

Nam Ngiep 1 Hydropower Project

Environmental Management Monthly Monitoring Report

February 2017

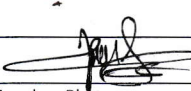
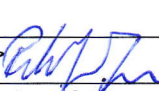
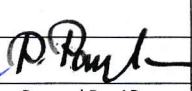
					
A	22 March 2017	Viengkeo Phetnavongxay	Peter G. Jensen	Prapard PanARam	
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BBREVIATIONS / ACRONYMS

AIP	Annual Implementation Plan
ADB	Asian Development Bank
BBS	Biodiversity Baseline Survey
BAC	Biodiversity Advisory Committee
BOF	Biodiversity Offset Framework
BOMC	Biodiversity Offset Management Committee
BOMP	Biodiversity Offset Management Plan
CA	Concession Agreement between the NNP1PC and GOL,
CAP	Corrective Action Plan
COD	Commercial Operation Date
CVC	Conventional Vibrated Concrete
CWC	Civil Works Contract
CTA	Common Terms Agreement
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
DSRP	Dam Safety Review Panel
EC	Electrolytic Conductivity
EOCD	EGAT Construction Obligation Commencement Date
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
EMMR	Environmental Management and Monitoring Reports
EMO	Environmental Management Office of ESD within NNP1PC
EMU	Environmental Monitoring Unit
EMWC	Electrical-Mechanical Works Contract
EPF	Environmental Protection Fund
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
FY	Fiscal Year
GOL	Government of Lao PDR
GIS	Geographic Information Systems
HH	Household
HMWC	Hydraulic Metal Works Contract
HR	Human Resources
IEE	Initial Environmental Examination
IMA	Independent Monitoring Agency
INRMP	Integrated Natural Resources Management Plan
ISP	Intergraded Spatial Planning
km	kilometre
kV	kilo-Volt
LEPTS	Lao Electric Power Technical Standard
LHSE	Lao Holding State Enterprise
LTA	Lender's Technical Advisor
M	million
m	metre
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mines, Lao PDR
MOF	Ministry of Finance, Lao PDR
MOM	Minutes of Meeting
MONRE	Ministry of Natural Resource and Environment, Lao PDR
MOU	Memorandum of Understanding
NBCA	National Biodiversity Conservation Area
NCI	Non-Compliance Issue
NCR	Non-Compliance Report
NN2	Nam Ngum 2 Power Company Limited
NNP1PC	Nam Ngiep 1 Power Company Limited
NPF	National Protection Forest
NTFP	Non-Timber Forest Products
NT2	Nam Theun 2 Hydropower Project
OC	Obayashi Corporation
ONC	Observation of Non-Compliance
PAFO	Provincial Department of Agriculture and Forestry
PAP	Project Affected People
PD	Property Damage

PONRE	Provincial Department of Natural Resource and Environment, MONRE
PvPA	Provincial Protection Area
RCC	Roller Compacted Concrete
SIR	Site Inspection Report
SLBMP	Salvage Logging Biomass Management Plan
SOP	Standard Operating Procedure
SMO	Social Management Office of ESD within NNP1PC
SS-ESMMP	Site Specific Environmental and Social Monitoring and Management Plan
TD	Technical Division of NNP1PC
TOR	Terms of Reference
TSS	Total Suspended Solids
UAE	United Analysis and Engineering Consultant Company Ltd.
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

During February 2017, the Environmental Management Office (EMO) of NNP1PC received a total of nine SS-ESMMPs, one ESMMP and one additional supporting document to a previously approved SS-ESMMP for review and clearance. With six SS-ESMMPs and one Site Decommissioning Plan carried over from previous months, there were a total of 15 SS-ESMMPs, one ESMMP, one supporting document and one Site Decommissioning Plan for EMO review. Out of these, six SS-ESMMPs, one supporting document and one Site Decommissioning Plan were cleared with conditions; one ESMMP and one SS-ESMMP were cleared with no conditions; one SS-ESMMP was returned with conditions and the remaining seven SS-ESMMPs are carrying over to March 2017.

NNP1PC-EMO issued seven new Observations of Non-Compliances (ONCs) and resolved a total of 12 ONCs and one Non-Compliance Report Level 1 (NCR1). A total of 11 ONCs, one NCR1 and four NCR2 will be active and carrying over into March 2017. NNP1PC-EMO will follow up with Contractors to resolve the remaining issues in March 2017.

The Environmental Management Units (EMUs) from Xaysomboun and Bolikhamxay Provinces conducted two separate missions on 15 February 2017 and from 21 to 22 February 2017 respectively. The EMUs submitted their draft mission reports to NNP1PC for prior review and comments on 18 and 23 February 2017 respectively. NNP1PC will submit response letters to both EMUs in March 2017 describing the progress with implementing the corrective actions requested by the EMUs.

The construction of NNP1 Project laboratory was commenced in the third week of October 2016 at the Owner's Site Office and Village (OSO) and was nearly completed by the end of February 2017. The laboratory is expected to be 100% complete in early March 2017. Once the laboratory can be occupied, the laboratory equipment will be relocated from the warehouse, installed and operated at the new laboratory. The NNP1 Project Laboratory in collaboration with the United Analysis and Engineering Consultant Company Limited will conduct performance verification of its analyses for Total Suspended Solids starting in March 2017.

