NAM NGIEP 1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Environmental Management Monthly Monitoring Report

November 2016

					
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BBREVIATIONS / ACRONYMS

AIP	Annual Implementation Plan
ADB	Asian Development Bank
BBS	Biodiversity Baseline Survey
BAC	Biodiversity Advisory Committee
BOF	Biodiversity Offset Framework
BODM	Board of Directors Meeting
BOMC	Biodiversity Offset Management Committee
CA	Concession Agreement between the NNP1PC and GOL,
COD	Commercial Operation Date
CVC	Conventional Vibrated Concrete
CWC	Civil Works Contract
DEB	Department of Energy Business, MEM
DEPP	Department of Energy Policy and Planning, MEM
DEQP	Department of Environment and Quality Promotion, MONRE
DESIA	Department of Environmental and Social Impact Assessment, MONRE
DFRM	Department of Forest Resources Management, MONRE
DLA	Department of Land Administration, MONRE
EDL	Electricite du Laos
EDL PPA	Power Purchase Agreement between NNP1PC and EDL
EGAT	Electricity Generating Authority of Thailand
EGATi	EGAT International Company Limited
EIA	Environmental Impact Assessment
EMO	Environmental Management Office of ESD within NNP1PC
EMU	Environmental Monitoring Unit
EPF	Environmental Protection Fund
ERIC	Environmental Research Institute Chulalongkhorn University
ERM	Environmental Resource Management
ESD	Environmental and Social Division of NNP1PC
ESMMP	Environmental and Social Monitoring and Management Plan
GIS	Geographic Information Systems
IEE	Initial Environmental Examination
IMA	Independent Monitoring Agency

INRMP	Integrated Natural Resources Management Plan
ISP	Intergraded Spatial Planning
kV	kilo-Volt
LTA	Lender's Technical Advisor
m	metre
MEM	Ministry of Energy and Mines, Lao PDR
MONRE	Ministry of Natural Resource and Environment, Lao PDR
NCI	Non-Compliance Issue
NCR	Non-Compliance Report
NNP1PC	Nam Ngiep 1 Power Company Limited
NPA	Non-Profit Association
NPF	National Protection Forest
NTFP	Non-Timber Forest Products
OC	Obayashi Corporation
ONC	Observation of Non-Compliance
PONRE	Provincial Department of Natural Resource and Environment, MONRE
PPA	Power Purchase Agreement (between NNP1PC and EGAT)
PvPA	Provincial Protection Area
RCC	Roller Compacted Concrete
SIR	Site Inspection Report
SS-ESMMP	Site Specific Environmental and Social Monitoring and Management Plan
TD	Technical Division of NNP1PC
UXO	Unexploded Ordinance
WMF	Watershed Management Fund
WMP	Watershed Management Plan
WRPC	Watershed and Reservoir Protection Committee
WRPO	Watershed and Reservoir Protection Office
WWTS	Waste Water Treatment System

EXECUTIVE SUMMARY

The Environmental and Social Management and Monitoring Plan for the Construction Phase (ESMMP-CP) is being revised and finalised by NNP1PC and will be submitted to the Ministry of Natural Resources and Environment (MONRE) for approval by the end of December 2016.

During November 2016, the Environmental Management Office (EMO) of NNP1PC received a total of 17 SS-ESMMPs in 19 submissions. Out of these, seven SS-ESMMPs were accepted with conditions, one SS-ESMMP was returned for further improvements, and 11 SS-ESMMPs are under review and will be carried over into December 2016. In addition, NNP1PC-EMO issued a total of six Observations of Non-Compliances (ONCs) and one Non-Compliant Report Level 2 (NCR2). With a carry-over from October 2016, a total of 18 ONCs and three NCRs were active in November 2016. Out of these, eight ONCs and one NCR were resolved, 10 ONCs and two NCRs will be carried over into December 2016, and of these seven ONCs and two NCRs carried over were not resolved by the agreed deadlines.

The NNP1 laboratory construction was commenced in the third week of October 2016 with 22% progress by the end of November 2016. The procurement of the laboratory equipment from a supplier in Thailand was completed in mid-November 2016 and the equipment is expected to be delivered in the second week of December 2016. In addition, staff training on laboratory equipment operation and maintenance will be held in mid-December 2016 by the supplier from Thailand with participation of EMU staff from both Provinces of Xaysomboun and Bolikhamxay.

All construction camps had higher concentrations of total coliforms than the allowable effluent standard including the Owner's Village and Site Office during the first mission. In order to address the pending issues concerning the Wastewater Treatment Systems of the camps and turbid water treatment at the sediment ponds of the RCC Plant and Aggregate Crushing Plant, the management from NNP1PC-TD and ESD held a meeting on 24 November 2016 which was chaired by the Managing Director to discuss the corrective actions.

The improvements of the Wastewater Treatment Systems (WWTS) at Song Da 5 Camp No. 2 has almost been completed. The system is being built in accordance with the conceptual design prepared by an external consultant and the NNP1PC Instruction Letter (reference no. NNP1/0750-016/OBA/EPC-CE dated 12 October 2016). In addition, NNP1PC closely monitored the construction of new camps to ensure that they implement the same requirements as per NNP1PC Instruction Letter mentioned above.

The Waste Landfill operation have been improved. After the Contractors and their sub-contractors were instructed to properly segregate the waste prior to disposal, there was a decrease in the number of incidences of mixed waste disposal observed during the daily spot check and supervision. Approximately 145.2 m^3 of waste was disposed at the NNP1 Project Landfill during November 2016, an increase of 18.6 m^3 compared with October 2016.

The preparation of the Nam Ngiep 1 Watershed Management Plan (WMP) has continued with focus on finalizing the baseline and trend analysis. ADB recommended that further discussions with relevant GOL offices should wait until the completion of a full draft in late January 2017. It is expected that the current draft WMP will be discussed and reviewed by IAP, LTA, BAC during the upcoming mission in December 2016.

NNP1PC has prepared the Terms of Reference for the preparation of the Biodiversity Offset Management Plan (BOMP) incorporating comments from the BAC. NNP1PC has agreed with BAC recommendation that additional surveys should be designed by the BOMP consultant to seek information to shape the management content of the BOMP. The final draft TOR was submitted to ADB for review and approval prior to NNP1 procurement process.

Biomass clearance activities have been delayed. The work could not be started immediately after the rainy season due to: (1) as per the Prime Minister's Order No. 15 (ban on logging) the Hom District Governor issued a notice to NNP1PC to suspend the biomass clearance activity until it is clarified if the biomass clearance falls under the logging ban, (2) Hom District has requested that all remaining trees in future reservoir area with diameter greater than 20 cm shall be cut and stockpiled for the use of the Government, and (3) biomass clearance of areas that belong to the project affected people in Zone 2UR and Zone 2LR have to wait until compensation has been completed. This all currently affects about 70% of the biomass clearance areas.

Four meetings were held with Xaysomboun authorities to discuss the logging ban issue and an agreement was reached on 09 November 2016.

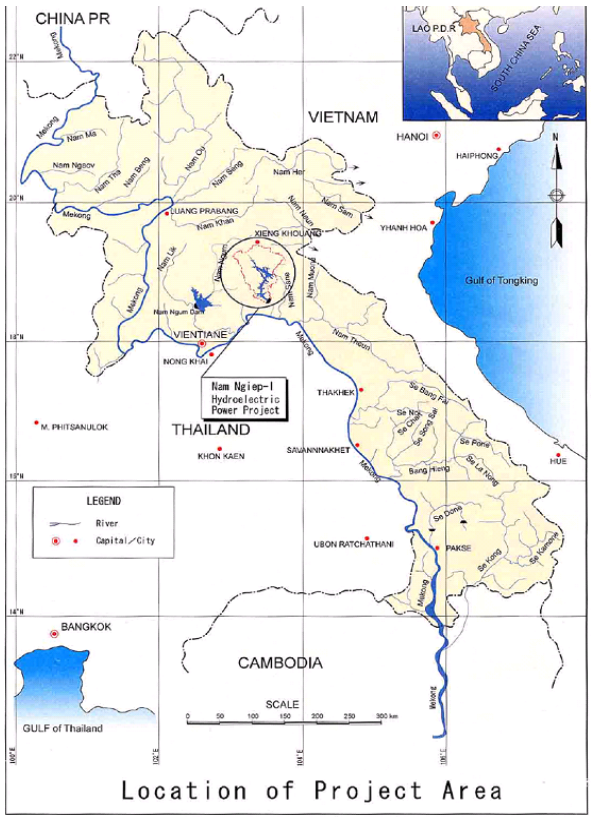
Biomass clearance resumed in third week of November 2016 in Block 1, 3 and 5 using manual clearing in Block 1 and machinery clearing in Block 3 and 5. By the end of November 2016, the biomass cutting was completed in around 9 ha in Block 3 and 10 ha in Block 5.

The fishery monitoring programme is progressing, and a database has been developed to support the future fish management programme as part of the in Nam Ngiep 1 Watershed Management Plan. Three types of survey were conducted during November 2016 including daily fish catch logbook monitoring, village interviews to verify the information in the logbook and community interview. The gathered information is being input into the database. Daily fish catch logbook monitoring is to analyse the amount fish catch each day and species using available data from previous month. The daily fish catch by individual household (HH) in Nam Ngiep river was estimated 3.3 kg/HH/day in October 2016. The estimated fish catch in Nam Ngiep basin for October 2016 is 87,000 kg, which is 20% higher than October 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 (Figure 1-1).

Figure 1-1: Location Map



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 outside Vientiane Capital. A 115-kV transmission line will be constructed by EDL from the Re-regulation Power Station to Pakxan substation over a distance of 40 km.

This Environmental Monthly Monitoring Report (EMMR) provides a summary of environmental monitoring activities and mitigation actions in November 2016. The EMMR 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 Government of Lao PDR (GoL) related agencies.

The EMMR and other related reports including related construction Site Specific Environmental and Social Monitoring and Management Plans (SS-ESMMPs) are publically disclosed on the Project website in line with the ADB and GoL Public Disclosure Policies. Hard copies of the final reports will also be available upon requests at the Project's main office in Vientiane Capital and field office in Pakxan, Bolikhamxay Province.

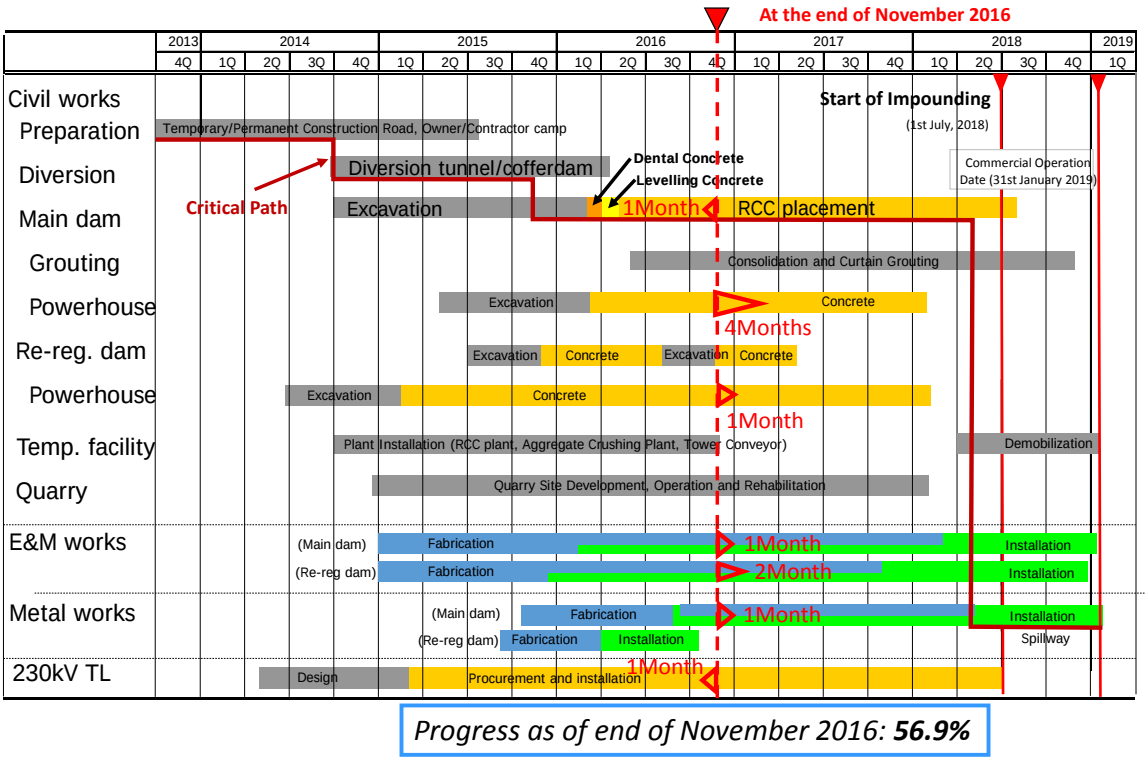
2. WORK PROGRESS OF PRINCIPAL CONTRACTORS

Construction Works for the Project are being carried out through four separate main construction contracts under the supervision of the Technical Division of NNP1PC. The four contracts are the Civil Works, the Electrical and Mechanical Works, the Hydraulic Metal or Hydro-mechanical Works and the 230 kV Transmission Line Works. Actual overall cumulative work progress until the end of

November 2016 was 56.9%[1] (compared to planned progress of 54.5%), based on achieved Interim Milestone Payments for all Contracts excluding the value of Advance Payments, varied works and other adjustments allowed under each Contract. In terms of the value of actual work done the percentage is slightly understated since work completed, but not paid, is not included.

The overall construction schedule and progress curve (by achieved Milestone Payments) are shown in Figure 2-1.

Figure 2-1: Overall Construction Schedule



2.1 Civil Work

The Civil Works Contract was executed between Obayashi Corporation and the Nam Ngiep 1 Power Company on 30 September 2013 and the NTP was issued on 03 October 2014. Excavation works of the main dam, the diversion tunnel and the re-regulation dam were commenced in October 2014 and completed in February 2016, following which the concreting works were commenced.

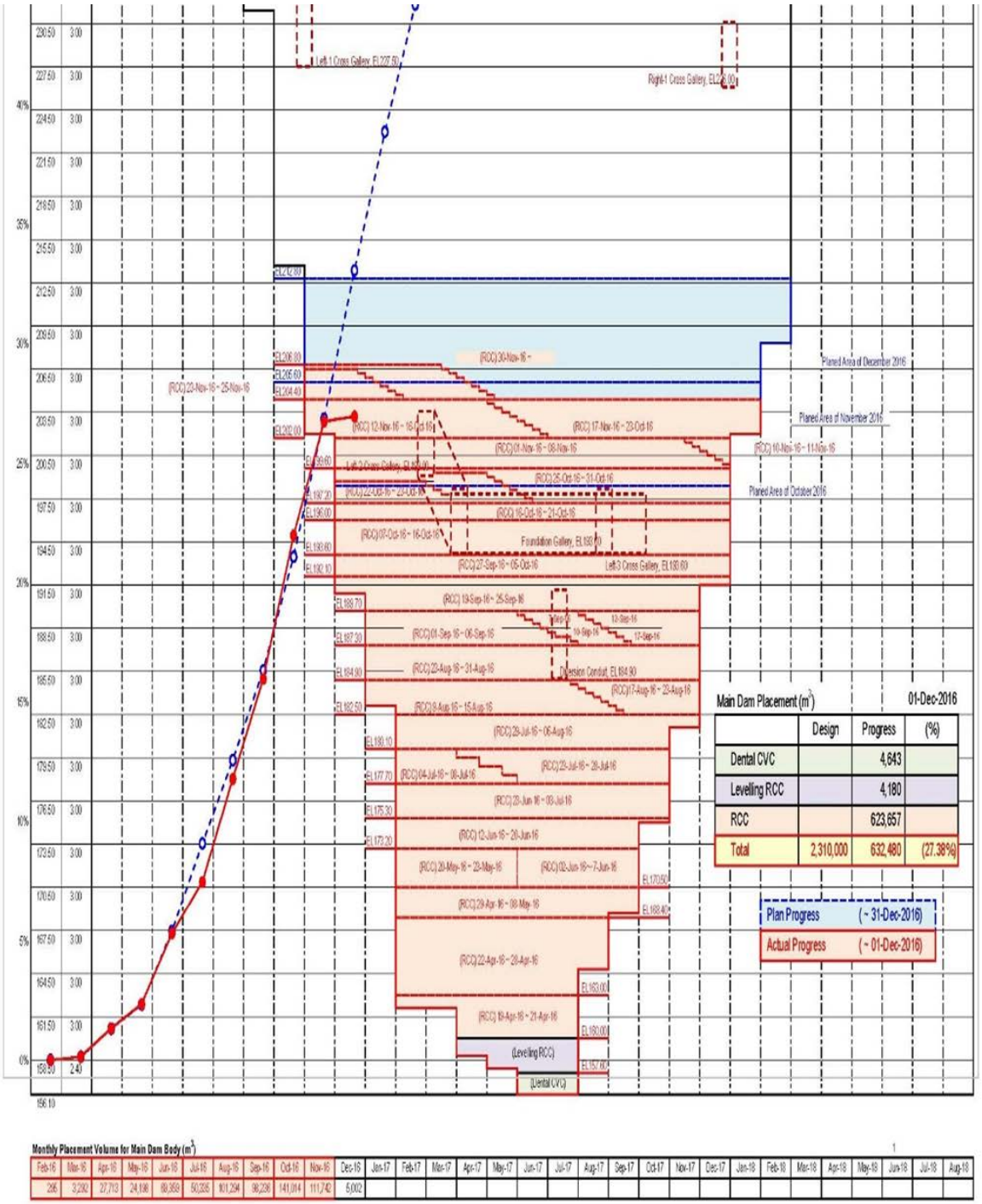
The cumulative actual work progress of the Civil Works until the end of November 2016 was 57.8% (compared to planned progress of 53.9 %) calculated in the same manner as described above for the value of achieved Interim Milestone Payments excluding advance payment.

[1] The progress to-date is calculated as (Cumulative Amount of Achieved Interim Milestone Payments) / (Total Agreed Original Price of Construction Contracts) and expressed as a percentage. These totals exclude varied works and other adjustments allowed under each Contract.

2.1.1 Main dam and power house

After starting the main dam excavation works in October 2014 on the left bank, the works were about one month advanced when diversion of the Nam Ngiep River was achieved at the end of October 2015. However, excavated volumes were 20% greater than expected and part of this additional work is necessary to construct a 'shear key' structure due to the weak layers of rock encountered in the dam foundation. Following the efforts on Site, the additional excavation work was completed at the end of February 2016.

Figure 2-2: Progress of Main Dam RCC Works as of 30 November 2016



The consolidation drilling and grouting for the main dam started in May 2016 and is ongoing. The progress is 61 % by achievement of total drilled length at the end of November 2016 as a proportion of the total expected drilling.

Table 2-1: Progress of Consolidation drilling and grouting at *23 November* 2016

Item	Total Anticipated Drilling (m)	Completed (m)	Progress (%)
Consolidation Grouting	16,510	10,167	61.6
Curtain Grouting	27,945	155	< 1

Main powerhouse sub-structure excavation works were completed in January 2016 and levelling concrete works was started in coordination with installation of the grounding system accordingly. Concrete embedment works for the penstocks was started in November 2016. Progress of the concreting works is proceeding well and is shown in Table 2-2 below.

Table 2-2: *Progress of Main Powerhouse Sub-Structure Concrete Works to 28 November 2016.*

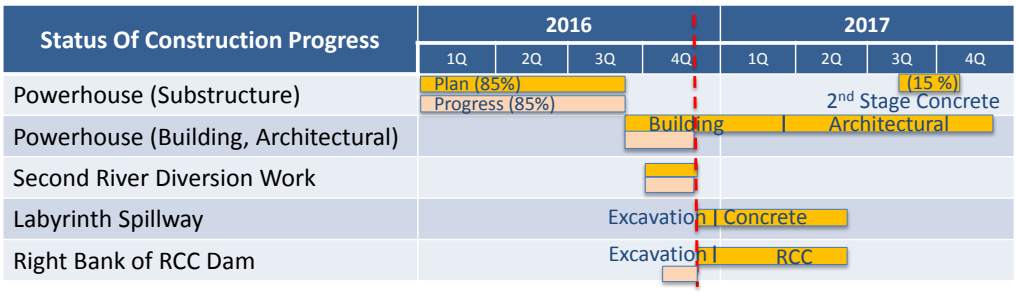
Location	Total Anticipated Volume (m^3)	Completed (m^3)	Progress (%)
Main Powerhouse	32,600	19,140	58.7
Penstock Embedment	6,977	1,240	17.8

2.1.2 Re-regulation dam and powerhouse

The re-regulation powerhouse excavation and cofferdam works for river diversion were commenced in early October 2014. The excavation works for the powerhouse on the left bank were fully completed down to El. 146.7 m at the end of February 2015.

