between the NNP1PC and GOL
CBI	Community and Biodiversity Investment
COD	Chemical Oxygen Demand
DEQP	Department of Environmental Quality Promotion
DESIA	Department of Environmental and Social Impact Assessment, MONRE
DFRM	Department of Forest Resources Management, MONRE
DO	Dissolved Oxygen
ECZ	Elephant Conservation Zone
EGAT	Electricity Generating Authority of Thailand
EIA	Environmental Impact Assessment
EMO	Environmental Management Office
EMU	Environmental Monitoring Unit
EPF	Environmental Protection Fund
GOL	Government of Lao PDR
IEE	Initial Environmental Examination
IFMP	Integrated Fishery Management Plan
IMA	Independent Monitoring Agency
ISP	Integrated Spatial Planning
km	kilometre
LTA	Lender's Technical Advisor
LTI	Lost Time Incident
m	metre
MONRE	Ministry of Natural Resource and Environment, Lao PDR
MVI	Motor Vehicle Incident
NCI	Non-Compliance Issue
NCR	Non-Compliance Report
NNP1PC	Nam Ngiep 1 Power Company Limited
NPA	Non-Profit Association
NPF	National Protection Forest
NTP	Notice to Proceed (under each construction contract)
OC	Obayashi Corporation
ONC	Observation of Non-Compliance
PAP	Project Affected People
PCDP	Public Consultation Disclosure Plan
PONRE	Provincial Department of Natural Resource and Environment, MONRE

PPA	Provincial Protected Area
QMR	Quarterly Monitoring Report
RI	Recordable Injury
ROW	Right of Way
SMO	Social Management Office
SS-ESMMP	Site Specific Environmental and Social Monitoring and Management Plan
TD	Technical Division
TOR	Terms of Reference
TSS	Total Suspended Solids
UXO	Unexploded Ordinance
WMC	Watershed Management Committee
WMP	Watershed Management Plan
WWTS	Waste water treatment systems

EXECUTIVE SUMMARY

The overall cumulative progress of the construction works until the end of December 2015 was 31.6% (compared to planned progress of 36.1%). The diversion tunnel was completed and the Nam Ngiep diverted on 31 October 2015 about a month ahead of schedule, and progress of critical work such as the re-regulation dam structure and the main dam and powerhouse excavation continued to be the same or better than planned.

The NNP1PC Environmental Management Office (EMO) has achieved a number of key environmental management activities. During the Fourth Quarter of 2015, the EMO received fourteen (14) SS-ESMMPs, out of which, 12 SS-ESMMPs were approved and 2 were returned to the Contractor for further revision. A total of 36 new Observation of Non-Compliances (ONCs) were issued compared to 62 ONCs in the previous Quarter. A total of 48 ONCs, 1 NCR Level 1 on the Sino-hydro camp's WWTS, and 1 NCR Level 2 on erosion control below the Access Road T11, were resolved in this Quarter.

The design of the NNP1PC landfill near Spoil Area number 6 was completed and the construction works was put out to tender in December 2015. In parallel with this, the bulk earthworks were undertaken to prepare the site for the construction the pits and leachate ponds. The construction works is expected to start in March 2016.

The Effluent discharges results showed that Biochemical Oxygen Demand ($BOD_{5)}$, Total Suspended Solid (TSS), Oil and Grease, faecal and total coliforms exceeded the Effluent Standards prescribed in the NNP1 Concession Agreement (CA) at the RT Camp. The BOD_5, Ammonia nitrogen, faecal coliforms and Total Coliforms at the OC Camp were above the prescribed Standard in the CA for October 2015. The Waste Water Treatment Systems (WWTS) have been reviewed by the Independent Consultant and an upgrade is in progress at V&K, RT and Song Da Camps.

The level of the TSS were above the National Standard in all 4 sites (diversion tunnel outlet, main dam, regulating dam and the RCC Plant). Monitoring of the discharge at the diversion tunnel outlet stopped in November and December as the construction was completed and became operational on 31 October 2015. In early December 2015, the TSS result at the main dam slightly exceeded the National Effluent Discharge Standard with a recorded value of 60.9 mg/l.

Regarding the dust monitoring, all measurements at the villages nearby the construction sites were below the National Environmental Standard for particulate matters. At the Aggregate Crushing Plant, in November 2015 the level of dust was found to be slightly higher than the National Standard; additional sprinkler systems were then installed and the dust measurements in December 2015 were below the National Environment Standards.

Noise monitoring is conducted by the EMO in key project construction sites including Songda Camp #2, Sino Hydro Camp, RCC Plant site (started from December 2015) and the Aggregate Crushing Plant Site (started from November 2015). The measurements indicate that all maximum noise level results are within the National Standard. However, the average night time (22:00 – 06:00) noise level at Songda Camp #2 slightly exceeded the National standard (<50 dBA); and at the Aggregate Crushing Plant the average daytime (6:00-22:00) noise level slightly exceeded the National Standard (70 dBA).

In November 2015, EMO completed the Initial Environment Examination (IEE) and the associated Integrated Natural Resources Management Plan (INRMP) of the Houay Soup Resettlement Area. Both reports have been approved by ADB and are disclosed to the public on the NNP1PC website. In October 2015, EMO submitted the draft Nabong Substation Upgrade Due Diligence Assessment to ADB and received feedback from ADB in November 2015. The main concern raised was the currency of existing environmental and social documents and permits. The assessment found that the current IEE for the upgrade works (EDL, 2007) is compliant with the ADB Safeguards Policy Statement, June 2009.

The preparation of the Nam Ngiep 1 Watershed Management Plan (WMP) involved a second round of Key Informant Interviews (KII) with 5 Districts in the NNP1 watershed area. A working draft of NNP1 WMP was presented and discussed during the joint mission of ADB-IAP-LTA in the first week of December 2015. However, the document was considered inadequate and it was agreed to improve the approach to the WMP development. The submission deadline of the final WMP was discussed and agreed to be extended to 31 October 2016 to allow sufficient time for further improvements and review process.

The NNP1 Watershed Management Committee (WMC) has prepared and submitted a priority action plan and request for transfer of funds from the NNP1 Watershed Management Fund. The priority action plan is part of the Watershed Management Action Plan (WMAP) prepared earlier in 2015. NNP1PC has notified ADB on the intention to disburse the requested funds and following the receipt of no objection from ADB, NNP1PC expects to be able to transfer the funds in January 2016. The first Integrated Spatial Planning (ISP) technical training for Xaysomboun Province was undertaken in October 2015 by MONRE's Department of Environmental Quality Promotion and Xaysomboun ISP technical committee. A Consultant's contract was settled at the end of October 2015 by hiring a Biodiversity Consultant to start the Biodiversity Management Sub-Plan (BMSP) development. The first inception report detailing a conceptual framework and approaches were discussed with ADB and IAP mission team in December 2015. It was recommended that this plan was integrated into the NNP1 Watershed Management Plan (WMP) instead of a stand-alone document.

The ground truth survey in the proposed offset sites of Phou Sod and Phou Hae in Xaysomboun Province and Eastern Bolikhamxay (Named Zone 3) up to Phou Sithon area commenced in late October to November 2015. The results indicate that none of these sites are suitable as offset sites. The way forward to conclude the offset site selection was discussed with the monitoring mission of ADB-IAP-LTA-BAC as well as the Government of Lao PDR of Bolikhamxay and Xaysomboun Provinces. The ADB and IAP mission representatives recommended to consider a parallel survey in the potential offset site outside NNP1 project provinces. It was also agreed during the mission that related milestones to biodiversity program need to be extended.

Finally on the biomass clearance, a contract for UXO Clearance work was awarded to the same Company contracted for biomass clearance. This contract was signed in November 2015. The UXO Clearance Implementation Plan was submitted to the EMO on 29 December 2015. The first draft of the Site Specific Environmental and Social Management and Monitoring Plan (SS-ESMMP) for Biomass Clearance was submitted by a Consulting Company on 13 November 2015; however, based on a careful review of the document and considering the need for a detailed management plan that the Biomass Removal Contractor will be fully committed to implement, it was decided to rearrange the structure and functions of the biomass removal

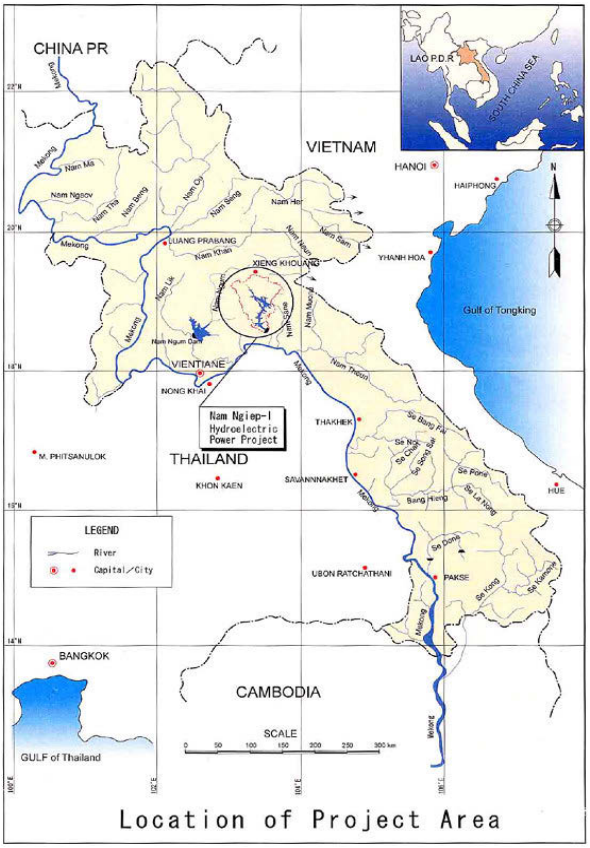
management plans. Thus, the original SS-ESMMP for Biomass Clearance that was prepared by the consulting company will now function as a framework plan, and the actual SS-ESMMP shall be prepared by the Contractor for review and approval by NNP1PC. The Contractor will prepare the SS-ESMMP in conjunction with a detailed Biomass Removal Implementation Plan. The draft SS-ESMMP and the draft Biomass Removal Implementation Plan are expected to be submitted to NNP1PC in January 2016 and shall be finalized by the end of February 2016. A kick-off meeting and field commencement of biomass clearance operations were postponed due the deteriorating security situation in Xaysomboun Province in November and December 2015.

1. INTRODUCTION

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

The project will consist of two dams. The main dam which is located 9.0 km upstream of Hat Gnuin Village in Bolikhan District, will create a 70-km-long, narrow reservoir that extends up the Ngiep Valley as far as Thathom District. At almost 150 m high, the main dam will be the second largest in Lao PDR. The Power Station at this dam will generate up to 272 MW of electricity for export to Thailand. With a combined capacity of 290 MW, Nam Ngiep 1 will generate around 1,620 GWh of electricity annually. Two transmission lines will be required to transport the electricity generated by the project. From the main power station a 230-kV line will run for 125 km to the Nabong substation outside Vientiane Capital. A 115-kV transmission line will be constructed by EDL from the Re-Regulating Power Station to Pakxan substation over a distance of 40 km.

Fig. 1: Project Location



This Quarterly Monitoring Report (QMR) provides a summary of environmental management and monitoring activities from 1 October to 31 December, 2015. The QMR was prepared by the Project's Environmental Management Office (EMO). It has been internally reviewed and cleared by EMO senior technical staff and management prior to submitting the report to the Lenders' Technical Assistance (LTA) and ADB.

The QMRs and other related reports, including the Site Specific Environmental and Social Monitoring and Management Plans (SS-ESMMPs), are publically disclosed on the Project website http://namngiep1.com/ in line with the ADB Public Communications Policy. Hard copies of these reports will also be available upon requests at the Project's main office in Vientiane Capital and field office in Pakxan, Bolikhamxay province.

2. CONSTRUCTION PROGRESS DURING THE REPORTING PERIOD

Construction Works for the Project are being carried out through four separate main construction contracts. These are the Civil Works, the Electrical and Mechanical Works, the Hydraulic Metal Works and the 230 kV Transmission Line Works. The overall cumulative work

progress until the last Quarter of 2015 was 31.6%[1] compared to planned progress of 36.1%. Main construction activities and respective progresses made during the period of October to December 2015 are shown in Fig. 2 and 3 below:

Fig. 2: Overall Construction Progress up to December 2015

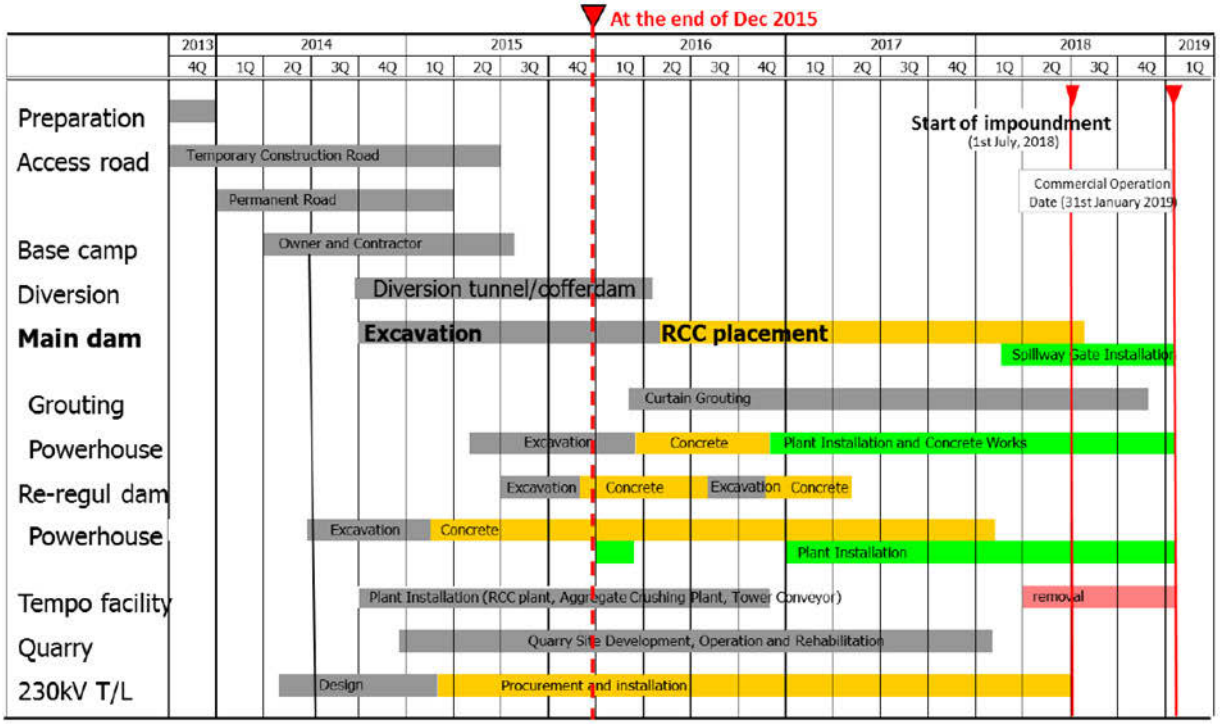
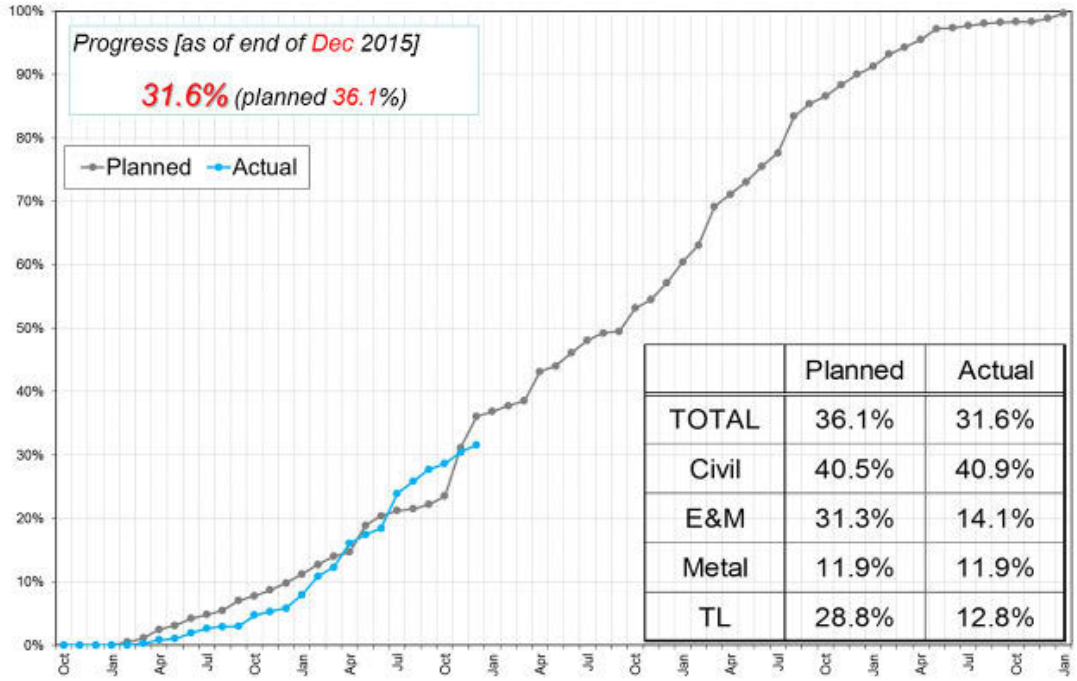


Fig. 3: Progress Curves (All Construction Works)

[1] The progress to-date is calculated as (Cumulative Amount of Achieved Interim Milestone Payments) / (Total Agreed Price of Construction Contracts) and expressed as a percentage.



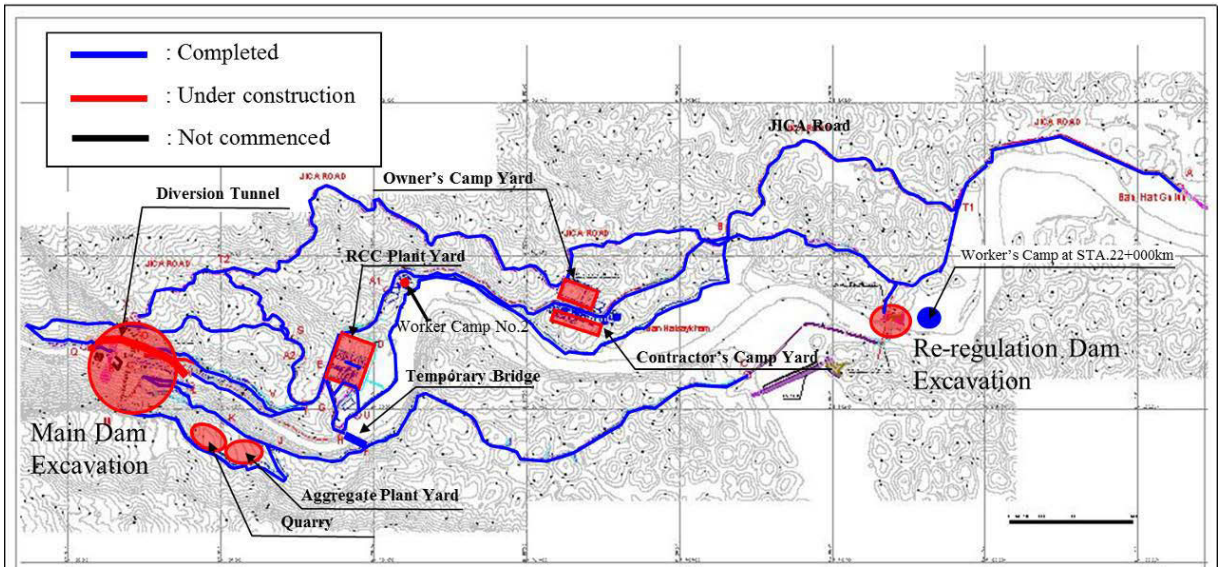
	Planned	Actual
TOTAL	36.1%	31.6%
Civil	40.5%	40.9%
E&M	31.3%	14.1%
Metal	11.9%	11.9%
TL	28.8%	12.8%

Excavation works of the main dam, the diversion tunnel and the re-regulation dam were commenced in October 2014. The cumulative work progress of the Civil Works until the end of December 2015 was 40.9% (compared to planned progress of 40.5%) calculated in the same manner as above for the value of achieved Interim Milestone Payments excluding advance payment. While the diversion tunnel was completed and the Nam Ngiep River diverted on 31 October 2015 about a month ahead of schedule, progress of critical work such as the re-regulation dam structure and the main dam and powerhouse excavation continue to be the same or better than planned. These activities are progressing to schedule despite increased quantities of dam excavation and slope stabilization; and overall, the Civil Works overall can be considered to be on schedule, if not slightly ahead.

2.1 ACCESS ROADS

Access road construction works are completed as shown in Fig. 4 below. Road maintenance is being carried out and the repairs to the damage caused by the 50-year rain-event at the beginning of August 2015 are almost completed.

Fig. 2: Internal Dam Construction Access Roads



2.2 MAIN QUARRY

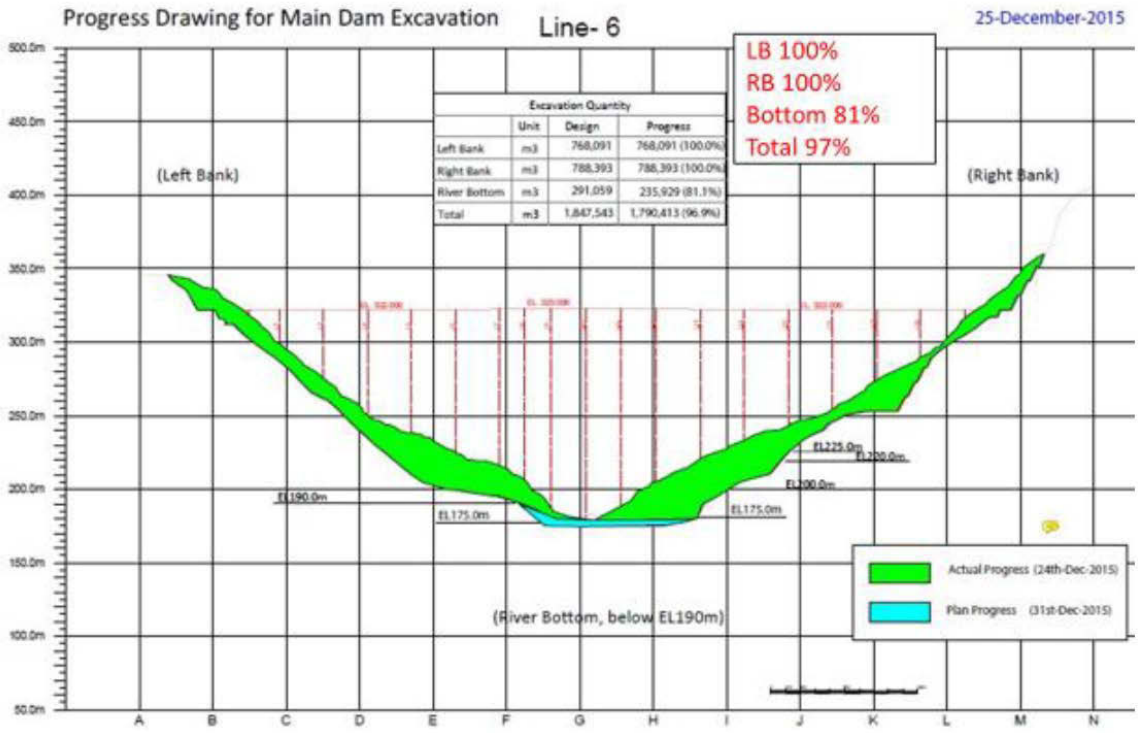
The removal of overburden continues and the excavation of raw materials were started in July 2015. The nature and type of the rock being exploited is variable and good quarry management is considered necessary. The Contractor submitted a Detailed Work Program and SS-ESMMP for the construction and operation of the Main Quarry on 30 October 2014 which was approved by the EMO on 3 December 2014. This document describes the technical requirements for the construction and operations of the quarry as well proposed measures to address 18 environmental aspects including noise, water quality, and topsoil. A draft Quarry Decommissioning Plan will be provided in the First Quarter of 2016.

2.3 MAIN DAM EXCAVATIONS

After starting the main dam excavation works in October 2014 on the left bank, both left and right banks were excavated down to El. 175 m by the end of December 2015. As shown in Fig.5, excavation below this level continues together with the necessary slope protection works, revisiting some areas where damage to the dam foundation was sustained during the wet season.

The dam excavation works have started in the river bed after diversion of the Nam Ngiep was achieved at the end of October 2015 and will be ongoing during the coming months. Excavation should be completed in good time to achieve an early start with RCC placement in March 2016. Excavated volumes are predicted to be greater than expected due weak layers of rock being encountered in the dam foundation and additional budget will be taken from the geotechnical contingency. The limb grouting tunnel invert and lining works at the right bank were completed in October 2015

Fig. 5: Progress Drawing of Main Dam Excavation by December 2015



2.4 DIVERSION TUNNEL INLET AND OUTLET

The diversion tunnel excavation and its slope protection works around the inlet and outlet were commenced in October 2014. Due to the worse than expected geological conditions at the outlet portal, additional open excavation works were carried out, and tunnel excavation works were actually commenced in early January 2015 after constructing the outlet portal. At the end of June 2015 the top-heading of tunnel excavation was completed, and the bench excavation was completed in August 2015. The invert lining concrete works were started in May 2015 and completed in September 2015. The arch lining concrete works were constructed by mobile sliding form having been started at the end of June 2015 and completed in late September 2015. The river diversion took place on 31 October 2015 together with construction of a cofferdam at the inlet and removal of the cofferdam at the outlet. The concrete placement works for the secondary upstream cofferdam were started in November 2015.

2.5 RE-REGULATING DAM

The re-regulating powerhouse excavation and cofferdam works for river diversion were commenced in early October 2014. The excavation works for the powerhouse were fully completed down to El. 146.7 m on the left bank at the end of February 2016.

Structural concrete works were commenced in March 2015, in coordination with installation of the grounding system. The concrete volume placed already for both powerhouse and dam is 20,849 m3 being 35% of the new estimated total of 59,586 m3 for both structures. The powerhouse concreting has advanced well and the formal handing-over of the appropriate working area from Civil Contractor to E&M Contractor for the delivery and installation of the

draft tube liner was carried out at Site on 30 November 2015 in accordance with the appropriate Interface Milestone Date.