The effluent monitoring results for February 2017 indicate that none of the workers' camps, except the Owner's Site Office and Village and the Zhefu Camp complied with the effluent standards, though such as Song Da 5 Camps should only require refinement of chlorine application procedures. Extensive discussions with the contractors about improving the Waste Water Treatment Systems (WWTS) continue to be carried out, and improvements scheduled to be completed in March 2017 are underway at the camps of Kenber, IHI, H-M Hydro and Lilama10. A proposal for the WWTS improvement at H-M Hydro and Sino Hydro Camp was submitted for NNP1PC review on 23 February 2017. Those remaining are the camps of V&K and Obayashi about which discussion will take place and proposals considered during March 2017.

Approximately 136.3 m³ of solid waste were disposed of at the NNP1 Project Landfill during February 2017, an increase of 4.6 m³ compared to January 2017. The construction of a second stage of NNP1 Project Landfill is expected to be commenced in March 2017. A total of 0.39 m³ of solid waste from HSRA's Contractors was disposed at Houay Soup Landfill. NNP1PC-EMO and the Contractor carried out a joint final inspection for the construction of the second stage of Houay Soup Landfill, and it was confirmed that the construction is completed. The completed works includes lining of a second and third waste pit with HDPE, a guardhouse, fencing of the landfill, internal road and other related facilities.

The development of the Nam Ngiep 1 Watershed Management Plan (WMP) continued to progress. The approach to continue with WMP finalization using the existing delineation of the NNP1 watershed area was accepted by ADB on 16 February 2017. The progress of WMP finalization includes analysis of the updated land use and land cover classification from the Department of Forestry, improvements of the Biodiversity and Fishery Section with a focus on No Net Loss, and development of a draft budget for the entire concession period.

The TOR for preparation of a Biodiversity Offset Management Plan (BOMP) was revised based on recommendations from BAC and IAP. The scope of work was simplified and excludes a baseline survey, which instead will be undertaken during the initial implementation of the BOMP. The scope of work has also been modified to include technical advice to NNP1PC on general biodiversity related matters. The consultant is expected to be engaged in early April 2017.

As of 28 February 2017, biomass clearance was completed for around 219 ha or around 97% of the total target for February 2017. The overall biomass clearance is around 849 ha, representing around 52% of the target for the whole biomass clearance area of 1,640 ha.

The fisheries monitoring programme is progressing, and a database has been developed to support the future fish management programme as part of the Nam Ngiep 1 Watershed Management Plan. Three types of surveys were conducted during February 2017 including daily fish catch logbook monitoring, daily catch logbook verification survey and fish migration and spawning survey. The gathered information is being put into the database. The data from the daily fish catch logbook monitoring indicates that the mean daily fish catch in the Nam Ngiep River was 2.5 kg/fishing household/day in January 2017. The estimated total fish catch in Nam Ngiep basin for January 2017 is 42,800 kg. Around 33% of the catch was sold, 56% was consumed fresh by the fishing households, 6% processed and approximately 5% was used for other purposes.

1. INTRODUCTION

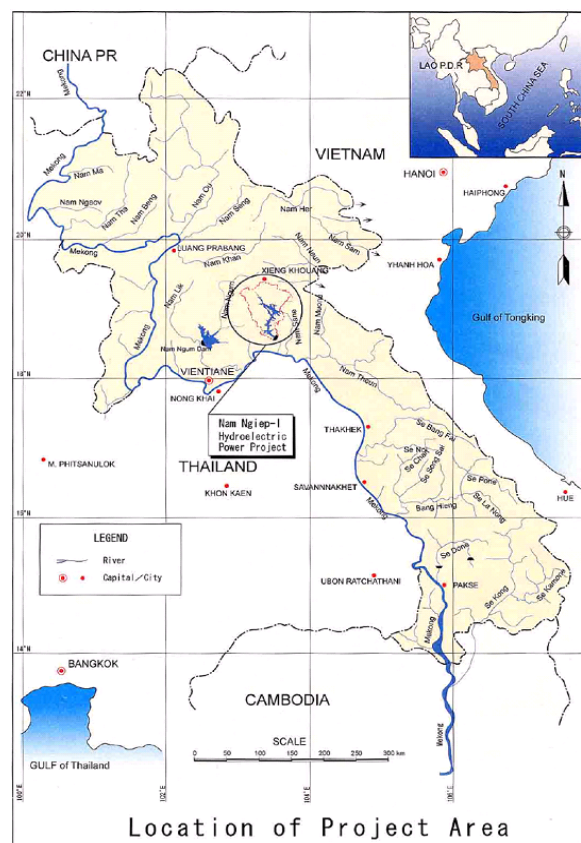
The Nam Ngiep originates in the mountains of Xieng Khouang Province, flowing through Khoun District into Thathom District of Xaysomboun Province, through Hom District and into Bolikhan District of Bolikhamxay Province. The Nam Ngiep meets the Mekong River just upstream from Pakxan in Bolikhamxay Province (Fig. 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 February 2017. 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 publicly 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 February 2017 was 63.9%¹ (compared to planned progress of 63.3%), based on achieved Interim