Structural concrete works were commenced in March 2015, in coordination with installation of the grounding system. The progress of structural concrete works is shown in Table 2-3 below

Figure 2-3: Progress of Re-regulation Dam Powerhouse Works to 30 November 2016



Structure	Civil Structure	Spillway	Building			2nd River Diversion		Excavation			Left Bank Backfill
	Intake + PH + Tailrace	-	Column	Beam	Block Wall under El.177	Upstream	Down-stream	Right Bank RCC		River bed	Powerhouse and Switch Yard
	(m3)	(m3)	(m3)	(m3)	(m2)	(m3)	(m3)	Soil (m3)	Rock (m3)	(m3)	(m3)
Design	26,549	23,500	136	40	300	21,447	6,500	9,378	1,083	3,375	45,000
Completed	24,748	3,758	134	23	260	21,447	6,500	9,000	0	0	42,000
Progress %	**93**	**16**	**99**	**58**	**87**	**100**	**100**	**96**	**0**	**0**	**93**

The powerhouse concreting has advanced well and secondary concrete embedment for the draft tube liner was completed at the end of April 2016. The left bank structure was re-designed as roller compacted concrete (RCC) and was completed on 18 March 2016. Installation of the re-regulation waterway gate and stop log and re-regulation intake gate and structural concrete works for the

retaining wall to support the substation yard were completed in October 2016. Building superstructure work continued for the powerhouse with the commencement of construction of concrete columns.

2.1.3 Temporary work facility

2.1.3.1 DIVERSION TUNNEL INLET AND OUTLET

The diversion tunnel works which is over 600 m in length and 10 m in diameter were commenced in October 2014 by drill and blast techniques and completed in late September 2015. The river diversion took place on 31 October 2015 together with construction of earth-fill cofferdams upstream and downstream.

2.1.3.2 SECONDARY UPSTREAM COFFERDAM

The concrete placement works in both conventional and roller compacted concrete (CVC and RCC respectively) for the secondary upstream cofferdam were started in November 2015 and completed ahead of construction schedule in the middle of February 2016. The grout curtain works were completed on 02 April 2016.

2.1.3.3 PLANT YARDS

These comprise the Aggregate Crushing Plant, the CVC Batching Plant and the RCC Batching Plant. Foundation work and installation of equipment were completed at all the plant yards and the belt conveyor system from the RCC plant to the main dam was completed in early April 2016.

2.1.3.4 QUARRY

After removal of overburden the excavation of raw materials for aggregate crushing were started in July 2015. The nature and type of the rock being exploited is acceptable though unsuitable soil layers are removed to spoil disposal areas, and good quarry management continues.

2.1.3.5 DISPOSAL AREAS

The disposal area on the right bank has been available for operation since January 2015, as was the adjacent waste disposal area. The Disposal Area No.9 along Road P1 near the entrance of Road T5 started operation in April 2015. Unsuitable material from the quarry continues to be hauled to Disposal area No.6 and Disposal Area No.9 is being developed by the E&M Contractor as stated above.

2.2 Electrical and Mechanical Works

The EMWC was executed between Hitachi-Mitsubishi Hydro Corporation and NNP1PC on 13 June 2014 and the NTP was issued on 03 October 2014. The cumulative work progress of the Electrical and Mechanical Works by value until the end of November 2016 was 59.5% (the same when compared to planned progress of 59.5%).

Figure 2-4: *Installation of Draft Tube for 1 at the Main Powerhouse*

2.3 Hydro-Mechanical Works

The HMWC was executed between IHI Infrastructure Systems (IIS) and NNP1PC on 18 April 2014 and the NTP was issued to the Contractor on 03 October 2014. The cumulative work progress of the Hydraulic Metal Works until the end of November 2016 was 30.1% (compared to planned progress of 30.1%).
The latest progress of penstock pipes fabrication at IHI field shop as of the end of November 2016 is shown ***in Table 2-3*** below

Table *2-3: Progress of the penstock pipe fabrication at the IHI field shop as at the end of November 2016*

Item No.	Work Description	Work Progress (%)	Remarks
1.1	Assembly & Welding	47.0 %	Straight pipes
1.1	Painting	40.0 %	"
1.1	Delivery to Main Dam Laydown Area	13.7 %	"
1.1	Site Erection at Main Dam	13.7 %	Inclined part

Latest progress of steel gate installation for each work item at the end of December 2016 is shown ***in Table 2-4*** below.

Table *2-4: progress of steel gate installation at the end of* November *2016*

Item No.	Description	Installation Progress	Remaining Inspection
2.1	Re-regulation Waterway Gate	100 %	Wet Test
2.2	Re-regulation Waterway Stop log	100 %	Wet Test
2.3.1	Intake Gate	100 %	Wet Test
2.3.2	Intake Trash Rack	100 %	N.A.
2.4	Draft Gate	100 %	Wet Test

2.4 230kV Transmission Line Works

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 November 2016 was 67.1% (compared to planned progress of 69.8%).

In respect of the delay to commencement of most works the Contractor is studying its programme to ensure that sufficient resources are committed as the works progress to ensure that completion is achieved in good time. Onset of daily rains has made access to all areas difficult but the Contractor follows its revised acceleration schedule, after the progress for the construction of tower foundations slowed after April, 2016 (See Figure 2-6 below)

Figure 2-5: Cumulative Work Progress of Tower *Foundation (Original Planned and Actual)*

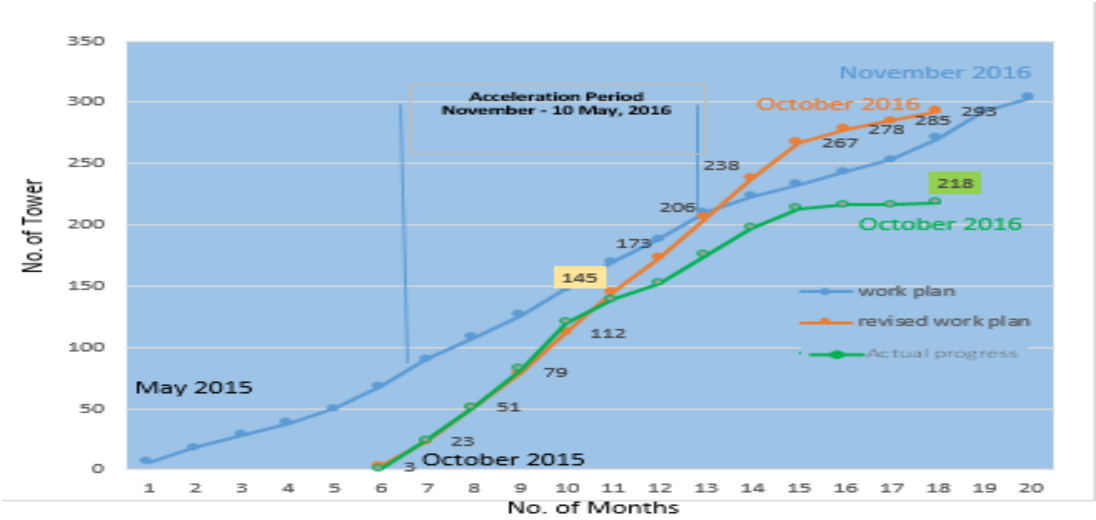
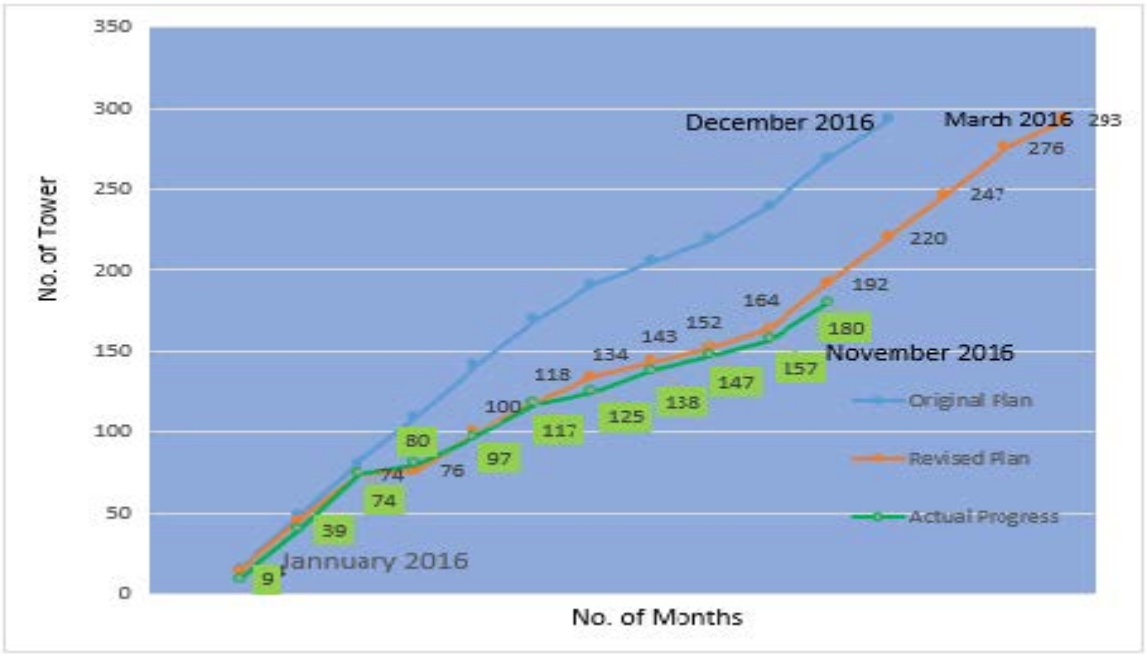


Figure 2-6: *Cumulative Works Progress (Revised Planned & Actual)*

Figure 2-7: *Revised Cumulative Works Progress of Tower Erection (Planned & Actual)*



3. ENVIRONMENTAL MANAGEMENT MONITORING

3.1 Compliance Management

3.1.1 ESMMP-CP Update 2016

The Environmental and Social Management and Monitoring Plan for the Construction Phase (ESMMP-CP) is being revised and finalised by NNP1PC and will be submitted to the Ministry of Natural Resources and Environment (MONRE) for approval by the end of December 2016.

3.1.2 Site Specific Environmental and Social Management and Monitoring Plans

During November 2016, the Environmental Management Office (EMO) of NNP1PC received a total of 17 SS-ESMMPs in 19 submissions. Out of these, seven SS-ESMMPs were accepted with conditions, one SS-ESMMP was returned for further improvements and, 11 SS-ESMMPs are under review and will be carried over into December 2016.

Table 3-1: SS-ESMMPs and review status in November 2016

Title	Date Received	Status	Comments
SS-ESMMP for Construction of Zhefu Warehouse	04 November 2016 (1st revision)	14 November 2016 No objection with conditions	Provide detailed design of the drainage control system and method statement of the warehouse operation
SS-ESMMP for Fabrication Work of Concrete Weight for Overhead Traveling Crane Load Test	03 November 2016 (1st submission)	23 November 2016: No objection with conditions	Provide detailed design of the waste water treatment system (WWTS) including drainage ditch, oil/grease trap and sediment pond. Revise site location map.

Title	Date Received	Status	Comments
SS-ESMMP for Curtain Grouting Works at Main Dam	10 November 2016 (4th submission)	Under review	
SS-ESMMP for Re-regulation Power Station Second River Diversion and Excavation at the Right Bank and Centre Bank	10 November 2016 (2nd submission)	Under review	
SS-ESMMP for Construction of Quarry Site	09 November 2016 (1st submission)	Under review	
SS-ESMMP for Installation work of embedded piping for main power station	16 November 2016 (2nd submission)	Under Review	
ESMMP update (R3) from HM Hydro Contractor	10 November 2016 (3rd submission)	Under Review	
SS-ESMMP for Construction of Tractor road at HSRA	28 November 2016 (2nd submission)	Under Review	
SS-ESMMP for Construction of Intake Mount at Houay Soup Resettlement Site	17 November 2016 (1st submission)	Under Review	
SS-ESMMP for Closing of Borrow Pit Area at Corner of P1 & P1A Road beside the Re-regulation Dam	29 November 2016 (1st submission)	Under Review	
SS-ESMMP for Operation and Maintenance Works of RCC Plant	10 November 2016 (3rd submission)	Under Review	
SS-ESMMP for Biomass Clearance at Reg-regulation Pond	28 October 2016 (1st submission)	Return with comments on 08 November 2016	Revise the whole document including most of the Appendices to be consistent with the NNP1 Re-regulation Pond Biomass Removal Works
	30 November 2016 (2nd submission)	Under Review	
SS-ESMMP for Building Construction at Main Powerhouse	30 July 2016 (1st submission)	No Objection with Conditions on 11 November 2016	Provide information of sanitary facilities (toilet septic tank and wastewater treatment system)

Title	Date Received	Status	Comments
	30 November 2016 (2nd submission)	Under Review	
SS-ESMMP for Paddy Field Development of 48 ha for 2LR People in the Resettlement Site	15 November 2016 (1st submission)	No Objection with conditions on 01 December 2016	- Indicate the management method of trees and waste vegetation; - Maintain riparian vegetation to control soil erosion and sedimentation
SS-ESMMP for Installation Work of 80 Ton Electrical Overhead Traveling Crane for Re-regulation Power Station	21 November 2016 (1st submission)	No Objection with Conditions on 29 November 2016	Improve camp management by completing the construction of Wastewater Treatment System, sanitation and waste management
SS-EMMP for Land Levelling (Cutting and Filling) for 90 House Plots at 2LR-Lower Reservoir Village and Health Centre at Resettlement Site	28 November 2016 (1st submission)	No Objection with Conditions on 30 November 2016	- Indicate the proposed stockpile locations for topsoil, spoil, cleared vegetation and trees; - Provide a drawing of the open ditches, drainage systems and sediment ponds
SS-ESMMP for the Supply and Installation Material for Natural Grass Soccer Field	21 November 2016 (1st submission)	No objection with conditions on 29 November 2016	- Complete the aspects of the Environmental Assessment Checklist; - Indicate the grass species to be used; and - Incorporate the detailed drawing and location of temporary toilet.

3.1.3 Compliance Report

In November 2016, NNP1PC-EMO issued a total of six Observations of Non-Compliances (ONCs) and one Non-Compliant Report Level 2 (NCR2) which was the same number of issues in October 2016. With a carry-over from October 2016, a total of 18 ONCs and three NCRs were active in November 2016. Out of these, eight ONCs and one NCR were resolved, 10 ONCs and two NCRs will be carried over into December 2016, of these seven ONCs and two NCRs carried over were not resolved within the agreed deadlines. NNP1PC-EMO will follow up with the Contractors to resolve the remaining issues in December 2016.

The carried-over ONC and NCR from October 2016 into November 2016 are summarized in Table 3-2 below.

Table 3-2: Carry-over ONC from October 2016 into November 2016

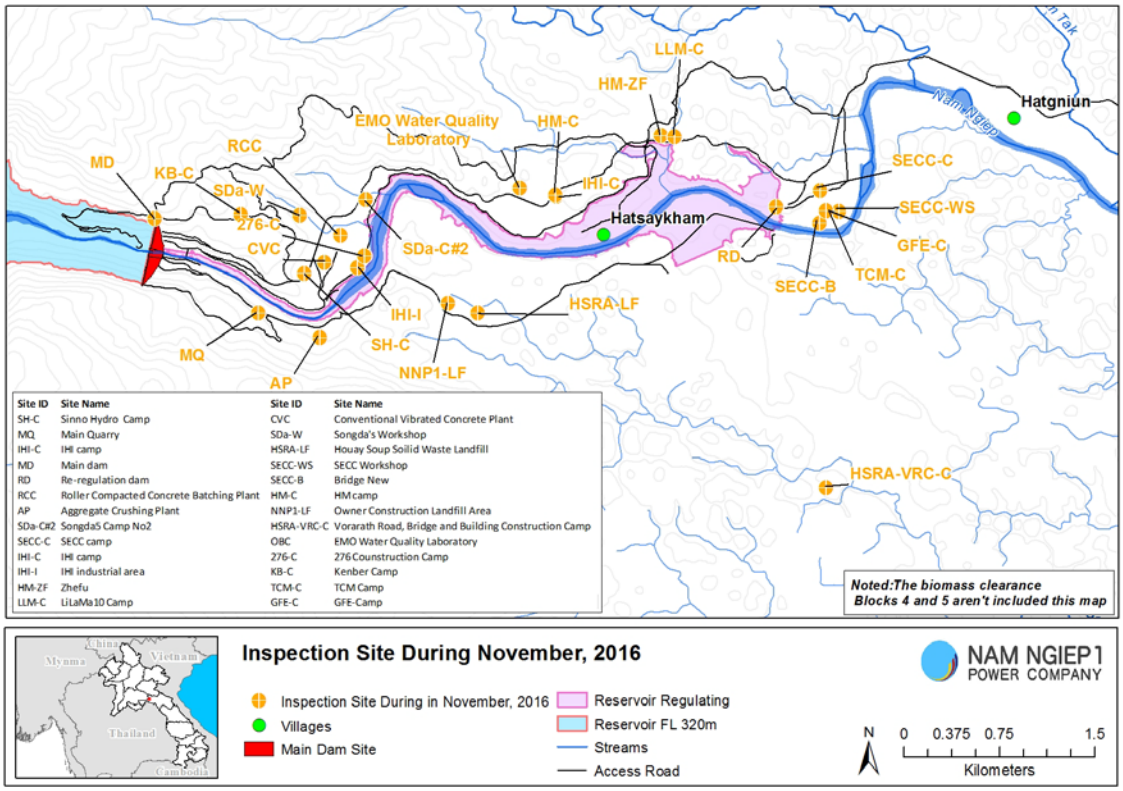
Site ID	Issues	Reporting	Actions
Song Da 5 Camp No.2	The WWTS construction was not consistent with the proposed design (ON_OC-0085). 1st inspection date: 02 June 2015 Latest follow up: 22 November 2016	1 ONC (Pending)	- NNP1PC-TD sent an instruction letter Ref. No.: NNP1/0750-016/OBA/EPC-CE dated 12 October 2016 to the Contractor for improving the WWTS by the end of November 2016. The priority camps are Song Da 5 Camp No.1 and Camp. No.2 followed by the remaining camps in line with the required improvement plan recommended by an external Thai Expert (Mr. Pipat). - The construction of chlorine contact tanks and monitoring tanks at those two camps is about 80% complete
V&K Camp	Insufficient capacity of waste water treatment ponds to handle the operation of the V&K camp (ON_OC-0087). 1st inspection date: 02 June 2015 Latest follow up: 22 November 2016	1 ONC (Pending)	The improvement of the WWTS in this camp shall follow the Thai expert's recommendations
HM Hydro Subcontract Worker Camp (LALIMA 10 Camp)	The Contractor commenced the construction of the camp's WWTS without submitting revised detailed designs and updated SS-ESMMP responding the NNP1P-EMO's comments (ON_HM-0004). 1st inspection date: 25 May 2016 Latest follow up: 17 November 2016	1 ONC (Pending)	- Submit the revised detailed designs and updated SS-ESMMP - improvement requirements shall be incorporated in the 3rd revision of SS-ESMMP according to Owner's Comment Sheet
	3. The LILAMA 10 Camp is accommodating 11 workers, but the construction of the Waste Water Treatment System (WWTS) remained incomplete (NCR_HM-0001) 1st inspection date: 28 September 2016 Latest follow up: 26 October2016	1 NCR level 1 (Pending)	The WWTS improvement was discussed during the Monthly Meeting scheduled on 09 November 2016 to ensure that improvement actions are in full compliance with the NNP1's instruction letter Ref. No.: NNP1/0750-016/OBA/EPC-CE dated 12 October 2016.
RCC Plant Yard	Lack of proper sedimentation facilities to improve the turbid water quality generated from the site (ONC_OC-0217) 1st inspection date: 28 June 2016 Latest follow up: 22 November 2016	1 ONC (Pending)	- The 3rd submission of the SS-ESMMP for Operation and Maintenance of the RCC Plant is under EMO's review. The Contractor is required to: - Follow the agreed actions specified in previous issued Site Inspection

Site ID	Issues	Reporting	Actions
			Report. The contractor is required to frequently clean-up the sediment ponds when observed at 60% full, and regularly remove the dried sediment from drying beds to keep space for incoming sediment from the clean-up of the ponds. - Submit a record sheet which documents the frequency of sediment clean –up by the Contractor for NNP1PC (TD and EMO) record and verification by 17/10/2016.
Aggregate Crushing Plant	Inadequate maintenance and implementation of agreed corrective actions on controlling the sediment pond at the Aggregate Plant below the spoil disposal area no.7; Improper monitoring and maintenance of the said sediment pond resulted in continuously discharging turbid water from the sediment pond into Nam Ngiep River. This is a serious non-compliance with CA annex C and ESMMP-CP 2014 (NCR_OC-0013) 1st inspection date: 08 November 2016 Latest follow up: 22 November 2016	1 NCR level 2 (New)	1. Repair sedimentation pond's embankment to stop turbid water discharge into to Nam Ngiep River by 25 November 2016; 2. Daily clean-up of sediment in the sediment pond before it reaches 60% of sediment pond capacity and dispose at designated spoil disposal area No. 6; 3. Provide sediment clean up records to NNP1 including (1) daily clean up frequency and (2) amount of collected sediment on a Weekly basis; 4. A design for installing at least four baffles in the sediment pond to aid settlement of sediments shall be proposed by 22 November 2016. If the effluent quality results still show no significant improvement (turbidity remains high), the baffles need to be installed.
SECC Camp (Access Bridge Contractor)	SECC Contractor would finish its construction activities by the end of November 2016. To ensure that SECC's site demolition is done properly, the Contractor was instructed to prepare and submit a Site Decommissioning Plan to EMO for review and approval at least 7 days prior to the commencement of decommissioning work (ONC_SECC-0039) 1st inspection date: 06 September 2016	1 ONC (Pending)	On 30 November 2016, EMO provided comments on the submitted Preliminary Site Decommission of SECC Contractor; it is noted that the SECC's workshop, concrete batching Plant and the workers' camp will be demolished. The site office and staff accommodation will be maintained until 25 December 2017 for the guarantee period of the bridge construction.