The shaping of the excavation of the re-regulating dam at the right bank was started in May 2015, and completed in the period ahead of the wet season. The excavation works at the left bank for the labyrinth dam portion and the left bank structure were started and finished in October 2015.

The dyke construction continued with the stripping of topsoil during October 2015.

Fig. 3: Status of Re-regulating Dam Works as of December 2015

2.6 CAMPS

(a) Owner's Site Office and Village:	The final road pavement (DBST) works were completed in November 2015.
(b) Other Contractors' Camp	This was started in late July 2015 and is expected to be handed over for occupation by the Electrical and Mechanical and Hydro-Mechanical Contractors in November 2015.
(c) Workers' Camps:	Contractor's Workers' Camps for the Electrical and Mechanical Contractor and the Bridge Contractor for the Huay Soup Resettlement Infrastructure were completed in December 2015 and those for the HydroMechanical Contractor are under construction.

2.7 230 kV TRANSMISSION LINE

The TLW Contract was executed between Loxley-Sri Consortium and NNP1PC on 11 July 2014 and the NTP was issued to the 230 kV TL Contractor on 03 October 2014. The cumulative work progress of the Transmission Line Works until the end of December 2015 was 12.8% (compared to planned progress of 28.8%). Significant progress has been made and the manpower resources have quadrupled in order to get back on schedule before the onset of the next wet season. The difference between the planned and the actual progress is mainly delays in land compensation, which have now been overcome.

The 230 kV Transmission Line will be connected to the Nabong Substation. The substation will be upgraded with a 230 kV switch-yard to be installed within the confines of the existing compound; and a 500 kV switch-yard to be constructed on an adjacent lot to transfer both Nam Ngum 2 and NNP1 electricity to Thailand via the existing 500 kV transmission line. These upgrades will be started in 2016.

3. ENVIRONMENTAL MANAGEMENT MONITORING

3.1 CONTRACTOR SS-ESMMPS

During the months of October to December 2015, the EMO received fourteen (14) SS-ESMMPs as listed below.

1. HM Hydropower - Contractor Labor Camp;
2. IHI Infrastructure Systems (IHI) - Field Shop (stockyard) and Camp;
3. IHI Infrastructure Systems (IHI) - for Installation of the draft tube liner;
4. Obayashi Corporation - Main Powerhouse Construction;
5. Obayashi Corporation - Primary Upstream and Downstream Coffer Dams;
6. Obayashi Corporation - Secondary Upstream and Downstream Coffer Dams;
7. Obayashi Corporation - Grouting Works at Secondary Cofferdam;
8. Obayashi Corporation - Earth Dyke Construction;
9. Under bidding - Construction the CWC Landfill;
10. State Enterprise Communication Construction (SECC) - Geological Investigation for the Houay Soup Resettlement Area Bridge Construction;
11. SECC - Worker Camp (Houay Soup Access Bridge);
12. Chalern Savan Company – Houay Soup Access Road;
13. Chalern Savan Company - Land Levelling (Cutting & Filling) for the Construction of a School;
14. Phatthiya Co., Ltd - Paddy Field Development for 38 Households.

A total of 12 out of the 14 SS-ESMMPs received were approved with comments and the remaining two documents were returned to the sub-contractors for further improvements. More details on these approved SS-ESMMPs can be found in Appendix 1.

3.2 COMPLIANCE MONITORING

3.2.1 RESULTS OF NON-COMPLIANCE MONITORING

During the months of October to December 2015, the EMO conducted inspections in 7 main construction sites including: (1) bridge and camp construction at Houy Soup resettlement site; (2) landfill construction at the disposal area No. 6; (3) re-regulating dam; (4) cofferdam; (5) Dam construction plants and the main quarry; (6) worker camps and workshop area; and (7) 230 kV Transmission Line. Three main Contractors currently on site are Obayashi Corporation for civil works; Loxley-SRI Consortium for the clearance of the 230 kV transmission line; and State Enterprise of Communication and Construction (SECC) for the construction of Houy Soup bridge.

A total of 36 new ONCs were issued compared to 62 in the previous Quarter. A total of 48 Observations of Non-Compliances (ONCs), 1 NCR Level 1 on the Sinohydro camp's WWTS and, 1 NCR Level 2 on erosion control below the Access Road T11 were resolved in this Quarter (Figure 7 and Table 1). More details of the non-compliance issues and corrective actions can be found in Appendix 2.

Fig. 4: Non-Compliance Matters Issued Monthly from January to December 2015

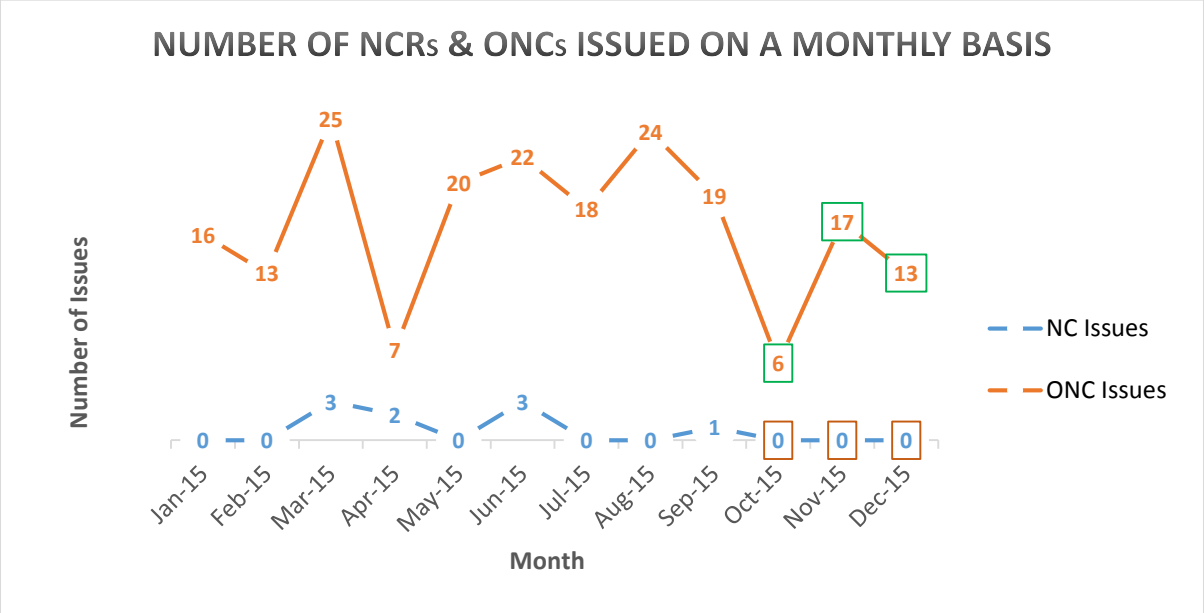


Table 1: Non-Compliance Status from October to December 2015

Reporting period	ONC	NCR Level 1	NCR Level 2
New issues	36	0	0
Carried over from the Third Quarter 2015	22	1	1
Total number of issues in the Fourth Quarter 2015	**58**	**1**	**1**
Resolved during Fourth Quarter 2015	48	1	1
Unresolved, carried over into Jan 2016	10	0	0

Table 2: Summary of New Issues by Type in the Fourth Quarter of 2015

Non-Compliance Category for New Issues	ONC	NCR1	NCR2	NCR3
Hazardous waste management including minor oil spills at the workshops, material storage and handling (disposal and/or storage)	8			
Solid Waste Management	7			
WWTS Function and Management	5			
Spoil Disposal Management	1			
Construction Site Discharge (rainy season incidences)	3			
Surface Water Drainage Management	4			
Erosion and Sediment Control	5			
Other (NTFP collection, site sanitary and hygienic facilities, site decommission)	3			
TOTAL	**36**	**0**	**0**	**0**
Closed / Resolved	**29 +** 19 (from the 3rd Quarter)	**0**	**0**	**0**
Pending issues being carried over into the next Quarter	**7 +** 3 (from the 3rd Quarter)	**0**	**0**	**0**

Photo 1 and 2 : Joint Site Inspection (every two weeks) During the Fourth Quarter of 2015

Photo 3: Sediment and Erosion Control Structure at the Road T10/T11

Photo 4 : Improvement of the WWTS of Sinohydro Camp

The EMO Compliance Monitoring Team comprises 8 staff including 1 Deputy Manager, 1 Compliance Team Leader, 2 Senior Inspection/Compliance Officers and 4 Inspection/Compliance Officers. Their roles and responsibilities are described in Fig. 5 below:

Fig. 5 EMO Compliance Monitoring Team's Roles and Responsibilities

Staff Work Station	Staff Position	Assigned Sites	Key Responsibilities
PAKSAN and Owner's Site Office and Village	Inspection/Compliance Team Leader	Main Dam, regulating dam, Houy Soup resettlement area, 230 kV transmission line, reservoir, affected villages	Lead the compliance monitoring, provide recommendations on the corrective actions, enter site inspection results into the database, finalize the compliance monitoring reports (ONCs/NCRs) for issuing the Contractor, coordinate and plan the EMU missions and, carry out compliance inductions/training to raise awareness
	Senior Inspection/Compliance Officer	Main Dam, regulating dam, transmission line	Carry out site inspections in the designated areas, review the submitted SS-ESMMPs and provide comments for improvements, finalise compliance monitoring reports, provide training, decommissioning, and distribute information.
	Senior Inspection/Compliance Officer	Main dam and associated facilities, Houay Soup resettlement area, reservoir	Carry out site inspections in designated areas, summarise and prepare reports on the ONCs/NCRs, provide technical support, carry out internal audits of construction sites on slope stability and sediment controls prior to the annual wet season, carry out inspection prior to site closure, analyze database, provide emergency response on oil and chemical spills up on requests by the Contractor.
	Inspection/Compliance Officer	Main dam, Houy Soup resettlement Area, affected villages (upstream and downstream of Nam Ngiep)	Response to EMU's concerns on sites inspections, communicating with MoNRE on supporting documents (laws/guidelines/policies), communicate with local communities regarding their concerns on environmental related issues
	Inspection/Compliance Officer	Proposed reservoir, main dam, watershed area, Nam Ngiep downstream.	Environmental/Hydrological modelling and inspection, equipment calibration and mainteenance, support the organisations of external missions' visits (LTA, IAP, ADB, EMU, etc.), sediment monitoring in the reserviour
	Inspection/Compliance Officer	Dam facilities, HouySoup Resettlement village, Transmission Line	Environmental/Safety Inspection, monitoring equipment calibration and maintenance, suppor the map preparation, emergency inspection upon requests.
	Inspection/Compliance Officer	Regulating dam, reservoir, Owner's Site Office Village and watershed area	Database management (data entry/update), compliance monitoring and site inspection

3.3 WASTE MANAGEMENT

3.3.1 LANDFILL MANAGEMENT

The design of the NNP1PC landfill near Spoil Area number 6 was completed in November 2015 and the construction works was put out to tender in December 2015. In parallel with this, the bulk earthworks were undertaken to prepare the site for the construction the pits and leachate ponds. The construction works is expected to start in March 2016. In the meantime, additional temporary pits, now six in total, are being used at the site for temporary storage. Once the landfill is completed, this waste material will be excavated and disposed in the new landfill pits.

The EMO continues to monitor conditions at the landfill site, participate in the review of the consultants' report and encourage completion of the facility in the shortest possible time.

Finding alternative options for other types of waste disposal is ongoing. The EMO received an equipment for the disposal of used fluorescent bulbs in December 2015.

Photo 5: First Two Temporary Waste Pits

Photo 6: The Fourth Waste Pit

3.3.2 HAZARDOUS WASTE MANAGEMENT

3.3.2.1 Hazardous Materials Inventory

From October to December 2015, the NNP1PC, Contractor and sub-contractors conducted a hazardous materials inventory for all main construction sites, engineering workshops and sub-contractors' camps including PKC Camp, Songda Camp, RT Camp, Songda workshop, CVC plant, TCM Camp, Sinohydro Camp, Sinohydro fuel storage area and Sinohydro explosive storage area. Findings from the hazardous material inventory are presented in Appendix 4.

3.3.2.2 Hazardous Materials Management Audit

During October to December 2015, the EMO conducted a Joint Hazardous Material Management Audit together with TD, OC (the main Contractor) and sub-contractors. The following locations were inspected: PKC Camp, Songda Camp, RT Camp, Songda workshop, CVC plant, TCM Camp, Sinohydro Camp, Sinohydro fuel storage area and Sinohydro explosive storage area. The audit involved an inspection of storage and disposal areas, checking adequacy and accuracy of hazardous material documentation, and also evaluation of general

management procedures and training (including emergency response, hazardous materials handling, safety and refueling area).

It was observed that the conditions for the hazardous material management at the RT workshop, Song Da workshop and Songda CVC Plant were not satisfactory in terms of facility conditions and waste management. The Compliance and Monitoring Team issued Observations of Non-Compliances (ONCs) to these Sub-Contractors requiring each workshop to improve their standards. During December the hazardous waste management at the workshop camps were improved and the ONCs were resolved.

Results of the hazardous material audit are presented in Appendix 3.

3.3.3 SELLING OF WASTE MATERIALS

During October to December 2015, several types of waste generated from construction activities were sold to Khunmixay Factory for further processing. The EMO monitored the collection process to ensure that the Khunmixay Factory implemented all waste collection, handling and processing in line with applicable environmental and social requirements. The amount of waste sold by the Contractor is presented in Table 3 below.

Table 3: Hazardous Waste Sold by the Contractor from October to December 2015

No.	Date	Types of Waste	Unit	Site Name				Total
				PKC Camp	RT Camp	RT Workshop	Song Da CVC Plant	
1	03 Oct 15	Scrap metal	kg	-	-	-	13,700	13,700
2	30 Oct 15	Scrap metal	kg	-	-	31,000		31,000
3	07 Nov 15	Scrap metal	kg	-	-	-	22,000	22,000
		Used tyres	Piece	-	47	-	-	47
		Used oil mixed with water	Drum (200 l)	-	20	-	-	20
		Contaminated soil	Bag	-	10	-	-	10
3	21 Dec 15	Scrap metal	kg	-	10,060	-	-	10,060
		Used oil	Drum (200 l)	-	4	-	-	4
		Used tyres	Piece	-	4		-	4
		Used oil mixed with water	Drum (200 l)	-	20	-	-	20
		Hydraulic hoses and oil filters	kg	-	3,000	-	-	3,000

Photo 7: Scrap Metal from Song Da CVC Plant	*Photo 8: Scrap Metal Being Sold at the RT Workshop*
	
Photo 9: Used Tyres from the RT Camp	*Photo 10: Used Oil Mixed With Water at the RT Camp*
	

3.3.4 COMMUNITY WASTE MANAGEMENT

The EMO continued to provide administration and management support to local villagers on running the Community Recycle Bank at Ban Hat Gnuin. By the end of December 2015, a total of 158 people held accounts at the Recycle Bank, an increase of about 2% from the previous Quarter (Photo 11-12). The amount of recyclables being stored at the Community Recycle Bank in the Fourth Quarter of 2015 is summarized in Table 4 below.

Table 4: Recyclables Received at the Community Recycle Bank in the Fourth Quarter of 2015

No	Date	Types of waste				
		Plastic	Aluminum/tin cans	Paper/ cardboard	Metal	Glass
		Quantity (kg)				
1	14/10/2015	40	5	-	-	17
2	21/10/2015	9	-	18	-	18
3	11/11/2015	-	1	9	-	-
4	16/12/2015	11	9	79	73.5	40
5	28/12/2015	43	17.2	24	226	48
6	29/12/2015	28	22.1	36	131	40
Total		**131**	**54.3**	**166**	**430.5**	**163**

Photo 11 and 12: Local Villages Traded Their Recyclables at the Community Recycle Bank

In addition, several types of recyclables were sold including glasses to Kaewlao Imported Company in Vientiane and cardboards to a local merchant. The EMO continued to arrange a recycling contractor to routinely collect these materials. As no merchant purchases glasses in Pakxan, the EMO collects and transports glasses to Kaewlao Imported Company in Vientiane at its own costs. Securing a collection contract with a recycling company remains a high priority for the ESD. The amount of recyclables traded in the Fourth Quarter of 2015 is shown below.

Table 5: Amount of Recyclables Sold in Fourth Quarter of 2015

No.	Date	Types of waste	Company	Unit	Total
1	02/10/2015	Glass/ bottles	Keow Lao Import Company	kg	440
2	19/10/2015	Glass/ bottles		kg	33
		Glass bottles (fish source bottles)		unit	352
3	06/11/2015	Cardboards	Local merchant in Pakxan district	kg	200

Photo 13: Recyclables Were Sold to A Processing Factory

Photo 14: Cardboards Were Sold to a Local Merchant

On 24 November 2015, a consultation with the PoNRE, DoNRE, village chief and the school director was held to discuss and agree on the installation and operation of a Recycling Press

Machine at Ban Hat Gnuin. It was agreed that the machine could be installed for a trial period of six months as long as strict safety and operation procedures were followed.

In addition, the entire building will be fenced and have a sole access driveway. This will allow for the complete partitioning of the Recycle Bank from the school (see below photos).

Photo 15: A Consultation Was Held on the Installation and Operation of a Recycling Pressing Machine

Photo 16: Storage Area for the Pressing Machine

3.3.5 TRAINING

Waste management training for 57 villagers in three villages of Ban Hat Gniun, Ban Hatsaykham, and Ban Thaheua was undertaken from 28 and 29 December 2015. The training was focused on waste separation, the Community Recycle Bank operation and how to clean recyclables prior to selling to the Community Recycle Bank. Purchasing procedures of recyclables from the villagers was also conducted after the training.

Table 6: Summary of Participants attended the Training in the Fourth Quarter of 2015

No	Name of village	Females	Males	Total
1	Ban Hatsaykham	17	6	23
2	Ban Hat Gniun	10	6	16
3	Ban Thahuea	17	1	18
Total				57

3.4 ENVIRONMENTAL MONITORING

The following section presents the results of environmental monitoring between October and December 2015. Environmental monitoring was undertaken for the following aspects:

- Surface Water (river) quality monitoring;
- Groundwater (village's wells);
- Effluent discharge;
- Construction area discharge;
- Gravity Fed Water Supply;
- Air quality (Dust emission); and

- Ambient noise.

The monitoring results are compared against the 2009 National Environmental Standards. For the purposes of simplified reporting, this Section focuses on monitoring results that do not meet the Standards. Appendix 6 of this report contains graphs of all key parameters since the beginning of water quality monitoring in September 2014.

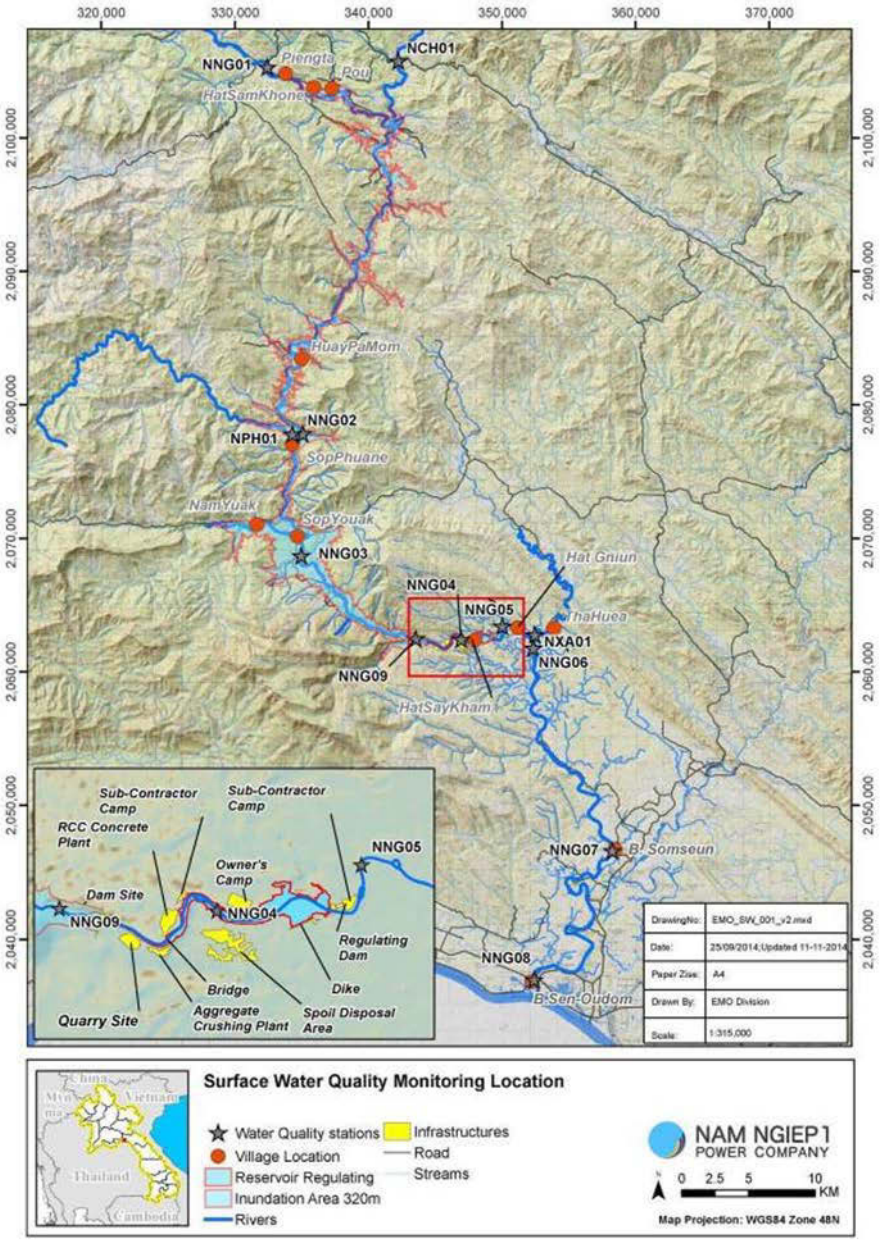
Photo 17: Waste Management Training at Ban Thaheua

Photo 18: Waste Management Training at Ban Hat Gniun

3.4.1 SURFACE WATER (RIVER) QUALITY

Water quality monitoring is conducted at 13 stations in the Nam Ngiep 1 watershed area: i) 6 stations located in the upstream of the Main Dam, which includes 4 stations along the upper Nam Ngiep River (station NNG09 is a control station for the surface water quality monitoring), a station at lower Nam Phouan and a station at lower Nam Chian and; ii) 7 stations located in the downstream of the Main Dam which include 5 stations along lower reaches of Nam Ngiep (stations NNG04 and NNG05 are stations which may indicate impacts from the project activities), a station at lower Nam Xao and a station at lower Nam Houay Soup (See Fig.6 below).

Fig. 6: Surface Water Quality Monitoring Locations



Note: This map excludes the Houay Soup sampling site

Description of each monitoring point and surface water quality monitoring parameters can be found in the Appendix 6. One of the 13 surface water quality stations was cancelled for the missions in November 2015 due to site access restrictions.

During the Fourth Quarter of 2015, the ambient surface water parameters that exceeded the Lao National Environmental Standard (Surface Water Quality Guideline) included Ammonia-Nitrogen, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD_5), Total coliforms and fecal coliforms as described in detail below.

3.4.1.1 Ammonia-Nitrogen (NH_3-N)

The recorded Ammonia-Nitrogen of 0.26 mg/l in December 2015 was slightly higher than the National Surface Water Quality Standard of less than 0.2 mg/l for the site of Nam Ngiep

Upstream of Ban Phiengta (NNG01). The sources of this high Ammonia-Nitrogen value are unknown, however, it highly unlikely to be related to any NNP1 activities. The Ammonia-Nitrogen values in all other stations of Nam Ngiep, Nam Chian, Nam Phouan, Nam Xao and Nam Houay Soup complied with the Standards.

Table 7: Surface Water Ammonia-Nitrogen Results from October to December 2015

	River Name	Nam Ngiep									Nam Chian	Nam Phouan	Nam Xao	Nam Houaysoup
	Station	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Month Year	Guideline													
Oct-15	<0.2 mg/L	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]
Nov-15	<0.2 mg/L	ND[12]	ND[12]	ND[12]	N/A	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]
Dec-15	<0.2 mg/L	0.26	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]

Note: N/A means no data available due to the cancelled mission. ND[12] means less than the detection limit (<0.2 mg/l)

3.4.1.2 Chemical Oxygen Demand (COD)

The Chemical Oxygen Demand (COD) is a measurement of the amount of oxygen required to chemically oxidize the substances in water - most of which will be organic matter. The higher the COD reading, the greater the concentration of organic matter.

In October 2015, the COD values in eight out of nine stations (i.e. NNG02-NNG09) along Nam Ngiep and Nam Houay Soup were recorded between 9.2-33.1 mg/l which were greater than the National Surface Water Quality Standard (less than 5.0 mg/l). In November, the amount of COD reduced in all stations except at Nam Ngiep downstream of Ban SopYuak (NNG03) which was recorded as 6.5 mg/l. In December 2015, all COD values were lower than the Standard for all stations monitored.

Table 8: Surface Water COD Results for October to December 2015

	River Name	Nam Ngiep									Nam Chian	Nam Phouan	Nam Xao	Nam Houaysoup
	Station	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Month Year	Guideline													
Oct-15	<5 mg/L	ND[16]	33.1	18.5	10.6	13.9	11.4	9.2	15.5	15.3	ND[16]	ND[16]	ND[16]	22.5
Nov-15	<5 mg/L	ND[16]	ND[16]	6.5	N/A	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]
Dec-15	<5 mg/L	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]	ND[16]

Note: N/A means no data available due to the cancelled mission. ND[16] means less than the detection limit (<5.0 mg/l)

3.4.1.3 Biochemical Oxygen Demand (BOD_5)

Biochemical Oxygen Demand (BOD_5) measures the amount of dissolved oxygen required by aerobic micro-organisms to decompose the organic matter in the water samples over five days. BOD_5 directly affects the amount of dissolved oxygen available in rivers. The greater the BOD_5, the more rapidly oxygen is depleted in a water body, resulting in less oxygen being available to aquatic biota.