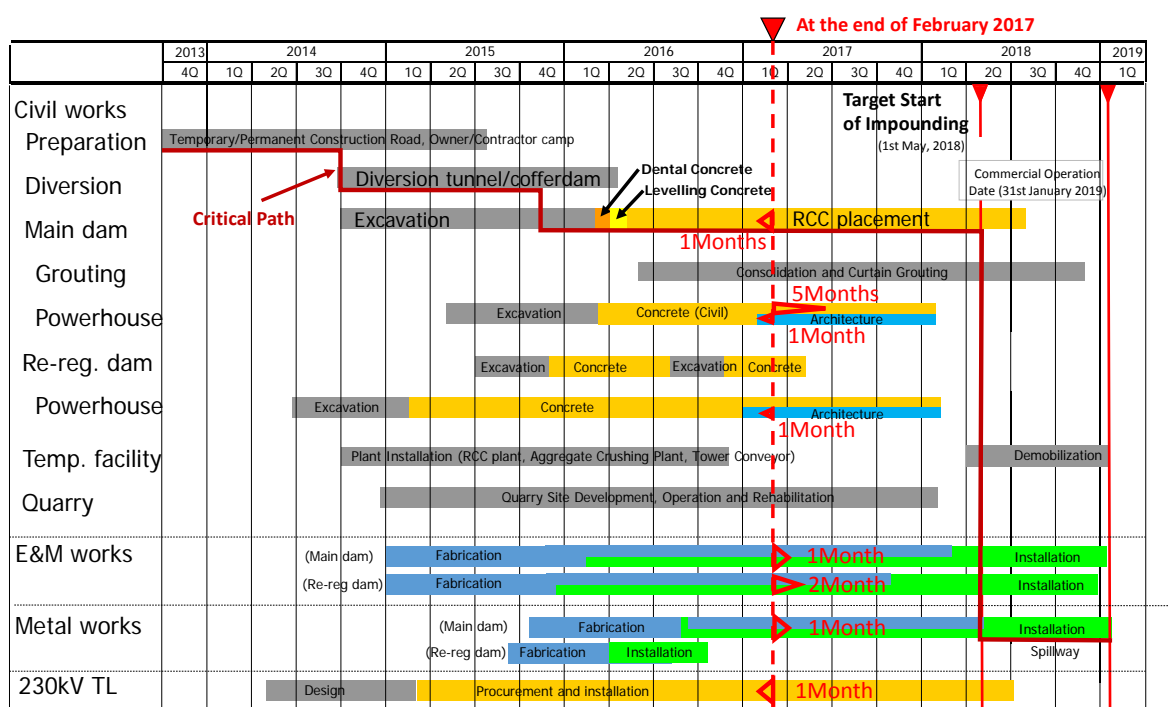
¹ The progress to-date is calculated as (Cumulative Amount of Achieved Interim Milestone Payments) / (Total Agreed Original Price of Construction Contracts) and expressed as a percentage. These totals exclude varied works and other adjustments allowed under each Contract.

² The progress to-date is calculated as (Cumulative Value Achieved for Completed Work by Variation Order or Other Adjustment) / (Total Budget Contingency Amount)

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.