Site ID	Issues	Reporting	Actions
	Latest follow up: 24 November 2016		
Re-Regulation Dam (Borrow Pit Area)	The Contractor started operating a borrow pit with inadequate environmental management practices as indicated below: - Topsoil was stockpiled at sensitive erosion area; - The cut slope area had no berm and cut-off drains; - Spoil was disposed and stockpiled on the access road to the SECC waste disposal pit. No information and management measures on the excavation of this borrow pit was included in the two approved SS-ESMMPs for the Re-Regulation Dam (i.e. the Re-Regulation Dam Left Bank Excavation and Re-Regulation Dam Power Station (ON_OC-0232). 1st inspection date: 30 August 2016 Latest follow up: 08 November 2016	1 ONC (Pending)	The Contractor needs to take the following immediate actions: - Stockpile topsoil - in an appropriate location to minimise soil erosion - for later use for rehabilitation of the borrow pit; - Install borrow pit berms, cut-off drains and sediment pond where feasible to prevent landslide and retain sediment. - Submit a revised SS-ESMMP to include this borrow pit and provide additional information by 11 October 2016. On 18 October 2016, the Contractor informed NNP1PC-EMO that the full improvement works will commence in early November 2016, after machinery becomes available from the second river diversion.
Re-regulation dam (spoil disposal area)	There was a land levelling activity for permanent spoil disposal from the excavation of left bank coffer dam behind the SECC camp (ON_OC-0236). 1st inspection date: 11 October 2016 Latest follow up: 08 November 2016	1 ONC (Pending)	- The contractor was required to include this spoil disposal management plan in the revised SS-ESMMP for the Re-regulation Dam which will be submitted by 11 October 2016 to EMO for review and approval. The spoil disposal management plan needs to follow ESMMP-CP 2014 and Draft Updated ESMMP-CP 2016 Vol. III and IV, SP10 Spoil Disposal; - On 30 November 2016, the EMO received the Annex of DWP & SS-ESMMP for Re-regulation, Closing of Borrow Pit Area at Corner of P1 and P1A Road beside the Re-regulation Dam. This annex is under review.
TL 230 KV (Temporary mobile camp)	No protective tray for a winch machine which is being used for tower election activity. This caused some oil spill on the dirt floor and soil contamination where the	1 ONC (New)	- Clean-up the oil contaminated soil, store in a secure facility for proper elimination;

Site ID	Issues	Reporting	Actions
	machine was operated (ON_LS-0016). 1st inspection date: 17 November 2016		- Provide oil spill tray for the winch machine and absorb oil spill immediately using absorbent pads or fine soil.
Song Da 5 Camp No. 1	A grey water pipe from the extended camp to the wetland ponds was disconnected which allowed the nutrient-rich wastewater discharge from the camp perimeter into Nam Ngiep river without prior treatment in the wetland ponds (ON_OC-0239). 1st inspection date: 22 November 2016	1 ONC (New)	Reconnect and secure the PVC pipe to stop the grey water release into the environment.
Area above CVC Plant Yard	The slurry from the RCC Plant was cleaned up and disposed at the areas above the CVC plant (the junction of Road P1 and P2). Some slurry has already been flushed into the road side drainage lines which are connected directly to the Nam Ngiep river (ON_OC-0240). 1st inspection date: 22 November 2016	1 ONC (New)	The Contractor is required to clean up slurry at this area and remove it to the spoil disposal no.6. The Contractor is required to be cautious that in the future, there should be no slurry disposal in any areas other than the designated spoil disposal area No.6. Ifno improvement is observed, a NCR level 2 will be issued.

Figure 3-1: Site Inspection Locations



Site ID	Site Name	Site ID	Site Name
SH-C	Sinno Hydro Camp	CVC	Conventional Vibrated Concrete Plant
MQ	Main Quarry	SDa-W	Songda's Workshop
IHI-C	IHI camp	HSRA-LF	Houay Soup Soilid Waste Landfill
MD	Main dam	SECC-WS	SECC Workshop
RD	Re-regulation dam	SECC-B	Bridge New
RCC	Roller Compacted Concrete Batching Plant	HM-C	HM camp
AP	Aggregate Crushing Plant	NNP1-LF	Owner Construction Landfill Area
SDa-C#2	SongdaS Camp No2	HSRA-VRC-C	Vorarath Road, Bridge and Building Construction Camp
SECC-C	SECC camp	OBC	EMO Water Quality Laboratory
IHI-C	IHI camp	276-C	276 Counstruction Camp
IHI-I	IHI industrial area	KB-C	Kenber Camp
HM-ZF	Zhefu	TCM-C	TCM Camp
LLM-C	LiLaMa10 Camp	GFE-C	GFE-Camp

Figure 3-2: 230 kV Transmission Line Construction Monitoring

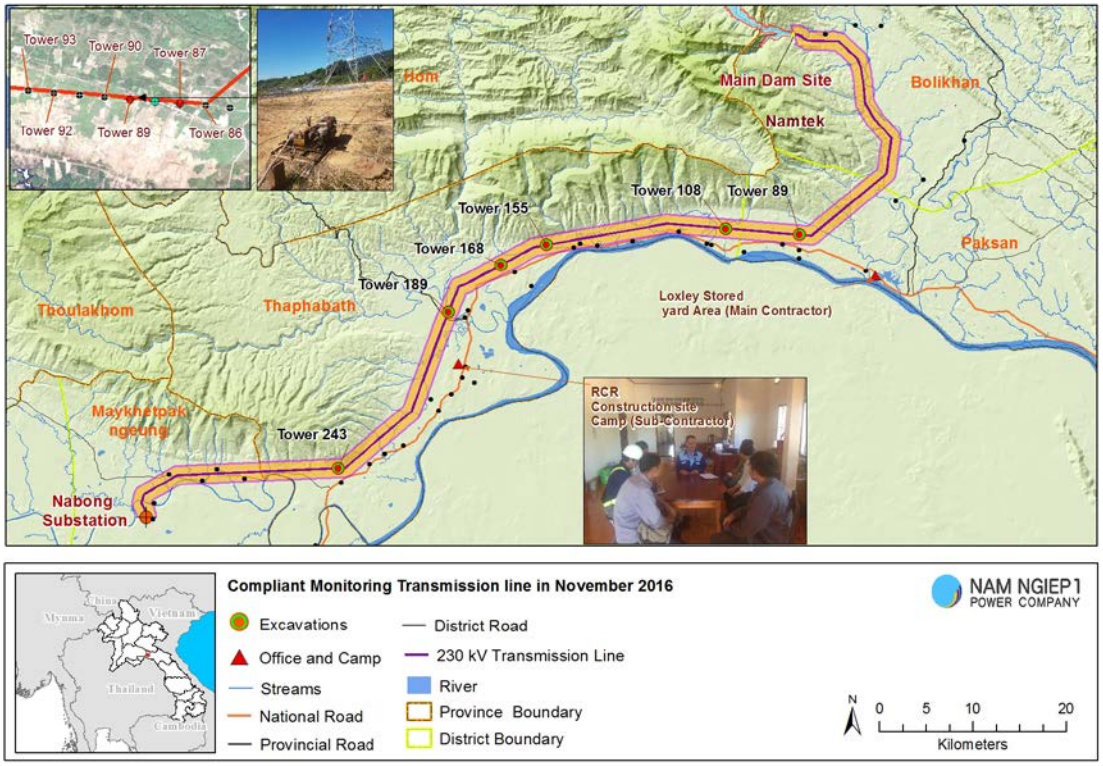
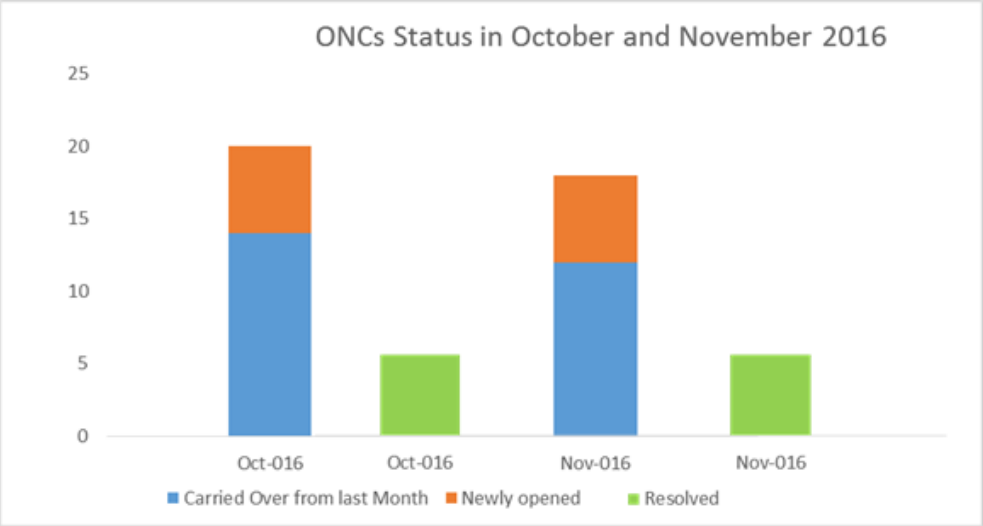


Table 3-3 Summary of ONCs and NCRs

Reporting Period (01-30 November 2016)	ONC	NCR-1	NCR-2	NCR-3
Carried over from October 2016	12	1	0	0
New issues this month	6	1	1	0
Resolved this month	8	1	0	0
Carried forward into December 2016	10	1	1	0
Unresolved exceeding deadline	7	1	1	0

Figure 3-3: Observations of non-compliance (ONCs) in November 2016 Compared with October 2016



3.1.4 Environmental Monitoring Unit Inspection

During 16 to 18 November 2016, Provincial and District EMUs conducted a joint environmental monitoring mission together with NNP1PC covering the main construction sites and camps, Houay Soup Landfill and Houay Soup Resettlement Area. The EMUs mission report was submitted to NNP1PC on 23 November 2016. The main environmental issues identified by the EMUs are the following:

a) Broken grey water pipe lines at Song Da 5 Camp No. 2 which allowed the waste water discharge into Nam Ngiep River; and
b) Improper sediment control from the RCC plant, CVC plant and Aggregate Crushing Plant.

3.2 Environmental Quality Monitoring

The construction of the NNP1 laboratory was commenced in the third week of October 2016 with progress of 22% by the end of November 2016. The procurement of the laboratory equipment from a supplier in Thailand was completed in mid-November 2016 and the equipment is expected to be delivered in the second week of December 2016. In addition, staff training on laboratory equipment operation and maintenance will be held in mid-December 2016 with participation of EMU staff from both Provinces of Xaysomboun and Bolikhamxay.

The environmental quality monitoring has followed the environmental quality monitoring programme presented in the ESMMP-CP Volume III. The programme consists of the following components:

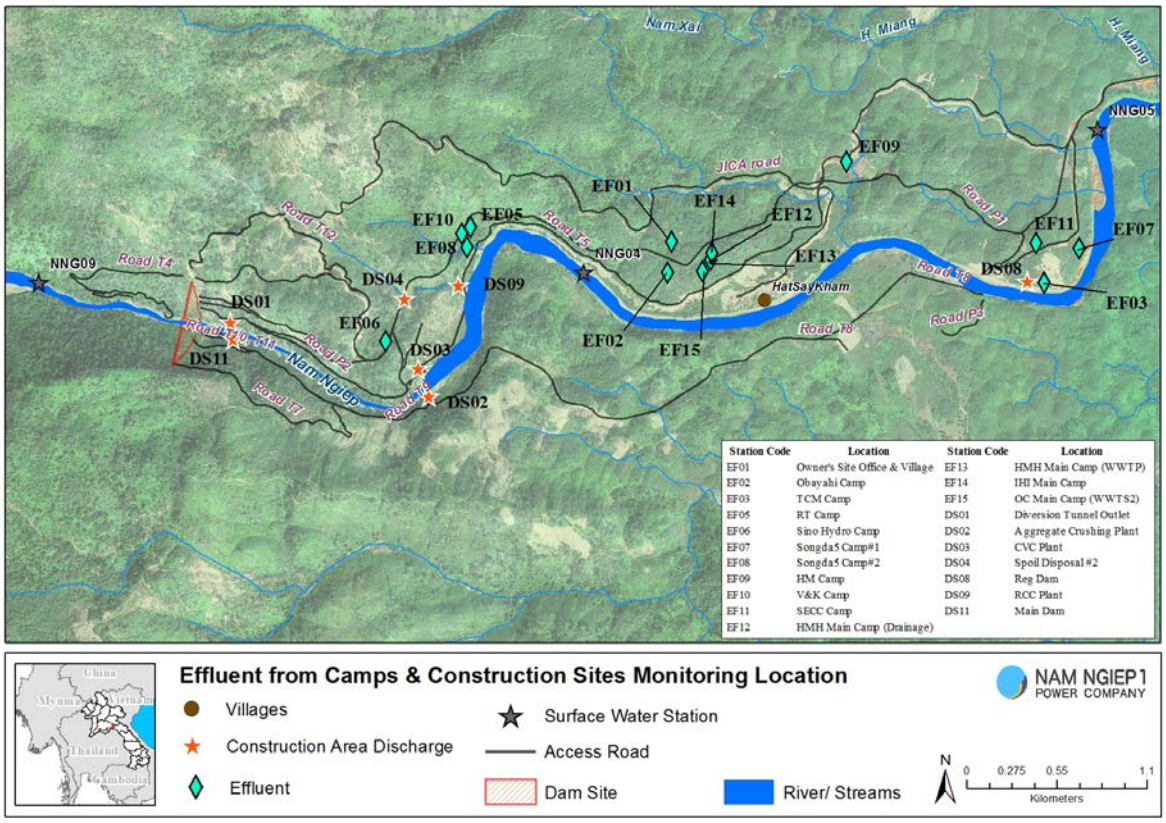
a) Effluent discharge from camps and construction sites;
b) Ambient surface water quality monitoring;
c) Groundwater and community water supply;
d) Landfill leachate;
e) Ambient noise and noise emission monitoring.

All Environmental Quality Monitoring data are routinely reported to the Ministry of Natural Resources and Environment (MONRE) in the Monthly Environmental Management and Monitoring Reports (EMMR) and to ADB in the Quarterly Environment Monitoring Reports.

3.2.1 Effluent Discharge from Camps and Construction Sites

Since July 2016, the frequency of effluent monitoring has increased from monthly to fortnightly at all the camps, and from fortnightly to weekly at the construction sites. Results of the monitoring of effluents from the camps and construction sites are presented in and the monitoring locations are displayed on the map in **Figure 3-4**.

Figure 3-4: Map of Effluent Discharge Monitoring Locations



All parameters were assessed with reference to the Effluent Standards specified in the Project's Concession Agreement Annex C, Appendix 2 Clause 1.13. During November 2016, all construction camps had higher concentrations of total coliforms than the effluent standard including the Owner's Village and Site Office during the first mission. In order to address the pending issues on the camps' WWTS and turbid water treatment at the sediment ponds of the RCC Plant and Aggregate Crushing Plant, key staff from NNP1PC-TD and ESD held a meeting on 24 November 2016 chaired by the Managing Director to discuss the corrective actions.

The improvements of the Wastewater Treatment Systems (WWTS) at Song Da 5 Camp No. 2 has almost been completed. The system is being built in accordance with the conceptual design prepared by an external consultant and the NNP1PC Instruction Letter (reference no. NNP1/0750-016/OBA/EPC-CE dated 12 October 2016). In addition, NNP1PC closely monitored the construction

of new camps to ensure that they implement the same requirements as per NNP1PC Instruction Letter mentioned above.

Detailed monitoring results are included in Annex A of this Report Section and the assessment of compliance and corrective actions are summarized below.

Photograph 1: Completed chlorine contact tank and monitoring tank at Song Da 5 Camp No. 2	Photograph 2: Ongoing WWTS improvement at Song Da 5 Camp No. 1
	

Table 3-4: Compliance Assessment of the Effluent Discharge from the Camps and Construction Sites

Site	Sampling ID	Non-Compliance	Corrective Actions
Owner's Site Office and Village	EF01	Total nitrogen exceeded the Standard for both missions. In addition, faecal coliform exceeded the Standard for the first mission with a recorded value of 5,400 MPN/100 ml.	NNP1PC will continue to monitor the WWTS. if non-compliance with the standards for total or faecal coliforms are found in December 2016, corrective actions will be considered
OC Camp (WWTP1)	EF02	Biochemical Oxygen Demand (BOD_5), COD, Ammonia nitrogen (NH_3-N), total nitrogen and total coliforms exceeded the Standards for both missions.	The improvement of the WWTS at this camp will commence in early 2017. The exact date of completion has not been confirmed by the Contractor. This will be discussed again during a joint IAP/ADB/LTA mission scheduled during 12-16 December 2016.
TCM Camp	EF03	Total coliforms (measured at 160,000 MPN/100 ml) exceeded the Standards for both missions. In addition, BOD and COD for the second fortnight mission exceeded the Standard with recorded values of 75.6 mg/l and 186 mg/l respectively.	As above

Site	Sampling ID	Non-Compliance	Corrective Actions
Sino Hydro Camp	EF06	Biochemical Oxygen Demand (BOD_5), Ammonia nitrogen (NH_3-N), total nitrogen and total coliforms exceeded the Standards for both missions.	As above
Song Da 5 Camp No. 1	EF07	TSS and COD slightly exceeded the standard with a value of 56 mg/l and 161 mg/l during the second fortnight. In addition, total coliforms measured at 160,000 MPN/100ml, exceeded the standard for both mission.	The improvement of the wetland ponds to be sub-surface flow systems and installation of a chlorine contact tank and monitoring tank is ongoing.
Song Da 5 Camp No. 2	EF08	NH_3-N, total nitrogen and total coliforms did not comply with the Standard for both missions.	The improvement of the wetland ponds to be a sub-surface flow system and installation of a chlorine contact tank and monitoring tank has been mostly completed by the end of November 2016. Plantation of reeds are ongoing.
Hitachi-Mitsubishi Hydro (HMH) Worker Camp No.1	EF09	Total coliforms and total nitrogen did not comply with the Standard for both missions.	A meeting was held between NNP1PC and HM Hydro to discuss the WWTS improvement plan in its main and sub-contractors' camps as per the NNP1PC Instruction Letter. No conclusion was reached.
V&K Camp	EF10	Total coliforms were 160,000 and 1,300 MPN/100ml for the first and second missions respectively, did not comply with the Standards for both missions. In addition, TSS was 2,540 mg/l, exceed the standard during the first fortnight.	The improvement of the WWTS at this camp will commence in early 2017. The exact date has yet been confirmed by the Contractor. This will be discussed again during a joint IAP/ADB/LTA mission during 12-16 December 2016.
SECC Camp	EF11	Total coliforms did not comply with the Standards for both missions (35,000 and 160,000 MPN/100ml for the first and second missions respectively).	This camp will be partly decommissioned in early December 2016 with a number of workers remaining during the 1 year road and Nam Ngiep 1 Bridge guarantee period. NNP1PC will continue to monitor the waste water quality at this camp.