In October 2015, the amount of BOD_5 was slightly higher than the National Surface Water Quality Standard (set at less than 1.5 mg/l) at the station of Nam Ngiep downstream of Ban Sop Yuak (NNG03) with a recorded value of 1.5 mg/l. In December 2015, the BOD_5 results increased at the Nam Ngiep upstream stations (i.e. NNG02 and NNG03), the lowest Nam Ngiep station (NNG08) and Nam Houay Soup station with measured values of 1.7 mg/l, 3.0 mg/l, 2.6 mg/l and 1.6 mg/l respectively. The assessment of these results indicated that the increase of the BOD_5 were unrelated to NNP1.

Table 9: Results of Surface Water BOD from October to December 2015

	River Name	Nam Ngiep									Nam Chian	Nam Phouan	Nam Xao	Nam Houaysoup
	Station	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Month Year	Guideline													
Oct-15	<1.5 mg/L	1.2	1.3	1.5	ND[13]	1.1	ND[13]	ND[13]	ND[13]	ND[13]	1.3	1.2	ND[13]	ND[13]
Nov-15	<1.5 mg/L	1.0	ND[13]	ND[13]	N/A	ND[13]	ND[13]	ND[13]	ND[13]	ND[13]	ND[13]	ND[13]	ND[13]	ND[13]
Dec-15	<1.5 mg/L	ND[13]	1.7	3.0	ND[13]	ND[13]	ND[13]	ND[13]	ND[13]	2.6	1.0	1.3	ND[13]	1.6

Note: N/A means no data available because of the mission was canceled. ND[13] means less than the detection limit (<1.0 mg/l)

3.4.1.4 Faecal and Total Coliforms

During the Fourth Quarter of 2015, the faecal coliforms exceeded the National Surface Water Quality Standard (1,000 MPN/100 ml) with records ranging between 1,300 – 4,900 MPN/100 ml at Nam Phouan, Nam Xao, Nam Houay Soup and most stations located along Nam Ngiep. The faecal coliform peak occurred at Nam Ngiep upstream Ban Hat Gniun (NNG05) in October 2015. This could be a result of the main Contractor camp's effluent discharge (EF02) with high fecal coliform contamination of 160,000 MPN/100 ml. In November, faecal coliform was above the Standard with recorded value of 13,000 MPN/100 ml at Nam Ngiep downstream of the RT Camp (NNG04). It cannot be ruled out that this may in part have been caused by the effluents from the RT Camp. In December, faecal coliform level was 1,100 MPN/100 ml which slightly exceeded the Standard at the stations of Nam Ngiep upstream Ban Hat Gniun (NNG05) and Nam Ngiep at Ban Somsuen (NNG07).

In addition, the total coliforms were found to be higher than the National Surface Water Quality Standard set at 5,000 MPN/100 ml at the stations of Nam Ngiep Upstream Main Dam (NNG09), Nam Ngiep downstream of RT Camp (NNG04), Nam Ngiep upstream Ban Hat Gniun

(NNG05), Nam Ngiep at Ban Somsuen (NNG07), Nam Ngiep at the Bridge of Road 13 (NNG08) and Nam Houay Soup (NHS01) with recorded ranges between 7,900 to 17,000 MPN/100 ml in October 2015. In November, only the station of Nam Ngiep downstream of RT (NNG04) was found to have total coliforms higher than the National Standard with a value of 13,000 MPN/100 ml.

Table 10: Surface Water Faecal and Total Coliforms from October to December 2015

	River Name	Nam Ngiep									Nam Chian	Nam Phouan	Nam Xao	Nam Houaysoup
	Station	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Month Year	Guideline													
Oct-15	<1,000MPN/100ml	920	1,300	1,300	3,300	470	4,900	2,400	1,700	2,400	920	1,700	3,300	1,700
Nov-15	<1,000MPN/100ml	330	170	130	N/A	13,000	46	94	40	49	490	470	70	17
Dec-15	<1,000MPN/100ml	230	240	920	920	79	1,100	330	1,100	240	630	350	540	540
Oct-15	<5,000MPN/100ml	1,300	3,300	3,300	17,000	7,900	7,900	2,400	11,000	13,000	1,300	3,300	4,900	17,000
Nov-15	<5,000MPN/100ml	1,200	1,700	1,300	N/A	13,000	490	700	490	330	1,100	1,700	490	1,700
Dec-15	<5,000MPN/100ml	330	240	920	920	540	1,100	700	1,100	240	1,700	350	920	540

Note: N/A means no data available because the mission was canceled. "<1,000 MPN/100 ml" is a guideline for faecal coliforms and "<5,000 MPN/100 ml" is a guideline for total coliforms

3.4.2 EFFLUENT DISCHARGE QUALITY MONITORING

The EMO regularly monitors the water quality of all effluents being discharged into the environment from work related sites including workers' camps. In the past few Quarters when no discharge was observed, such as the case where the effluent was being held in tanks, no monitoring was conducted. During the ADB-LTA-IAP mission held in December 2015, it was recommended that the effluent samples should have been taken from the last discharging pond during the event that no discharge was observed. Thus, from January 2016, the effluent discharge will be monitored from the last retention pond if there is no discharge.

During the Fourth Quarter of 2015, three camps discharged effluents including the Right Tunneling (RT) Camp, Obayashi Corporation's Camp and, Owner's Site Office and Village. The effluent monitoring at Obayashi Camp has been conducted since October 2015 (see Fig.7).

Fig. 7 Map of Effluent Monitoring Locations

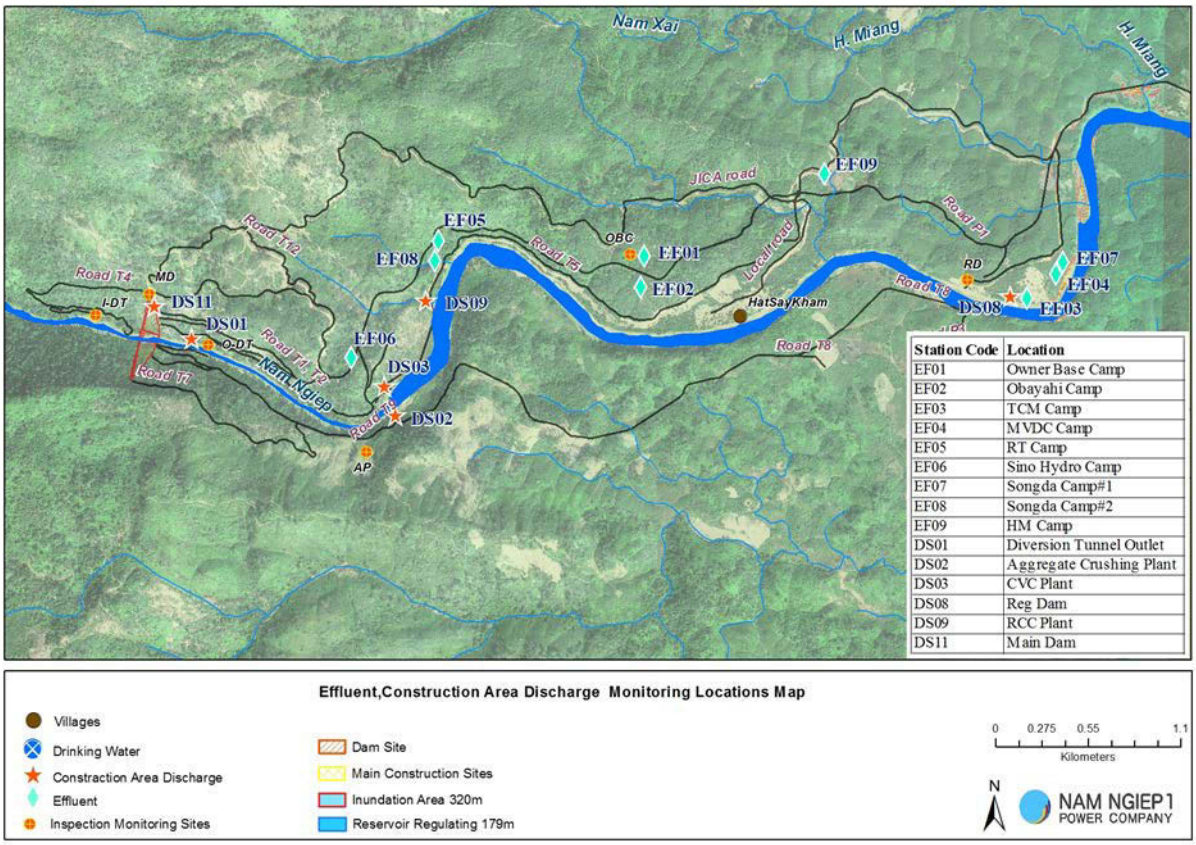


Table 11: Results of Effluent Discharge Monitoring from October to December 2015

Month- Year	Parameter (Unit)	Site Name	Owner's Site Office and Village	Obayashi Camp	RT Camp	TCM Camp	Sino Hydro Camp
		Station	EF01	EF02	EF05	EF03	EF06
		Guidelines in the CA					
Oct - 15	TSS (mg/l)	<50	ND	22	36.5	No discharge was observed during the quarter	
Nov - 15	TSS (mg/l)	<50	ND	N/A	142		
Dec - 15	TSS (mg/l)	<50	ND	N/A	ND		
Oct - 15	BOD (mg/l)	<30	ND	40.9	38.5		
Nov - 15	BOD (mg/l)	<30	4.2	N/A	73		
Dec - 15	BOD (mg/l)	<30	6.2	N/A	6.9		
Oct - 15	Oil & Grease (mg/l)	<10	ND	1	2.0		
Nov - 15	Oil & Grease (mg/l)	<10	ND	N/A	13.0		
Dec - 15	Oil & Grease (mg/l)	<10	ND	N/A	ND		
Oct - 15	NH3-N (mg/l)	<10	ND	18	5.0		
Nov - 15	NH3-N (mg/l)	<10	3.0	N/A	6.0		
Dec - 15	NH3-N (mg/l)	<10	6.0	N/A	4.0		
Oct - 15	Total coliforms (MPN/100 ml)	<400	17	160,000	160,000		

Month- Year	Parameter (Unit)	Site Name	Owner's Site Office and Village	Obayashi Camp	RT Camp	TCM Camp	Sino Hydro Camp
		Station	EF01	EF02	EF05	EF03	EF06
		Guidelines in the CA					
Nov - 15	Total coliforms (MPN/100 ml)	<400	79		160,000		
Dec - 15	Total coliforms (MPN/100 ml)	<400	2,200		540		
Oct - 15	Faecal coliforms (MPN/100 ml)	-	17	160,000	160,000		
Nov - 15	Faecal coliforms (MPN/100 ml)	-	79		160,000		
Dec - 15	Faecal coliforms (MPN/100 ml)	-	2,200		540		

Note: ND means less than the detection limit and N/A means no data available due to no discharge

RT Camp (EF05): At this station, it was found that BOD_5, TSS, Oil and Grease, Faecal and Total Coliforms exceeded the Effluent Standards prescribed in the NNP1 Concession Agreement (CA) for the Fourth Quarter. The estimated volume being discharged was approximately 50 m^3 per day. The Waste Water Treatment System (WWTS) continued to be a problem until November before the WWTS upgrade was carried out by the sub-contractor in mid-November 2015. This resulted in a significant reduction of the total and faecal coliforms to 540 MPN/100 ml in December 2015, although it was still higher than the required Standard.

Obayashi Corporation's Camp (EF02): It was found that the BOD_5, Ammonia nitrogen, faecal coliforms and Total Coliforms were above the prescribed Standard in the CA for October 2015. Total discharge volume was approximately 50 m^3/day. No discharge was observed from Obayashi Corporation Camp during November and December 2015.

Photo 18: Obayashi Camp Discharge Location – next to Road T5

Owner's Site Office and Village (EF01): At this station, the total and faecal coliforms were recorded as 2,200 MPN/100 ml in December 2015, which was above the prescribed Standard

for total coliforms set at 400 MPN/100 ml. The estimated volume being discharged was approximately 70 m^3 per day.

	
Photo 19: Owner's Site Office and Village Grey Water Treatment System	*Photo 20: Location of the Owner's Site Office and Village Effluent Discharge*

For more information on the corrective actions, refer to a section on **Error! Reference source not found.** in Appendix 2.

The Waste Water Treatment Systems (WWTS) at the construction camps has been reviewed by the Independent Consultant and an upgrade is in progress at V&K, RT and Song Da Camps.

3.4.3 GROUNDWATER QUALITY MONITORING

Three wells were installed by the NNP1PC at Ban Hatsaykham for domestic consumption purposes. Water samples were collected about 1 m below the well's water surface. These samples were tested against twenty two (22) parameters which include the following:

1. pH
2. Sat. DO (%)
3. DO (mg/l)
4. Conductivity (µs/cm)
5. TDS (mg/l)
6. Temperature
7. Turbidity (NTU)
8. Arsenic (mg/l)
9. Cadmium (mg/l)
10. Calcium (mg/l)
11. Iron (mg/l)
12. Magnesium (mg/l)
13. Manganese (mg/l)
14. Potassium (mg/l)
15. Sodium (mg/l)
16. Fluoride (mg/l)
17. Nitrate (mg/l)
18. Nitrite (mg/l)
19. Total Hardness (mg/l)
20. Total Coliforms (MPN/100ml)
21. Feacal Coliform (MPN/100ml)
22. E. coli (MPN/100ml)

Fig. 8 Map of Groundwater Sampling Site at Ban Hatsaykham

Table 12: Results of the Groundwater Quality Monitoring from October to December 2015

Month-Year	Parameter	Site Name	Ban Hatsaykham		
		Station	GHSK01	GHSK02	GHSK03
		Guideline			
Oct-15	pH	6.5 -9.2	6.13	6.52	6.17
Nov-15	pH	6.5 -9.2	5.71	5.72	5.88
Dec-15	pH	6.5 -9.2	5.98	5.97	5.94
Oct-15	Faecal Coliform (MPN/100 ml)	0	0	0	0
Nov-15	Faecal Coliform (MPN/100 ml)	0	0	0	0
Dec-15	Faecal Coliform (MPN/100 ml)	0	0	0	0
Oct-15	E.Coli (MPN/100 ml)	0	0	0	0
Nov-15	E.Coli (MPN/100 ml)	0	0	0	0
Dec-15	E.Coli (MPN/100 ml)	0	0	0	0

Note: Sampling could not be conducted in one well (GHSK02) in August at Ban Hatsaykham due to a faulty pump and sampling at Ban Hat Gniun's well (GHGN01) was stopped from August 2015-

Most water quality parameters in three boreholes of Ban Hatsaykham were below the National Environmental Standards, except pH, which decreased from the last Quarter of about 6.1 to slightly less than 6 (Table 12 above). The pH values observed are not considered

to have any significant health impacts on consumers, but it can cause odor and affect the taste of water.

Neither Faecal coliforms nor E.Coli bacteria were detected in any of the wells. The result of other 19 other parameters can be obtained from NNP1PC's Environmental Management Office.

3.4.4 CONSTRUCTION AREA DISCHARGE WATER MONITORING

Over the reporting period, four construction sites were discharging effluents into the natural environment- Main Dam, RCC Plant site, Regulation Dam and Diversion Tunnel Outlet. These sites produce potentially large volumes of water both groundwater and/or trapped surface water. Discharging the stored water, after processing, is necessary for the purposes of maintaining a dry construction area. The Re-regulating Dam and Diversion Tunnel Outlet operate for 2x10 hour shifts per day and for six days a week, but the requirement to treat these sites' waste water is 24 hours a day, seven days a week. An effluent treatment system that controls the level of pH and removes some TSS is now operating at both sites. The water is pumped into a tank where the pH is adjusted and flocculants are added and mixed with the water. The water is then diverted to sedimentation ponds where the flocculants bind the small suspended particles together and force them to precipitate. Sediment 'cake' is removed and disposed of at the Spoil Area #6. Once the water is filtered and treated to meet the required Standard, it is discharged directly into the Nam Ngiep. Due to the landslide occurred at the end of July 2015, the filtration plant at the Diversion tunnel was broken and out of use since then. However, Sulfuric Acid (H_2SO_4) was manually added to the sediment ponds as a temporary method for pH adjustment until the diversion tunnel outlets were completed in October 2015. A water saple has been taken from the discharge point for analysis and the result shows that the water quality is within the guideline values.

There is only a sediment pond used to settle the sediment from the RCC plant site. Another turbid water treatment system was installed at the Main Dam and testing was initiated in December 2015. Effluent water sample at the Main Dam was collected only from December 2015.

A total of nine (9) parameters were tested at these sites: pH, Saturated DO (%), DO (mg/l), Conductivity (µs/cm), TDS (mg/l), Temperature, Turbidity (NTU), TSS (mg/l), Oil & Grease (mg/l).

Key results of the construction area discharge monitoring are described below. Parameters that are above the prescribed Standards are highlighted in yellow:

- **Diversion Tunnel Outlet (DS01):** The Total Suspended Solids (TSS) results were higher than the National Effluent Discharge Standard in early October. This shows that the manual application of Sulfuric Acid (H_2SO_4) to the sediment ponds to treat the TSS was inadequate. However, the treatment only continued until the diversion tunnel construction was completed and became operational on the 30 October 2015. Approximate effluent discharge in early October was 10,000 m^3/day.
- **Main Dam (DS11):** In December 2015, the TSS result slightly exceeded the National Effluent Discharge Standard with a recorded value of 60.9 mg/l. The monthly site

inspection in early December confirmed that the capacity of the existing sediment pond and WWTS was inadequate for treating the TSS. Building 2-3 additional sediment ponds downstream of the discharge point shall be considered. The contractor followed the instruction and the TSS level was reduced below the Standard in late December. Estimated pumping volume was 300 m^3/day.

- **Regulation Dam (DS08):** In October 2015, the TSS value was higher than the National Effluent Discharge Standard. This was caused by a filtration system failure during the period. Approximate discharge volume was 1,000 m3/day.
- **RCC Plant Site (DS09):** The pH were 9.4 and 11.39 and the TSS were found to be higher than the National Standard in October and December 2015. Approximate discharge volume was 1,000 m^3/day.

Table 13: Results of the Construction Area Discharge Monitoring from October to December 2015

Month- Year	Parameter (Unit)	Site Name	Diversion Tunnel Outlet	Main Dam	CVC Plant	Reg. Dam	RCC Plant
		Station	DS01	DS11	DS03	DS08	DS09
		Lao National Standard					
Oct - 15	pH	6.0-9.0	7.68	NC	N/A	7.90	7.66
Oct - 15	pH	6.0-9.0	7.61	NC	N/A	8.55	11.39
Nov - 15	pH	6.0-9.0	N/A	NC	N/A	7.19	7.15
Nov - 15	pH	6.0-9.0	6.70	NC	N/A	8.14	9.41
Dec - 15	pH	6.0-9.0	NA*	6.71	N/A	7.11	8.32
Dec - 15	pH	6.0-9.0	NA*	N/A	N/A	6.6	7.09
Oct - 15	TSS (mg/l)	<50	359	NC	N/A	11.3	157
Oct - 15	TSS (mg/l)	<50	6,062	NC	N/A	7,600	68.8
Nov - 15	TSS (mg/l)	<50	N/A	NC	N/A	46.7	14.0
Nov - 15	TSS (mg/l)	<50	NA*	60.9	N/A	8.9	16.5
Dec - 15	TSS (mg/l)	<50	NA*	6.71	N/A	34.6	134
Dec - 15	TSS (mg/l)	<50	NA*	N/A	N/A	11.3	252

Note: N/A means no data available due to no discharge. NA means no data available as the construction activities were completed and NC means a sampling was not commenced*

Month/Year	Parameter (Unit)	Site Name	Diversion Tunnel Outlet	CVC Plant Site	Regulating Dam	RCC Plant Site
		Station	DS01	DS03	DS08	DS09
		Guideline				
Jul-15	pH	6.0 -9.0	8.56	No Discharge	7.95	No Discharge
Aug-15	pH	6.0 -9.0	10.04	7.57	9.84	8.99
Aug-15	pH	6.0 -9.0	No Discharge	No Discharge	8.29	7.9
Sept-15	pH	6.0 -9.0	8.45	9.3	7.79	7.47
Sept-15	pH	6.0 -9.0	No Discharge	No Discharge	7.15	6.92
Jul-15	TSS (mg/l)	<50	ND	No Discharge	12.2	No Discharge
Aug-15	TSS (mg/l)	<50	2,719	41.1	15.1	408
Sept-15	TSS (mg/l)	<50	1,488	900	45.1	1,002
Sept-15	TSS (mg/l)	<50	No Discharge	No Discharge	48.2	930
Jul-15	Oil &Grease (mg/l)	<10	ND	No Discharge	ND	No Discharge
Aug-15	Oil &Grease (mg/l)	<10	28	ND	ND	ND
Sept-15	Oil &Grease (mg/l)	<10	4	ND	ND	ND
Sept-15	Oil &Grease (mg/l)	<10	No Discharge	ND	ND	ND

Note: ND means "Not Detected"

3.4.5 GRAVITY FED WATER SUPPLY (GFWS) MONITORING

The GFWS monitoring was carried out by the EMO in December 2015 to monitor and assess the water quality that is used for bathing and washing by the Project affected villages of Hat Gniun and Thahuea. Water samples were taken from the tap for analysis. Results are shown in Table 10 and described below.

Table 14: Water Quality Results of the GFWS Monitoring in December 2015

	Site Name	Ban Thaheua	Ban HatGnuin
	Station	WTHH02	WHGN02
	Date	17/12/15	17/12/15
Parameter (Unit)	Guideline		
pH	6.5-8.5	7.03	6.95
Sat. DO (%)	-	102.3	106.9
DO (mg/L)	-	8.64	8.79
Conductivity (µs/cm)	<1,000	154.9	87.6
TDS (mg/L)	<600	77.9	43.8
Temperature (°C)	<35	23.2	24.7
Turbidity (NTU)	<10	2.64	1.43
Color (Pt-Co)	<5	ND[16]	ND[16]
Arsenic (mg/L)	<0.05	0.0004	0.0006
Cadmium (mg/L)	<0.003	ND[5]	ND[5]
Total iron (mg/L)	<1	0.014	0.014
Lead (mg/L)	<0.01	ND[10]	ND[10]
Magnesium (mg/L)	-	1.46	2.12
Manganese (mg/L)	<0.5	ND[4]	ND[4]
Mercury (mg/L)	<0.001	0.0004	ND[3]
Selenium	<0.01	ND[1]	ND[1]
Fluoride (mg/L)	<1.5	0.10	0.13
Nitrate –N (mg/L)	<50	0.08	0.06
Nitrite -N (mg/L)	<3	ND[9]	ND[9]
Total Hardness (mg/L)	<300	27.2	40.2
Fecal coliform (MPN/100ml)	0	70	79
Ecoli Bacteria (MPN/100mL)	0	70	79

- **Ban Thahuea (WTHH02):** All parameters complied with National Drinking Water Standard, except fecal coliform and E.Coli bacteria parameters which are 70 MPN/100ml, above the National Standards (0 MPN/100 ml).
- **Ban Hat Gniun (WHGN02):** All parameters complied with National Drinking Water Standard, except fecal coliform and E. Coli bacteria parameters which are 79 MPN/100ml, above the National Standards (0 MPN/100 ml).

The level of bacteria contamination would not cause significant concern for bathing and washing purposes only. However, for drinking purpose, the villagers have been advised through the SMO to boil the water before drinking. NNP1PC will set-up procedures to ensure that the results of the water quality analyses are communicated duly and timely to the relevant local authorities and the water users. NNP1PC's Livelihood and Health teams will be responsible for communicating the results and together with the environment management team, they will with the authorities what could be done to mitigate water quality problems; for example, protect the water sources from access of livestock, and warn people against drinking un-boiled water.

3.4.6 Air Quality (Dust) Monitoring

3.4.6.1 Target Villages

The dust emission monitoring was carried out for 72 consecutive hours in targeted villages by starting the monitoring on the weekend to obtain a record of at least 20 hours of ambient conditions. During the Fourth Quarter of 2015, dust emission monitoring was conducted in Ban Hatsaykham, Ban Hat Gniun and Ban Thaheua (in October and December only as a result of the equipment failure).