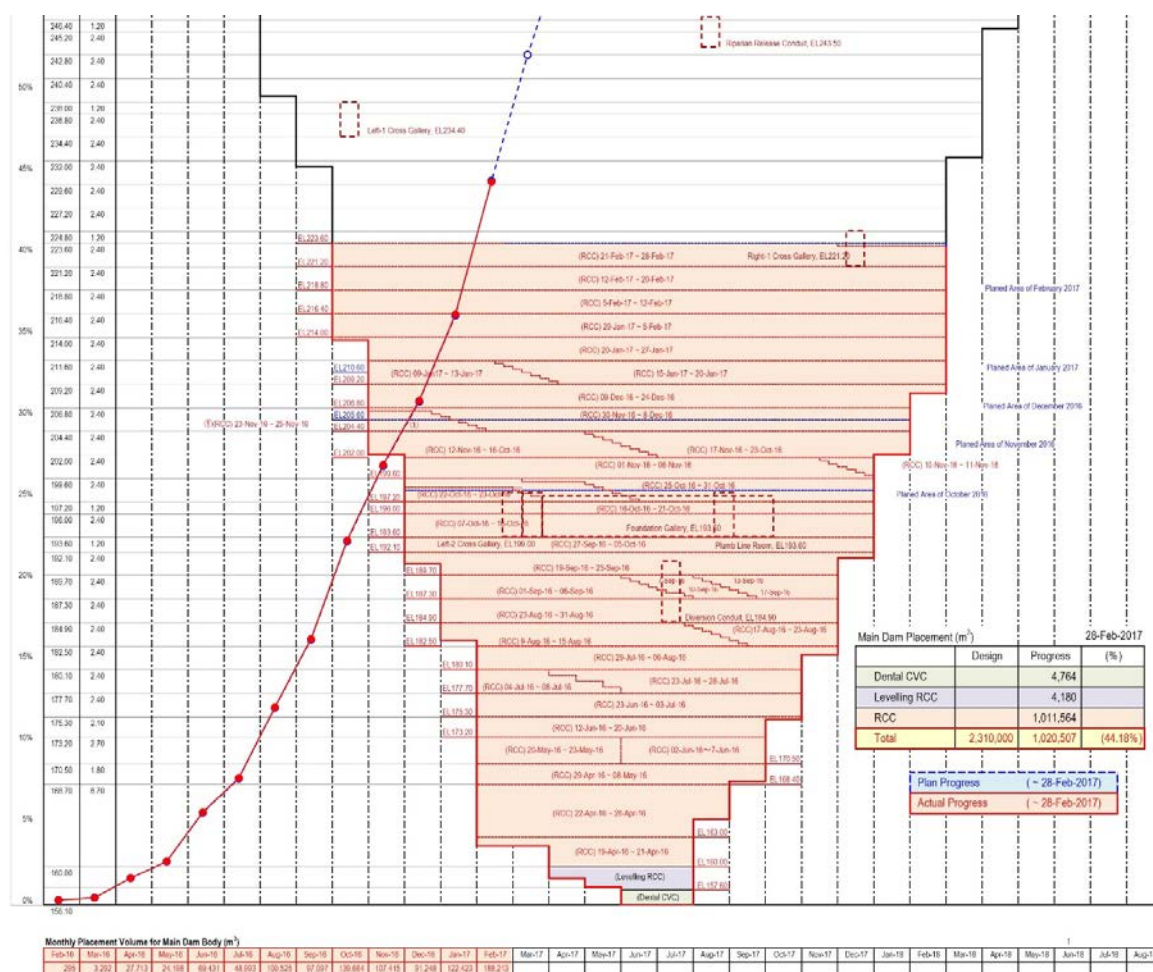
The cumulative actual work progress of the Civil Works until the end of February 2017 was 67.0% (compared to planned progress of 65.6 %) calculated in the same manner as described above for the value of achieved Interim Milestone Payments excluding advance payment.

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 27 January 2017



The consolidation drilling and grouting for the main dam started in May 2016 and is ongoing. The progress is 77 % by achievement of total drilled length at the end of February 2017 as a proportion of the total expected drilling

Table 2-1: Progress of consolidation and curtain drilling for grouting as of 28 February 2017

Item	Total Anticipated Drilling (m)	Completed (m)	Progress (%)
Consolidation Grouting	16,845	13,052	77
Curtain Grouting	27,945	1,739	6

*The value of "Completed" includes grouting works

Main powerhouse sub-structure excavation works were completed in January 2016 and levelling concrete works were started in coordination with installation of the grounding system. Overhead travelling crane runway beam was installed in December 2016. Progress of the powerhouse concreting works is still proceeding well and is shown in Table 2-2 below

Table 2-2: Progress of Main Powerhouse Sub-Structure Concrete Works to 28 February 2017.

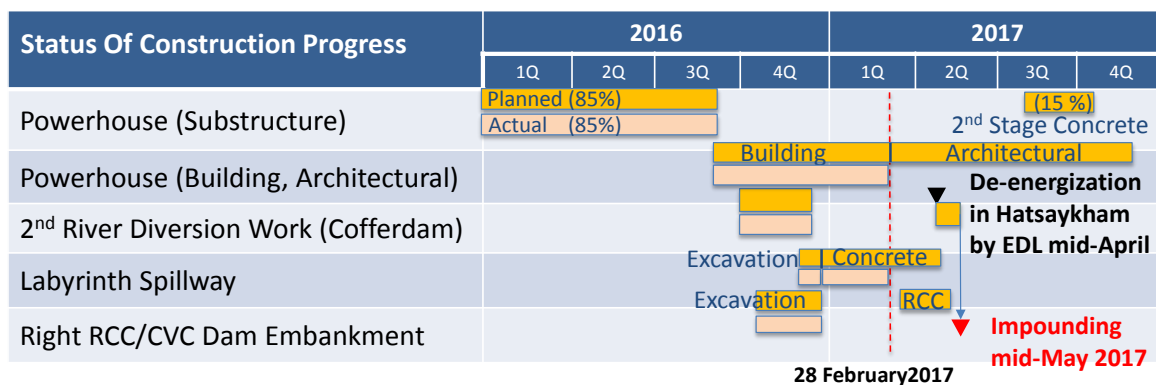
Location	Total Anticipated Volume (m³)	Completed (m³)	Progress (%)
Main Powerhouse	32,600	24,071	73
Penstock Embedment	10,117	6,875	67

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 28 February 2017



Structure	Civil Structure	Spillway		Building			Right Bank RCC Structure	Left Bank Backfill
	Intake + PH + Tailrace	Right Bank Side Concrete	Concrete Apron	Roof Frame	Roof Sheet	Block Wall over El.177 m	RCC + CVC	Powerhouse and Switch Yard
	(m3)	(m3)	(m3)	(ton)	(m2)	(m2)	(m3)	(m3)
Design	26,549	17,515	471	65	1,532	1,576	10,703	45,000
Completed	24,748	12,658	0	45	1,100	1,150	750	42,000
Progress %	93	72	0	69	72	73	7	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 February 2017 was 60.8% (the same when compared to planned progress of 60.8 %).