Site	Sampling ID	Non-Compliance	Corrective Actions
H-MH Main Camp (WWTS)	EF13	TSS, Total coliforms, BOD and COD did not comply with the Standards for both missions. In addition, Ammonia Nitrogen and total nitrogen were 15 and 12.9 mg/l respectively, exceeded the standard during the second fortnight.	The negotiation on the improvement is ongoing. This will be discussed again during a joint IAP/ADB/LTA mission during 12-16 December 2016.
IHI Main Camp	EF14	Biochemical Oxygen Demand (BOD_5), COD, ammonia nitrogen, total nitrogen and total coliforms exceeded the Standards for both missions.	A conclusion was reached with IHI Contractor for the improvement of its camp's WWTS. Construction of a chlorine contact tank and a monitoring tank will commence in December 2016 and planned to be completed before a joint mission of the IAP/ADB/LTA during 12-16 December 2016.
OC Camp (WWTS2)	EF15	Total coliforms were higher than the Standards at 160,000 MPN/100 ml for both mission. In addition, total nitrogen was 11 mg/l, slightly exceeded the Standard (<10 mg/l).	The improvement of the WWTS at this camp will commence in early 2017. The exact date is yet confirmed by the Contractor. This will be discussed again during a joint IAP/ADB/LTA mission during 12-16 December 2016.
Main Dam Construction Area	DS11	The pH values measured on 03 November 2016 and 22 November 2016 were 11.42 and 10.88, higher than the Standard (6.0-9.0).	The Contractor was notified to ensure that the wastewater from the main dam is treated by the RCC treatment plant. NNP1PC will continue to monitor this in December 2016.
Re-regulation Dam	DS08	No water sampling due to no discharge from this construction site.	
Spoil Disposal Area No.2 (Song Da 5 Workshop)	DS04	The pH value (on 22 November 2016) was 5.96, lower than standard range.	This low pH values in the past 3 months confirmed the natural water quality condition of the creek which passes this sampling site. Similar cases happened in the last dry season (2015).
RCC Plant	DS09	All TSS results in November 2016 were higher than the Standard (<50 mg/l) with recorded values of 14,175 mg/l, 163 mg/l and 29,443 mg/l respectively. In addition, pH on 3 November 2016 was 10.57, exceeded the	A 3rd revision of the SS-ESMMP was submitted to NNP1PC for comments. A management meeting chaired by the Managing Director was held to discuss the pending issues.

Site	Sampling ID	Non-Compliance	Corrective Actions
		Standard for the first fortnightly mission.	
CVC Plant	DS03	Wastewater was contained in the ponds and no discharge to the environment was observed.	
Aggregate Crushing Plant	DS02	All TSS values (sampled on 03, 09, 17 and 22 November 2016) exceeded the standard with values recorded of 1,778 mg/l, 14,107 mg/l, 1,699 mg/l and 2,227 mg/l respectively.	The Contractor is cleaning up the sediment pond before improving the entire structure.

3.2.2 Ambient Surface Water Quality Monitoring

Surface water samples are collected and analysed twice a month[2] from nine stations in Nam Ngiep and four stations in the main tributaries including the lower Nam Chian, Nam Phouane, Nam Xao and Houay Soup, a total thirteen stations. From August 2016, weekly surface water quality monitoring (physical parameters only) has been undertaken with respect to Station NNG09 located upstream of construction sites, NNG04 located within the Construction Site and NNG05 downstream of construction sites.

2 Monthly for chemical parameters and fortnightly for physical parameters

Figure 3-5: Surface Water Quality Monitoring Stations

Key findings for surface water quality monitoring in November 2016 are shown below.

Nam Ngiep

The Chemical Oxygen Demand (COD) exceeded the Standard for almost all stations of Nam Ngiep River, except the stations of Nam Ngiep upstream Main Dam (NNG09 – Upstream Construction Sites) and Nam Ngiep at the Bridge of Road 13 (NNG08 – downstream Construction Sites). The highest amount of COD recorded was at Nam Ngiep downstream of the former RT Camp (NNG04 – Within Construction Sites) at 10.0 mg/l. In addition, total coliforms re exceeded the standard at the station of Nam Ngiep Upstream Nam Phouan confluence (NNG02 – upstream of Construction Sites) with recorded value of 7,900 MPN/100 ml. Moreover, the faecal coliforms exceeded the standard at the stations of Nam Ngiep Upstream Ban Phiengta (NNG01 – upstream of Construction Sites) and Nam Ngiep downstream of Nam Xao confluence (NNG06 – downstream of Construction Sites) with values recorded of 1,700 MPN/100ml and 1,100 MPN/100ml respectively. The remaining parameters monitored complied with the relevant Standards.

Since Nam Ngiep surface water quality monitoring programme commenced in September 2014, EMO has frequently found elevated levels of COD and bacteria with concentrations exceeding the surface water quality standards.

Table 3-5: Results of the Physical and Chemical Parameters of Nam Ngiep Surface Water Quality Monitoring

	River Name	Nam Ngiep								
	Zone	Upstream of Construction Sites				Within Construction Site	Downstream of Construction Sites			
	Station Code	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08
	Date	01/11/16	02/11/16	02/11/16	03/11/16	03/11/16	03/11/16	03/11/16	03/11/16	03/11/16
Parameters (Unit)	**Guideline**									
pH	5.0 – 9.0	6.7	7.05	7.47	7.16	8.11	7.15	7.25	8.01	7.88
DO (%)		92.2	95.1	97.8	100.8	103.8	99.7	88.7	98.5	98.1
DO (mg/l)	>6.0	7.72	7.89	8.07	8.43	8.26	8.07	7.67	7.86	7.77
Conductivity (µs/cm)		115.2	89.3	78	75.7	75.9	120	133	78.6	196
TDS (mg/l)		57	45	39	38	38	60	66	39	98
Temperature (°C)		22.4	23.3	24.2	23.4	25.9	23.6	24.12	25.8	26.4
Turbidity (NTU)		24.4	35	25.3	16.2	17.3	32.7	28.8	32.8	26.6
TSS (mg/l)		75.3	104	72	42	33.6	57.2	56.1	73.2	42.8
BODs (mg/l)	<1.5	ND[12]	ND[12]	1	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]
COD (mg/l)	<5.0	6.1	6.1	5.9	ND[16]	10	5.1	5.5	5.7	ND[16]
NH_3-N (mg/l)	<0.2	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]
NO_3-N (mg/l)	<5.0	2.92	0.11	0.12	0.25	3.12	0.13	0.13	0.14	0.14
Total Nitrogen (mg/l)		3.15	1.57	0.9	1.08	0.12	1.53	0.99	1.59	1.51
Manganese (mg/l)	<1	0.098	0.083	0.058	ND	0.038	0.05	0.051	0.064	0.045
Total Iron (mg/l)		4.38	4.59	3.98	2.18	1.84	2.96	2.62	3.6	2.47
Total Phosphorus (mg/l)		0.02	0.04	0.03	0.02	0.02	0.02	0.02	0.03	0.02
Total coliform (MPN/100ml)	<5,000	1,700	7,900	490	240	2,200	700	3,500	790	490
Faecal coliform (MPN/100ml)	<1,000	1,700	220	170	240	210	210	1,100	330	330

ND[1] (<0.0005 mg/L) ND[2] (<0.0003 mg/L) ND[3] (<0.0002 mg/L) ND[4] (<0.005 mg/L) ND[5] (<0.003 mg/L)
ND[6] (<0.09 mg/L) ND[7] (<0.07 mg/L) ND[8] (<0.04 mg/L) ND[9] (<0.02 mg/L) ND[10] (<0.01 mg/L)
ND[11] (<0.3 mg/L) ND[12] (<0.2 mg/L) ND[13] (<1.0 mg/L) ND[14] (<1.5 mg/L) ND[15] (<4.0 mg/L)
ND[16] (<5.0 mg/L) ND[17] (<2.7 mg/L)

Table 3-6 Results of Nam Ngiep Surface Water Quality (Measured Every Week)

	River Name	Nam Ngiep								
	Zone	Upstream of Construction Sites				Within Construction Site	Downstream of Construction Sites			
	Station Code	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08
	Date	15/11/16	16/11/16	16/11/16	17/11/16	17/11/16	17/11/16	17/11/16	17/11/16	17/11/16
Parameters (Unit)	**Guideline**									
pH	5.0 – 9.0	7.4	7.64	7.56	7.85	7.37	7.19	7.54	7.54	7.59
DO (%)		104.4	96.6	102	102.1	93.6	97	90.8	101.1	99.3
DO (mg/l)	>6.0	8.26	8.22	8.41	8.28	7.48	7.85	7.3	7.96	7.89
Conductivity (µs/cm)		105.6	138.3	89.8	98.9	114.7	83.5	84.4	93	86.3
TDS (mg/l)		52	69	45	49	57.35	41.75	42.2	46	43
Temperature (°C)		25.2	21.9	23.6	24.8	25.67	25.05	25.14	26.3	25.9
Turbidity (NTU)		15	13.2	11.5	11.9	14.7	17.8	19.5	20	11.1

Table 3-7 *Monitoring results of Nam Ngiep Surface Water Quality at the Upstream, within and Downstream of Construction Sites (Measured Weekly)*

	River Name	Nam Ngiep		
	Zone	Upstream of Construction Sites	Within Construction Site	Downstream of Construction Sites
	Station Code	NNG09	NNG04	NNG05
	Date	09/11/16	09/11/16	09/11/16
Parameters (Unit)	**Guideline**			
pH	5.0 – 9.0	7.45	7.68	7.63
DO (%)		101.4	102.1	101.1
DO (mg/l)	>6.0	8.3	8.14	8.17
Conductivity (µs/cm)		73.2	72.3	71.3
TDS (mg/l)		36	36	36
Temperature (°C)		24	25.6	25
Turbidity (NTU)		33	60.7	71.2

	River Name	Nam Ngiep		
	Zone	Upstream of Construction Sites	Within Construction Site	Downstream of Construction Sites
	Station Code	NNG09	NNG04	NNG05
	Date	22/11/16	22/11/16	22/11/16
Parameters (Unit)	**Guideline**			
pH	5.0 – 9.0	7.18	7.15	7.36
DO (%)		100.7	103.9	107
DO (mg/l)	>6.0	7.89	8.17	8.28
Conductivity(µs/cm)		83	83.7	81.2
TDS (mg/l)		41	42	40
Temperature (°C)		26.5	26.2	27.4
Turbidity (NTU)		13.2	18.4	21.4

Tributaries upstream the main dam: Nam Chiane (NCH01), Nam Phouan (NPH01)

Nam Chiane (NCH01) is located about 66 km upstream of the NNP1 Project construction site. The Chemical Oxygen Demand (COD) exceeded the National Surface Water Quality Standard with recorded values of 5.9 mg/l. In addition, faecal coliform exceeded the standard with values recorded of 1,300 MPN/100 ml.

Nam Phouan is located about 24 km upstream of NNP1 Project construction site. The COD exceeded the National Surface Water Quality Standard with recorded values of 5.5 mg/l.

Tributaries downstream of the main dam: Nam Xao (NXA01), Nam Houay Soup (NHS01)

Nam Xao has confluence with the Nam Ngiep downstream of the NNP1 Project construction site. All parameters monitored complied with the surface water quality standard.

Houay Soup Nyai has a confluence with the Nam Ngiep River downstream of NNP1 Project construction site. The COD exceeded the National Surface Water Quality Standard with recorded values of 7.5 mg/l.

Table 3-8: Results of Physical and Chemical Parameters of Nam Chian, Nam Phouan, Nam Xao and Nam Houay Soup

	Site Name	Nam Chain	Nam Phouan	Nam Xao	Nam Houaysoup
	Zone	Tributaries Upstream		Tributaries Downstream	
	Station Code	NCH01	NPH01	NXA01	NHS01
	Date	01/11/16	02/11/16	03/11/16	03/11/16
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	6.93	7.01	7.51	7.57
DO (%)		100.4	99.7	6.44	6.22
DO (mg/l)	>6.0	8.45	8.39	81.4	80.2
Conductivity(µs/cm)		33.6	66.7	147	54
TDS (mg/l)		16	33	74	27
Temperature (°C)		21.9	22.6	25.33	23.99
Turbidity (NTU)		7	4.51	4.59	4.46
TSS (mg/l)		20.3	10.1	ND[5]	ND[5]
BOD_5 (mg/l)	<1.5	ND[13]	1	ND[13]	ND[13]
COD (mg/l)	<5.0	ND[16]	5.5	ND[16]	7.5
NH_3-N (mg/l)	<0.2	ND[12]	ND[12]	ND[12]	ND[12]
NO_3-N (mg/l)	<5.0	0.13	0.13	0.11	0.17
Total Nitrogen (mg/l)		1.33	1.78	0.48	0.6
Manganese (mg/l)	<1	0.035	0.033	0.065	0.036
Total Iron (mg/l)		1.34	0.34	0.625	1.02
Total Phosphorus (mg/l)		0.03	0.02	0.02	0.04
Total coliform (MPN/100ml)	<5,000	1,300	1,700	700	940
Faecal coliform (MPN/100ml)	<1,000	790	84	49	70

ND[1] (<0.0005 mg/L)	ND[2] (<0.0003 mg/L)	ND[3] (<0.0002 mg/L)	ND[4] (<0.005 mg/L)	ND[5] (<0.003 mg/L)
ND[6] (<0.09 mg/L)	ND[7] (<0.07 mg/L)	ND[8] (<0.04 mg/L)	ND[9] (<0.02 mg/L)	ND[10] (<0.01 mg/L)
ND[11] (<0.3 mg/L)	ND[12] (<0.2 mg/L)	ND[13] (<1.0 mg/L)	ND[14] (<1.5 mg/L)	ND[15] (<4.0 mg/L)
ND[16] (<5.0 mg/L)				

Table 3-9: Physical Parameters Results of Surface Water Quality – Nam Chian, Nam Phouan, Nam Xao and Nam Houay Soup (measured Every Fortnight)

	Site Name	Nam Chain	Nam Phouan	Nam Xao	Nam Houaysoup
	Zone	Tributaries Upstream		Tributaries Downstream	
	Station Code	NCH01	NPH01	NXA01	NHS01
	Date	15/11/16	16/11/16	17/11/16	17/11/16
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.78	7.34	7.47	7.03
DO (%)		104.2	98.2	90.1	84.5
DO (mg/l)	>6.0	8.53	8.46	7.11	6.86
Conductivity(µs/cm)		35.7	73.6	112.9	34.6
TDS (mg/l)		17	36	56.85	17.3
Temperature (°C)		23.3	21.3	25.9	25.54
Turbidity (NTU)		14	2.76	3.68	4.19

3.2.3 Groundwater Quality Monitoring

During November 2016, NNP1PC sampled and analysed the groundwater quality in 14 boreholes. Out of these, two boreholes are community owned boreholes at Hatsaykham Village, one borehole is a private well at Hat Gniun Village, six boreholes are built by the Project for re-settlers at Houay

Soup Resettlement Area, and five boreholes are built by NNP1PC around NNP1 Project Landfill and Houay Soup Landfill.

All groundwater quality data are routinely reported to the Social Management Office of NNP1PC which then communicates the results to the village authorities and the local health centres as part of the Project's public health programme. The results are shown below.

Hatsaykham Village

Most of the monitored parameters complied with the standards, except pH which was lower than the Standard range between 6.50 and 9.20 with recorded values of 6.05 and 6.19 for the borehole number GHSK01 and GHSK03 respectively.

Hat Gnuin Village

The faecal coliforms and E.coli bacteria contamination were 2,400 MPN/100 ml which was much higher than last month and exceeded the National Groundwater Standard. In addition, pH result was 6.36 which was slightly lower than the Standard. Other remained parameters monitored complied with groundwater quality standard.

Houay Soup Resettlement Area (HSRA)

All parameters monitored complied with the standard except Faecal Coliform and E. coli bacteria for the borehole number GHSP03.

NNP1 Solid Waste Landfill and Houay Soup Landfill

Elevated levels of lead were detected in MW1, MW3, MW4 and MW5 similar to the levels found in September and October 2016. Initial assessments of the results find it highly unlikely that the elevated levels of lead could be caused by seepage of leachate from the landfills. NNP1PC will continue to monitor and assess the groundwater quality.

The sample collected from MW5 (near Houay Soup Landfill) had a high content of E. coli bacteria (2,400 MPN/100 ml). The contamination with Coliform bacteria is unlikely to have been caused by the landfill as it has just started operating and is equipped with high standard of protection against infiltration of leachate. The content of E. coli bacteria may be caused by infiltration of domestic or wild animal faecal matter.

Figure 3-6: Groundwater Quality Monitoring Locations

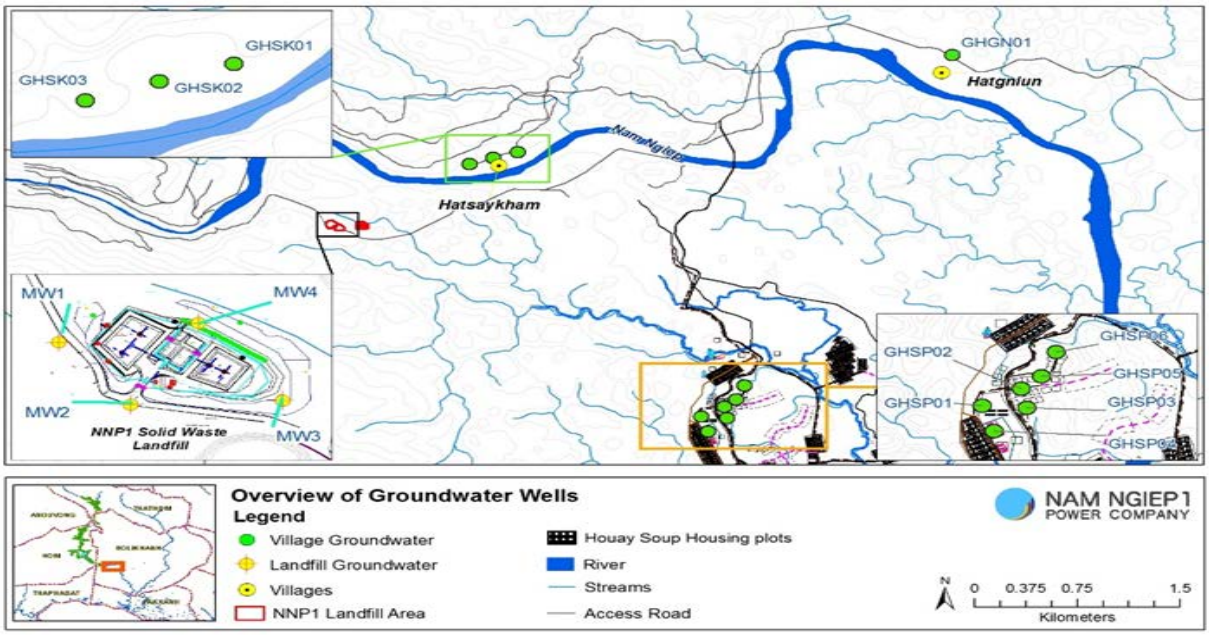


Table 3-10: Groundwater Quality Monitoring Results Hatsaykham and Hat Gniun Villages in November 2016

	Site Name	Hatsaykham Village			Hat Gniun Village
	Station Code	GHSK01	GHSK02	GHSK03	GHGN01
	Date	10/11/2016		10/11/2016	10/11/2016
Parameter (Unit)	**Guideline**				
pH	6.5-9.2	6.05	Broken Hand Pump	6.19	6.36
Sat. DO (%)		49.8		49.3	47.4
DO (mg/l)		4.01		3.9	3.77
Conductivity (µs/cm)		70.6		60.6	24.4
TDS (mg/l)	<1,200	35.2		30.3	12.2
Temperature (°C)		24.3		26	26.2
Turbidity (NTU)	<20	0.75		0.85	4.98
Faecal coliform (MPN/100 ml)	0	0		0	2,400
E.coli Bacteria (MPN/100 ml)	0	0		0	2,400

ND[1] (<0.0005 mg/L)	ND[2] (<0.0003 mg/L)	ND[3] (<0.0002 mg/L)	ND[4] (<0.005 mg/L)	ND[5] (<0.003 mg/L)
ND[6] (<0.09 mg/L)	ND[7] (<0.07 mg/L)	ND[8] (<0.04 mg/L)	ND[9] (<0.02 mg/L)	ND[10] (<0.01 mg/L)
ND[11] (<0.3 mg/L)	ND[12] (<0.2 mg/L)	ND[13] (<1.0 mg/L)	ND[14] (<1.5 mg/L)	ND[15] (<4.0 mg/L)
ND[16] (<5.0 mg/L)	ND[17] (<2.7 mg/L)			

Table *3-11: Groundwater Quality Monitoring Results for Houay Soup Resettlement Area in November 2016*

	Site Name	Houay Soup Resettlement					
	Station Code	GHSP01	GHSP02	GHSP03	GHSP04	GHSP05	GHSP06
	Date	07/11/2016	07/11/2016	07/11/2016	07/11/2016	07/11/2016	07/11/2016
Parameter (Unit)	**Guideline**						
pH	6.5-9.2	8.47	7.36	7.44	7.08	7.87	7.78
Sat. DO (%)		80.9	30.5	40.4	21.4	87.4	86.1
DO (mg/l)		6.34	2.11	2.99	1.67	6.81	6.56
Conductivity (µs/cm)		407	200.1	432	153.5	122.4	204
TDS (mg/l)	<1,200	203	100	216	76.75	61.2	102
Temperature (°C)		26.5	26.3	26.6	26.8	26.7	28
Turbidity (NTU)	<20	0.82	0.97	0.83	1.92	1.18	0.91
Faecal coliform (MPN/100ml)	0	0	0	2	0	0	0
Ecoli Bacteria (MPN/100ml)	0	0	0	2	0	0	0

Table 3-12: Groundwater Monitoring Results for NNP1 Project Landfill and Houay Soup Landfill

	Site Name	NNP1 Landfill				Houay Soup Landfill
	Station Code	MW1	MW2	MW3	MW4	MW5
	Date	10/11/2016	10/11/2016	10/11/2016	10/11/2016	10/11/2016
Parameters (Unit)	**Guideline**					
pH		6.22	5.99	6.35	5.96	6.31
Sat. DO (%)		39.2	39.9	27.9	31.8	42.1
DO (mg/l)		3.12	3.17	2.23	2.53	3.33
Conductivity (µs/cm)		187.9	30.4	209.4	59.9	103
TDS (mg/l)		93.95	15.2	104.8	30	51.6
Temperature (°C)		25.8	25.9	25.7	25.9	26.2
Turbidity (NTU)		1.62	4.35	4.79	2.89	9.88
BOD (mg/l)		ND[13]	ND[13]	ND[13]	ND[13]	ND[13]

	Site Name	NNP1 Landfill				Houay Soup Landfill
	Station Code	MW1	MW2	MW3	MW4	MW5
	Date	10/11/2016	10/11/2016	10/11/2016	10/11/2016	10/11/2016
Parameters (Unit)	**Guideline**					
NH_3-N (mg/l)		ND[12]	ND[12]	ND[12]	ND[12]	ND[12]
Total Nitrogen (mg/l)		0.34	1.17	0.44	1.48	0.57
Copper (mg/l)		ND[18]	ND[18]	ND[18]	ND[18]	ND[18]
Lead (mg/l)	<0.01	0.111	0.01	0.065	0.014	0.022
Total Phosphorus (mg/l)		0.04	0.03	0.1	0.04	0.07
Total coliform (MPN/100 ml)		0	0	0	0	2,400
Faecal Coliform (MPN/100 ml)		0	0	0	0	1,600
Total Petroleum hydrocarbons (mg/l)		ND[13]	ND[13]	ND[13]	ND[13]	ND[13]

3.2.4 Gravity Fed Water Supply (GFWS) Quality Monitoring

Water quality monitoring for GFWS system is conducted on a monthly basis with the aim to alert the users in case of health risks when using the water for bathing or washing. During November 2016, water samples were taken from the taps at Thaheua and Hat Gniun Villages.