All village recordings were within the Lao National Environmental Standard for Air Quality of 0.12 mg/m^3. The dust emission monitoring result average in 24 hours during the Quarter are shown in Fig. 9 and summarized in Table 15 below:

Fig. 9 Village Noise and Dust Emission Monitoring Locations

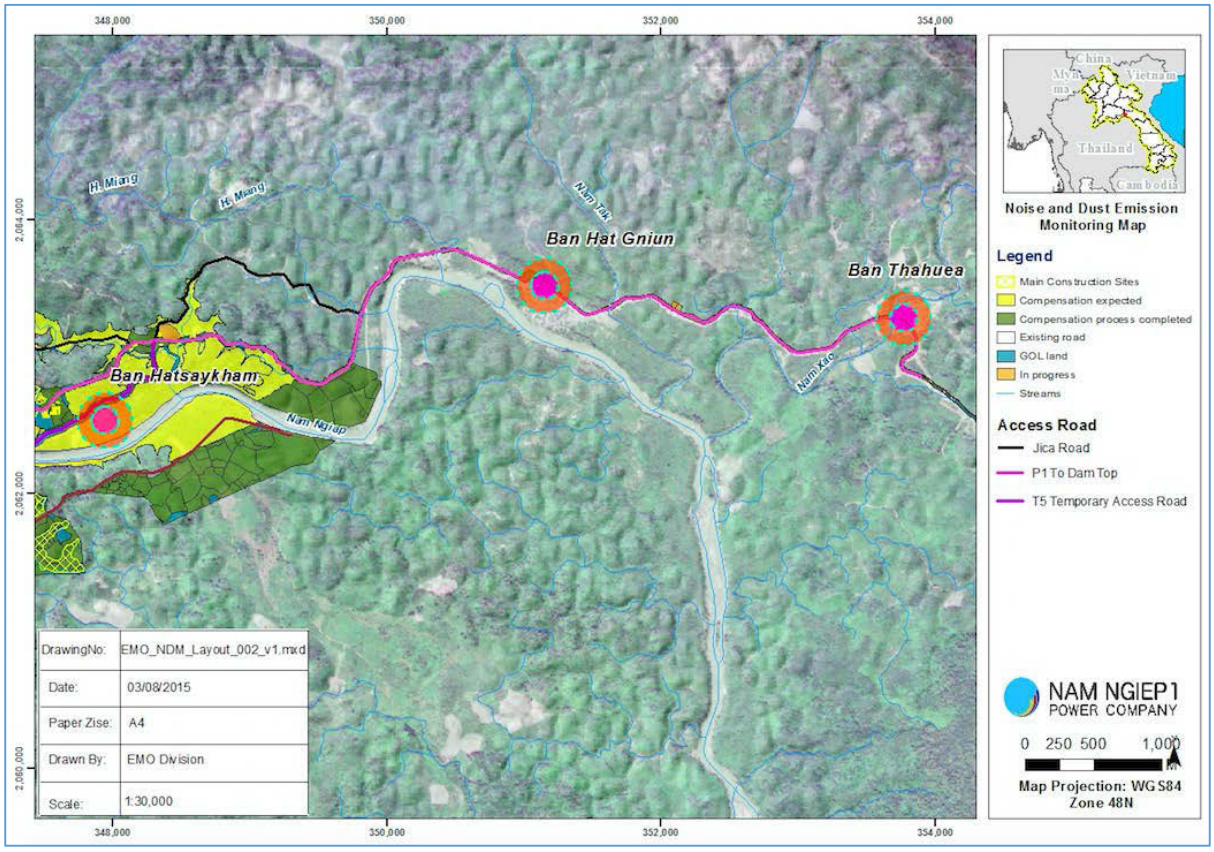


Table 15: Air Quality (Dust) Monitoring Results from October to December 2015

Ban Hatsaykham - Dust Emission Average in 24 h – October 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	18/10/2015 12:31	19/10/2015 12:31	20/10/2015 12:31
End Time	19/10/2015 12:31	20/10/2015 12:31	21/10/2015 12:31
Average Data Record in 24h	0.0308	0.0387	0.0213
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Hatsaykham - Dust Emission Average in 24 h – November 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	01/11/2015 10:15	02/11/2015 10:15	03/11/2015 10:15
End Time	02/11/2015 10:15	03/11/2015 10:15	04/11/2015 10:15
Average Data Record in 24h	0.0350	0.0322	0.0363
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Hatsaykham - Dust Emission Average in 24 h – December 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	20/12/2015 09:58	21/12/2015 09:58	22/12/2015 09:58
End Time	21/12/2015 09:58	22/12/2015 09:58	23/12/2015 09:30
Average Data Record in 24h	0.0526	0.0485	0.0361
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Hat Gniun - Dust Emission Average in 24 h – October 2015			

Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	11/10/2015 09:42	12/10/2015 09:42	13/10/2015 09:42
End Time	12/10/2015 09:42	13/10/2015 09:42	14/10/2015 09:42
Average Data Record in 24h	0.0540	0.0470	0.0240
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Hat Gniun - Dust Emission Average in 24 h – November 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	08/11/2015 09:19	09/11/2015 09:19	10/11/2015 09:19
End Time	09/11/2015 09:19	10/11/2015 09:19	11/11/2015 09:19
Average Data Record in 24h	0.0410	0.0366	0.0312
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Hat Gniun - Dust Emission Average in 24 h – December 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	12/12/2015 10:30	13/12/2015 10:30	14/12/2015 10:30
End Time	13/12/2015 10:30	14/12/2015 10:30	15/12/2015 10:30
Average Data Record in 24h	0.0770	0.0684	0.0763
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Thaheua - Dust Emission Average in 24 h – October 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	04/10/2015 09:56	05/10/2015 09:56	06/10/2015 09:56
End Time	05/10/2015 09:56	06/10/2015 09:56	07/10/2015 09:56
Average Data Record in 24h	0.0503	0.0374	0.0149
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Thaheua - Dust Emission Average in 24 h – December 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	03/12/201514:37:22	04/12/201514:37:22	05/12/201514:37:22
End Time	04/12/201514:37:22	05/12/201514:37:22	06/12/201508:59:52
Data Record Average in 24h	0.0544	0.0319	0.0506
Guideline Average in 24h	***0.12***	***0.12***	***0.12***

3.4.6.2 Project Construction Sites

Dust emission monitoring was implemented at prioritized project construction sites for 24 hours consecutively on a monthly basis. During the Fourth Quarter, the Aggregate Crushing Plant, RCC Plant, Songda Camp#2 and Sino Hydro Camp were monitored. The results of dust emission monitoring in these construction sites are summarized and shown in Table 16 below:

Table 16: Air Quality Monitoring Results from October to December 2015 – Project Construction Sites

Dust Emission Average in 24 h – December 2015			
Site Name	Songda Camp # 2	Sino Hydro Camp	RCC Plant
Start Time	25/12/2015 16:53	29/12/2015 16:36	24/12/2015 16:44
End Time	26/12/2015 16:03	30/12/2015 14:00	25/12/2015 15:48
Average Data Record in 24 h	0.0184	0.0303	0.0529
Guideline Average in 24 h	***0.12***	***0.12***	***0.12***

Dust Emission Average in 24 h – November and December, 2015		
Site Name	Aggregate Crushing Plant	
Start Time	23/11/2015 14:48	28/12/2015 17:08
End Time	24/11/2015 16:23	29/12/2015 16:11
Average Data Record in 24 h	0.1554	0.0474
Guideline Average in 24 h	***0.12***	***0.12***

- **Songda Camp #2, Sino Hydro Camp and RCC Plant**: All dust emission results in December 2015 complied with the National Environment Standard (Dust Emission for Particulate Matter with a size of less 10 microns).
- **Aggregate Crushing Plant:** Dust emission results in November 2015 was slightly above the National Environment Standard (Dust Emission for Particulate Matter with a size of less 10 microns). However, it later decreased in December and complied with the National Environment Standard after the installation of additional sprinkler systems.

3.4.7 NOISE MONITORING

3.4.7.1 Target Villages

The noise monitoring was carried out from 10.30 am for 72 consecutive hours (both day and night time) in selected villages by starting the monitoring on a non-working day (Sunday), to obtain a record of at least 20 hours of ambient conditions. In the Fourth Quarter, it was conducted in Ban Hatsaykham, Ban Hat Gniun and Ban Thaheua (see Fig.9 above). The recorded values were measured against the Lao National Environment Standards 2009 with respect to daytime (06:00 to 22:00) and nighttime (22:00 – 06:00) average noise limits as well as with respect to maximum noise levels.

The results revealed that all village recordings were within the allowable maximum value of 115 dB(A) but the recorded average daytime noise level in Ban Thaheua was slightly higher than the allowable value of 55 dB(A) as summarized in Table 17 below. The sources of the elevated noise levels could be the music from the local people' houses that are located nearby the station during the daytime as well as the vehicle movement.

Table 17: Noise Monitoring Results from October to December 2015 for Project Targeted Villages

Parameter (Unit) - Month	Ban Hatsaykham		Ban Hat Gniun		Ban Thahuea	
	6:00 - 22:00	22:01 - 5:59	6:00 - 22:00	22:01 - 5:59	6:00 - 22:00	22:01 - 5:59
Standard Maximum	***115***	***115***	***115***	***115***	***115***	***115***
Recorded Maximum [dB(A)] in Oct 15	76.9	70.4	92.3	71.2	89.2	78.9
Recorded Maximum [dB(A)] in Nov 15	77.4	61.1	83.2	65.9	N/A	N/A
Recorded Maximum [dB(A)] in Dec 15	67.5	65.7	78.7	81.6	79.2	78.8
Standard Average for Residential Area	***55***	***45***	***55***	***45***	***55***	***45***
Recorded Average [dB (A)] – Oct 15	45.78	48.19	57.96	54.02	53.19	57.62
Recorded Average [dB (A)] – Nov 15	44.40	41.61	48.29	46.18	N/A	N/A
Recorded Average [dB (A)] –Dec 15	45.45	45.21	48.83	44.50	56.22	47.53

Detailed noise records over 72 hours in the targeted villages, selected construction sites and camps can be found in Appendix 7.

3.4.7.2 Project Construction Sites

During the Fourth Quarter, EMO monitored the noise levels at Songda Camp #2, Sino Hydro Camp, the RCC Plant Site (from December 2015) and the Aggregate Crushing Plant Site (from November 2015). The site selection was based on the nature of project activities that can potentially cause excessive noise level to the nearby villages or staff who live in the camps.

The assessment found that all maximum noise level results are within the National Standard. However, the nighttime average (22:00-06:00) noise level at Songda Camp#2 slightly exceeded the National standard (<50 dB(A)), and at the Aggregate Crushing Plant the daytime (06:00-22:00) average noise level slightly exceeded the National Standard (70 dB(A)). The exceedance at Songda Camp#2 was likely caused by project vehicle movement during night shift work, and at Aggregate Crushing Plant from crushing activity.

The ESMMP-CP requires that all workers wear appropriate ear protection equipment when exposed to noise levels greater than 80 dB(A). Thus, wearing appropriate ear protection equipment is required at the RCC plant, Songda Camp#2 and aggregate crushing plant during 6:00-20:00.

Table 18: Noise Monitoring Results for Project Construction Sites from October to December 2015

Parameter (Unit) -	RCC		Songda Camp# 2		Sino Camp		Aggregate Crushing Plant	
	6:00 - 22:00	22:01 - 5:59	6:00 - 22:00	22:01 - 5:59	6:00 - 22:00	22:01 - 5:59	6:00 - 22:00	22:01 - 5:59
Standard Maximum	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***
Recorded Maximum [dB(A)] in Dec 15	84.7	74.5	80.8	62.4	73.9	66.1	90	57.3
Standard Average for Residential Area	***70***	***50***	***70***	***50***	***70***	***50***	***70***	***50***
Recorded Average [dB (A)] – Dec 15	63.71	49.82	52.02	51.80	55.33	49.69	72.10	45.25

3.4.8 VIBRATION

Lao PDR does not have a recommended guideline for vibration. Structural damage from road construction activity (e.g. vibratory rollers) and ancillary activity (e.g. blasting at the quarries) is unlikely given the distance from public infrastructure to the construction areas.

3.5 WATERSHED AND BIODIVERSITY MANAGEMENT

3.5.1 WATERSHED MANAGEMENT

Obligation	Activity	Results (Outputs and Outcomes)	Next Step
NNP1 Watershed Management Plan to be completed by 31 July 2016	1. October–November 2015, continued with the WMP development by holding a second Key Informant Interview (KII) targeting 5 Districts in NNP1 watershed area. 2. October – November 2015, continued with the development of a sub-plan, an Integrated Fishery Management Plan (IFMP). 3. October 2015, commenced the first ISP technical training for Xaysomboun Province managed by MoNRE DEQP and Xaysomboun ISP technical committee. 4. Late November-early December, organized an in house workshop between NNP1PC EMO,	1. Detailed short and long term plans within the scope of forestry, biodiversity, agriculture, fishery, and water related sectors. 2. Draft IFMP was submitted at the end of October 2015. Internally reviewed by NNP1 EMO was completed in November 2015. 3. Representatives from 5 Districts within the Xaysomboun Province was briefed on the conceptual framework of ISP and a step by step process for ISP development. Community mapping exercise was commenced as an initial ISP development. The	1. Execute the Watershed Management Fund (WMF) disbursement to avoid further delay in starting priority activities proposed in the watershed management action plan. 2. The concerned GOL organizations notably the Secretariat of the WMC functions as the Planning Team will lead the plan development with technical assistance provided by the EMO Watershed Team. External specialist will be recruited for reviewing and providing comments of the plan. 3. Revise related milestones discussed

	Watershed Consultant team on the progress of a working draft. The document was presented and discussed with ADB and IAP mission team in December. 5. October, prioritised activities as part of the WMAP were prepared and submitted by NNP1 Watershed Committee (WMP). The first Watershed Management Fund (WMF) was officially been requested to implement these priority activities.	detailed planning exercise at the district level will be further commenced to complete the ISP focusing on the districts within NNP1 watershed area (Thathom, Anouvong and Hom). 4. NNP1PC has notified ADB on the intention to disburse the fund in November 2015 but the process was delayed until the end of December 2015.	and agreed during the ADB-IAP mission in December 2015.

3.5.2 BIODIVERSITY MANAGEMENT

Obligation	Activity	Results (Outputs and Outcomes)	Next Step
NNP1 Biodiversity Management Sub-Plan (BMSP) as part of a NNP1 Watershed Management Plan (WMP)	1. In November, a final revision of a Baseline Biodiversity Survey Report was undertaken. 2. During November to December, developed a BMSP.	1. The Baseline Biodiversity Survey Report was further improved on the GIS-Qualitative assessment section as per comments provided by BAC. 2. The contract was settled with the consultant at the end of October 2015 by continue hiring a Biodiversity Consultant to start the BSMP development. The first inception report detailing the conceptual framework and approaches were discussed with ADB and IAP mission team in December 2015. It was then recommended to integrate this plan into NNP1 Watershed Management Plan (WMP)	1. Focus on the survey in Nam Mouane Watershed of Bolikhamxay Province. If it is not suitable as an offset site then a discussion with the Project Steering Committee, Xaysomboun Province, Bolikhamxay Provinces, and MoNRE DFRM will be held prior to deciding the candidate site outside NNP1 project provinces. 2. The rapid survey should be commenced as soon as possible in which NNP1 plan to start the field work in February 2016.

		instead of a stand-alone document.	
Offset Site Selection	3. Late October-November, commenced a ground truth survey in the proposed offset sites: Phou Sod and Phou Hae in Xaysomboun Province and Eastern Bolikhamxay (Named Zone 3) up to Phou Sithon area. 4. December, discussed the way forward for concluding the offset site selection with monitoring mission of ADB-IAP-LTA-BAC as well as GOL of Bolikhamxay and Xaysomboun Province.	3. The results indicate that none of these sites were suitable as an offset site based on the prediction of habitat extent, type, condition, accessibility and connectivity as well as local community attitude accessed through the village interview and field observation within the sites. 4. NNP1PC requested Bolikhamxay Province to reconsider the first proposal of the Nam Mouane Watershed Area with the area of around 77,000 ha bordering with Phou Mat National Park of Vietnam. ADB and IAP mission representative recommended to consider a parallel survey in the potential offset site outside NNP1 project provinces.	3. It was also agreed during the mission that related milestones to biodiversity program will be extended.

3.6 BIOMASS CLEARANCE

Obligation	Activity	Result	Next Step
Complete a biomass clearance in the reservoir in accordance with the Biomass Guidelines in Lao PDR	October to December, preparation phase of a Biomass Clearance Operation: 1. Concluded the procurement of a UXO Clearance Contractor.	1. The contract for UXO Clearance work was awarded to the same Company contracted for biomass clearance. A Contract was signed in November 2015. The UXO Clearance Implementation Plan	1. Finalize the plan development in early January 2016. 2. Conduct a coordination Meeting with NNP1 WMC as part of the preparation for

before reservoir inundation	2. Prepared an ESMMP for Biomass Clearance. 3. On-going development of Biomass Removal Implementation Plan, UXO Clearance Implementation Plan, and SS-ESMMP development 4. A kick-off meeting on field commencement of biomass clearance operations with WMC and relevant government line agencies	was later submitted to the EMO on 29 December 2015. 2. The first draft of the ESMMP for Biomass Clearance was submitted by a Consulting Company on 13 November 2015 and will be further elaborated in the NNP1 ESMMP-CP update. 3. A concept note and proposed mitigation measures highlighted in the working draft were presented by the Contractor to ADB-IAP-LTA mission representatives. Several views and recommendations have been addressed and recommended to be incorporated into the draft plan, particularly detailed views on clearance for each priority clearing area. 4. A kick-off meeting and field commencement of biomass clearance operations were postponed due to delay in plans completion as well as the security issue in Xaysomboun Province from late November to December 2015.	biomass clearance operations to update the GOL on the overall progress and schedules to commence the operation. 3. Organise a kick-off meeting prior to commencing biomass clearance operations which also include the approval of biomass related plans, in particular, Contractor's working plan. 4. Commencing clearance operations after the plan approval starting from mobilization of Contractor workers, clearing area demarcation, and training on environmental protection measures, inspection protocols, compliance monitoring, record keeping and emergency response procedures.

4. OTHER SUPPORT PROGRAMS

4.1 INTEGRATED SPATIAL PLANNING PROGRAM

The Technical training on ISP was conducted by DEQP-MONRE for Provincial Technical team in October 2015. DEQP has requested fund for the district level technical planning exercise in November 2015 and the fund has already released from NNP1PC in December 2015. Due to the local security problem during year end the activity could not implemented. The activity is planning to start in the last week of January 2016 in Thathom district and will be following by Hom district in early February 2016. For Anouvong district the fund request letter will be submitted in advance prior to activity implementation in February 2016.

4.2 HOAUY SOUP RESETTLEMENT AREA IEE AND INRMP

The Houay Soup Initial Environment Examination (IEE) was approved by the ADB in November 2015. The associated Integrated Natural Resources Management Plan (INRMP) for Houay Soup was approved by the ADB in December 2015. Both documents are now being disclosed to the public on the NNP1PC website.

4.3 NABONG SUBSTATION UPGRADE DUE DILIGENCE ASSESSMENT

A Draft Nabong Substation Upgrade Due Diligence Assessment was submitted to the ADB on 20 October 2015 and feedback was received on 19 November 2015. The main concern raised was the currency of existing environmental and social documents and permits. The assessment found that the current IEE for the upgrade works (EDL, 2007) is compliant with the ADB Safeguards Policy Statement, June 2009.

On 30 October 2015, the NNP1PC made a presentation and a request to the Department of Energy Business (Ministry of Energy and Mines) and EDL to facilitate the passage of the DDA (Nabong Upgrade and 115kV) through MONRE. A minute of the meeting will be prepared and submitted to NNP1PC. In addition, a working group will be established in January 2016 which consists of NNP1PC, EDL and Nam Ngum 2 (the site owner and developer) to facilitate the development of the Nabong Substation Upgrade DDA.

4.4 115KV TRANSMISSION LINE IEE DUE DILIGENCE ASSESSMENT

During 27-29 November 2015, Dongfang Construction undertook a scoping study of the 115 kV alignment with the intent of preparing a full IEE. The minutes of the scoping study were provided to NNP1PC on 09 December 2015. Notably, the report cited that the current alignment of the 115 kV traverses about 2 km of the Houay Ngua Provincial Protect Area. The Dongfang Construction Company will now proceed with the preparation of the full IEE for submission to MONRE whilst NNP1PC will work with EDL and Dongfang Construction to ensure its compliance with environmental and social requirements in accordance with the NNP1 Facility Agreement Clause 17-2 (n).

In order to achieve this, the NNP1PC will set up a working group with EDL and Dongfang Construction to support the IEE development. Establishment of the working group is to commence in January 2016. Construction of the 115 kV TL is expected to start in late 2016.

4.5 MISSIONS OF THE ENVIRONMENTAL MANAGEMENT UNITS (EMU)

During the Fourth Quarter of 2015, the EMUs of Bolikhamxay Province conducted 2 monthly environmental monitoring missions at the NNP1 sites during 06-08 October and 18-20 November 2015. The December 2015 mission was postponed to be held in the second week of January 2016.

The main issues of concerns raised by the EMU are the following:

i) General construction waste management of a few worker camps;

ii) Wastewater treatment system of the worker camps;

iii) Sediment control structure at the batching plant; and

iv) Potential dust emission at the aggregate plant.

In response, the NNP1PC has increased monitoring points at the aggregate plant and advised the Contractor on the potential health risks and ensure adequate Personal Protective Equipment (PPE) is provided to all workers.

The NNP1PC also instructed the Contractor to improve the environmental condition at the camps and construction sites raised by the EMU especially on the issues of the wastewater treatment system, hazardous and general waste management at the selected workshop and the batching plant areas, dust reduction along the road within the construction sites and fence installation around the camps in order to prevent the local cattle from entering. The responses are being prepared and will be presented in the next EMU monitoring mission scheduled in January 2016.

Photos 21: Bolikhamxay Province's EMU Environmental Monitoring Mission during the Fourth Quarter of 2015

4.6 INDEPENDENT MONITORING AGENCY (IMA) TOR AND PROCUREMENT

The IMA TOR and recruitment process, including a proposal provided by the selected candidate, have been reviewed by NNP1PC during October 2015. Further improvement has been made by MoNRE to the TOR and proposal to suit the concession agreement (CA). In November, the NNP1PC issued to MoNRE an acceptance letter on the revised TOR and

proposal. MoNRE will continue with the IMA recruitment process and finalize it in early 2016. NNP1PC closely monitored this process and will include the progress in the First QMR of 2016.

4.7 ENVIRONMENTAL PROTECTION FUND (EPF)

The two PONRE of Xaysomboun and Bolikhamxay provinces were in the process of preparing 2 proposals to request for funding from the EPF in the early January 2016. Both proposals will be subjected to technical reviews by the EPF prior to submitting to the Board of Directors for approval. The proposal of Xaysomboun Province is aimed at the protection of an important Mai Longleng [2] (*Cunninghamia sinensis*) protected forest in Anouvong district and the proposal of Bolikhamxay province is focused on Houay Ngoua provincial protected Area management.

5 OCCUPATIONAL HEALTH & SAFETY OF CONSTRUCTION WORKERS

5.1 SAFETY ORGANISATION

In the Fourth Quarter of 2016, the organisation of the Civil Works Contractor has remained the same except that the responsibilities for leading the safety team have been gradually transferred from the senior Lao safety officer, originally recruited from a mining background, to the senior Safety Officer, more recently joining from Obayashi Philippines, who has more construction safety experience. He also has a Philippine assistant safety officer, the two having worked together previously on international projects for Obayashi. The whole safety group from the Owner's side, the Civil Contractor and its Subcontractors have continued to develop together to carry out safety inspection, monitoring and training in a thorough and professional manner. The standard of safety on this Project has been complimented to be one of the best, if not the best in Lao PDR.

As the Electrical and Mechanical and Hydro-mechanical Contractors mobilise their resources for installation of their Works in this final quarter of 2015, they will be introduced to and asked to meet the high standards of safety that the Civil Contractor has achieved. The Owner's replacement Safety Officer (an ethnic Hmong) was recruited as reported last Quarter and two experienced construction engineers co-opted to strengthen the Owner's safety team. As an interim condition safety is still under the responsibility of the Owner's Thai QA/QC Manager and Philippine Deputy Manager. In 2016 this responsibility for safety will

[2] A local commercial tree specie

transition again to a separate Deputy Manager, still to be recruited. The Owner's safety team at all times constitutes 5 persons in the field and is additionally overseen by experienced senior management and is independent of those directly responsible for construction supervision.

The Civil Contractor has 4 safety specialists in a health, safety and environmental team comprising of seven persons. Excluding vastly experienced construction managers, the combined total of 9 persons from Owner and Contractor who are directly concerned with safety are from 4 different nationalities and 6 have previous international experience of construction of large hydropower projects. It is hoped that the to-be-recruited Owner's Deputy Manager (Safety) will have the capability to communicate in Vietnamese and/or Chinese, as well as Laos, since a significant proportion of workers speak those languages.

5.2 SAFETY TRAINING

All the training that the Safety Officers of the Owner and Contractor carried out in the period October to December 2015 is provided in the Contractor's Monthly Progress Reports and is summarised in Table 19 below. This includes all training by external and internal trainers and toolbox talks given by Owner, Contractor or Subcontractor personnel. For example, in October 2015, the total number of training courses held in the period is 37 and the total number of workers receiving training according to their needs is 1,490.

Table 19: Safety Training for the Reporting Period from July to September 2015

Month & Year	Total Number of Training Courses held in each month	Total Number of Workers Receiving Training in Each Month According to Their Needs	Subject Matter of Training Courses Variously Attended According to the Needs of Workers
October, 2015	37	1,490	Induction, general, good housekeeping, working on slopes, working at height, fire-fighting and procedures, safety committee, speeding in vehicles (8 topics)
November, 2015	48	1,761	Crane safety and permit system, struck by hazards, caught in hazards, induction, safety committee (5 topics)
December, 2015	50	1,796	Induction, site regulations, general safety, hot works permits, vehicle checking and driving, safety committee, excavator operation on slopes (7 topics)

5.3 SAFETY CLASSIFICATION AND STATISTICS

Incidents are classified by the Owner into six categories in accordance with international convention. These categories are:

		Cum. Total to 31 Dec 15	2015 Q4 Total
LTI	Lost Time Incident	9	0
RI	Recoverable Injury	4	1
NM	Near Miss (Reported)	10	1
PD	Property Damage	2	1
FI	Fire Incident	3	0
MVI	Motor Vehicle Incident	27	4
	Total	**55**	**7**

During the 23-month period from February 2014 to 31 December 2015, the table above shows that there have been 55 reported safety incidents in total. The distribution in number by type is shown with the cumulative totals in the left-hand column and the Q4 total in the right-hand column. In the Fourth Quarter of 2015, there were 7 incidents, comprising 4 Motor Vehicle Incidents and one each of Recoverable Injury, Near Miss, and Property Damage.

In the last quarter the number of safety incidents increased by 2, from 5 in the Third Quarter to 7 in the Fourth Quarter. Motor Vehicle Incidents continue to be the prevailing type of incident with 4 out 7 for the Quarter. This is not surprising given the number of vehicles used on Site. However most if not all resulted in minor damage and in none were there any personal injuries and therefore no Lost Time Incidents in Q4. The most spectacular incident of Q4 occurred on a Sunday afternoon in November 2015 when a mobile crane overturned during lifting an unbalanced load, outside its capacity, for temporary works purposes. Fortunately there was no injury to any individual, but there followed an intense period of training of operators and supervisors and instigation of a permit system to ensure no lifting is carried out without a proper lifting plan being approved.

The Project continues to be focussed on identifying risk by regular inspection, training and warning to avoid risk and in this has good cooperation between the Owner, the Civil Contractor and its Subcontractors.

5.4 Reporting to the Lenders, LTA and Others on Safety Incidents and Accidents

The total 55 incidents recorded to 31 December 2015 are included above table. No serious injuries were sustained in the Fourth Quarter. NNP1 includes data and statistics on safety incidents in their Monthly Progress Report to shareholders, Lenders and their Technical Advisors.