Figure 2-4: Installation of 360 tonne OHTC Tube for Unit at the Main Powerhouse



Figure 2-5: Preparation for Installation of 80 tonne at the Re-regulation 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 February 2017 was 30.1% (compared to planned progress of 33.8%).

The latest progress of penstock pipes fabrication at IHI field shop as of the end of February 2017 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 February 2017

Item No.	Work Description	Work Progress (%)	Remarks
1.1	Assembly and Welding	64 %	Straight Pipes
1.1	Painting	59 %	Straight Pipes
1.1	Delivery to Main Dam Laydown Area	28 %	Straight Pipes
1.1	Site Erection at Main Dam	27 %	Inclined Part

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 February 2017 was 82.6% (compared to planned progress of 84.8%).

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 2-6: Cumulative Work Progress of Tower Foundation (Original Planned and Actual)

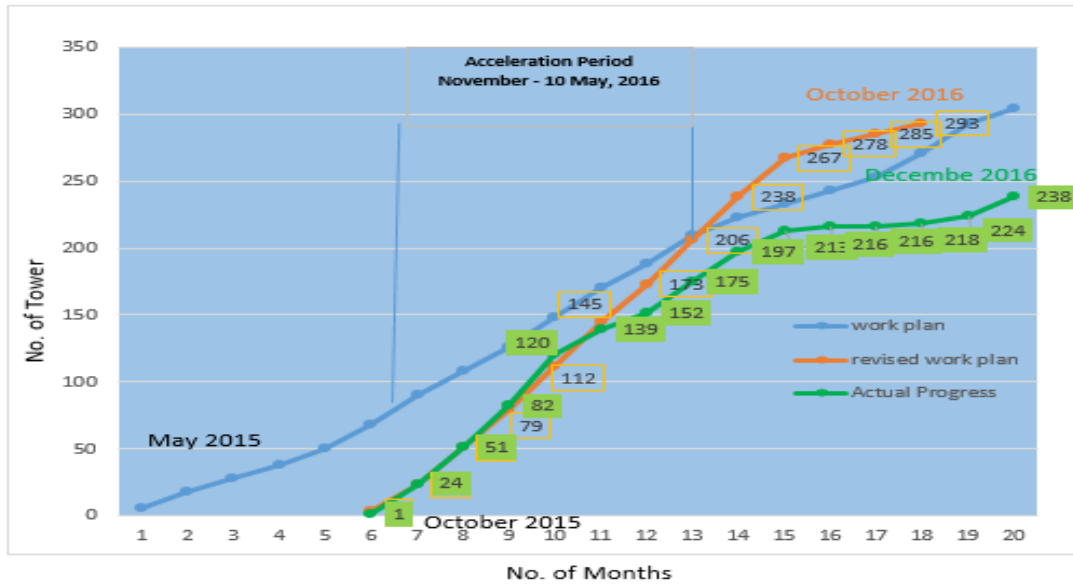


Figure 2-7: Cumulative Works Progress of tower foundation (Revised Planned & Actual)