Results of the assessment for GFWS of both Thaheua and Hat Gniun Villages are shown and summarised as below:

Thahuea Village (WTHH02): All parameters complied with the National Drinking Water Standards except for faecal coliforms and E. coli which were found to be 33 MPN/100 ml for both parameters.

Ban Hat Gnuin (WHGN2): Faecal coliforms and E. coli were found to be 140 MPN/100 ml and the pH was 5.85.

Table 3-13: Results of the Gravity Fed Water Supply Quality Monitoring

	Site Name	Ban Thaheua	Ban Hat Gnuin
	Station Code	WTHH02	WHGN02
	Date	09/11/2016	10/11/2016
Parameter (Unit)	**Guideline**		
pH	6.5-8.5	8.23	5.85
Sat. DO (%)		98.8	97.2
DO (mg/l)		7.85	7.57
Conductivity (µs/cm)	<1,000	46.4	64.5
TDS (mg/l)	<600	23	32.2
Temperature (°C)	<35	26.1	27.3
Turbidity (NTU)	<10	2.3	1.45
Faecal coliform (MPN/100ml)	0	33	140
Ecoli Bacteria (MPN/100mL)	0	33	140

3.2.5 Landfill Leachate Monitoring

During November 2016, water samples were taken from all four landfill leachate ponds. The location of landfill leachate monitoring is displayed in Figure 3-7. The results indicate compliance with the relevant standards in the final pond (LL4) except with respect to total nitrogen. However, any excess leachate will be recycled back to the waste pit preventing discharge to the environment.

Figure 3-7: Landfill Leachate Monitoring Location

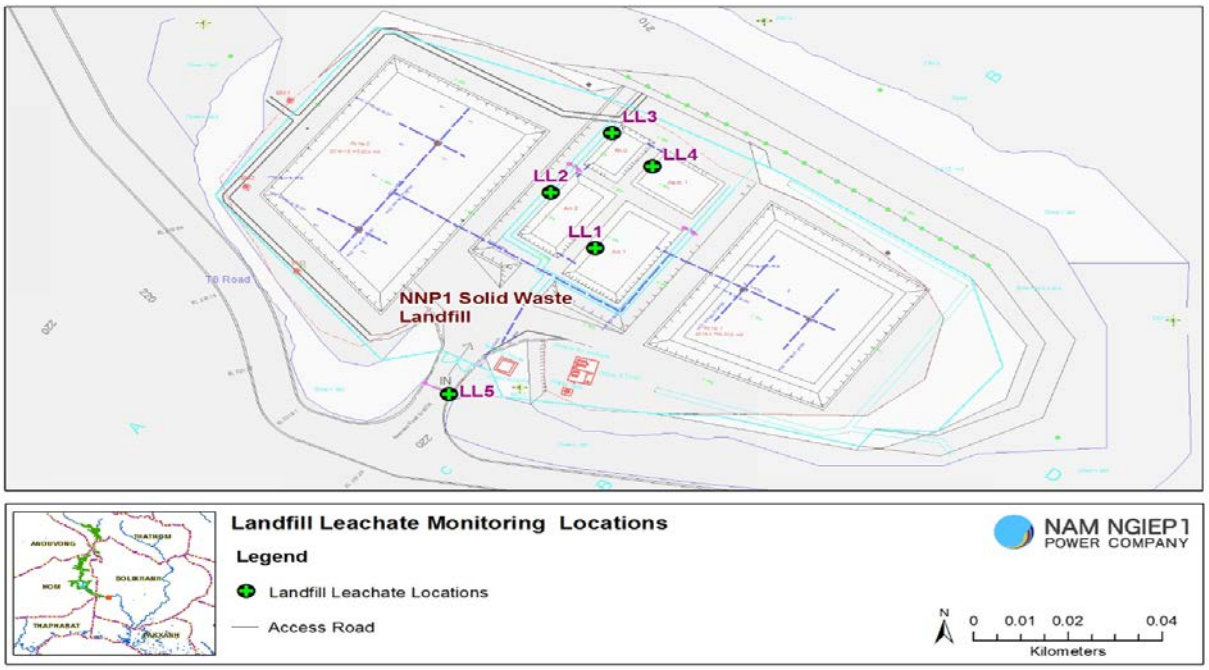


Table 3-14: Landfill Leachate Monitoring Results

	Site Name	NNP1 Landfill (Leachate Ponds)			
	Station Code	LL1	LL2	LL3	LL4
	Date	09/11/2016	09/11/2016	09/11/2016	09/11/2016
Parameters (Unit)	**Guideline**				
pH	6.0 - 9.0	7.97	8.47	8.15	7.89
Sat. DO (%)		30.9	97.6	106.1	104.2
DO (mg/l)		2.45	7.73	8.47	8.36
Conductivity (µs/cm)		326	213	185	174.4
TDS (mg/l)		163	106	92	87
Temperature (°C)		25.9	26	25.5	25.2
Turbidity (NTU)		10.61	5.37	21.1	7.31
BOD (mg/l)	<30	10.8	3.8	5.5	4.9
COD (mg/l)	<125	56.5	37.3	45.9	38.1
NH_3-N (mg/L)	<10.0	4	ND[12]	ND[12]	ND[12]
Total nitrogen (mg/l)	<10.0	6.28	5.03	3.79	20
Oil & Grease (mg/l)	<10	ND[13]	1	1	ND[13]
Copper (mg/l)	<0.3	ND[18]	ND[18]	ND[18]	ND[18]
Lead (mg/l)	<0.2	ND[10]	ND[10]	ND[10]	ND[10]
Total phoshorus (mg/l)	<2	0.04	0.03	0.02	0.02
Total coliform (MPN/100ml)	<400	35,000	4,600	700	330
Faecal Coliform (MPN/100ml)		35,000	1,100	140	31
Total petroleum hydrocarbons (mg/l)		ND[13]	ND[13]	ND[13]	ND[13]

3.2.6 Dust Monitoring

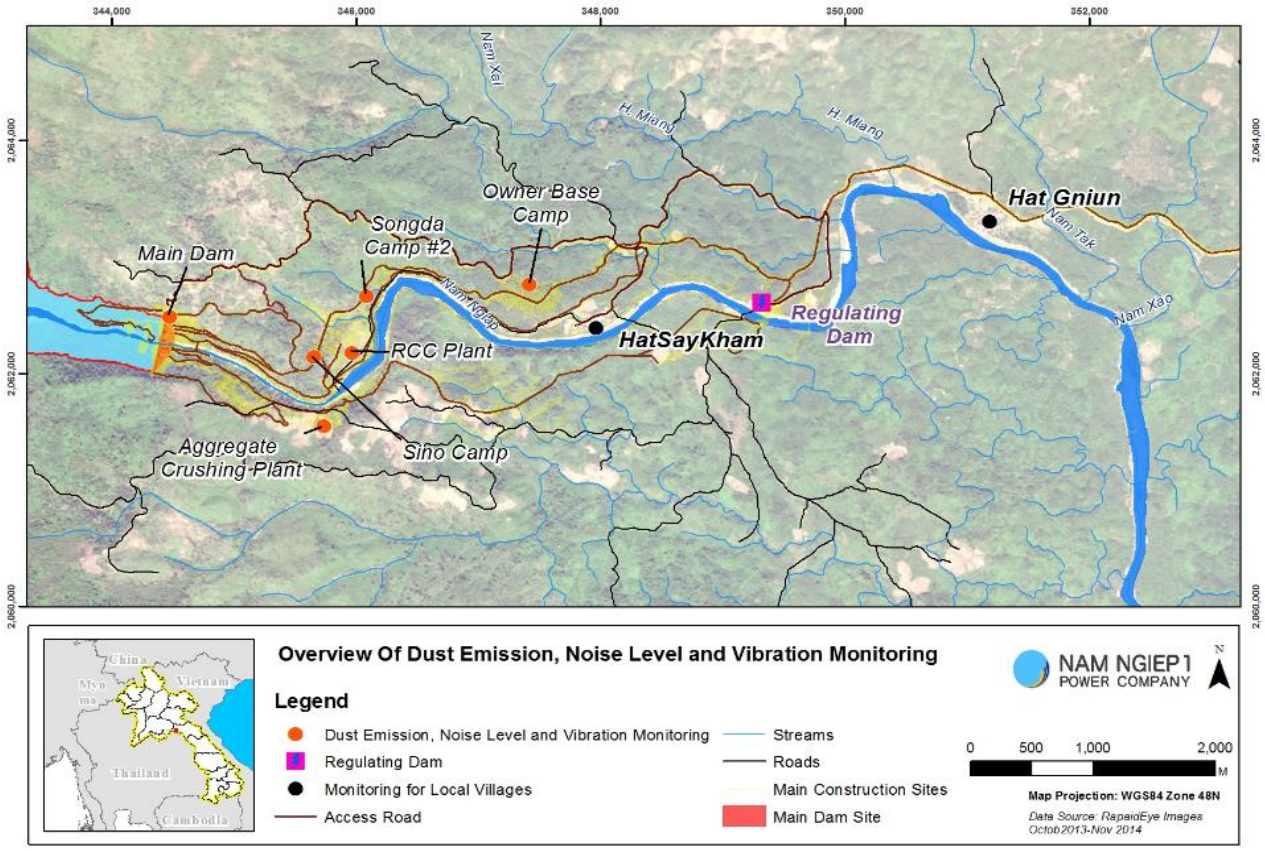
Dust monitoring for Hat Gnuin village, Aggregate Crushing Plant, RCC Plant, Sino Hydro Camp, Sino Hydro Temporary Workers' Camp and Song Da5 Camp No. 2 was resumed in November 2016. However, no dust monitoring was conducted at the Main Dam and Owner's Site Office and Village due to unavailability of a dust aerosol monitoring equipment in early November 2016. In addition, the dust monitoring for Hatsaykham village was completed as the villagers moved out to Houay Soup Resettlement Area since mid-November 2016.

3.2.7 Noise Monitoring

During November 2016, noise monitoring was conducted in Ban Hatsaykham and Ban Hat Gnuin for at least 72 consecutive hours in each village. Noise monitoring was also conducted at the Aggregate Crushing Plant, RCC Plant, Sino Hydro Camp, Song Da 5 Camp No. 2 and Sino Hydro Temporary Worker Camp (new) to assess possible impact on workers' health and Owner's Site Office and Village (to monitor the ambient noise levels) for 24 consecutive hours.

The noise monitoring location are described in the Figure 3-8 below

Figure 3-8: Noise and Dust Emission Monitoring Locations



The recorded noise levels indicate full compliance with the National Standard for the period of 06:01-22:00 in all stations monitored. For the period of between 22:01-06:00, higher levels than the Standard were recorded at the RCC, Aggregate Crushing Plant, Sino Hydro Camp, Sino Hydro Temporary Workers' Camp and the Main Dam [between 52.98 – 74.18 dB(A) compared to the Standard of 50 dB(A)].

3.3 PROJECT WASTE MANAGEMENT

3.3.1 Solid Waste Management

In November 2016, NNP1PC closely supervised the landfill operations including waste disposal, compaction and soil cover activities using crawler excavator. Solid waste being delivered to the NNP1 Project landfill is regularly checked by NNP1PC staff. For example, on 22 November 2016, through bag checking, it was found that mixed waste was disposed of at the NNP1 landfill. The subcontractor was instructed to properly segregate the mixed waste prior to disposal. Approximately 145.2 m^3 of waste was disposed at the NNP1 Project Landfill during November 2016, an increase of 18.6 m^3 compared with October 2016.

Photograph 3: Waste Compaction and Soil Cover at the NNP1 Project Landfill	Photograph 4: Waste Disposal Spot Checking by NNP1PC staff at NNP1 Project landfill
	

3.3.2 Hazardous Materials and Waste Management

During November 2016, NNP1PC-EMO provided the hazardous waste management induction for contractors and subcontractors including Song Da 5, TCM, Sino Hydro and V&K. Approximately 18 supervisors attended. The induction focused on hydrocarbon and chemical spill protection and response through the "Control-Contain-Clean-up Principles". NNP1PC-EMO used hydrocarbon and chemical absorbent sheets for demonstrations in this training.

The types and amounts of hazardous materials generated at different construction sites and camps are sold to an authorised vendor (Khounmixay Processing Factory) for disposal.

Table 3-15: Results of hazardous material inventory

No.	Hazardous Waste Type	Unit	Total in November 2016 (A)	Disposal by Selling (B)	Remainder (A - B)
1	Used hydraulic and engine oil	Littre (L)	5,930	0	5,930
2	Cement bag	Bag	2,500	0	2,500
3	Empty used chemical drum/container	Drum (20 L)	2,000	600	1,400
4	Used oil filters	Piece	467	0	467
5	Used tyre	Piece	245	3	242
6	Used oil mixed with water	Littre (L)	200	0	200
7	Ink cartridge	Unit	164	0	164
8	Empty contaminated bitumen drum/container	Drum (200 L)	82	0	82
9	Empty paint and spray cans	Can	73	8	65
10	Empty used oil drum/container	Drum (20 L)	48	10	38

No.	Hazardous Waste Type	Unit	Total in November 2016 (A)	Disposal by Selling (B)	Remainder (A - B)
11	Empty used oil drum/container	Drum (200 L)	33	11	22
12	Empty used chemical drum/container	Drum (200 L)	31	0	31
13	Contaminated soil, sawdust and concrete	Bag	23	0	23
14	Halogen/fluorescent bulbs	Unit	17	0	17
15	Contaminated textile and material	Bag	15	0	15
16	Car battery	Unit	10	0	10
17	Acid and caustic cleaners	Bottle	0	0	0
18	Clinical waste	Kg	0	0	0

Photograph 5: Hazardous waste management induction for Song Da5 subcontractor

Photograph 6: Hazardous waste management induction for Sino Hydro subcontractor

In addition, the amount of recyclable waste was recorded at each NNP1 Project construction site and offices including GFE Camp, Kenber Camp, SECC Camp and each Contractor's Camps at Houay Soup Resettlement Area (HSRA).

Table 3-16: Amounts of Recyclable Waste Sold

N0.	Recycled Waste Type	Unit	Sold	Cumulative Total at November 2016
1	Scrap metal	kg	215	25,274
2	Glass	kg	15	589
3	Plastic bottles	kg	45	189
4	Aluminium	kg	4	186
5	Paper/Cardboard	kg	20	133

The food waste generated from the Owner's Site Office and Village, selected camps of the contractors and subcontractors was collected by Hatsaykham villagers for use as animal feed (pig and poultry). A total of 3,531 kg was collected in November 2016.

Table 3-17: Amount of Food Waste Collected by Villagers

NO.	SITE LOCATION NAME	UNIT	TOTAL
1	Song Da 5 Camp No. 2	kg	1,477
2	Song Da 5 Camp No. 1	kg	1,457
3	Obayashi Corporation Camp	kg	482
4	Owner's Village and Site Office	kg	115
Total		**kg**	**3,531**

3.4 Community Waste Management

3.4.1 Community Recycling Programme

Since July 2015, a total of 9,309 kg of recyclables were received by the Community Recycle Bank. During November 2016, a total of 331 kg of recyclable waste was recorded, a reduction of 327 kg comparing to October 2016. A total of 121 households hold accounts at the Community Recycle Bank (no increase in membership since October 2016). The percentages of participation in the programme for each village remain to be 87% for Hat Gniun Village, 64% for Hatsaykham Village and 64% for Thahuea Village.

The types and amounts of waste recycled in November 2016 are presented below.

Table 3-18: Types and amounts of waste traded

Types of Waste	Unit	Amount Recycled In November 2016	Accumulated Amount Recycled (July 2015 – November 2016)
Scrap metal	kg	106	3,097
Glass	kg	89	2,631
Plastic bottle	kg	33	1,427
Paper/cardboard	kg	61	1,421
Aluminium cans	kg	42	733
Total	kg	331	9,309

In November 2016, the purchase of recyclables from the Community Recycle Waste Bank was 331 kg, it is reduced by 327 kg compared to October 2016 as indicated above. Recyclables waste from construction camps will continue to be stockpiled at the Community Recycle Waste Bank with the intention of arranging a routine collection by the Khounmixay Processing Factory (see ***Photograph*** 7 and ***Photograph 8*** below):

Photograph 7: Recyclables from Recycle Waste Bank was sold to Khounmixay Processing Factory

Photograph 8: Recyclables and hazardous waste from the Contractor was sold to Khounmixay Processing Factory

In addition, on 09 November 2016, NNP1PC-ESD staff, Hat Gniun Village Chief and District authorities continued to carry out waste management induction for the camp followers/shops at Hat Gniun Village. The purpose of this induction was to raise their awareness on a sound waste management practices which include waste segregation, waste generation reduction based on the principle of 3 R's (Reduce, Reuse and Recycle), waste disposal and types of waste that the Community Recycle Bank purchases

Table 3-19: The number of camp follower/shop owners participating in the waste management consultation at Hat Gniun Village

No.	Camp Follower/Shop Owner	Total No. of Camp Follower/Shop Owners	No. of Women
1	Laos camp followers/shops	12	08
2	Vietnamese camp followers/shops	07	03
Total		**19**	**11**

In addition, NNP1PC's Environmental and Social Department staff carried out a briefing session on waste management to villagers of Hatsaykham village before relocating to a Houay Soup Resettlement Area (HSRA), the topics of discussions included waste segregation, waste generation reduction and waste disposal at Houay soup landfill as well as selling recyclables to a Recyclable Waste Bank at Hat Gniun Village.

Photograph 11: Waste management recommendation to villagers (PAPs) of Hatsaykham Village	Photograph 12: Waste management recommendation to new residents at Houy Soup Resettlement Area
	

3.4.2 Houay Soup Resettlement Area Waste Management

In November 2016, waste generated by the contractors working in Houay Soup Resettlement Area was not disposed at Houay Soup Landfill. NNP1PC-EMO has therefore repeated the instruction to the contractors at HSRA to transport and dispose waste to Houay Soup Landfill only. The contractors are not permitted to make disposal of their waste in the temporary pit at the camp. The Houay Soup Landfill is open every Tuesday and Thursday from 09:30 to 10:30 am through individual arrangement with NNP1PC-EMO staff.