An extract from the Civil Contractor's Monthly Progress Report at the end of December 2015 is shown below and provides the Obayashi analysis of reported safety accidents (where an injury occurs and there is lost time from work) to 31 December 2015:

- Total working hours until this end of December 2015: 5,744,475 hours
- Total working hours in December 2015: 367,903 hours
- Total working hours until the end of December 2015: 6,112,378 hours
- Total working hours without accident: 341,500 hours
- Number of Accidents to-date: 5
- Number of Lost Days to-date: 634 days

- Performance parameters:

Accident Frequency	=	0.82 < 1.00 (Target)
Accident Severity Rate	=	103.20 < 350 (Target)

Note:

1. The method of calculation follows the Japanese Standard and the targets have been determined by the Head Office of Obayashi Corporation for all overseas projects;
2. An accident in which no-one is absent from site works is not counted as an accident in this analysis
3. Total working hours are calculated from the record of the Daily Report (numbers of workers of each activity x working hours of each activity)
4. Accident Frequency Rate; = (Number of Accidents/ (Total Working Hours) x 1,000,000.
5. Accident Severity Rate = (Number of Lost Days)/ (Total Working Hours) x 1,000,000.

6 APPENDICES: ENVIRONMENTAL MONITORING RESULTS

APPENDIX 1: STATUS OF SS-ESMMPS APPROVAL DURING OCTOBER TO DECEMBER, 2015

No	Site name	List of ESMMP and SSESMMP	Sub-Contractor	Approval Status by EMO/NNP1 (date)	Detailed Site Information	Monthly Construction & Operation Status
Electrical and Mechanical Works						
1	Main dam and re-regulating dam	SS-ESMMP for HM's Sub-Contractor Labor Camp	HM Hydro	Approved with conditions: 19 October 2015	To install the camp for workers	Start installing the camp platform
		SS-ESMMP for Field Shop and Camp	IHI	Approved with conditions on 17 November 2015	To install the field shop and site office	Start clearing the yard
		SS-ESMMP for Installation of the Draft Tube Liner		Approved with conditions on 04 December 2015	To install the draft tuber liner	Start installing at the Re-regulating dam
Associated Construction Facilities						
Construction Sites						
2	Main dam right bank	SS-ESMMP for Main Powerhouse Construction	Song Da 5, TCM	Approved with conditions on 24th December 2015	To construct the powerhouse at the main dam and re-regulation dam	On-going of limb grouting construction and cut-off berm maintenance and powerhouse foundation

3	Cofferdam	SS-ESMMP for Primary Upstream and Downstream Cofferdam	Song Da 5	Approved on 14 October 2015	For diver the river water turn into the inlet-outlet diversion tunnel	On-going
		SS-ESMMP for Secondary Upstream and Downstream Cofferdam		Approved with conditions: 19 October 2015	To construct the grouting and diaphragm wall for water proofing during the dam construction	On-going
		SS-ESMMP for Grouting Works at Secondary Cofferdam		Approved with conditions on 23rd December 2015	To construct the grouting for the secondary cofferdam	On-going
4	Re-regulating dam	SS-ESMMP for Earth Dyke Construction	PKC	Approved with No conditions: 04 November 2015	To construct the water storage for supporting the re-regulation dam	Start the clearing, store the top soil and earthwork
Spoil Disposal Area						
5	Landfill of Civil Work Construction (Disposal Area N#6)	SS-ESMMP for construction the CWC landfill	Under bidding	Pending	To construct the landfill for civil work construction period	Under reviewing by PoNRE/PWT of Bolikhamxay province. The contractor bidding is ongoing.
Houay Soup Residential Area (Resettlement Site)						
6	Bridge Construction	SS-ESMMP of Geological Investigation for HSRA's Bridge Construction	State Enterprise of Communication and Construction (SECC)	Approved with No comment: 27 November2015	To construct the bridge for the Houy Soup resettlement site	Start the installation of pier foundation
7	Camp Construction for bridge construction	SS-ESMMP of SECC Worker Camp	SECC	Approved on 29 October 2015	To set up the worker camp for bridge construction	On-going

8	Enhancement Works on Road Conditions	SS-ESMMP of HouySoup access road	Chalern Savan., Ltd	Approved with conditions on 10 December 2015	To improve the existing access road through the resettlement site	Works not commenced
9	Houy Soup School Construction	SS-ESMMP of Land levelling (Cutting & Filling) for construct the school of Hatsaykham Resettlement Villagers	Chalern Savan Road and Bridge Construction Co., Ltd.	Objection with Comments on 18 December 2015	To construct the school at Houysoup resettlement site	Works not commenced
10	Paddy Field Development for 38 Households	SS-ESMMP of Paddy Field Development for 38 households	Phatthiya Co., Ltd.	Objection with Comments on 24 December 2015	To develop the paddy field at Housoup resettlement site	Works not commenced

APPENDIX 2:

ENVIRONMENTAL MONITORING CORRECTIVE ACTIONS FOR OCTOBER TO DECEMBER 2015

Issue ID	Inspection Date	Site Name	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up Date	Final Status
ON_OC-0028	17.02.2015	RT Camp	The temporary existing sediment retention ponds which contain the camp site's grey water and storm run-off, have accumulated and leaked into the environment/natural water. The result of waste water discharge monitoring in December 2014 and January 2015 found that the Total Coliforms detected was significantly higher than the National Standard (i.e. 9200MPN/100ml and >160,000 MPN/100ml for Total Coliforms and 160,000MPN/100ml for Faecal Coliforms). These		29.12.2015		Open

			indicated continuous contamination of the surface water (Nam Ngiep) with high bacteria.				
NC_OC-0005	10.04.2015	Sino hydro camp	**Sino Hydro Camp (EF06):** BOD, COD, Ammonia-nitrogen (NH3-N), Fecal coliform and Total coliform exceeded effluent water quality standard of Lao government for the samples of February and March 2015 as below: 1. COD = 127 mg/l on 09 February 2015 and 150 mg/l on 06 March 2015. 2. BOD = 59.2 mg/l on 09 February 2015 and 78.2 mg/l on 06 March 2015. 3. Ammonia-nitrogen (NH3N) = 16 mg/l on 09 February 2015 and 17 mg/l on 06 March 2015. 4. Total coliform = 160,000 MPN/100 ml on 09 February 2015 and No result due to sample bottle was broken on 06 March 2015. 5. Fecal coliform = 160,000 MPN/100 ml on 09 February 2015 and No result due to sample bottle was broken on 06 March 2015. During the February and March monthly water quality monitoring on Sino Hydro camp site,	1. Stop discharging from pipe close road P1 and find an alternative solution and also redesign current layout of camp to improve drainage system. 2. The contractor shall propose an improved waste water treatment system.	30/04/2015	29.12.2015	Resolved
ON_OC-0085	02.06.2015	Songda5 camp #2	The wastewater treatment system does not follow the proposed design.	i. Contractors needs to follow the proposed plan, submitted on 31 Mar 2015; ii. Contractor should fix the drainage system with the sediment pond. It needs to separate	29.12.2015		Open

				the drain of surface water run-off and wastewater from bathroom and kitchen.			
ON_OC-0087	02.06.2015	V&K Camp	Refer the previous site inspection report ref; NNP1-ESD-EMO-SIR-OC-0005 on SI-0036 dated 03 Mar 2015, the issue has been repeated. No improvement on the design of wastewater treatment system. The camp has insufficient facilities for the long-term operation. There is an evidence of grey water has been released from the septic tank to the open ditch. This is observed to be non-compliance to the project's environmental guideline.	i. Contractor needs to improve the submitted plan on 31 Mar 2015 which EMO has been commended and advised. ii. Contractor shall install the wastewater treatment system following the improved system under the EMO's recommendation.	29.12.2015		Open
ON_OC-0132	11.08.2015	Spoil Disposal #3	There is inadequate mitigation for onsite erosion and sediment control. The installed drainage pipe has insufficient capacity to drain storm water runoff during the heavy events. Storm water runoff flashes over the spoil area and transports sediment off-site. This effect was monitored by the Compliance Team during one such event. The site also being used to extract material for use as base material for construction, and with rain the vehicle movements will enhance sediment mobilization and make the area difficult to work. The site needs to have improved drainage and sediment movement control.	The contractor needs apply mitigation measures to reduce erosion and off-site loading of sediment. Install adequate drainage and sediment pongs at the spoil area boundary.	25/08/2015	17.11.2015	Resolved

ON_OC-0133	11.08.2015	Spoil Disposal #2	There is inadequate mitigation for onsite erosion and sediment control. Storm water runoff flashes over the spoil area and transports sediment off-site. The site needs to have improved drainage and sediment movement control.	The contractor needs apply mitigation measures to reduce erosion and off-site loading of sediment. Install adequate drainage and sediment pongs at the spoil area boundary.	25/08/2015	01.12.2015	Resolved
ON_OC-0134	11.08.2015	Outlet Diversion Tunnel	Due to heavy rains occurred on 30 July 2015, a landslide at the Tunnel Outlet rendered the turbid water filtration system was idle. The tunnel was also filled with seepage water which required pumping to allow the construction to recommence. The contractor built sediment ponds to treat the excavated water prior to discharge into the Nam Ngiep, but there was a delay in the implementation process.	The contractor is required to use sediments prior to discharge. They are also requested to monitor any discharge water from the site according to the owner requirements. Further the contractor is requested to repair the turbid water filtration system as soon as possible, and inform the owner of the when the system will be functioning. Note: As advised by the contractor, the NNP1 is to receive water quality results of effluent water discharge from the site.	14/08/2015	6/10/2015	Resolved
NC_OC-0010	03.09.2015	T11	1) Road T10 has been affected by recent heavy rains causing landslide that closed the road. The contractor has made attempts to reopen the road by excavating into the hillside along its length, and placing spoil material over the embankment. The embankment is over 35 degrees in slope, and the Nam Ngiep River is approximately 30 m directly below the works; 2) This materials being side cast is readly mobilized and transported to the Nam Ngiep River, exacerbating turbidity and TSS levels of the River; 3)	1. The contractor is to minimize as much as possible side casts entering the Nam Ngiep River; 2. In the future excavations, the contractor is to remove all excess spoil materials and dispose at a designated Spoil Disposal Area; 3. The contractor please provide the corrective action plan in order to ensures best environmental practice is being implemented on site to minimize impact to water quality of Nam Ngiep River and also aquatic animals.	10.09.2015	3/11/2015	Resolved

			Erosion and sediment control and best practice are not being applied at site; 4) The contractor is to make all reasonable efforts to prevent erosion materials entering the river. Use of a site bund, bamboo/geo fab sediment fencing, etc should be considered in the Corrective Action Plan. Note: The NNP1 Compliance has on previous joint bi-weekly site inspection [11 August 2015 as reference SIR: Site inspection report_NNP1-ESD-EMO-SIR-OC-0019 (Issue ID*: ON-0142)] raised this issue with the contractor.				
ON_OC-0148	08.09.2015	RT Camp	Oil spills or leaks have occurred in the used drum holding bay in the hazardous material storage shed. There was evidence of contaminated soil being disposed of near the shed, and not held in a storage container for later processing. This has the potential risk of spilt hazardous material being washed by rain to the natural environment.	The contractor shall clean up the used oil and keep the material in the hazardous storage area for later processing	22.09.2015	6/10/2015	Resolved
ON_OC-0150	08.09.2015	Songda Camp N#1	During EMO followed up of environmental issues on Sept 07, it was observed that the drying pond of the grey WWTS was leaking to the road side drain contaminating the local environment, and potentially creating a disease vector.	The contractor shall fix and block the wastewater discharge leak, and monitor to ensure no leaks re-occur.	22.09.2015	6/10/2015	Resolved

ON_OC-0151	22.09.2015	Songda Camp N#1	The cattle barricade around the camp effluent sediment pond is damaged, allowing cattle access to wallow in the pond. This carries the risk of disease vector for livestock and the community.	The contractor shall repair the barricade and reform the pond bank.	22.09.2015	6/10/2015	Resolved
ON_OC-0152	22.09.2015	Songda Camp N#1	Undesignated area. In addition, it was found the waste was not separated, and contained construction waste and recyclables.	The sub-contractor shall clean-up the waste and segregate recyclables before disposal. The construction waste shall be transported and disposed at a designated disposal area.	06.10.2015	6/10/2015	Resolved
ON_OC-0153	22.09.2015	TCM Camp	A truck load of construction waste was disposed behind TCM camp, a few meters the Nam Ngiep. As the stock pile erodes the sediment will enter the river impacting on water quality.	1. Contractor shall investigate which of OC's sub-contractor had disposed the construction waste at that location; Contractor shall remove and dispose those waste to the disposal area.	06.10.2015	6/10/2015	Resolved
ON_OC-0154	22.09.2015	TCM Camp	Poor housekeeping at the camp. Waste from the camp has been discarded to the environment impacting on biodiversity values, and on the local amenity.	The Contractor shall routinely collect the wastes from the area in the camp and nearby and transport to a designated waste disposal area.	06.10.2015	6/10/2015	Resolved
ON_OC-0155	22.09.2015	TCM Camp	The cattle barricade around the camp effluent sediment pond is damaged, allowing cattle access to wallow in the pond. This carries the risk of creating a disease vector for livestock and the community.	The contractor shall repair the barricade.	06.10.2015	6/10/2015	Resolved

ON_OC-0156	22.09.2015	Main dam	The generators at the left bank Limb Grouting Tunnel do not have housing or bunding to contain oil/fuel leaks. This risks contaminated wash entering the Nam Ngiep.	1. Contractor shall install increase a bund area, and add roofing to prevent the rain water flow inside the storage area; 2. Contractor shall clean up the contaminated sediment / soil and keep it in designated storage area for processing.	06.10.2015	6/10/2015	Resolved
ON_OC-0157	22.09.2015	RT industrial area	There was evidence of construction waste being improperly stored behind the RT workshop.	The contractor shall clean up and segregate the construction waste such as wood, scrap metal, concrete waste and other things. Wood can be burnt on site, and concrete waste disposed of at a designated disposal area.	06.10.2015	6/10/2015	Resolved
ON_OC-0158	22.09.2015	Songda workshop	The contractor shall clean up and segregate the construction waste such as wood, scrap metal, concrete waste and other things. Wood can be burnt on site, and concrete waste disposed of at a designated disposal area.	The contractor shall clean up and segregate the construction waste such as wood, scrap metal, concrete waste and other things. Wood can be burnt on site, and concrete waste disposed of at a designated disposal area. 1. The contractor shall install a sign board and barricade at that holding site; 2. The contractor shall move the material offsite for processing at the earliest possible convenience.	06.10.2015	6/10/2015	Resolved

ON_OC-0159	22.09.2015	Songda workshop	Improper waste management at the workshop area. Hazardous waste was mixed with general solid waste.	1. Contractor shall segregate the waste according to type and store in bins for each specified type; 2. Contractor shall provide waste bins with completed labels for each waste type. Hazardous waste and recyclables are to be transferred offsite and processed according to type by Owner approved vendors. Solid waste is to go to the NNP1 landfill.	06.10.2015	6/10/2015	Resolved
ON_OC-0160	22.09.2015	Aggregate Plant	Sediment has accumulated in the surface water drain reducing its volumetric capacity and risking localized flooding, causing increased sediment load of the drainage lines, and impact on water quality of the Nam Ngiep.	The Contractor shall clean up the sediment and dispose at the disposal area. The pond is to be routinely emptied between 60% and 80% full.	06.10.2015	3/11/2015	Resolved
ON_OC-0161	22.09.2015	RT Camp	Evidence that oil and sediment laden water was draining into the oil trap units, and are not being separated which indicates an improperly functioning system. (The trap was emptied the previous day.)	1. Contractor shall routinely check the drainage pipe of the trap to ensure no blockage; 2. Contractor shall undertake all necessary repairs of the trap to improve system functionality.	06.10.2015	6/10/2015	Resolved
ON_OC-0162	22.09.2015	RT camp	Sediment has accumulated in the surface water drain reducing its volumetric capacity. Sediment laden waters spill outside the drain and enter to the Nam Ngiep.	The contractor is required to routinely clear sediment from the drain and dispose of material at a designated disposal area.	06.10.2015	6/10/2015	Resolved

ON_OC-0163	22.09.2015	RT camp	Evidence of effluent water being released from a full underground septic tank. This has a potential risk of bacterial release to the Nam Ngiep and the camp.	Contractor shall fix the septic function, and empty the septic tank according to the agreed Owner procedures for Emergency Disposal.	06.10.2015	6/10/2015	Resolved
ON_OC-0164	22.09.2015	IHI & Mitsubishi camp	The construction site has no means to retain sediment on site. Rain washed sediments are moving offsite reducing water quality and impacting local environments.	The contractor shall apply necessary mitigation measures to reduce the sediment transport offsite. This can include silt fencing, site drainage and sediment ponds.	06.10.2015	6/10/2015	Resolved
ON_OC-0165	06.10.2015	Main quarry	There was inadequate environmental mitigation measures and no lack of best practice is being implemented, resulting in evidence of sediment was transported off-site. The previous monitoring during the time of raining and identified rain water flashed through the rock excavating and rock blasting area, resulted in highly turbid water released off-site without proper sedimentation control device /facilities. This has a potential risk of: - Contamination of surface water by suspended sediment (turbidity – can result in clogging of filter feeders…etc.) - Pollution from natural contaminants, including acid rock drainage.	The contractor need to take an appropriate action and provide an appropriate mitigation measures to minimize the potential risk of impacts: - Careful design of surface drainage within a site - Use of settling lagoons for suspended solids - Use of vegetated channels and reed beds for dealing with heavy metal contaminants absorbed into suspended sediment particles - Capping of spoil heaps (rock, clay, soil or synthetic material) to minimize infiltration of rainwater. - Appropriate water treatment works	30.10.2015	3/11/2015	Resolved

ON_OC-0166	06.10.2015	RCC Plant	The existing sediment pond capacity is inadequate for sediment removal / clean up. It was evident that the water discharging at discharge point of outlet is still high turbidity which was not different compares from inlet.	The Contractor is required to: (i). Remove / clean up the sediment from the sediment pond to keep the actual capacity and its effectiveness; (ii). If possible, provide additional stone rip rap at the outlet to act as a natural filtration system to allow water seepages through and assist in diluting the turbidity. (iii). The contractor needs to monitor and ensure that their sub-contractor clean up sediment regularly.	20.10.2015	20/10/2015	Resolved
ON_OC-0167	06.10.2015	V&K Camp	There was inadequate sediment clean up and removal from sedimentation pond. Resulted in sediment pond id full and cause sediment pond low effective.	Please clean up the sediment to maintain sediment pond effective.	20.10.2015	20.10.2015	Resolved
ON_OC-0168	20.10.2015	Songda batching plant	Sediment has accumulated in the surface water drain decreasing its volumetric capacity and risking localized flooding. Sediment laden waters spill outside the drain and flow toward to the Nam Ngiep River.	1. The contractor is required to regularly clean up sediment along the drain and dispose of material at a designated Spoil Disposal Area. 2. Need to modified the open ditch to store stormwater and capture sediment	03.10.2015	3/11/2015	Resolved
ON_OC-0169	20.10.2015	RT Camp	Evidence of oil spill without clean up around workshop and oil trap area, it will reach to the storm drainage and will cause to the water quality in the watercourse.	Avoid any equipment contaminated with oil washing outside the workshop; and clean up the black oil spillage immediately and store properly in designated hazardous waste storage area.	03.10.2015	3/11/2015	Resolved

ON_OC-0170	20.10.2015	Re-regulation dam	On 15 October 2015, during Monitoring Team of EMO took water samples at the re-regulation dam, they found the turbid water pumping from its facility construction didn't pass the treatment processing. the risk is to damage the aquatic living along the Nam Ngiep River, and also decrease the river's water quality.	Any discharged water from the construction site, it must be pass the treatment process before release to the adjacent creeks and Nam Ngiep River otherwise NCR shall be issued.	03.10.2015	3/11/2015	Resolved
ON_OC-0171	03.11.2015	Main dam (right bank)	No toilet facilities at the Main dam (Right bank) for more than 20 workers, raising environmental health and privacy concerns.	1. Contractor shall provide mobile toilet facilities on site. At isolated areas pit latrines will be installed for the workforce. 2. Toilet facilities will be maintained by the contractor to prevent water borne diseases.	17.11.2015	29.12.2015	Resolved
ON_OC-0172	03.11.2015	Main dam (right bank)	Lacks hazardous materials management was observed at site. Sika Sikunit was found to be leached on the ground, causing the contaminated soil at the working area.	1. The Contractor shall clean up the Sika Sikunit and ensure all hazardous waste do not leach into the environment. 2. The Contractor shall install the earth bund on surround temporary hazardous storage area. 3. The Contractor shall be observed/monitored to hazardous material dump and hazardous material management plan.	17.11.2015	17.11.2015	Resolved
ON_OC-0173	03.11.2015	Sino hydro Camp	NNP1 staff and contractors are prohibited to collect NTFP, as this represents a breach of the Company Code of Conduct.	1. The Contractor shall be trained all project staff to prohibit from harvesting any forest products as follow ESMMP-CP/NNP1. 2. The Contractor shall be raised official letter to each Camp to acknowledge on this issue	17.11.2015	17.11.2015	Resolved

				and do not collecting anything of Orchid or NTFPs in the Project area.			
ON_OC-0174	03.11.2015	Sino hydro Camp	The drainage system from the camp kitchen/canteen is inadequately designed to trap food before it is released, and to allow the free flow of water. Stagnated water has the potential to produce un-pleasant odor, and increase vectors of mosquito breeding areas.	1. The Contractor shall fix the pipeline to allow the flow of water. 2. Food waste in the oil trap/grease trap need to be routinely cleaned.	17.11.2015	17.11.2015	Resolved
ON_OC-0175	03.11.2015	Sino hydro Camp	There are insufficient number of proper waste bins on site. The garbage is being scattered at the site, and their so regulation to separate solid waste materials.	1. The Contractor shall be regular clean up the general waste along camp area; 2. The Contractor shall sufficient provide the waste bins on site. 3. The contractor shall separate recyclable waste from solid waste to be disposed of at the landfill site.	17.11.2015	17.11.2015	Resolved
ON_OC-0176	03.11.2015	V&K Camp	The workshop was conducted without surface water drainage and an oil trap. The workshop must also contain a purpose built hazardous material storage area.	The Contractor shall install the oil trap, and also to install the drainage system surround the workshop; and also to construct the Hazardous waste storage facility.	17.11.2015	01.12.2015	Resolved
ON_OC-0177	03.11.2015	RT Camp	Surface water is mixing with oil and is passing behind the workshop area and into the camp. There is a high risk this contaminated water will be washed to the Nam Ngiep and be a cause of nuisance to camp residents.	The Contractor shall construct the open drainage line to allow the groundwater flow into main drainage line of camp site. The contractor shall make best efforts to reduce oil spill in and around the workshop.	17.11.2015	17.11.2015	Resolved

ON_OC-0178	03.11.2015	Songda 5 Camp #1	Water from the holding tank is overflowing to the nearby area, creating muddy conditions underfoot.	The Contractor shall install the PVC pipe to connect tank overflow to the main drainage line. Alternative arrangements, such as reduced pumping times can also be used.	17.11.2015	01.12.2015	Resolved
ON_OC-0179	03.11.2015	Songda 5 Camp #1	There is improper of grey water drainage system provided for the kitchen / canteen area. Water is stagnant water and creating foul odors, and is potential disease risk.	1. The Contractor shall clean up the food waste along the drainage system. 2. The Contractor shall routinely clean and maintain the oil trap of food waste and kitchen area.	17.11.2015	01.12.2015	Resolved
ON_LS-0001	11.11.2015	TL230 kV	Lack of housekeeping and proper waste collection procedures. The fly camp/mobile camp and construction activities along the ROW have created the garbage disposed/scattered on ground.	1. The contractor will clean up all working area on a daily basis and transport the material to the designated disposal area. 2. The contractor should provide at least two waste bins at camps/work sites and three bins at the site office.	25.11.2015	05.12.2015	Resolved
ON_LS-0002	11.11.2015	TL230 kV	Evidence of concrete waste has being poured on the ground along the ROW. As concrete wastes generally contain high pH levels, so these activities have the potential cause pollution to local waterways.	The contractor should clean up the concrete waste after finish work and transport/dispose of the material to a designated disposal area. No concrete waste is to be left at site.	25.11.2015	05.12.2015	Resolved
ON_LS-0003	11.11.2015	TL230 kV	It was observed that no temporary toilet facilities had been provided for workers at the mobile camp. There was also a lack of proper hygienic and sanitation facilities for the cooking, bathing and toilet area.	Temporary/mobile environmental and health management measures including the appropriate site sanitary and hygienic facilities is to be provided on site.	25.11.2015	01.12.2015	Resolved