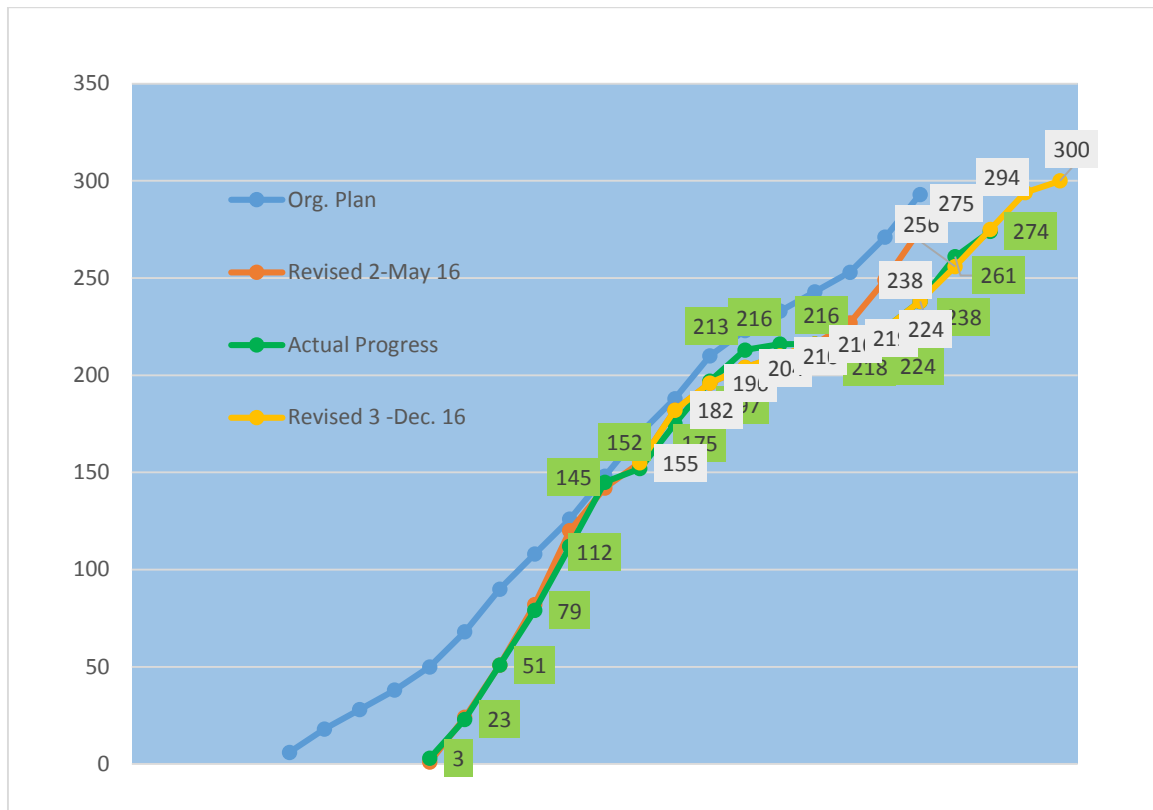
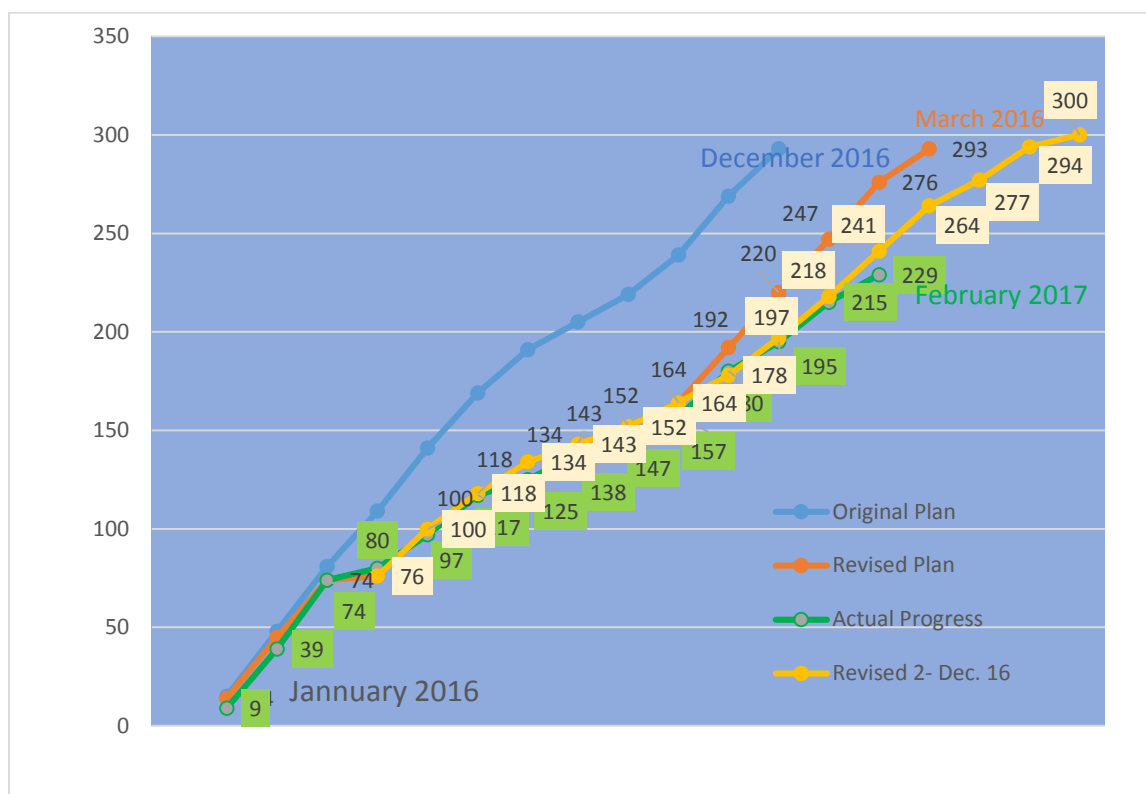


Figure 2-8: Revised Cumulative Works Progress of Tower Erection (Planned & Actual)



3. ENVIRONMENTAL MANAGEMENT MONITORING

3.1 Compliance Management

3.1.1 ESMMP-CP Update 2016

The finalisation of the Environmental and Social Management and Monitoring Plan for the Construction Phase (ESMMP-CP) is in progress. Due to technical data availability, the final review to address some of the provided comments have faced delay. Therefore, the translation into the Lao language cannot be made until a final revision is completed. It is expected that the submission to the Ministry of Natural Resources and Environment (MONRE) can be made by the end of April 2017.