3.5 Watershed and Biodiversity Management

3.5.1 Preparation of the Nam Ngiep 1 Watershed Management Plan

Obligations	Status by November 2016
Prepare: **1) Full draft Nam Ngiep 1 Watershed Management Plan by 15 November 2016**	ADB recommended that further discussion with relevant GOL offices should wait until the completion of full draft in late January 2017
Prepare draft Watershed Management Regulations by 15 November 2016	WRPO submitted the first draft watershed management regulation in the first week of November 2016. Further discussions on the draft regulations need to be postponed until the completion of the full draft Watershed Management Plan
Final Watershed Management Plan by 23 December 2016	As agreed between ADB and NNP1PC, this target date will be moved to the first quarter 2017
1) Draft provincial regulation submitted to Provincial Justice Department by 23 December 2016. **2) Start of public hearing process by 10 January 2017**	As agreed between ADB and NNP1PC, this target date will be moved to the first quarter 2017

Obligations	Status by November 2016
Activities in November 2016	**Results**
Data and Information Collection and Analysis for WMP Development	• The plan preparation continues with the focus on finalizing the baseline and trend analysis. • ADB recommends that further discussion with relevant GOL offices should wait until the completion of full draft of WMP in late January 2017. • The current draft will be discussed and reviewed by IAP, LTA, and BAC during the upcoming mission in December 2016.
Prepare draft Watershed Management Regulations by 15 November 2016	• The draft regulation was shared by WRPO in the first week of November 2016. • NNP1 EMO including watershed consultant have provided the comments on the document but further discussion needs to be postponed until the completion of the full draft Watershed Management Plan
WRPO Activities	• NNP1 completed fund transfer to WRPOs for the payment of remaining cost of office construction in Xaysomboun and Bolikhamxay with the total amount of $ 102,100 • NNP1PC-EMO has further discussed the 2nd pre-WMP proposal with WRPOs. WRPOs agreed to revise the proposal according to comments and recommendations of ADB. • The revised proposal with the total amount of $47,226 was approved by ADB in the middle of November. The activity includes the village land use planning in 3 villages within NNP1 watershed area at Xaysomboun Province and minimum office operational cost for 6 months until the end of the first quarter of 2017.
Xaysomboun ISP	• Key notes from the technical workshop at MONRE DEQP on 4 November 2016 include: o There is need to further improve the current ISP draft particularly on the section of baseline analysis and management plan o DEQP agreed to provide further technical assistance to help Xaysomboun ISP team and Xaysomboun Districts in finalizing the report o To have internal technical workshop between DEQP and Xaysomboun ISP team

3.5.2 Biodiversity Offset Management

Obligations	Status by November 2016
Start of the Boundary Confirmation Baseline Survey by 20 September 2016	• Completed

Consultant acceptable to ADB is engaged as technical consultant for preparation of biodiversity offset management plan by 30 November 2016	• NNP1 received feedback on the TOR from BAC in the last week of November 2016. The target date will be moved because the procurement process is expected to be finalized in 1.5-2 months after the TOR is approved by ADB.
Issuance of the Boundary Confirmation Baseline Survey preliminary report by 30 November 2016	• The preliminary report is expected to be submitted in the first week of December 2016
Issuance of the Boundary Confirmation Baseline Survey draft final report by 31 January 2017	Not relevant at this time

Boundary Confirmation Baseline Survey led by ADB Consultant	
Consultant acceptable to ADB is engaged as technical consultant for preparation of biodiversity offset management plan by 30 November 2016	• The TOR for BOMP preparation was further revised in the first week of November 2016. The TOR was submitted to BAC for further review and the comments were provided in the last week of November 2016. • NNP1 agreed with BAC recommendation that additional surveys should be designed by the BOMP consultant to seek information to shape the management content of the BOMP. • The revised TOR was submitted to ADB for final review and approval. • It is expected the procurement process will start in December 2016 and will be completed in February 2017. Therefore, the original target date will be moved accordingly.
Activities pre-BOMP period of 1 October 2016 – 31 September 2017	• BAC has provided the final review on pre-BOMP proposal in the third week of November 2016. • NNP1 has prepared the response matrix to BAC review and forwarded to ADB for final review and approval in last week of November 2016.

3.5.3 Biomass Clearance

Biomass clearance activities have been delayed. The work could not be started immediately after the rainy season due to: (1) as per the Prime Minister's Order No. 15 (ban on logging) the Hom District Governor issued a notice to NNP1PC to suspend the biomass clearance activity until it is clarified if the biomass clearance falls under the logging ban, (2) Hom District has requested that all remaining trees in future reservoir area with diameter greater than 20 cm shall be cut and stockpiled for the use of the Government, and (3) biomass clearance of areas that belong to the project affected people in Zone 2UR and Zone 2LR have to wait until compensation has been completed. All this currently affects about 70% of the biomass clearance areas.

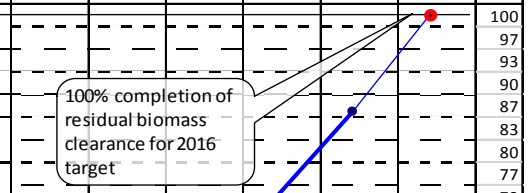
NNP1PC held four meetings with Xaysomboun authorities to discuss the logging ban issue and on 9 November 2016 the parties reached an agreement.

Biomass clearance resumed in third week of November 2016 in Block 1, 3 and 5 using manual clearing in Block 1 and machinery clearing in Block 3 and 5. By the end of November 2016, the biomass cutting was completed in around 9 ha in Block 3 and 10 ha in Block.

The overall progress of biomass clearance programme is demonstrated in Figure **3-9** below.

Figure 3-9: Gantt Chart of Biomass Clearance Programme in 31 November 2016

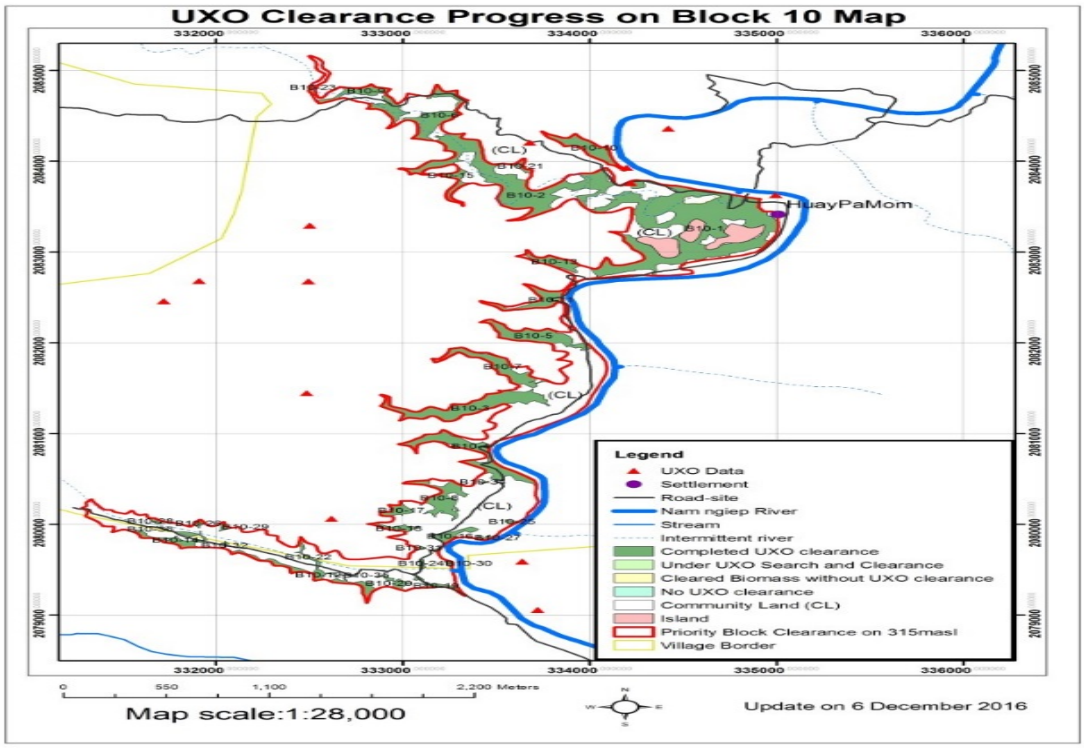
	Task List / Steps of work		Weight (%)	YEAR 2016												% S-Curve
				Q1			Q2			Q3			Q4			
				01	02	03	04	05	06	07	08	09	10	11	12	
1	**Preparation of Biomass Clearance Operation**	Planed	100.0													100
		Actual	0.0													97
1.1	Development of EMP, Implementation Plan, and SS-ESMMP for biomass Clearance	Planed	10.0	10.0												93
		Actual	10.0	10.0												90
1.1.1	Training on environmental protection measures, safety protocols, and compliance protocols	Planed	2.5			2.5										87
		Actual	2.5			2.5										83
1.2	Procurement of equipments for biomass work	Planed	5.0			5.0										80
		Actual	5.0			5.0										77
2	**Biomass Clearance**	Planed	0.0													73
		Actual	0.0													70
2.1	Perform biomass clearance for 256 ha (block 1-4) on lower reservoir	Planed	25.0		5.0	5.0	5.0							5.0	5.0	67
		Actual	17.0		4.0	4.0	4.0	2.0						3.0		63
2.2	Perform biomass clearance for 289 ha (block 5, 6, 8, 10, 11, 12) on lower and central reservoir	Planed	30.0			5.0	5.0	5.0					5.0	5.0	5.0	60
		Actual	19.0			5.0	5.0	4.0					2.0	3.0		57
2.3	Perform biomass clearance for 65 ha (block 13-18) on upper reservoir	Planed	12.0			3.0	5.0							2.0	2.0	53
		Actual	0.0													50
2.4	Utilization of NTFP and waste biomass and rice plantation on cleared biomass area (project affected villagers)	Planed	3.0	1.5			1.5									47
		Actual	3.0	0.5	1.0		1.5									43
3	**Floating/Debris Removal**	Planed	0.0													40
		Actual	0.0													37
3.1	Procurement of equipment and service for floating logs/debris removal	Planed	1.0												1.0	33
		Actual	0.0													30
4	**Monitoring and Reporting**	Planed	0.0													27
		Actual	0.0													23
4.1	Field monitoring and inspection of biomass clearance and compliance to SS-ESMMP (weekly & Monthly)	Planed	9.5		1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	1.5	1.0	1.0	20
		Actual	7.5		1.0	1.0	1.0	0.5	1.0	0.5	0.5	0.5	1.5			17
4.2	Coordination or Ad-hoc meeting to discuss the progress, concerns and problem solving	Planed	2.0		0.5				0.5			0.5			0.5	13
		Actual	2.0		0.5		0.3	0.3				0.5	0.5			10
	Total	Planed	100.0	**11.5**	**6.5**	**21.5**	**17.5**	**6.0**	**1.0**	**0.5**	**0.5**	**1.0**	**6.5**	**13.0**	**14.5**	7
		Actual	66.0	**10.5**	**6.5**	**17.5**	**11.8**	**6.8**	**1.0**	**0.5**	**0.5**	**1.0**	**4.0**	**6.0**	**0.0**	3
		0.0														
	Planned Progress	monthly		11.5	6.5	21.5	17.5	6.0	1.0	0.5	0.5	1.0	6.5	13.0	14.5	
		Cumulative		11.5	18.0	39.5	57.0	63.0	64.0	64.5	65.0	66.0	72.5	85.5	100.0	
	Actual Progress	monthly		10.5	6.5	17.5	11.8	6.8	1.0	0.5	0.5	1.0	4.0	6.0	0.0	
		Cumulative		10.5	17.0	34.5	46.3	53.0	54.0	54.5	55.0	56.0	60.0	66.0	66.0	



The blue graph and yellow highlight represent the planned activity, the red graph and green highlight represent the actual progress.

Activities in November 2016	Results
Labour recruitment	• 15 village labourers from Ban Nong were employed for vegetation clearing in Block 1 as the work resumed in late November 2016. • Daily contract for 30 village labourers from Ban Houaypamom for vegetation clearing in Block 10 is under preparation.
Perform UXO work for 9 blocks of priority biomass clearance	• UXO work (scrub cutting and UXO detection) completed around 128 ha in Block 10. There is no UXO found during the reporting period. • The progress of the UXO work in Block 10 can be seen in Figure 3-10.
Perform biomass clearance of block 1-9 on lower and central reservoir	• The meeting with Xaysomboun authorities on the remaining valuable timber in biomass clearance areas was held on 9 November 2016 at Xaysomboun Provincial Governor Office. Results of the meeting are as follows: o Biomass clearance shall continue as planned. o The contractor has to cut and stockpile the remaining timber with diameter >20 cm in the priority biomass clearance area. o NNP1PC, the Contractor and Xaysomboun Province will conduct weekly inspection and general inventory of felling and stockpiling of remaining value timber with diameter >20 cm in the priority biomass clearance area o Xaysomboun Provincial Authorities will consult with MONRE and MAF on utilization of remaining value timber. The remaining value timber trees shall be cut, stockpiled and burned at site if the Ministries decide that the timber may not be utilized. • Village consultation meeting on commencement of biomass clearance on Block 13-Block 18 in 2UR in Thathom District was held on 11 November 2016 with the following highlights: o Biomass clearance can start in Block 13-Block 18 (203 ha) in 2UR without any issue of land asset compensation. o Most of biomass clearance in B13-B18 in 2UR can be accessed by boat and walk. Biomass clearing will involve only hand cutting. o Decision on stockpiling of remaining value timber with diameter >20 cm will be made during ground survey for block demarcation and tree inventory. o Local labourers for biomass clearance in 2UR are available only from December 2016 after rice harvesting period. • Biomass clearance resumed in third week of November 2016 in Block 1, 3 and 5 using manual clearing in Block 1 and machinery clearing in Block 3 and 5. By the end of November 2016, the biomass cutting was completed in around 9 ha in Block 3 and 10 ha in Block 5.

Figure 3-10: ***UXO Search and Clearance in Block 10***



Photograph 13: Vegetation clearing using a bulldozer in Blocks 3 and 5

3.5.4 Fishery Monitoring

The fishery monitoring programme is progressing, and a database has been developed to support the future fish management programme as part of the in Nam Ngiep 1 Watershed Management Plan. Three types of survey were conducted during November 2016 including daily fish catch logbook monitoring, village interview to verify the information in the logbook and community interview. The gathered information is being input into the database. Daily fish catch logbook monitoring is to analyse the amount fish catch each day and species using available data from previous month. The daily fish catch by individual household (HH) in Nam Ngiep river was estimated 3.3 kg/HH/day in October 2016. The estimated fish catch in Nam Ngiep basin for October 2016 is 87,000 kg, which is 20% higher than October 2015.

The overall progress of fish monitoring programme is illustrated in Figure 3-11 below.

Figure 3-11: Gantt Chart of Fish Monitoring Programme as of 30 November 2016

	Task List / Steps of work		Weight (%)	YEAR 2016												% S-Curve	Assigned to
				Q1			Q2			Q3			Q4				
				01	02	03	04	05	06	07	08	09	10	11	12		
1	**Daily catch logbook and Verification Survey**		100.0														
1.1	Daily catch logbook data collection on 162 HHs in 25 villages	Planed	24.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	100	FM Team
		Actual	21.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	-	3.0		97	
1.2	Survey design, interview form design, test and development for verification survey	Planed	4.0		4.0											93	Consultant and FM team
		Actual	4.0		4.0											90	
1.3	Daily catch logbook verification survey for Q 2-4 on 144 HHs	Planed	10.0			2.0		2.0		2.0		2.0		2.0		87	FM Team
		Actual	9.5			2.0		2.0		2.0		1.5	0.5	1.5		83	
2	**Household Catch Assessment Survey**															80	
																77	
2.1	Data collection and validation on 121 HHs	Planed	10.0		2.0		2.0		2.0		2.0		2.0			73	FM team
		Actual	10.0		2.0		2.0		2.0		2.0		2.0			70	
3	**Fish Spawning Survey**															67	
																63	
3.1	Survey design, interview form design, test and development	Planed	2.0						2.0							60	Consultant and FM team
		Actual	2.0						2.0							57	
3.2	Data collection and validation on 16 villages	Planed	2.0						2.0							53	FM team
		Actual	2.0						2.0							50	
4	**Village Community Interview**															47	
																43	
4.1	Survey design, interview form design, test and development	Planed	7.0								4.0	3.0				40	Consultant and FM team
		Actual	7.0								4.0	3.0				37	
4.2	Data collection and validation on 34 villages	Planed	9.0										3.0	3.0	3.0		FM team
		Actual	7.5									1.0	3.0	3.5			
5	**Data management and report**															33	
																30	
5.1	Data input to database system	Planed	21.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	27	FM team/ Database team
		Actual	18.0	1.0	0.5	1.5	2.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0		23	
5.2	Annual Data analysis and draft annual report for 2015-2016	Planed	5.0							5.0						20	Consultant
		Actual	5.0							5.0						17	
5.3	Disemination/presentation the report for 2015-2016	Planed	3.0								3.0					13	Consultant
		Actual	3.0							3.0						10	
5.4	Final Annual Report for 2015-2016	Planed	3.0									3.0				7	Consultant
		Actual	3.0								3.0					3	
	Total	Planed	**100.0**														
		Actual	**92.0**														
		Planned Progress	monthly	3.0	9.0	5.0	6.0	6.0	10.0	11.0	13.0	12.0	6.0	6.0	4.0		
			Cumulative	3.0	12.0	17.0	23.0	29.0	39.0	50.0	63.0	75.0	81.0	87.0	91.0		
		Actual Progress	monthly	-	8.5	5.5	6.0	6.0	10.0	14.0	13.0	7.5	4.5	6.5	-		
			Cumulative	-	8.5	14.0	20.0	26.0	36.0	50.0	63.0	70.5	75.0	81.5	81.5		
	Budget Code EL4.03	Approved	USD	3,000	2,450	1,850	3,000	1,850	1,850	3,000	1,850	1,850	5,600	1,850	1,850		30,000
		Actual Paid	USD														-

Activities in November 2016	Results
Daily Catch Logbook and Verification Survey	• Completed the daily catch logbook survey in 152 households out of the total target of 162 households. 4,919 forms were used in the survey • Conducted daily catch logbook survey for round 5 on 116 out of 144 households • Database is being developed on the collected information • The daily household catch on average for Nam Ngiep in October 2016 is 3.3 kg/household/day. The median catch for all fishing zone is presented as Figure 3-12. • The estimated total catch for Nam Ngiep in October 2016 is approximately 87,000 kg as shown in Figure 3-13
Household Catch Assessment Survey	• Completed households catch assessment for 121 households • Completed data input both household catch assessment survey and exit interview
Village Community Interview	• Completed village community interview in 29 villages out of the total target of 35 villages. • Database is being developed on the collected information.
Gillnet Sampling Survey	• The Consultant (FishBio) presented the draft annual gillnet survey report to NNP1 on 18 November 2016 • The notes from the discussion will be elaborated into the draft report for further final review

Figure 3-12: Median daily household catch by fishing zone and Nam Ngiep mean value for all fishing zones combined (Kg/HH/day)

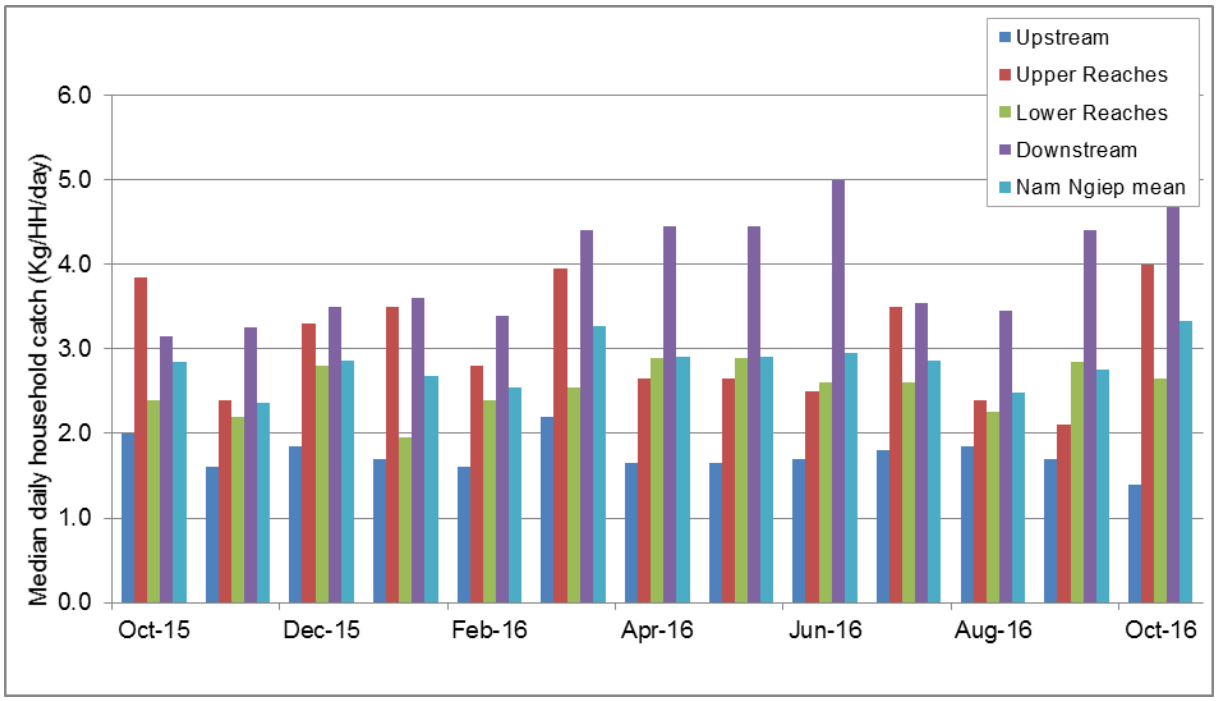
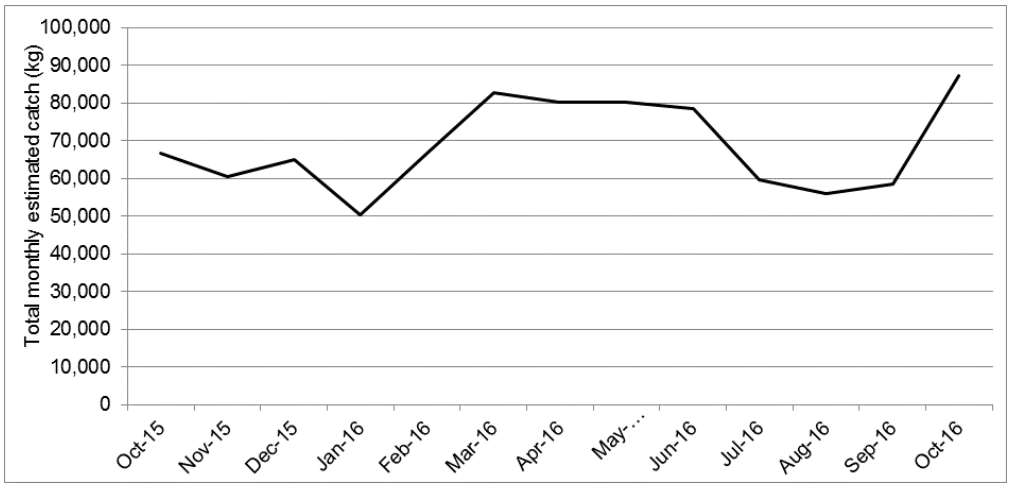


Figure 3-13: Total estimated fish catch for Nam Ngiep by month (Kg)



3.6 Other Obligations and Support Programmes

3.6.1 Environmental Protection Fund (EPF)

There was no update from the EPF and provinces on the development and implementation of EPF's subprojects.