ON_OC-0180	17.11.2015	Earth Dyke	There is improperly temporary storage area for generators at workshop of Earth dyke construction area do not have housing or steel tray to contain oil/fuel leaks. This risks contaminated soil/water entering the Nature.	The contractor shall install temporary storage for generator and also provide steel tray on site when they to be fixed vehicle on site and regularly maintenance for heavy truck at workshop.	03.12.2015	01.12.2015	Resolved
ON_OC-0181	17.11.2015	Songda batching plant	There is improperly truck washing area due to Song's heavy truck washed on the road T5 to sensitive impact water quality of Nam Ngiep River especially oil spillage/leak with water washed down to Nam Ngiep River.	The contractor shall instruct its sub-contractor to stop washing their heavy truck at sensitive area especially Nam Ngiep River bank on the both sides also other stream to avoid impact water quality also aquatic animals.	17.11.2015	01.12.2015	Resolved
ON_OC-0182	17.11.2015	Songda batching plant	There is inadequate mitigation for sediment control, mud, and also concrete waste/wastewater there.	The contractor shall block wastewater discharge or flow to outside and to appropriate manage by regularly clean up the sediment there.	03.12.2015	01.12.2015	Resolved
ON_OC-0183	17.11.2015	RT camp	Evidence of effluent water being released from a broken pipe underground. This has a potential risk of bacterial release to the Nam Ngiep and the camp.	The contractor shall fix and block the blackwater/wastewater from septic tank discharge to outside and also to frequently monitor the water quality before any discharging request	28.11.2015	15.12.2015	Resolved
ON_OC-0184	17.11.2015	Re-regulation dam	There is inadequate mitigation for sediment control. Sediment has accumulated in the pond reducing its volumetric capacity.	The contractor shall clean up the sediment. The pond is to be routinely emptied between 60% and 80% full.	03.12.2015	01.12.2015	Resolved
ON_OC-0185	01.12.2015	Main quarry	Used cement bags was disposed / scattered and left behind at working areas without a practicable collection for proper disposal. In-appropriate disposal	(i). Completely collect the scattered cement bags and other garbage for proper disposal. (ii).General waste bins need to be provided	15.12.2015	15.12.2015	Resolved

			of other type of garbage such as plastic bottles and plastic bags are also observed.	on site where assembly points for temporary garbage storage			
ON_OC-0186	01.12.2015	Main dam	Highly turbid water have been pumping/ discharging from the main dam excavation area to the Nam Ngiep river directly. EMO concerned that this has a potential risk of: (i). Non-compliance of water discharge (i.e. turbidity, TSS and hardness, etc.) (ii). Without controlling, any spilt oil and / or oil film from dirt machine will be discharged / released to the environment.	The contractor needs to ensure that appropriate environmental impact mitigation measures and monitoring has being implementing as per proposed in the approved SSE-SMMP. EMO recommend that, at least a series of sedimentation ponds (2-3 ponds) could be installed and operated on site.	04.12.2015	29.12.2015	Resolved
ON_OC-0187	01.12.2015	CVC Plant Yard	There is an evidence of cement water accumulated in the open ditch at beside of CVC plant's dewatering ponds. This has a potential risk of causing to release waste water with a high of cement concentration off-site, which may resulted to impact on environment at downstream.	(i). Stop the act of creating cement waste accumulate in the open ditch. (ii). Any waste water from concrete work shall be discharged through sedimentation ponds / dewatering ponds.	01.12.2015	15.12.2015	Resolved
ON_OC-0188	01.12.2015	RT camp	There is an evidence of black water leaked from underground septic tanks. This has high potential of non-compliance water discharge (high bacteria…etc., released off-site). The contractor and sub-contractor have inadequate maintenance of their camp	The contractor shall quickly repairs the source of leaking in appropriate. The proper clean up the septic tanks may need.	04.12.2015	29.12.2015	Resolved

			facilities to be used effectively, because of this issue has been repeated on.				
ON_OC-0189	01.12.2015	Earth Dyke	1. There is no spillage protection facilities provided to prevent of spillage from machines maintenance activities. An evidence of hydraulic oil spilt on the ground without cleaning up is continuing and observed on site. The recommendation had been repeated but less improvement has been undertaken. 2. Fuel drum is stored on the ground without spillage protection facilities, resulted in hydrocarbon spills on to the ground from refilling activities is observed.	(i). Provide steel tray for the fuel drum to prevent spillage from refilling. Otherwise move the fuel drum to a designated hazardous storage area. (ii). Provide mobile drip trays for the maintenance activities to prevent spillage from maintenance. Otherwise designated maintenance area only is allowed. (iii). Completely clean up the contaminated ground and store in proper hazardous material storage for environmentally elimination. Otherwise NCR will be issued and / or approved SSE-SMMP will be guided.	04.12.2015	15.12.2015	Resolved
ON_LS-0004	10.12.2015	RCR Camp	There are insufficient numbers of proper waste bins on site. The garbage is being scattered at the site, and their so regulation to separate solid waste materials.	i. The Contractor will regular clean up the general waste along camp area; ii. The Contractor will be provided the sufficient waste bins on site.	24.12.2015	24.12.2015	Open
ON_LS-0005	10.12.2015	RCR Camp	Evidence of hydrocarbon spills on the ground from mobile maintenance activities without cleans up properly.	Clean up the spilt hydrocarbon completely, store in designated hazardous storage area properly, and provide dip tray/steel tray on-site when the repairing/maintenance request.	24.12.2015	24.12.2015	Open
ON_OC-0190	15.12.2015	RCC Plant	Sediment has accumulated and filled ponds near the aggregate washing area. Sediment shall be transported by rain and will be carried along the natural creek and	i. Please remove / clean up the sediment from sediment pond to keep the actual capacity and its effectiveness; ii. The contractor needs to monitor and	29.12.2015	29.12.2015	Open

			river which it shall impact on the water quality.	ensure their contractor clean up sediment and maintenance daily basis.			
ON_OC-0191	15.12.2015	RT industrial area	Improper the waste management at the stockyard area. Scrap metal and shards scattered across the site. No classing/ separating metal waste.	i. The contractor shall cleanup and segregates the construction waste such as wood, scrap metal, concrete waste and other things; ii. The contractor shall install a signboard and barricade at that holding site.	29.12.2015	29.12.2015	Resolved
ON_LS-0006	24.12.2015	RCR Camp	Improper waste management. Waste is not centralized in one managed location. There was not an adequate number of waste bins, and waste was not be segregated.	i. The Contractor shall provide the recycling center with label at the stockyard and RCR camp; ii. The Contractor shall segregate and recycle all the waste materials (bottles, cans, paper, cardboard etc.) and dispose them at recycling center, as per NNP1 requirements.	12.01.2016		Open
ON_OC-0192	29.12.2015	RT Camp	A part of grey water pipe line (inflow) was lower that the new grey water treatment system, and the grey water cannot flow into the new treatment system, resulted in grey water leaked and stagnant in the open ditch.	The contractor needs to re-install the grey water pipe line to allow grey water flow into the new grey water treatment system and ensure any leakage is stopped.	12.01.2016		Open

ON_OC-0193	29.12.2015	RT Camp	There is lack of spill response and spills clean up. (i) An evidence of black oil and hydrocarbon spilt surrounding the workshop without clean up. (ii) Contaminated soil was cleaned up from inside bund area and throw / scattered on the ground surrounding the workshop without a proper collection and storage. (iii) A number of used oil drum are stored on the ground without spillage protection facilities. Resulting in black oil and contaminated soil spilt on the ground which it could be washed off-site when the rain come, which to impact on the environmental condition.	The contractor should monitor and take an appropriate action in order to ensure that spillages shall be cleaned up and stored properly. (i). Clean up / collect the contaminated soil and store in designated hazardous storage area for proper disposal / elimination. (ii). Move the used oil drum into bund area. Hazardous material management awareness training and disposal orientation training or enforcement needs to be provided to the sub-contractor.	12.01.2016		Open
ON_OC-0194	29.12.2015	RT industrial area	1). The site was decommissioned and landscaped with remaining the septic tank (s) left without a proper management / decommissioning. 2). No proper site decommissioning and / or closure plan has prepared and submitted to NNP1 for review, approval and reference.	The contractor needs to take an additional work such as: (i). Apply lime into the septic tank to ensure the sewage was treated and backfill properly. (ii). Prepare a site closure / site environmental restoration plan and submitted to EMO for review, approval and reference.	12.01.2016		Open

APPENDIX 3: HAZARDOUS MATERIALS AUDIT RESULTS FOR OCTOBER TO DECEMBER 2015

Site		PKC Fuel station and storage			Songda Camp			TCM fuel station and HazMat storage			RT work shop			V&K Camp			Songda Work shop			Sino hydro camp			Sino hydro fuel station			Songda CVC Plant		
Month		**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**
Storage area																												
1	Floor of storage area is impervious	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
2	Fully bunded with capacity >120% of combined container capacity	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	NR	√	√	√	√	√	√	√	√
3	Bunds in adequate condition	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	NR	√	√	√	√	√	X	X	X
4	Closed storage protected from rainfall and flood level	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
5	Storage area is well ventilated	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	√	√	√
6	Oil trap linked to the storage area	√	√	√	√	√	√	√	√	√	X	X	X	√	√	√	NA	NA	NA	NR	√	√	√	√	√	NA	NA	NA
7	Located not close to camp, office and watercourse	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
8	Storage has the fence and lock	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X	√	√	√	√	√	√	√	√	√	X	X	X
9	Incompatible hazardous materials and chemicals stored separately	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
10	Explosives stored in underground facilities or in appropriate bunding	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11	Explosive storage facilities are locked and access is restricted	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Containers																												
12	Containers leak-proof and in good condition	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Site		PKC Fuel station and storage			Songda Camp			TCM fuel station and HazMat storage			RT work shop			V&K Camp			Songda Work shop			Sino hydro camp			Sino hydro fuel station			Songda CVC Plant		
Month		**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**
13	Metallic (Iron) containers without corrosion (rust)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
14	Container chemically compatible with material stored	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
15	Container closed unless material added or used	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
16	Refuelling equipment without leakages observed	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Labels																												
17	Restricted access signs outside facility	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X	√	√	√	√	√	√	√	X	X
18	Display of labels with words “Hazardous product/waste”	√	√	√	√	√	√	-	-	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X
19	Label describes hazards for users	√	√	√	X	X	√	√	√	√	√	√	√	√	√	√	X	√	√	X	√	√	√	√	√	√	X	X
20	PPE request sign posted within premises	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
21	Procedures for HazMat handling posted within premises	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X
22	Procedures for emergency response posted within premises	√	√	√	X	√	√	√	√	√	√	√	√	√	√	√	X	√	√	NA	NA	NA	√	√	√	X	X	X
Safety																												
23	Fire fighting equipment available and controlled	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X

	Site	PKC Fuel station and storage			Songda Camp			TCM fuel station and HazMat storage			RT work shop			V&K Camp			Songda Work shop			Sino hydro camp			Sino hydro fuel station			Songda CVC Plant		
	Month	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**
24	Fire fighting equipment is sited appropriately for ease of access	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X
25	Staff wear PPE on site	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
26	Staff trained for HazMat handling and spill response	√	√	√	√	√	√	X	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Spill response																												
27	Spill response kits readily available with adequate supply	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	NR	NR	NR	√	√	√	X	X	X
28	Safe storage is provided for contaminated materials after spill response	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	√	√	X	√	√	X	X	X
29	Plan is in place for removal and final disposal of contaminated materials	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X
Documentation																												
30	HazMat Register in place	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
31	HazMat Register up-to-date	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
32	MSDS sheets readily accessible	√	√	√	X	X	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X

Note: √ = Yes
X = No
NA= Not available
NR= Not required
= Corrective action not provided
= Corrective action provided

APPENDIX 4: HAZARDOUS WASTE INVENTORY OCTOBER TO DECEMBER 2015

No.	Site	PKC Camp			TCM 1&2 Camp			Songda camp			RT camp			Songda workshop			V&K camp			CVC Plant			Sino hydro fuel station			Songda cvc plant			Total		
		10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10	11	12	10	11	12
1	Used oil	33d	34d	30d	11co	11co	11co	4d	1d	1d	6d	2d	8d	6d	3d	3d	1d	2sd	3sd	0	0	0	6d	0	1sd	1sd	1d	1d 1sd	52 11co 1sd	41d 11co 2sd	43d 5sd, 11co
2	Used oil mixed with water	0	0	0	0	0	0	0	0	0	5d	3d	3d	5d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5d	3d	3d
3	Empty used oil drum/container	5d	5d	6d	6sd	5sd	7sd	14d 6sd	1d, 5sd	2d, 3sd	20d	8d, 2sd	2d	20d	4d	4d 3sd	7d, 5co	1d, 3co	1d	0	0	0	12d	8d	4d	1d	4d	3d	59d, 12sd, 5co	31d, 12sd ,3co	22d, 13sd
4	Used oil filters	47u	50u	52u	0	0	0	0	0	0	9d	10 d	10 d	9d	1u	2u	10u	9u	12u	0	0	0	2u	0	0	2u	0	0	9d, 62u	10d, 60u	10d, 66u
5	Contaminated soil, sawdust and concrete	7b	8b	8b	0	0	0	0	0	0	10b	2b	15b	10b	0	2b	1d	1d	1b	0	0	0	0	0	0	0	0	0	18b	11b	26b
6	Contaminated textile and materials	3b	4b	4b	0	0	0	0	0	0	2b	2b	2b	2b	1b	1b	1b	1b	1b	0	0	0	0	0	0	0	0	0	7b	8b	8b
7	Contaminated used rubber (hydraulic) hose	2d	2d	2d	0	0	0	0	0	0	15d	15d	15d	15d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17d	17d	17d
8	Contaminated grease	1d	1d	1d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1d	1d	1d
9	Empty contaminated	2d	2d	2d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2d	2d	2d
10	Empty contaminated bitumen drum/container	0	0	0	0	0	30d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30d
11	Used tire	146u	152u	158u	0	0	0	0	0	0	34u	5u	15u	34u	8u	50u	11u	10u	8u	1u	0	0	0	5u	4u	3u	3u	10u	215u	183u	245u
12	Empty used chemical drum/container	0	0	0	0	0	0	0	0	0	1d	1d	1d	1d	0	0	30d	54d	35d	2d	2d	7d	0	0	0	1d	5d	3d	34d	62d	46d

13	Acid and caustic cleaners	80 bo	85 bo	90 bo	0	0	0	0	0	0	240 bo	245 bo	250 bo	240 bo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	320 bo	330 bo	340 bo
14	Empty paint and spray cans	0	0	0	2ca	3ca	4ca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2ca	0	0	0	0	0	4ca	3ca	4ca
15	Used battery	6u	8u	10u	0	11u	11u	0	0	0	1u	0	0	1u	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7u	19u	21u

Note: d = drum (contain 200 L/unit); sd = small drum (contain 20 L/unit); co = container (contain 1-10 L/unit); ca = can (contain 1-5 L/unit); b = bag; bo = bottle (contain 1-5 L/unit); u = unit

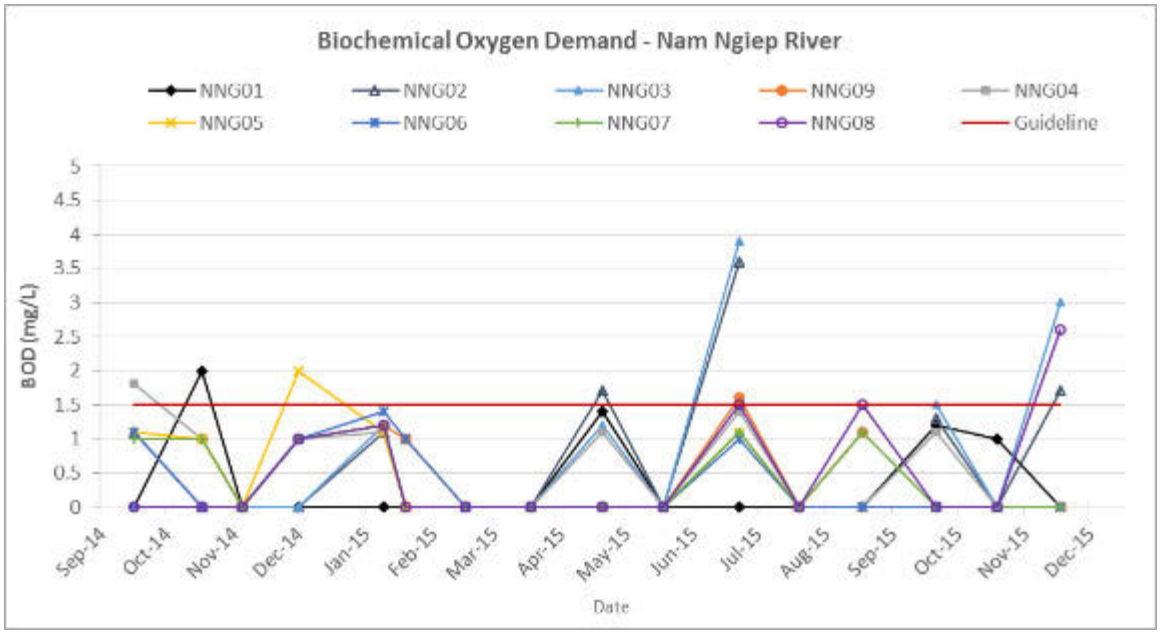
APPENDIX 5: SURFACE WATER QUALITY MONITORING CODE AND LOCATIONS

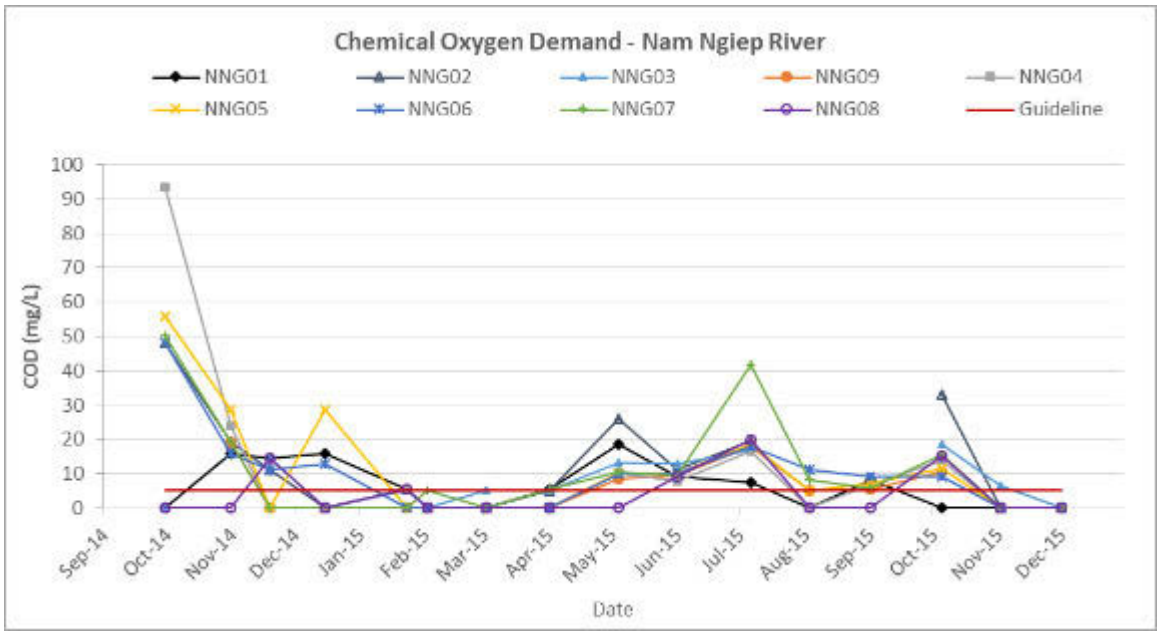
Site Code	Location station
NNG01	Nam Ngiep Upstream of Ban Phiengta
NNG02	Nam Ngiep Upstream of Nam Phouan Confluence
NNG03	Nam Ngiep Downstream of Ban Sop-Yuak
NNG09	Nam Ngiep Upstream Main Dam
NNG04	Nam Ngiep Downstream RT Camp
NNG05	Nam Ngiep Upstream of Ban Hat Gniun
NNG06	Nam Ngiep Downstream of Nam Xao Confluence
NNG07	Nam Ngiep at Ban Somsuen
NNG08	Nam Ngiep at the Bridge of Road 13
NCH01	Nam Chiane at the Bridge of Road 1D
NPH01	Nam Phouan Upstream of Nam Ngiep Confluence
NXA01	Nam Xao Upstream of Nam Ngiep Confluence

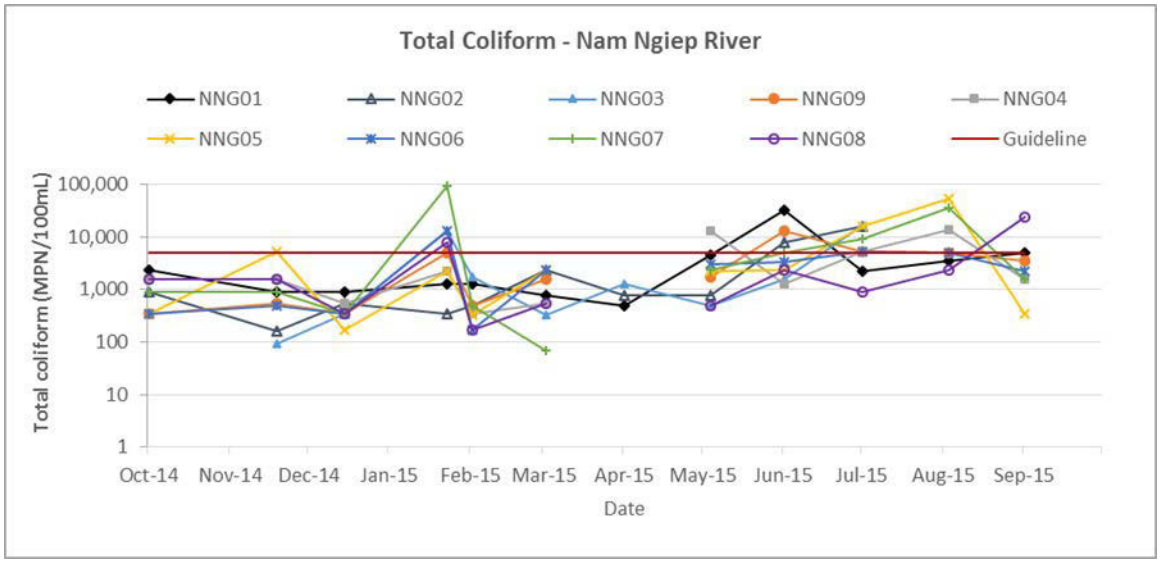
Note: The lower Houay Soup was introduced to routine surface water quality monitoring from June 2015

APPENDIX 6: KEY TRENDS OF WATER QUALITY MONITORING FROM SEPTEMBER 2014 TO END OF DECEMBER 2015 (ONLY PARAMETERS THAT EXCEEDED GUIDELINE STANDARDS)

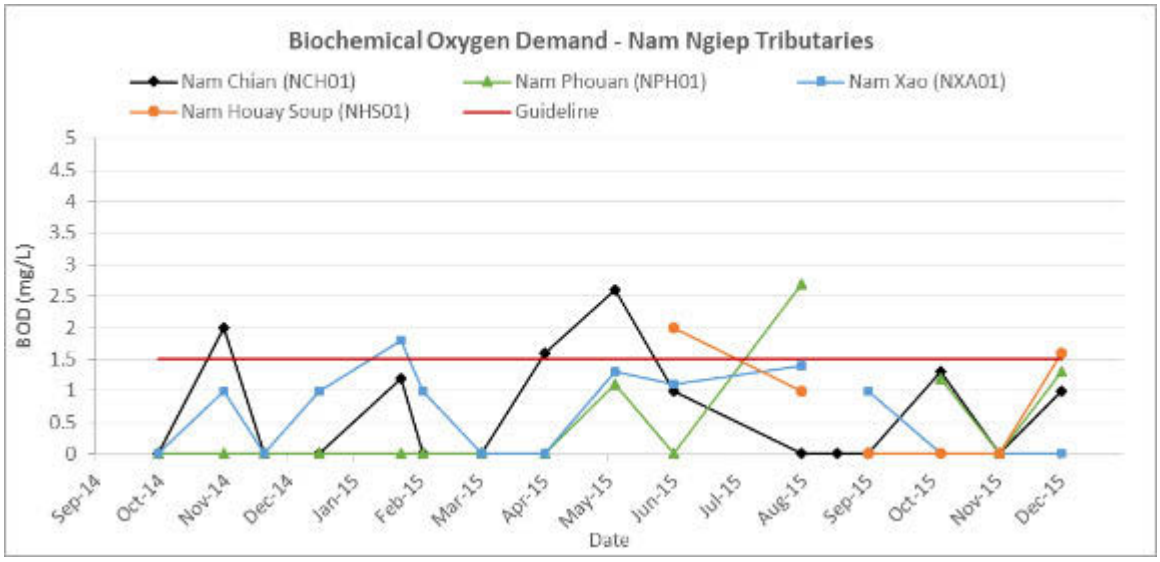
Nam Ngiep Surface Water main channel

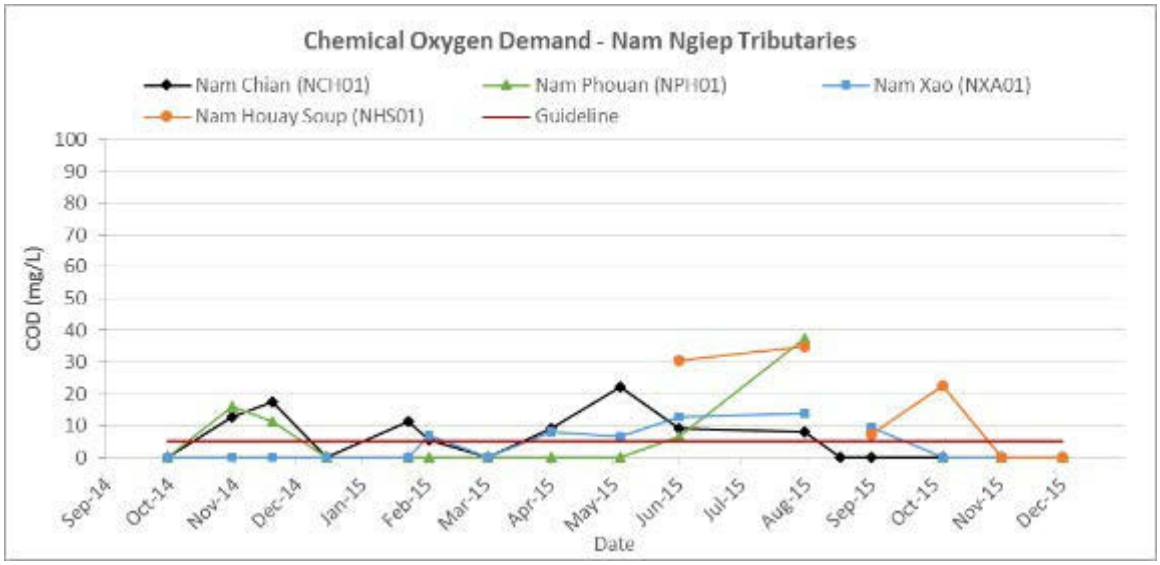


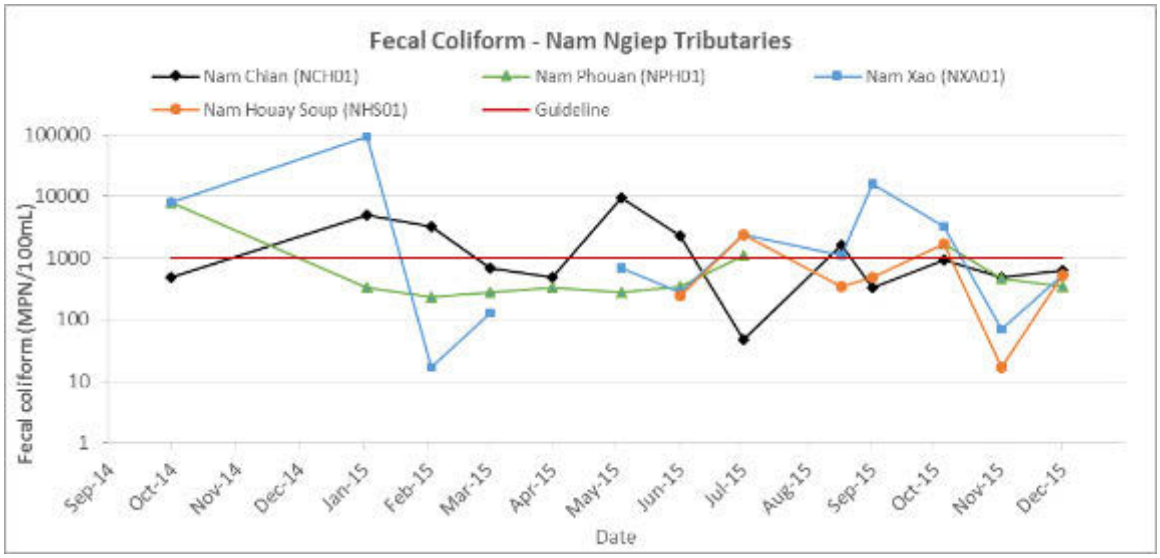


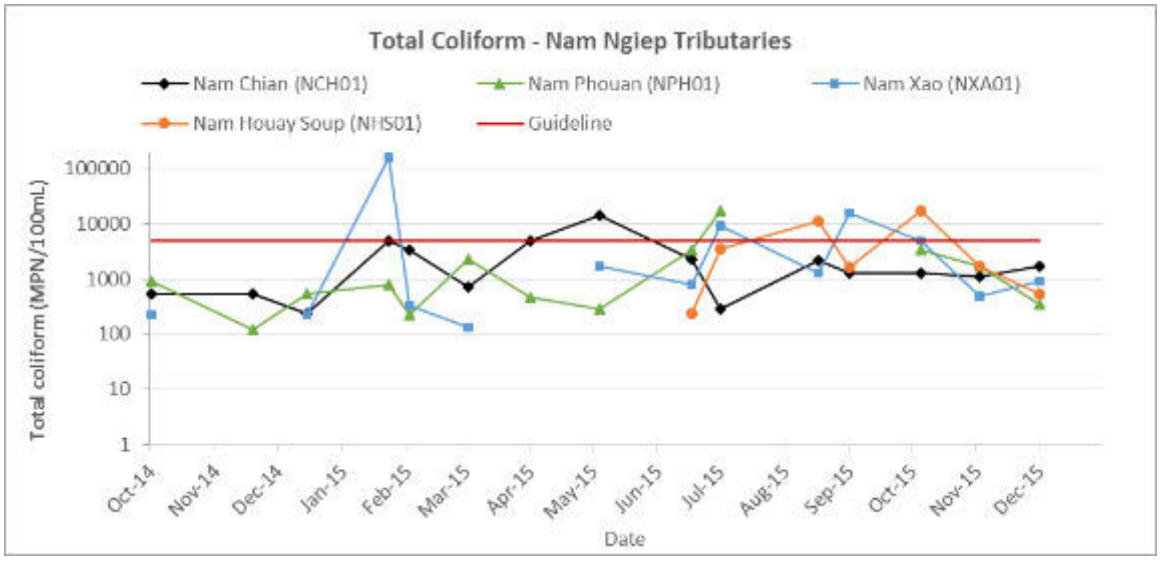


Key Water Quality Parameters for the Nam Ngiep Tributaries: Nam Chian, Nam Phouan, Nam Xao, Nam Houay Soup