3.1.2 Site Specific Environmental and Social Management and Monitoring Plans

During February 2017, the Environmental Management Office (EMO) of NNP1PC received a total of nine SS-ESMMPs, one ESMMP and one additional supporting document to a previously approved SS-ESMMP for review and clearance. With six SS-ESMMPs and one Site Decommissioning Plan carried over from previous months, there was a total of 15 SS-ESMMPs, one ESMMP, one supporting document and one Site Decommissioning Plan for EMO review. Out of these, six SS-ESMMPs, one supporting document and one Site Decommissioning Plan were cleared with conditions; one ESMMP and one SS-ESMMP were cleared with no conditions; one SS-ESMMP was returned with conditions and remaining seven SS-ESMMPs are carrying over to March 2017.

Table 3-1: SS-ESMMP review status in February 2017

Title	Date Received	Response Status	Comments
SS-ESMMP for Building Construction at Main Powerhouse	30 November 2016 (2 nd submission)	Responded with 'No Objection with Conditions' on 08 February 2017	Sanitary Facility Diagrams illustrated that sewage (greywater and black water) from kitchen and toilet would be treated by "Aerobic Tanks"

Title	Date Received	Response Status	Comments
			prior to discharging to the environment. The Contractor needs to ensure that the proposed Waste Water Treatment System (WWTS) will meet the National Environmental Standard for effluent discharge
SS-ESMMP for Construction of Re-Regulation Power Station Building (Super Structure), Re-Regulation Powerhouse Station (B1)	21 December 2016 (3 rd submission)	Responded with 'No Objection with Conditions' on 07 February 2017	<ul style="list-style-type: none"> - Provide Method Statement for installation of Sanitary Facilities (septic tank) and WWTS for grey and back water; - Provide detailed drawings of the layout of drainage systems, septic tanks and WWTS.
SS-ESMMP for Curtain Grouting Works at Main Dam	27 December 2016 (6 th submission)	Returned with Comments on 14 February 2017	The Contractor shall respond to NNP1PC-EMO's previous comments to the fifth submission of the SS-ESMMP
SS-ESMMP for Adit Closure at Right Bank of Main Dam	28 December 2016 (1 st submission)	Responded with 'No Objection with Conditions' on 08 February 2017	<ul style="list-style-type: none"> - Provide an estimated volume of waste materials to be generated per day and in total; - Provide management measures of Spoil Disposal Area as per Sub-plan 10.
SS-ESMMP for installation work of Spiral Case and Stay Ring for Main Power Station	27 January 2017 (1 st submission)	Responded with 'No Objection and No Further Comment' on 22 February 2017	
SECC Contractor's Site Decommissioning Plan	31 January 2017 (2 nd submission)	Responded with 'No Objection with Conditions' on 24 February 2017	<ul style="list-style-type: none"> - Provide clear timeline ensuring that clean-up of waste material is completed by the end of warranty period
HM Hydro Contractor's Environmental and Social Monitoring and Management Plan	08 February 2017 (4 th submission)	Responded with 'No Objection and No Further Comment'	
SS-ESMMP for House Construction of seven (07) Units for 2LR Resettlement Site	09 February 2017 (1 st submission)	Responded with 'No Objection with Conditions' on 14 February 2017	<p>Provide information related to waste management and Workers' Camp Decommissioning Plan as the following:</p> <ul style="list-style-type: none"> - Hazardous materials and waste shall be cleaned up,

Title	Date Received	Response Status	Comments
			<p>stored and disposed of in accordance with the ESMMP-CP;</p> <ul style="list-style-type: none"> - Separate grey water (from black water).
SS-EMMP for Land Levelling (Cutting and Filling) for 90 House Plots at 2LR-Lower Reservoir Village and Health Centre at Resettlement Site	09 February 2017 (2 nd submission)	Responded with 'No Objection with Conditions' on 14 February 2017	<ul style="list-style-type: none"> - Indicate the volume of left over soil and management measures to prevent future ponding and erosions; - Clearly mention that the four sediment ponds shown in the map are natural void in the terrains to help settle sediment from the run-off during the wet seasons. Thus, drawings were not needed.
SS-EMMP for 1.2 km Road Construction to Landfill at Houay Soup Resettlement Site of the Nam Ngiep 1 Hydropower Project	09 February 2017 (1 st submission)	Responded with 'No Objection with Conditions' on 17 February 2017	<ul style="list-style-type: none"> - Add proper erosion and sediment control measures (diversion channels, sediment ponds and berms) - Add rehabilitation of borrow pits with layer of topsoil to enhance natural regrowth; - Attach a Preliminary Site Decommissioning Plan
Appendix 9.17 Additional Document for the Disposal of Waste Materials at the Main Dam Body	15 February 2017 (1 st submission)	Responded with 'No Objection with Conditions' on 22 February 2017	<ul style="list-style-type: none"> - Clearly identify the permanent disposal areas for each type of waste; - The Contractor needs to propose mitigation measures for removing waste materials to Spoil Disposal Area No. 6 before each wet season and the impoundment in 2018.
SS-ESMMP for Improvement of the Internal Road for Ban Pou, Ban Hatsamphone, and Ban Phiengta at Zone 2, Upper reservoir (2UR)	01 February 2017 (3 rd submission)	Under review	-
SS-ESMMP for RRPS, Closing of Borrow Pit Area at Corner P1&P1A beside RRD	15 February 2017 (2 nd submission)	Under review	-
SS-EMMP for Extension of Main Road Construction 1.375 Km, phase 2 for	19 February 2017 (2 nd submission)	Under review	-