3.6.2 115 kV Transmission Line IEE Due Diligence Assessment

There was no update from EDL during November 2016 on the revision of the 115 kV Transmission Line IEE.

3.6.3 Nabong Substation Upgrade Due Diligence Assessment

Further to the follow up with EDL and Nam Ngiep 2 Power Company on the permission letters for the upgrade works in the Nabong Substation, the NNP1PC will be discussed with ADB on 17 December 2016.

3.7 External Monitoring

NNP1PC has followed up with EDL and Nam Ngiep 2 Power Company on the permission letters for the upgrading works planned in the Nabong Substation. The progress of obtaining information on this issue will be updated in the December 2016 Environmental Monthly Monitoring Report.

3.7.1 Independent Monitoring Agency

There was no IMA mission and activity update during the month of November 2016.

3.7.2 Biodiversity Advisory Committee

The recruitment of third BAC member is completed, the BAC Chairperson has been reappointed. The next BAC mission is planned in December 2016 jointly with the IAP, LTA, and ADB mission. The progress of their visit will be updated in December 2016 Monthly Monitoring Report.

ANNEXES

ANNEX A: RESULTS OF EFFLUENT ANALYSES

Table A- 1: *Results of Camp Effluents –First Fortnightly*

	Site Name	Owner Site Office and Village	Obayashi Camp WWT1	Obayashi Camp WWT2	TCM Camp	Sino Hydro Camp	V & K Camp
	Station Code	EF01	EF02	EF15	EF03	EF06	EF10
	Date	08/11/16	08/11/16	08/11/16	08/11/16	08/11/16	08/11/16
Parameters (Unit)	**Guideline**						
pH	6.0 - 9.0	8.42	8.11	8.09	7.88	8.26	7.99
Sat. DO (%)		37.9	20.6	83.1	72.2	8.4	79.5
DO (mg/l)		2.94	1.62	6.47	5.72	0.66	6.39
Conductivity (µs/cm)		446	696	600	119.1	737	139
TDS (mg/l)		223	348	300	59.9	368.5	69.5
Temperature (°C)		27.3	26.6	27	26.2	26.7	25.4
Turbidity (NTU)		1.94	31.3	15.4	10.37	7.38	3,328
TSS (mg/l)	<50	ND[5]	28.4	18.7	7.2	17.7	2,540
BOD (mg/l)	<30	2.1	36.4	21.6	2.7	45.9	16.2
COD (mg/l)	<125	12.3	183	80.2	16.7	98.2	112
NH_3-N (mg/l)	<10.0	4	27	9	ND[12]	31	ND[12]
Total Nitrogen (mg/l)	<10	12.2	30.9	11	0.84	34.2	3.96
Oil & Grease (mg/l)	<10.0	ND[13]	3	ND[13]	ND[13]	2	1
Total Phosphorus (mg/l)	<2	0.96	1.63	0.9	0.09	1.69	0.19
Total coliform (MPN/100ml)	<400	5,400	160,000	160,000	160,000	160,000	160,000
Faecal Coliform (MPN/100ml)		4,900	160,000	160,000	3,300	160,000	160,000
Discharge Volume (m3/day)		***17.3***	***0***	***0***	***0***	***0***	***4.3***

	Site Name	Songda5 Camp#1	Songda5 Camp#2	HMH Worker Camp #1	SECC Camp	HMH Main Camp - Drainage	HMH Main Camp WWTP	IHI Camp
	Station Code	EF07	EF08	EF09	EF11	EF12	EF13	EF14
	Date	08/11/16	08/11/16	08/11/16	08/11/16		08/11/16	08/11/16
Parameters (Unit)	**Guideline**							
pH	6.0 - 9.0	8.11	7.77	7.98	7.96		8.21	8.31
Sat. DO (%)		96.9	26	94.2	18.1		21.2	0.7
DO (mg/l)		7.59	2.1	6.73	1.44		1.65	0.05
Conductivity (µs/cm)		535	710	278	189.2		444	753
TDS (mg/l)		267	355	169	90		222	376
Temperature (°C)		26.8	25.1	31.9	25.8		26.8	26.4
Turbidity (NTU)		12.67	11.6	5.65	3.41		12.1	50.6
TSS (mg/l)	<50	58	13.6	ND[5]	7.9		69.8	24.1
BOD (mg/l)	<30	28.2	22.5	2.4	ND[13]		54.4	102
COD (mg/l)	<125	160	94.2	29.2	13.3		190	212
NH_3-N (mg/l)	<10.0	5	38	ND[12]	ND[12]		4	11
Total Nitrogen (mg/l)	<10	9.02	34	14.2	1.79		8.67	17.8
Oil & Grease (mg/l)	<10.0	ND[13]	1	ND[13]	ND[13]		4	5
Total Phosphorus (mg/l)	<2	1.58	1.63	1.39	0.12		0.85	1.63
Total coliform (MPN/100ml)	<400	160,000	160,000	35,000	35,000		160,000	160,000
Faecal Coliform (MPN/100ml)		92,000	24,000	35,000	1,300		160,000	160,000
Discharge Volume (m3/day)		***0***	***0***	***0***	***0***		***0***	0

Table A- 2: *Results of camp Effluents –Second Fortnight Sampling*

	Site Name	Owner Site Office and Village	Obayashi Camp WWT1	Obayashi Camp WWT2	TCM Camp	Sino Hydro Camp	V & K Camp
	Station Code	EF01	EF02	EF15	EF03	EF06	EF10
	Date	21/11/16	21/11/16	21/11/16	21/11/16	21/11/16	21/11/16
Parameters (Unit)	**Guideline**						
pH	6.0 - 9.0	7.28	8.66	7.38	7.65	8.06	8.21
Sat. DO (%)		56.5	7.6	88.2	64.7	4.9	116.3
DO (mg/l)		4.24	0.57	6.86	4.98	0.37	10.6
Conductivity (µs/cm)		488	759	735	523	666	340
TDS (mg/l)		244	379	367	261	333	170
Temperature (°C)		28.6	28.5	26.9	27.4	28	28.9
Turbidity (NTU)		2.09	15.1	6.91	8.62	9.83	8.61
TSS (mg/l)	<50	ND[5]	19.9	7.2	27	38.3	11.9
BOD (mg/l)	<30	7.4	67.8	8.2	75.6	32.8	5.6
COD (mg/l)	<125	9.4	148	61	186	96.8	36.2
NH_3-N (mg/l)	<10.0	4	23	ND[12]	ND[12]	31	5
Total Nitrogen (mg/l)	<10	15.4	27.6	2.97	2.35	33	7.28
Oil & Grease (mg/l)	<10.0	ND[13]	4	ND[13]	1	3	ND[13]
Total Phosphorus (mg/l)	<2	1.04	1.39	0.29	0.15	1.5	0.2
Total coliform (MPN/100ml)	<400	170	160,000	160,000	160,000	160,000	1,300
Faecal Coliform (MPN/100ml)		13	160,000	54,000	92,000	160,000	240
Discharge Volume (m3/day)		***14.4***	***0***	***0***	0	***0***	***0***

	Site Name	Songda5 Camp#1	Songda5 Camp#2	HMH Worker Camp #1	SECC Camp	HMH Main Camp - Drainage	HMH Main Camp WWTP	IHI Camp
	Station Code	EF07	EF08	EF09	EF11	EF12	EF13	EF14
	Date	21/11/16	21/11/16	21/11/16	21/11/16		21/11/16	21/11/16
Parameters (Unit)	**Guideline**							
pH	6.0 - 9.0	8.16	7.92	8.59	8.26		7.23	7.83
Sat. DO (%)		106.2	15.4	95.7	79.4		106.3	8.5
DO (mg/l)		11.21	1.17	7.02	6.24		10.3	0.67
Conductivity (µs/cm)		597	762	221	313		610	779
TDS (mg/l)		298	381	110	156		305	375
Temperature (°C)		27.7	29.8	30.2	26.3		27.2	27.8
Turbidity (NTU)		12.94	15.8	4.35	13		12.6	50.9
TSS (mg/l)	<50	56	15.5	ND[5]	11.2		72.2	29.2
BOD (mg/l)	<30	27.6	29.5	ND[13]	5.3		58.8	107
COD (mg/l)	<125	161	96.8	8	21.4		246	234
NH_3-N (mg/l)	<10.0	5	40	ND[12]	7		15	27
Total Nitrogen (mg/l)	<10	9.91	39.3	11.1	9.58		12.9	27.9
Oil & Grease (mg/l)	<10.0	1	2	ND[13]	ND[13]		2	9
Total Phosphorus (mg/l)	<2	1.44	1.59	1.32	0.21		1.6	1.63
Total coliform (MPN/100ml)	<400	160,000	160,000	14,000	160,000		160,000	160,000
Faecal Coliform (MPN/100ml)		160,000	160,000	4,900	35,000		35,000	160,000
Discharge Volume (m3/day)		***0***	***0***	***0***	***0***		***0***	***0***

Table A- 3: *Results of the Construction Area Discharge in November 2016*

	Site Name	Aggregate Crushing Plant				CVC Plant			
	Station Code	DS02				DS03			
	Date	03/11/16	09/11/16	17/11/16	22/11/16	03/11/16	09/11/16	17/11/16	22/11/16
Parameter (Unit)	**Guideline**								
pH	6.0 - 9.0	8.4	8.89	8.32	6.76	No discharge from this construction site.			
Sat. DO (%)		97.2	99.5	102.7	100.4				
DO (mg/l)		7.86	8.09	8.19	7.75				
Conductivity (µs/cm)		58.8	69.1	27.6	65.9				
TDS (mg/l)		29	37	13	33				
Temperature (°C)		25.1	24.7	26.5	27.2				
Turbidity (NTU)		3,470	7,840	64	2,485				
TSS (mg/l)	<50	1,778	14,107	1,699	2,227				
Oil & Grease (mg/l)	<10	ND[13]	N/A	ND[13]	N/A				
Discharge Volume (m^3/day)		***86.4***	***173***	***87***	***172.8***				

	Site Name	Spoil Disposal #2				RCC Plant			
	Station Code	DS04				DS09			
	Date	03/11/16	09/11/16	17/11/16	22/11/16	03/11/16	09/11/16	16/11/16	22/11/16
Parameter (Unit)	**Guideline**								
pH	6.0 - 9.0	6.88	6.97	6.34	5.96	10.57	7.23	7.10	6.82
Sat. DO (%)		84.9	92.5	88.2	86.7	99.3	100.4	100	101.1
DO (mg/l)		6.57	7.13	6.93	6.69	7.39	8.03	8.01	7.61
Conductivity (µs/cm)		19.94	46.6	39.1	43.3	261	193.5	160	120.3
TDS (mg/l)		10	23	20	21	130	96	80	60
Temperature (°C)		26.7	26.3	26.6	27.2	29.6	25.6	26	28.7
Turbidity (NTU)		5.02	6.9	6.73	7.48	32,000	94	216,000	29,470
TSS (mg/l)	<50	ND[5]	ND[5]	9.2	6.2	14,175	163	N/A	29,443
Oil & Grease (mg/l)	<10	ND[13]	N/A	ND[13]	N/A	ND[13]	N/A	N/A	N/A
Discharge Volume (m^3/day)		***864***	***346***	***180***	***220***	***259***	***173***	***150***	***345.0***

	Site Name	Regulating Dam				Main Dam			
	Station Code	DS08				DS11			
	Date	03/11/16	09/11/16	17/11/16	22/11/16	03/11/16	09/11/16	17/11/16	22/11/16
Parameter (Unit)	**Guideline**								
pH	6.0 - 9.0	No discharge from this construction site.				11.42	8.87	8.45	10.88
Sat. DO (%)						98	100.4	101.1	101.4
DO (mg/l)						8.04	7.79	7.94	7.78
Conductivity (µs/cm)						1,896	342	423	1295
TDS (mg/l)						948	171	211	647
Temperature (°C)						24.3	26	26.4	27.6
Turbidity (NTU)						8.15	3.5	9.34	12.68
TSS (mg/l)	<50					24.6	ND[5]	35.3	41.8
Oil & Grease (mg/l)	<10					ND[13]	N/A	ND[13]	N/A
Discharge Volume (m^3/day)						***6,000***	***6,000***	***6,000***	***6,000***

ANNEX B: AMBIENT NOISE DATA

Table B- 1: 24-hour Average Dust concentrations measured in Ban Hat Gniun

Ban Hat Gnuin - 24 Hours Average Particulate Matter (PM10) Concentration			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	20-11-16 09:57	21-11-16 09:57	22-11-16 09:57
End Time	21-11-16 09:57	22-11-16 09:57	23-11-16 09:57
Average Data Record in 24h (mg/m3)	0.10	0.04	0.04
Guideline Average in 24h (mg/m3)	***0.12***	***0.12***	***0.12***

Figure B- 1: Dust Monitoring Results at Ban Hat Gnuin in November 2016

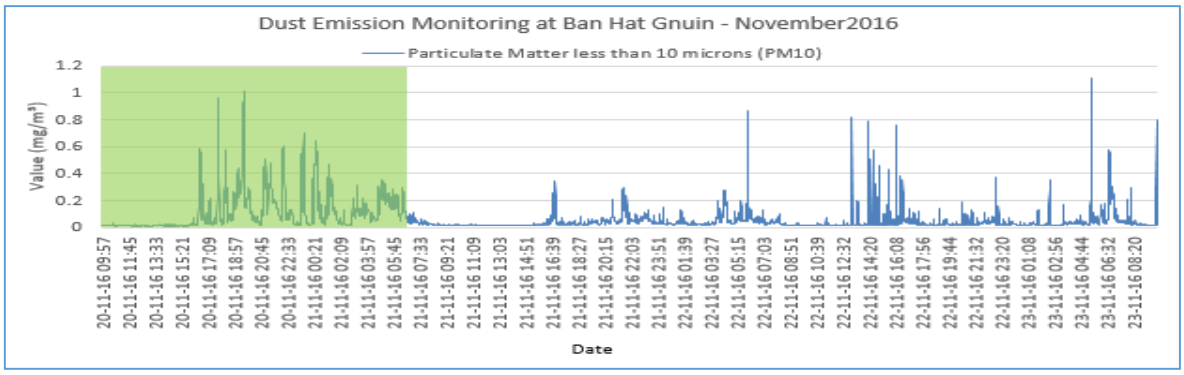


Figure B- 3: Dust Monitoring Results at the Aggregate Crushing Plant in November 2016

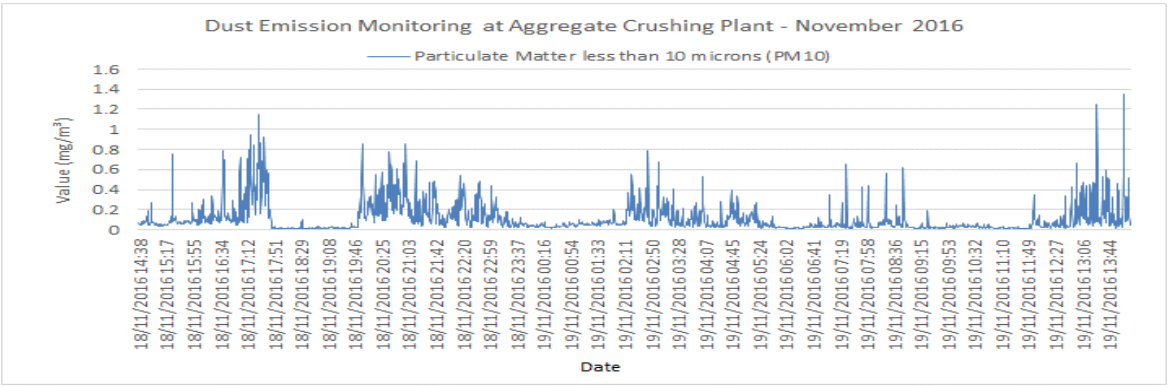


Figure B- 3: Dust Monitoring Results at the RCC Plant in November 2016

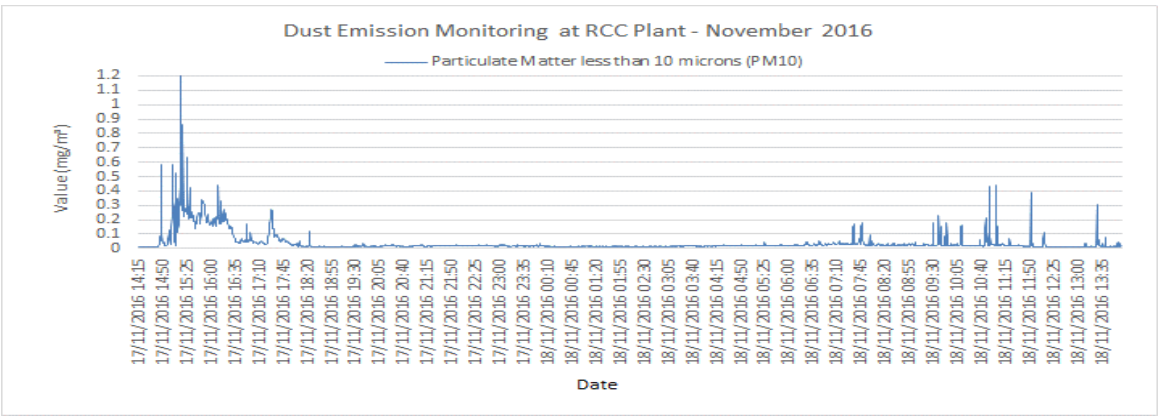


Figure B- 4: Dust Monitoring Results at the Sino Hydro Camp in November 2016

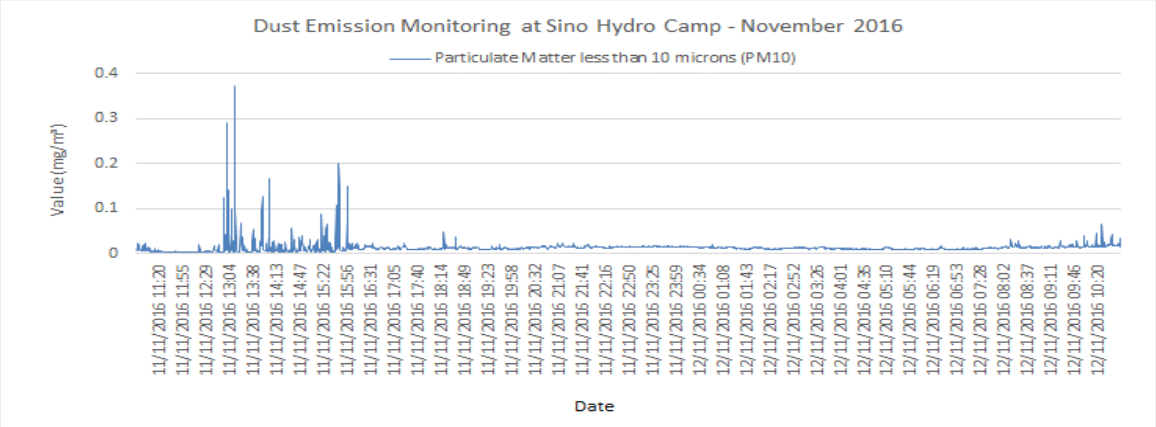


Figure B- 5: Dust Monitoring Results at the Sino Hydro Temporary Camp in November 2016