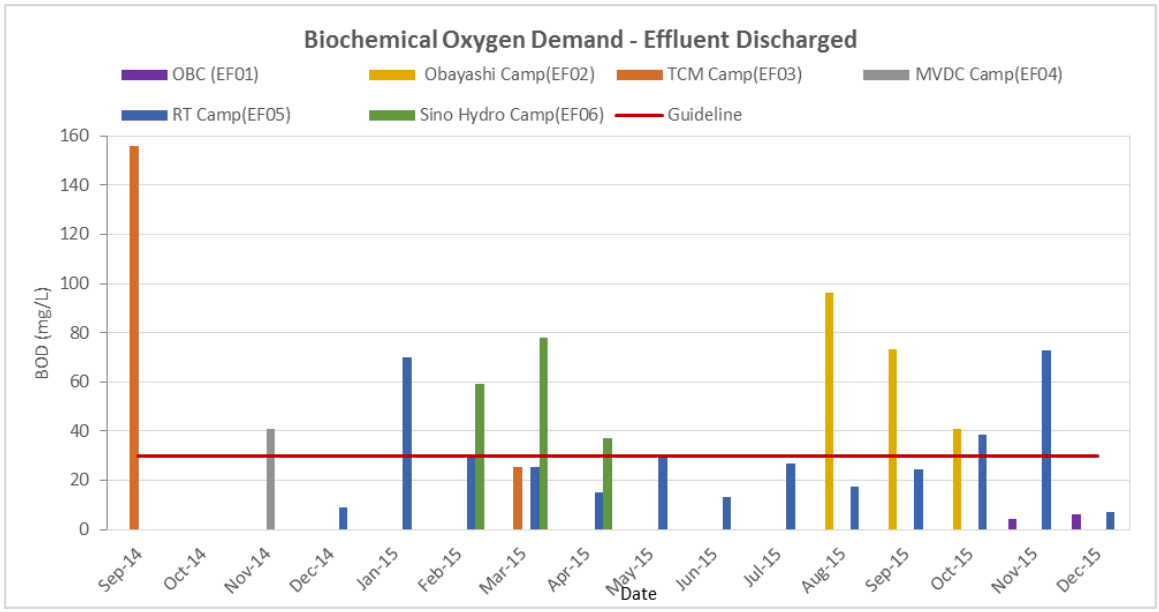


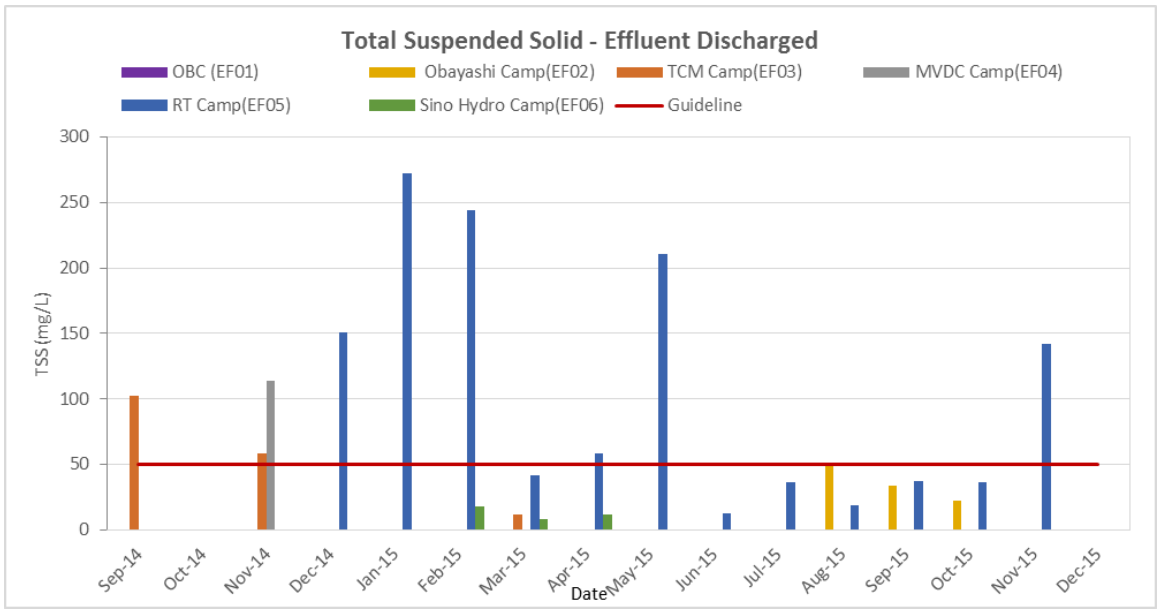

Chemical Oxygen Demand - Nam Ngiep Tributaries
Nam Chian (NCH01)
Nam Phouan (NPH01)
Nam Xao (NXA01)
Nam Houay Soup (NHS01)
Guideline
COD (mg/L)
Date

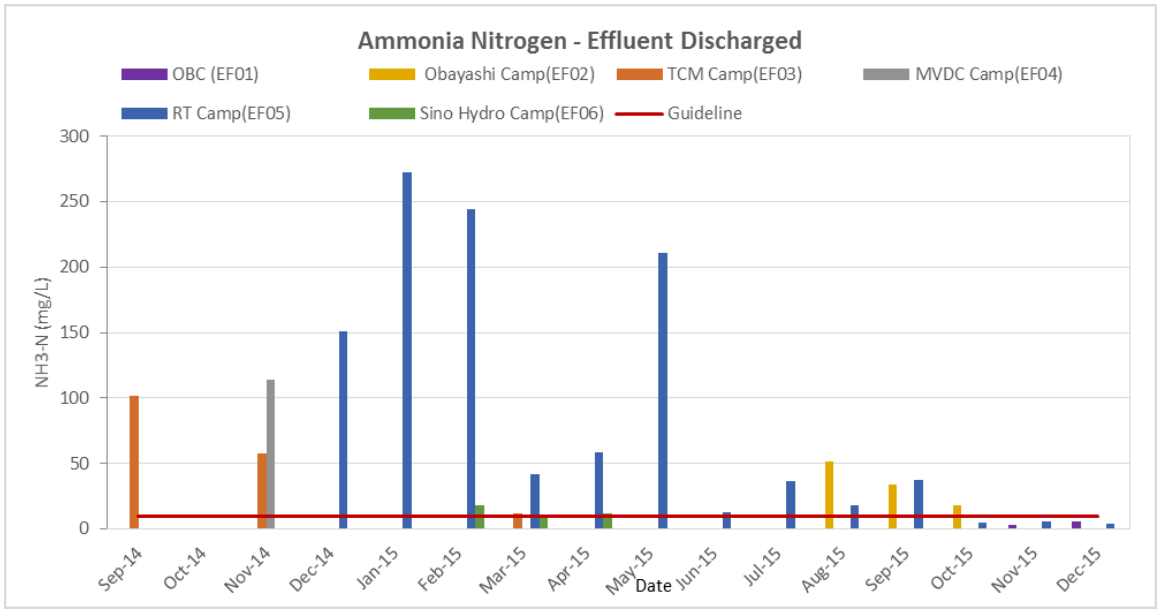

Fecal Coliform - Nam Ngiep Tributaries
Nam Chian (NCH01)
Nam Phouan (NPH01)
Nam Xao (NXA01)
Nam Houay Soup (NHS01)
Guideline
Fecal coliform (MPN/100mL)
Date

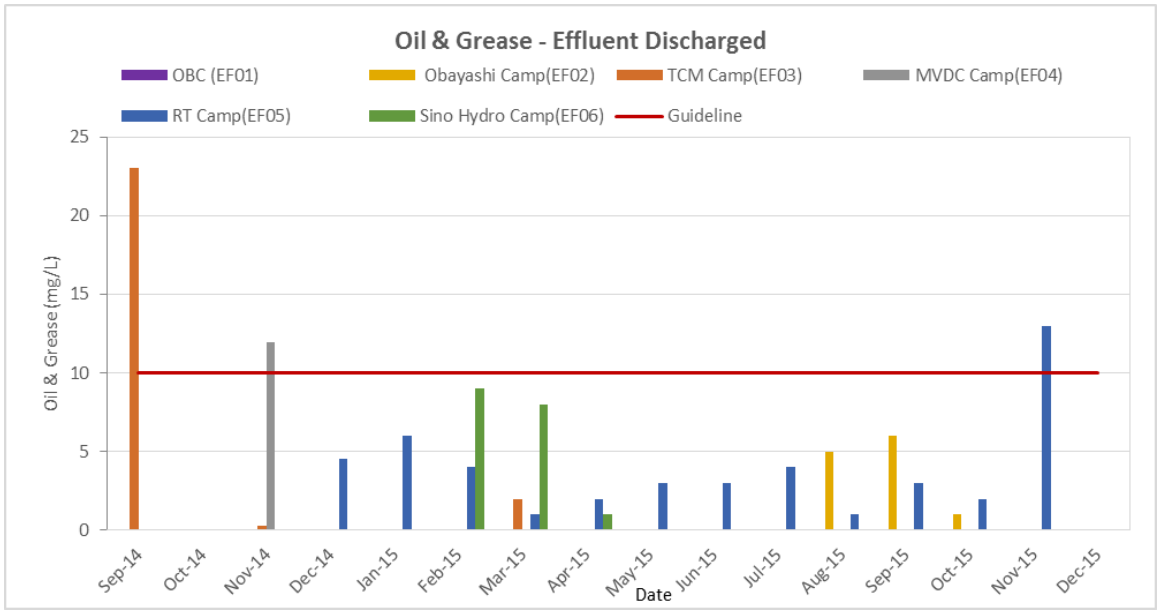

Total Coliform - Nam Ngiep Tributaries
Nam Chian (NCH01)
Nam Phouan (NPH01)
Nam Xao (NXA01)
Nam Houay Soup (NHS01)
Guideline
Total coliform (MPN/100mL)
Date

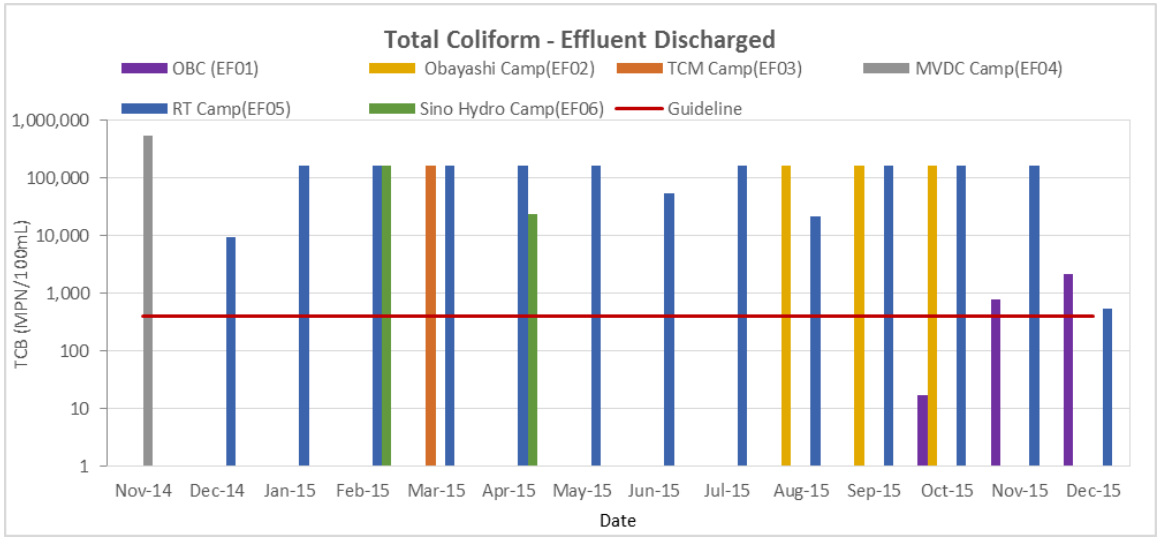
Camp Effluent Water Discharge Trends



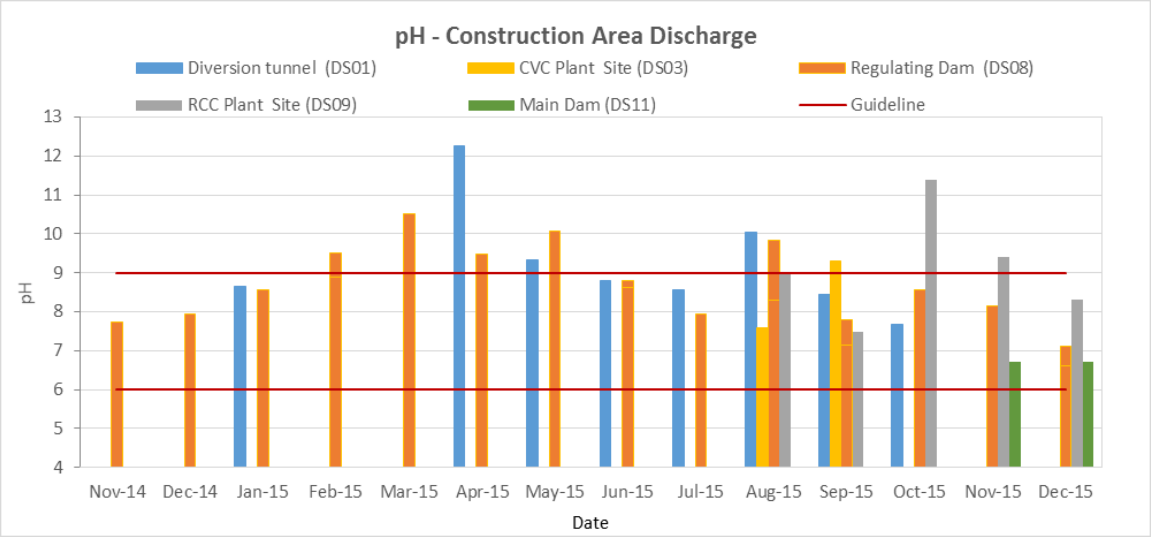


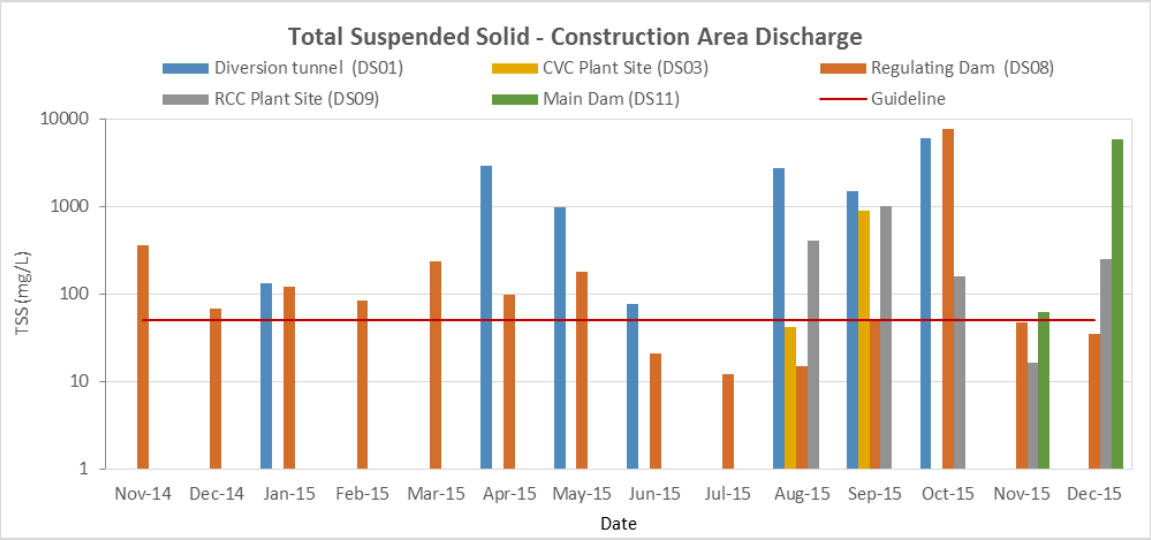

Ammonia Nitrogen - Effluent Discharged
OBC (EF01)
Obayashi Camp(EF02)
TCM Camp(EF03)
MVDC Camp(EF04)
RT Camp(EF05)
Sino Hydro Camp(EF06)
Guideline
NH3-N (mg/L)
300
250
200
150
100
50
0
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Date


Oil & Grease - Effluent Discharged
OBC (EF01)
Obayashi Camp(EF02)
TCM Camp(EF03)
MVDC Camp(EF04)
RT Camp(EF05)
Sino Hydro Camp(EF06)
Guideline
Oil & Grease (mg/L)
25
20
15
10
5
0
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Date


Total Coliform - Effluent Discharged
OBC (EF01)
Obayashi Camp(EF02)
TCM Camp(EF03)
MVDC Camp(EF04)
RT Camp(EF05)
Sino Hydro Camp(EF06)
Guideline
TCB (MPN/100mL)
1,000,000
100,000
10,000
1,000
100
10
1
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Date

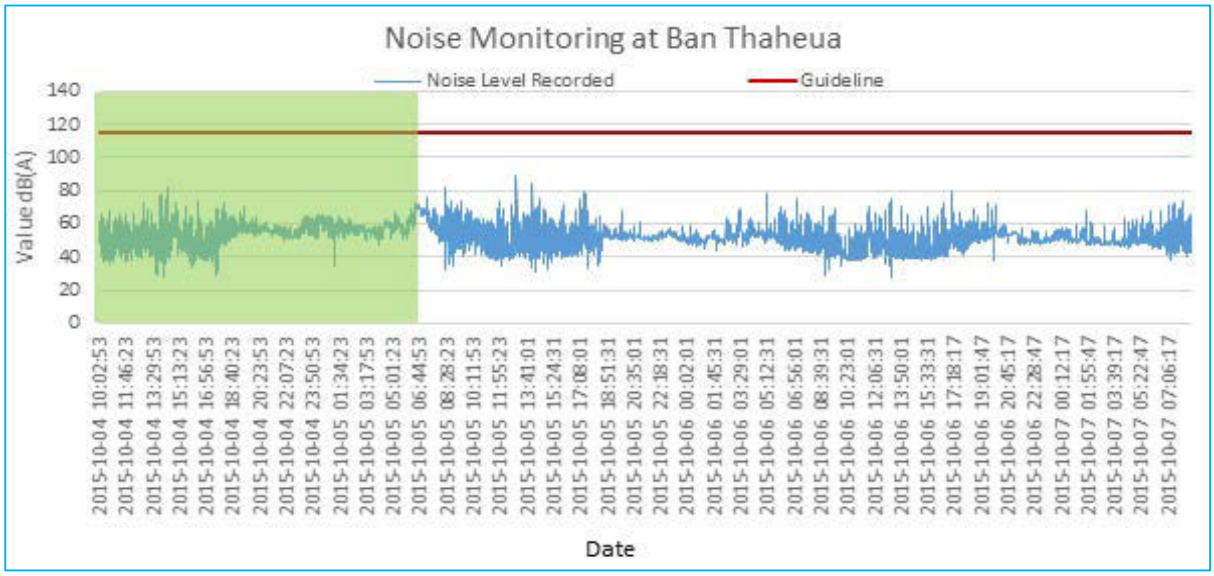
Construction Area Discharge Water Quality

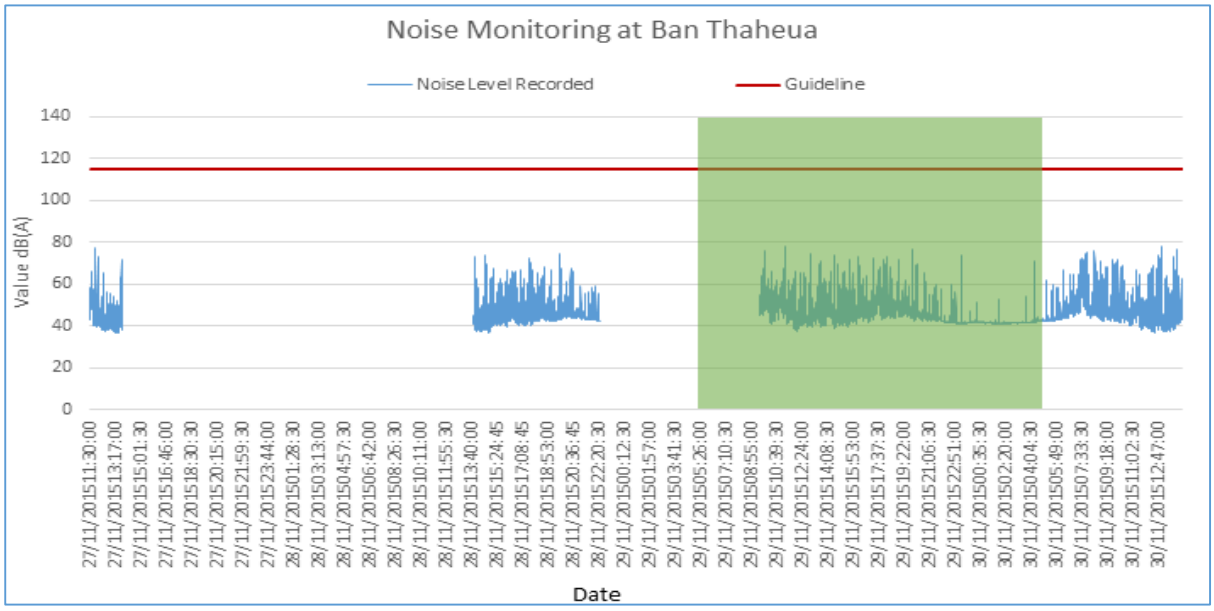


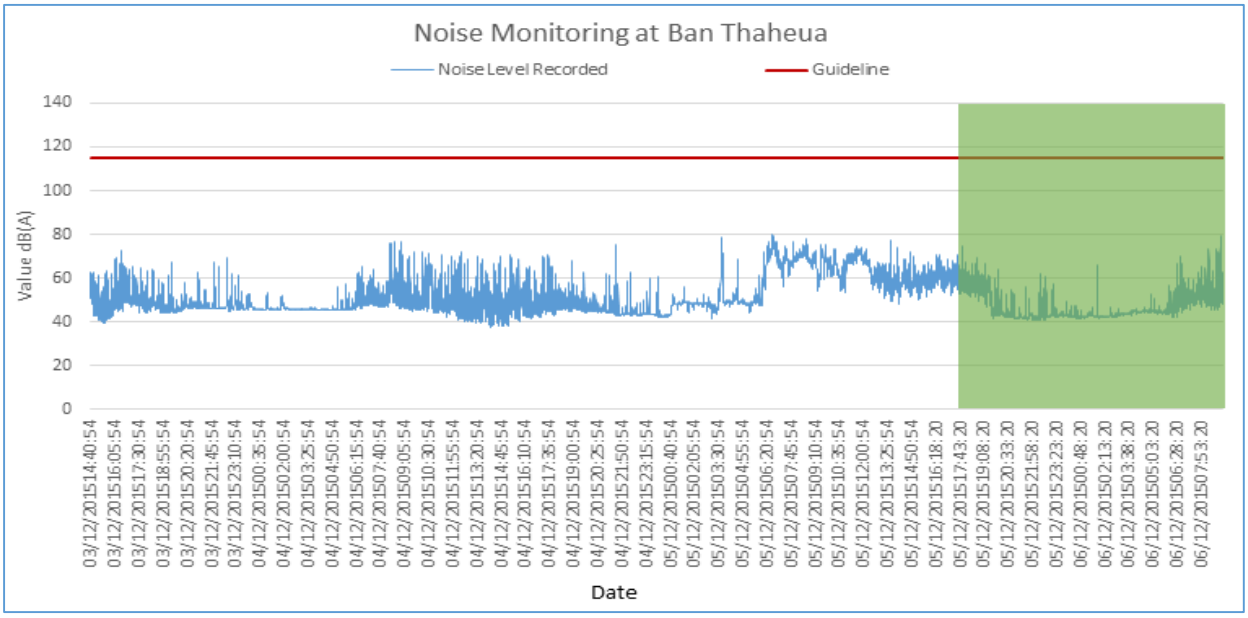


Appendix 7: Dust Emission Monitoring Over 72 Hours Period in Ban Thaheua, Hat Gnuin and Hatsaykham During October, November and December 2015

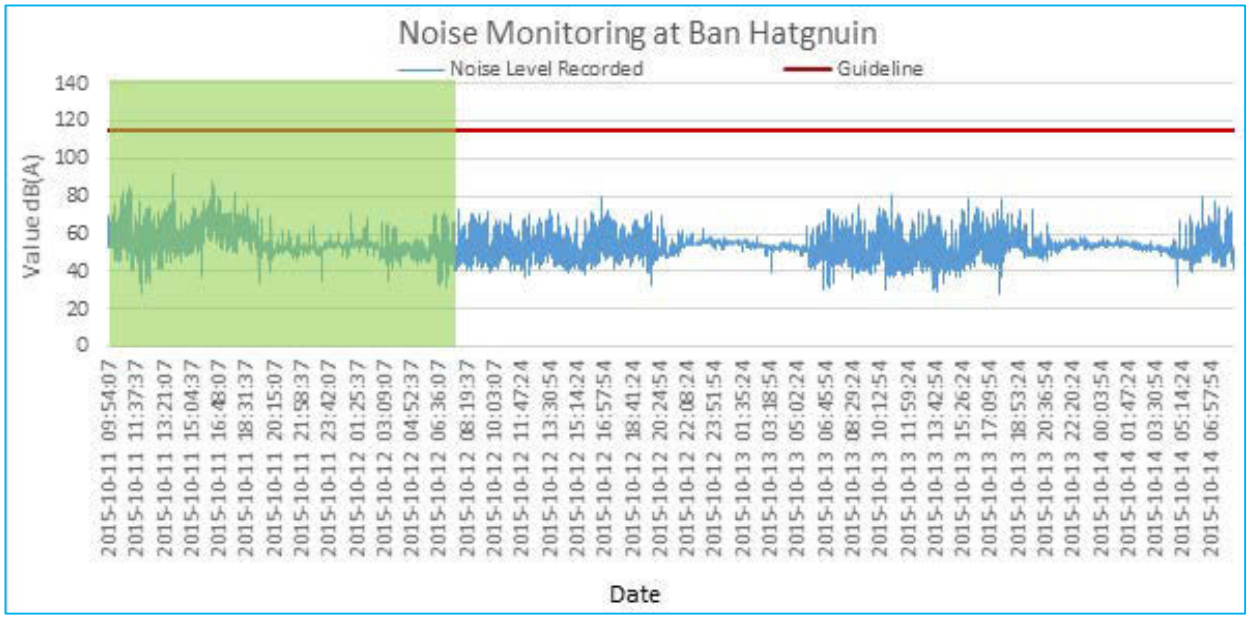
1. Ban Thaheau

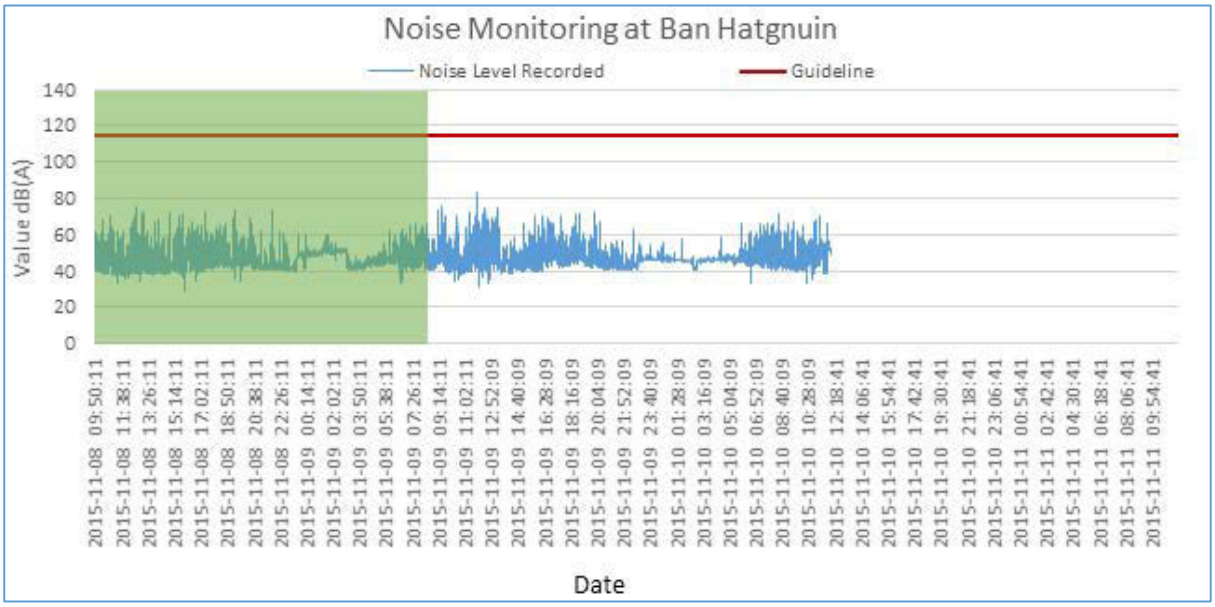

Noise Monitoring at Ban Thaheua
Noise Level Recorded
Guideline
Value dB(A)
Date

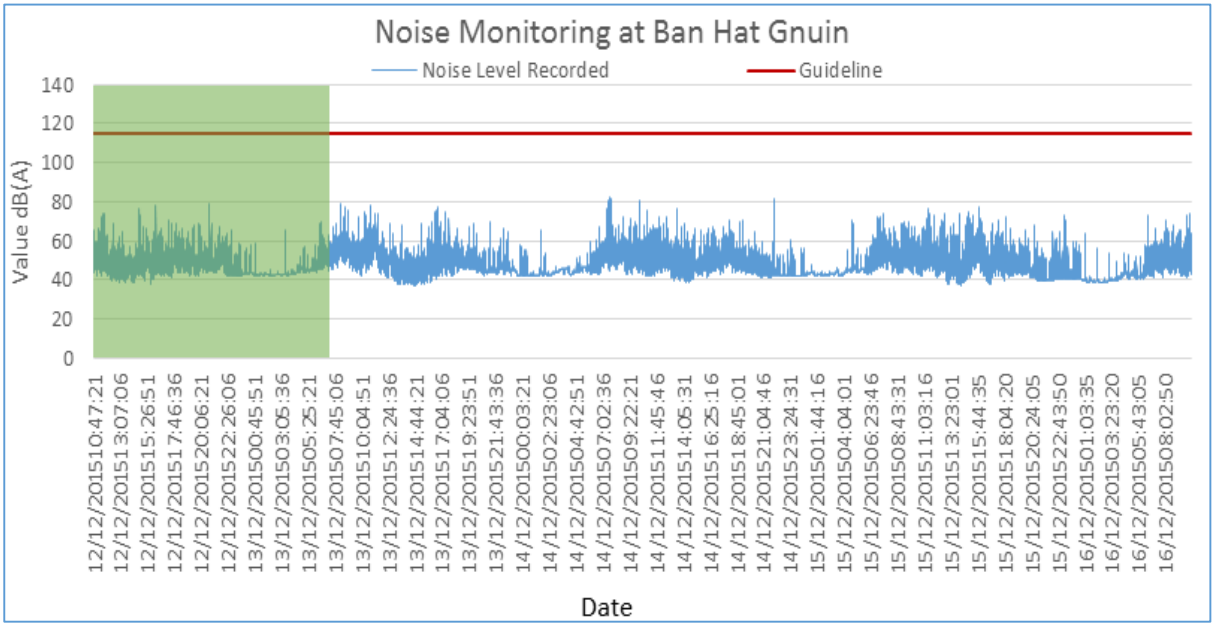

Noise Monitoring at Ban Thaheua
Noise Level Recorded
Guideline
Value dB(A)
Date



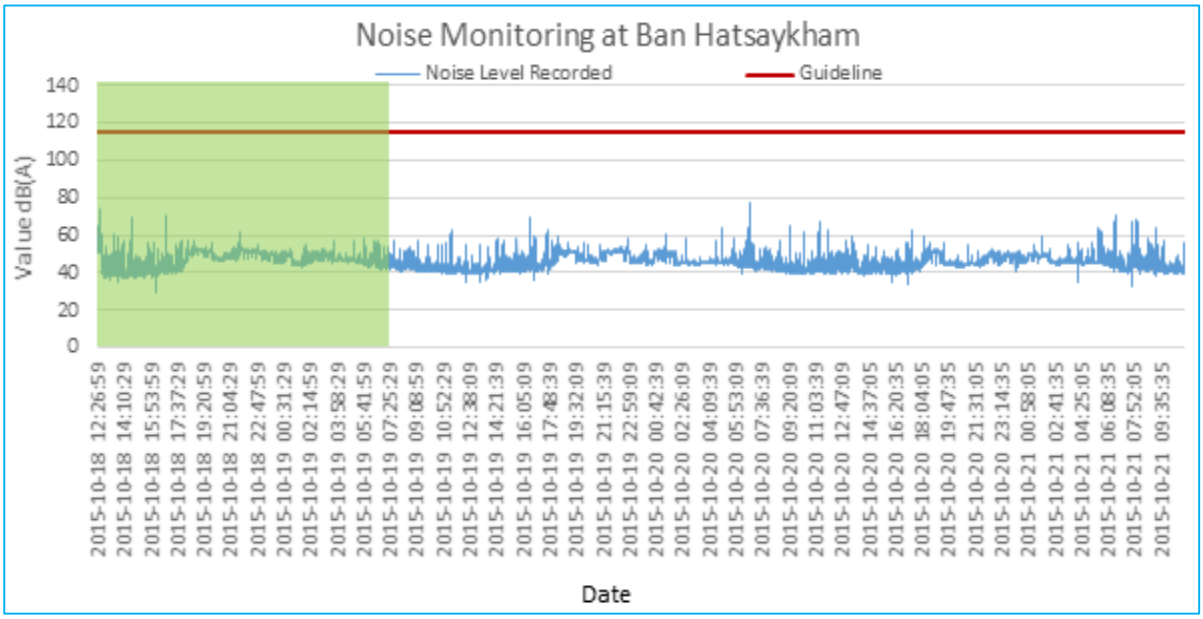
2. Ban Hat Gnuin



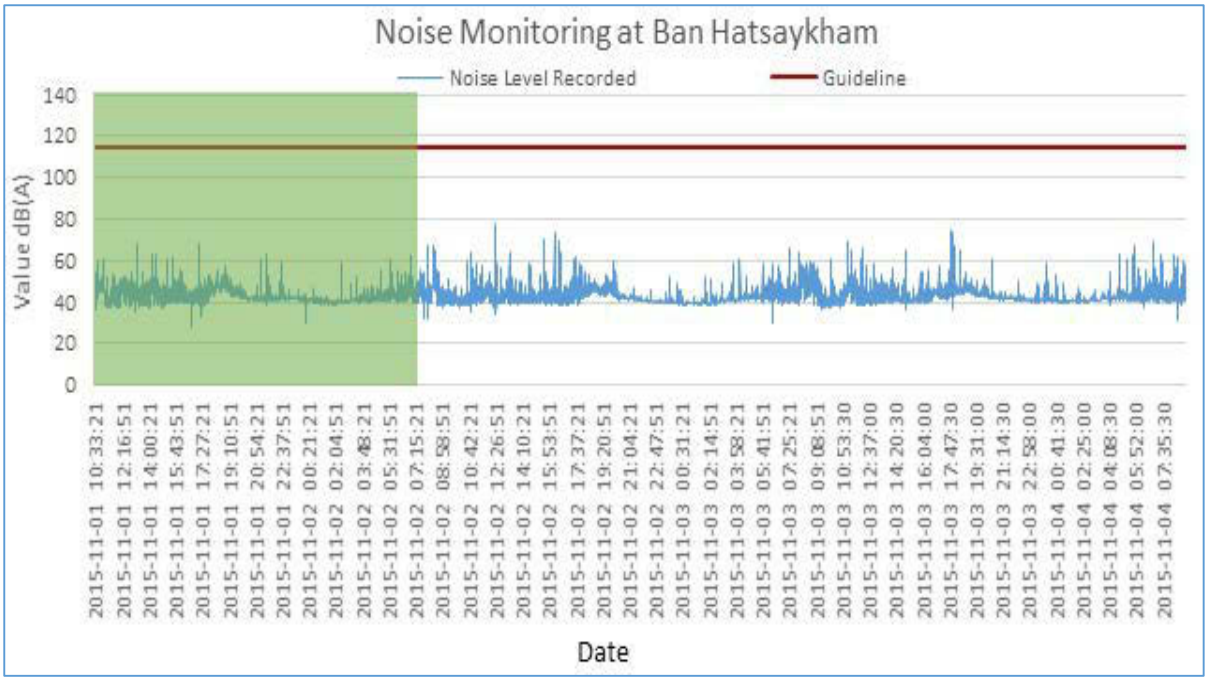


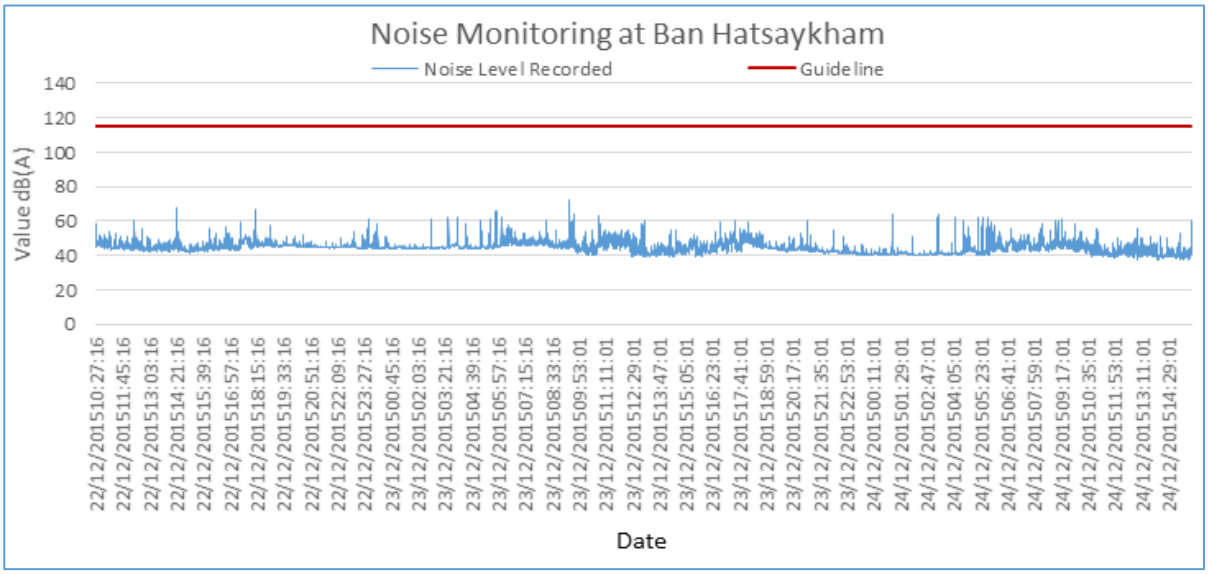


3. Ban Hatsaykham


Noise Monitoring at Ban Hatsaykham
Noise Level Recorded
Guideline
Value dB(A)
Date

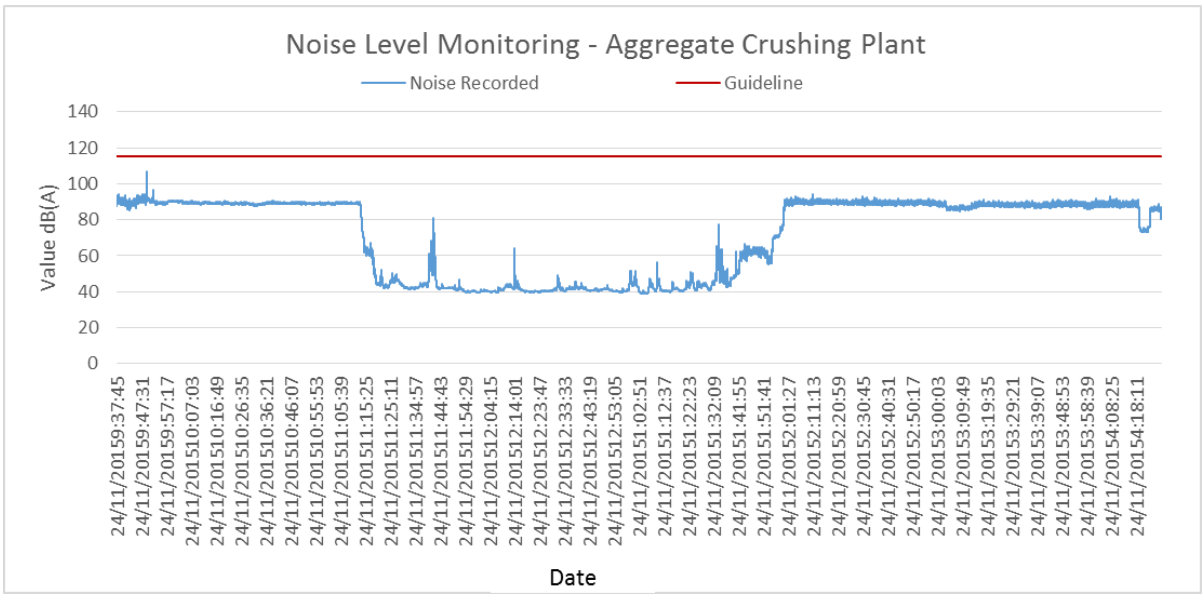
November

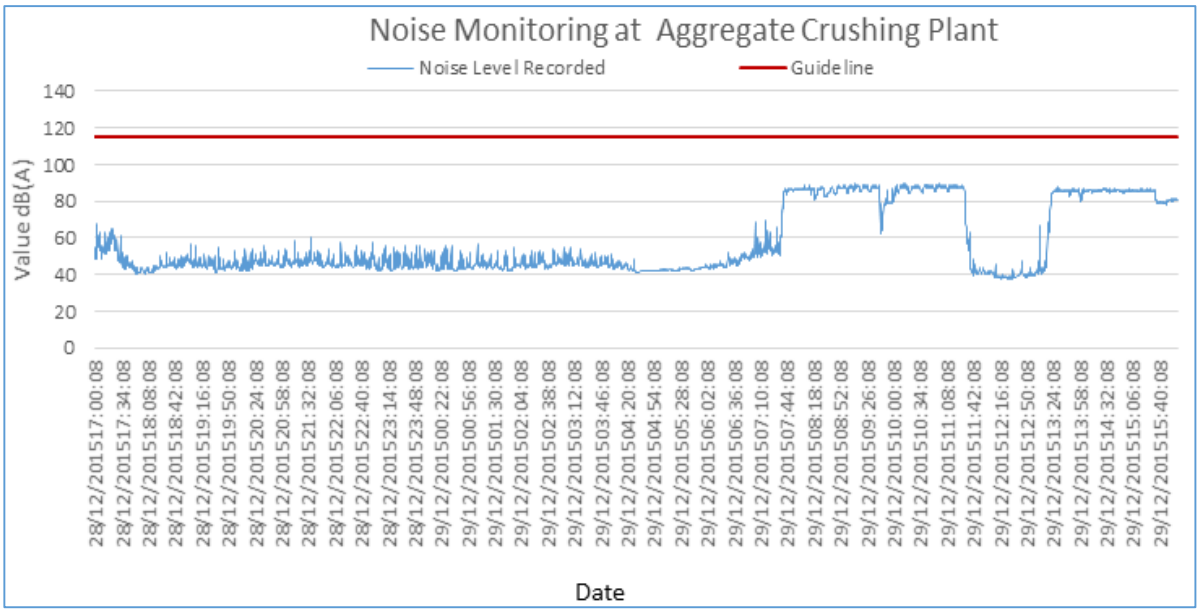

Noise Monitoring at Ban Hatsaykham
Noise Level Recorded
Guideline
Value dB(A)
Date



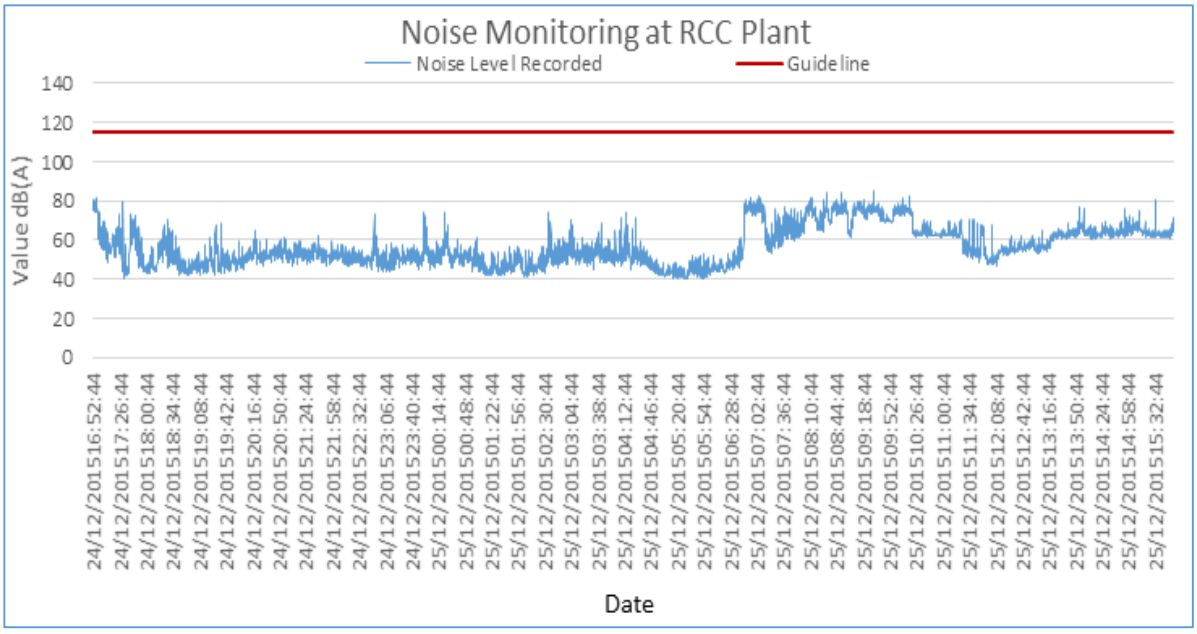
Construction Sites, November to December, 2015

1. Aggregate Crushing Plant

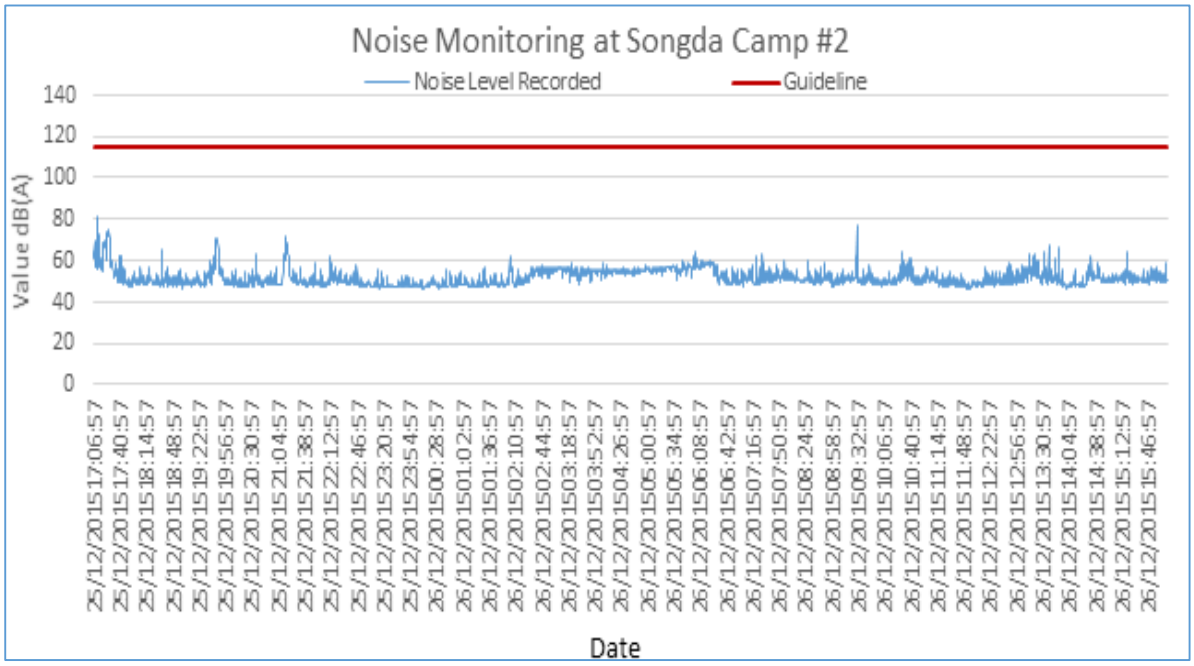




2. RCC Plant



3. Songda Camp #2



4. Sino Hydro Camp