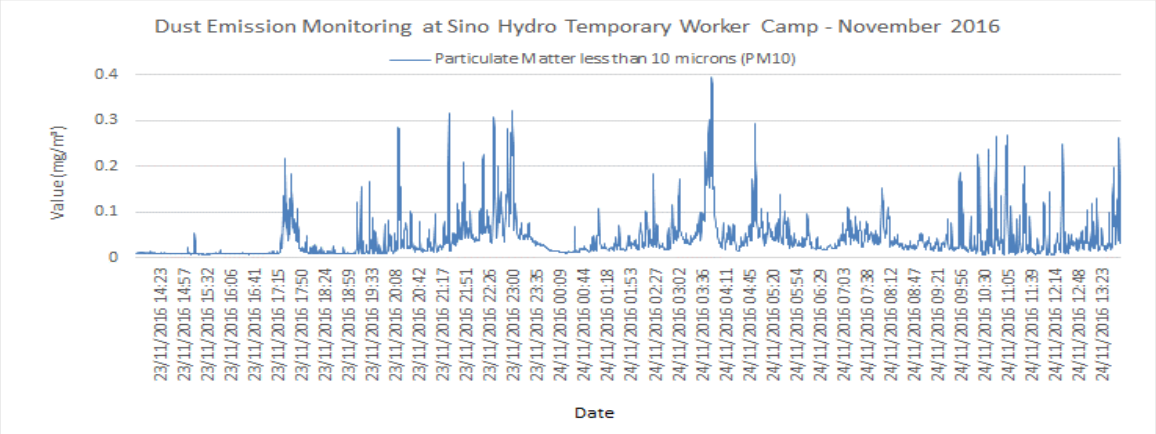
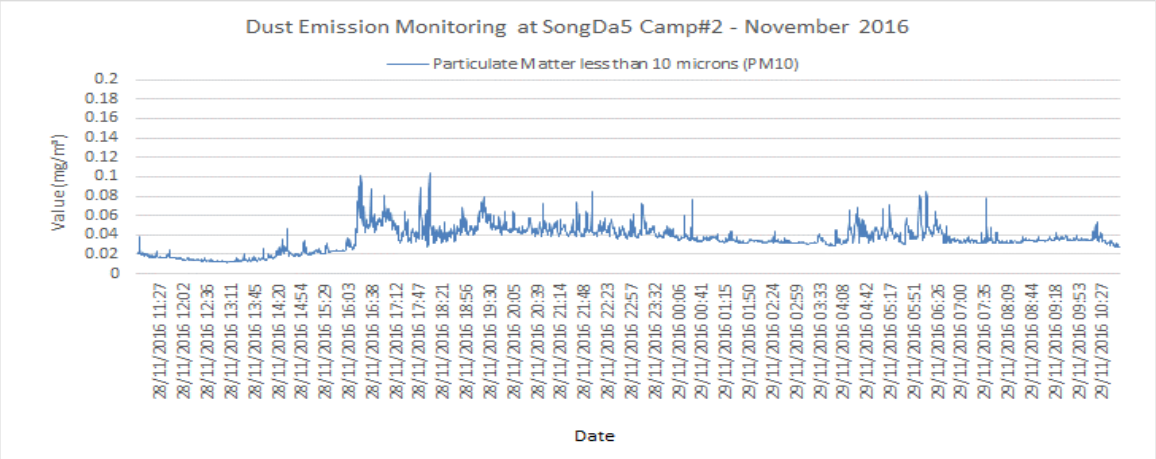


Figure B- 6: Dust Monitoring Results at the SongDa5 No.2 Camp in November 2016



ANNEX C: AMBIENT NOISE DATA

Table C- 1: Average Results of Noise Monitoring at Ban Hat Gnuin in November 2016

Noise Level (dB)	20-21/11/2016			21-22/11/2016			22-23/11/2016			23/11/2016
	10:37-18:00	18:01 – 22:00	22:01 – 06:00	06:01 – 18:00	18:01 – 22:00	22:01 – 06:00	06:01 – 18:00	18:01 – 22:00	22:01 – 06:00	06:01 - 10:37
Maximum Value Recorded	74.90	70.20	68.10	76.20	67.30	68.10	73.30	66.20	63.90	67.10
Guideline Max	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***
Average Data Recorded	48.29	47.41	43.30	49.96	43.02	41.18	51.20	45.38	40.90	46.34
Guideline Averaged	***55***	***55***	***45***	***55***	***55***	***45***	***55***	***55***	***45***	***55***

Figure C- 1: Result of Noise Level Monitoring at Ban Hat Gnuin in November 2016

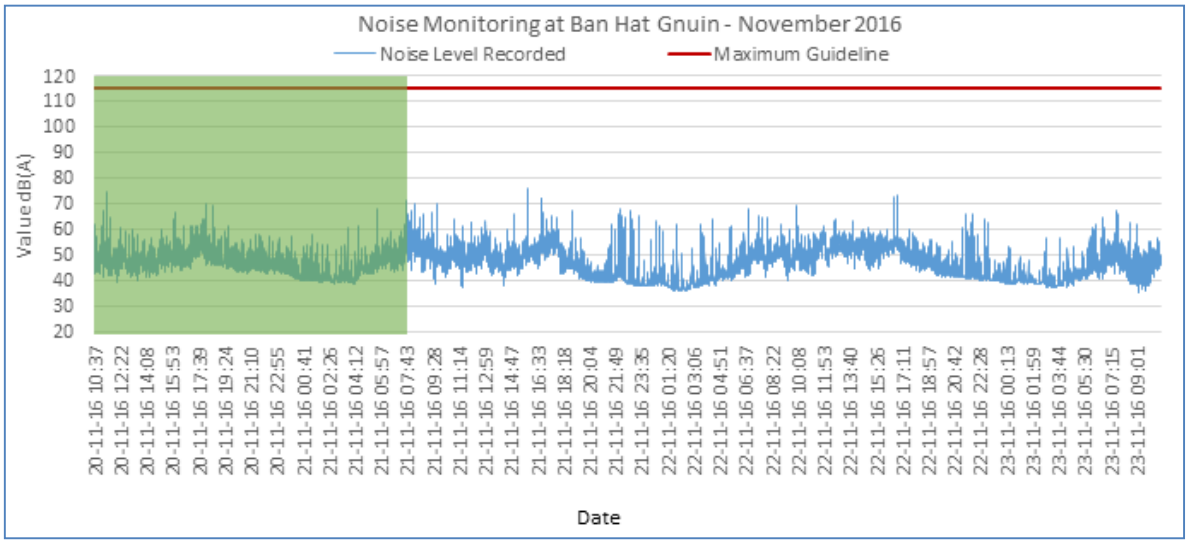


Table C- 2 and Table C-3: Average Results of Noise Monitoring at Aggregate Crushing Plant and RCC Plant in November 2016

Aggregate Crushing Plant

Noise Level (dB)	18-19/11/2016		19/11/2016
	15:09 – 22:00	22:01 – 06:00	06:01-14:51
Maximum Value Recorded	83.9	83.7	83.5
Guideline Max	***115***	***115***	***115***
Average Data Recorded	74.06	74.18	65.24
Guideline Averaged	***70***	***50***	***70***

RCC Plant

Noise Level (dB)	17-18/11/2016		18/11/2016
	14:40 – 22:00	22:01 – 06:00	06:01-14:38
Maximum Value Recorded	81.2	70.6	74.9
Guideline Max	***115***	***115***	***115***
Average Data Recorded	61.95	67.71	64.05
Guideline Averaged	***70***	***50***	***70***

Figure C- 2: Results of Noise Level Monitoring at the Aggregate Crushing Plant in November 2016

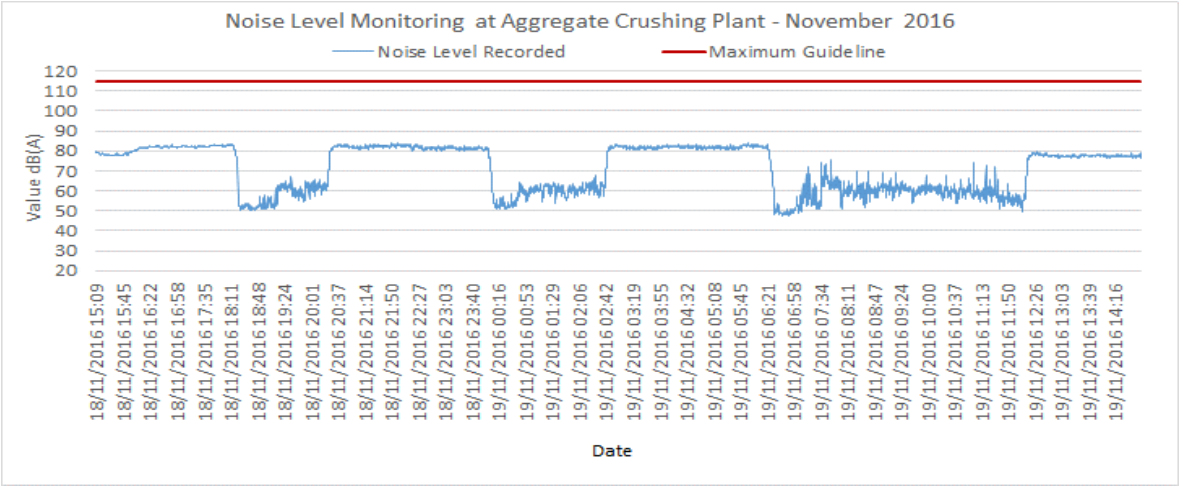


Figure C- 3: Results of Noise Level Monitoring at the RCC Plant in November 2016

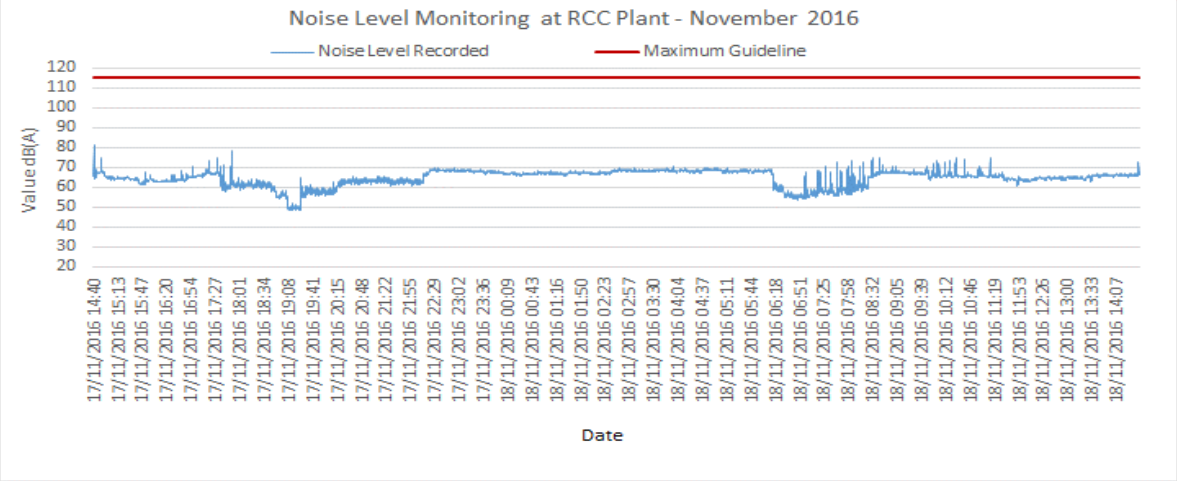


Table C- 5 and Table C- 6: ***Average Results of Noise Monitoring at Songda Camp#2 and Sino Hydro Camp in November 2016***

Songda Camp#2

Noise Level (dB)	28-29/11/2016		29/11/2016
	11:31 – 22:00	22:01 – 06:00	06:01-11:31
Maximum Value Recorded	64.3	57.2	67.7
Guideline Max	***115***	***115***	***115***
Average Data Recorded	46.19	48.05	46.63
Guideline Averaged	***70***	***50***	***70***

Sino Hydro Camp

Noise Level (dB)	11-12/11/2016		12/11/2016
	11:09 – 22:00	22:01 – 06:00	06:01-11:09
Maximum Value Recorded	74.5	60.5	75.5
Guideline Max	***115***	***115***	***115***
Average Data Recorded	55.17	53.17	51.45
Guideline Averaged	***70***	***50***	***70***

Figure C- 4: Results of Noise Level Monitoring at Songda5 Camp#2 in November 2016

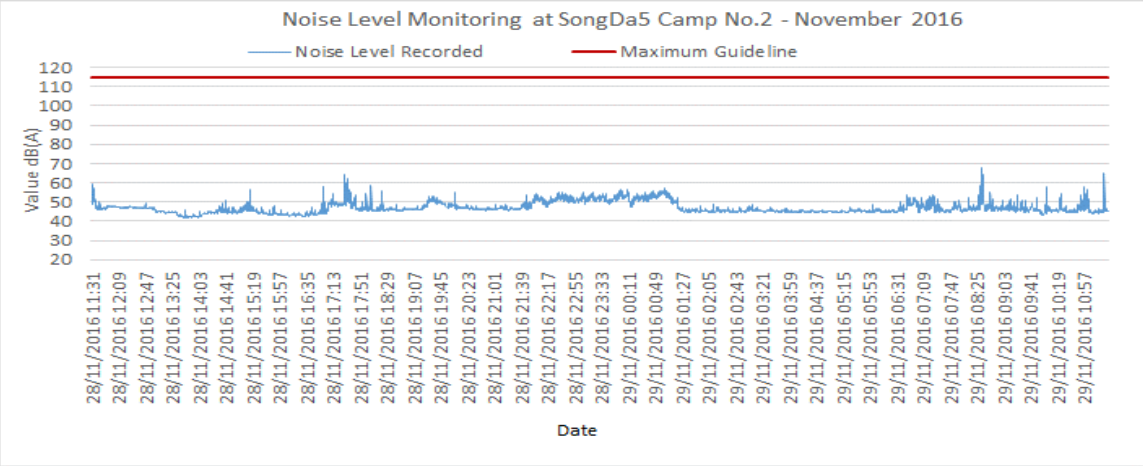


Figure C- 5: Results of Noise Level Monitoring at Sino Hydro Camp in November 2016

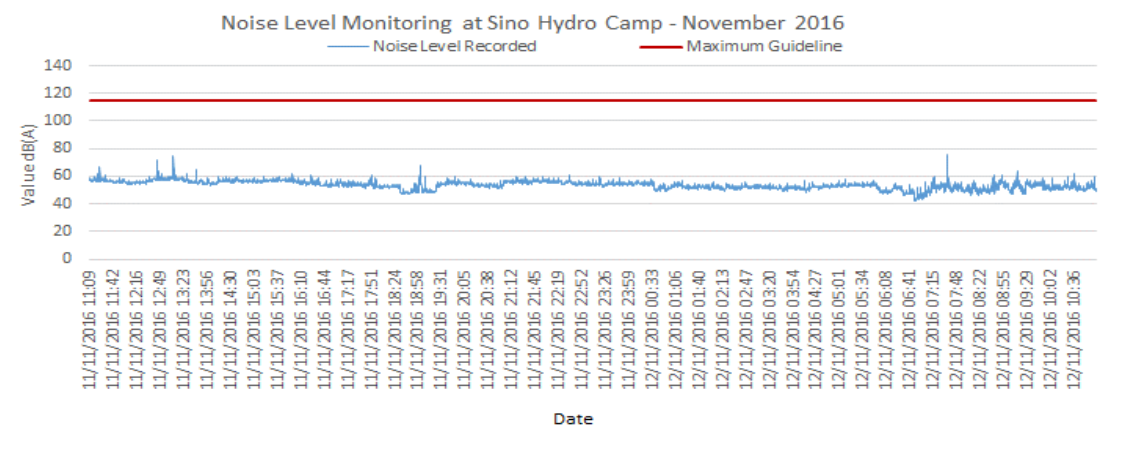


Table C- 7 and Table C- *8:* *Average Results of Noise Monitoring at the Owner's Site Office and Village and, the Main Dam in November 2016*

Owner's Site Office and Village

Noise Level (dB)	04-05/11/2016		05/11/2016
	11:00 – 22:00	22:01 – 06:00	06:01-11:00
Maximum Value Recorded	53.8	54.6	54.2
Guideline Max	***115***	***115***	***115***
Average Data Recorded	37.64	39.81	36.06
Guideline Averaged	***70***	***50***	***70***

Main Dam

Noise Level (dB)	01-02/11/2016		02/11/2016
	11:38 – 22:00	22:01 – 06:00	06:01-11:38
Data Record Max	65.1	62.9	67.8
Guideline Max	***115***	***115***	***115***
Data Record Average	53.82	52.98	56.82
Guideline Averaged	***70***	***50***	***70***

Figure C- 6: Results of Noise Level Monitoring at Owner's Site Office and Village in November 2016

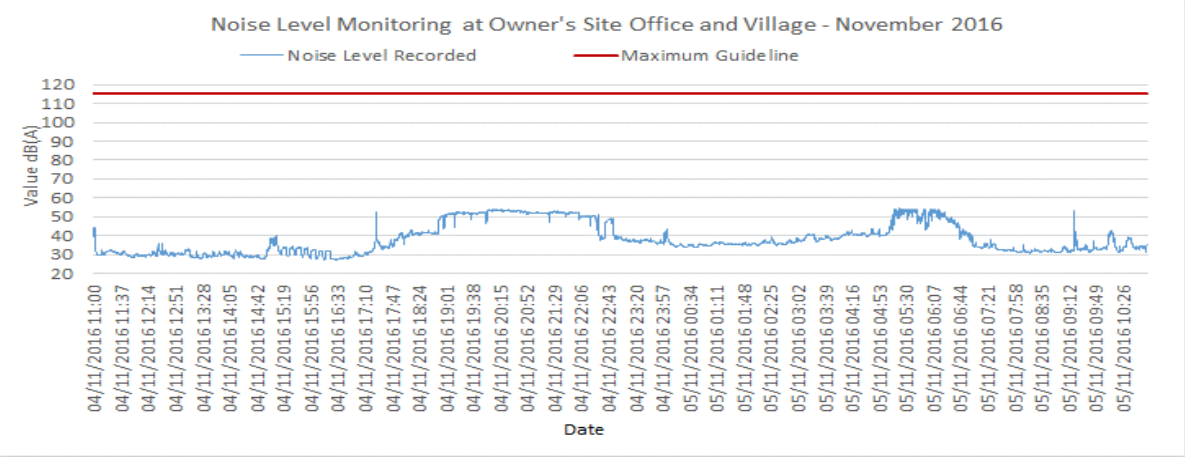


Figure C- 7: Results of Noise Level Monitoring at Main Dam in November 2016

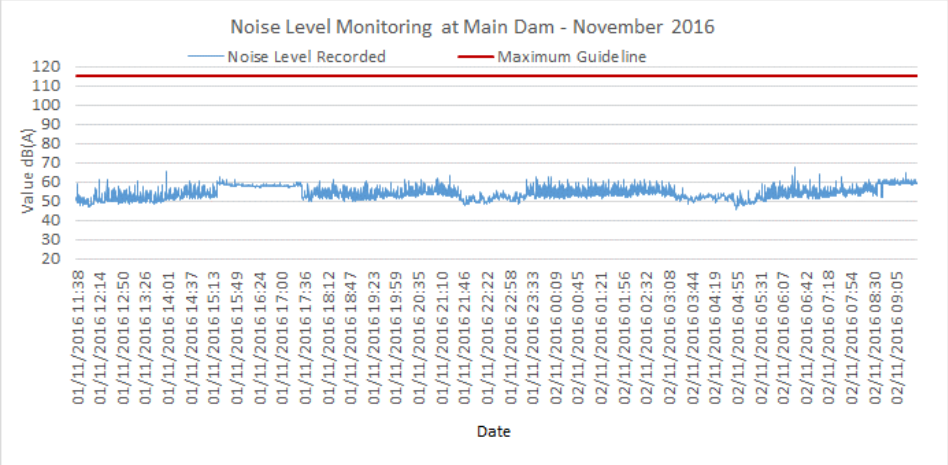


Table C- 9: Average Results of Noise Monitoring at the Sino Hydro Temporary Worker Camp in November 2016

Sino Hydro Temporary Worker Camp

Noise Level (dB)	23-24/11/2016		24/11/2016
	14:21 – 22:00	22:01 – 06:00	06:01-14:21
Maximum Value Recorded	85.9	67.1	84.7
Guideline Max	***115***	***115***	***115***
Average Data Recorded	58.10	57.31	58.46
Guideline Averaged	***70***	***50***	***70***

Figure C-8: Results of Noise Level Monitoring at Sino Hydro Temporary Worker Camp