Title	Date Received	Response Status	Comments
Houay Soup Resettlement Site			
SS-ESMMP for Installation Work of 360 Ton Electrical Overhead Traveling Crane for Main Power Station	20 February 2017 (2 nd submission)	Under review	-
SS-ESMMP for Building Construction at Main Powerhouse	22 February 2017 (4 th submission)	Under review	-
SS-ESMMP for the NNP1 Solid Waste Landfill Construction (Stage 2)	24 February 2017 (1 st submission)	Under review	-
SS-ESMMP for Construction of Irrigation Dam, 1 spillway & outlet pipe culvert	27 January 2017 (2 nd submission)	Under review	-

3.1.3 Compliance Report

During February 2017, NNP1PC-EMO issued seven new Observations of Non-Compliances (ONCs) and resolved a total of 12 ONCs and one Non-Compliance Report Level 1 (NCR1). A total of 11 ONCs, one NCR1 and four NCR2 are carried over to March 2017. NNP1PC-EMO will follow up with Contractors to resolve the remaining issues in March 2017.

The carried-over ONC and NCR from February 2017 into March 2017 are summarized in Table 3-2 below.

Table 3-2: Carried-Over ONCs and NCRs from February 2017 into March 2017

Site ID	Issues	Reporting	Actions
Song Da 5 Camp No.2	The WWTS construction was not consistent with the proposed design (ON_OC-0085). 1 st inspection date: 02 June 2015 Latest follow up: 21 February 2017	ONC (Closure pending)	The Contractor checked and flushed the pipelines that connect with each wetland pond to avoid waste water overflowing to the outside environment. However, dead reeds need to be replaced by flattening the sand surface and planting healthy reeds by 21 March 2017.
	Stagnant grey water created unpleasant odour and attracted diseases vectors. Note: This observation of Non-Compliance (ONC) was raised during the previous two Government of Lao PDR (EMU) missions in October and November	NCR-2 (New)	The Contractor has implemented agreed corrective actions and will submit an official response to this NCR2 by 21 March 2017. This NCR2 will be closed after the official response is received.

Site ID	Issues	Reporting	Actions
	<p>2016 and various Bi-weekly joint site inspection (NCR-OC-0014)</p> <p>1st inspection date: 24 January 2017</p> <p>Latest follow up: 21 February 2017</p>		
V&K Camp	<p>Insufficient capacity of waste water treatment ponds to handle the operation of the V&K camp (ON_OC-0087).</p> <p>1st inspection date: 02 June 2015</p> <p>Latest follow up: 21 February 2017</p>	ONC (Closure Pending)	<p>The improvement of the WWTS shall follow the waste water expert's recommendations and be completed by the end of February 2017. However, this indicative deadline was not confirmed during the latest discussion meeting held on 01 February 2017 between NNP1PC (TD and EMO) and OC at OSOV.</p>
HM Hydro Subcontractor's Worker Camp (LALIMA10 Camp)	<p>The LILAMA10 Camp is accommodating 11 workers, but the construction of the Waste Water Treatment System (WWTS) remained incomplete (NCR_HM-0001). The Camp is expected to accommodate about 200 workers by May 2018.</p> <p>1st inspection date: 28 September 2016</p> <p>Latest follow up: 21 February 2017</p>	NCR Level 1 (Closure Pending)	<p>The construction progress of wetland systems is about 40%. This will be completed by the end of March 2017.</p>
RCC Plant	<p>Lack of proper sedimentation facilities to improve the turbid water quality generated from the site (ONC_OC-0217)</p> <p>1st inspection date: 28 June 2016</p> <p>Latest follow up: 28 February 2016</p>	ONC (Closure Pending)	<ul style="list-style-type: none"> - Improvement of sediment ponds located at the lower slopes next to Nam Ngiep was completed in mid-February 2017. - A draft response and a revised DWP & SS-ESMMP (4th submission) for the RCC Plant Operation was discussed with NNP1PC on 28 February 2017. The Contractor confirmed that sediments from all sediment ponds are cleaned up at least once a day. However, it was found on 28 February 2017 that both sediment ponds at the lower slopes were about 80% full. This resulted in discharges of turbid water into Nam Ngiep (more information can be found in next section on the Water Quality Monitoring Results for February 2017). The Contractor was instructed to clean up sediments in all ponds on a daily basis. If it is found that high turbidity waste

Site ID	Issues	Reporting	Actions
			water is discharged into Nam Ngiep, NCRs will be issued.
Re-Regulation Dam (Borrow Pit Area)	<p>The Contractor started operating a borrow pit with inadequate environmental management practices as indicated below:</p> <ul style="list-style-type: none"> - 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. <p>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).</p> <p>1st inspection date: 30 August 2016</p> <p>Latest follow up: 24 January 2017</p>	ONC (Closure Pending)	No further progress was observed on the site closure by the Contractor. NNP1PC will discuss with the Contractor during the next monthly meeting between NNP1PC and OC in March 2017.
Re-regulation dam (spoil disposal area)	<p>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).</p> <p>1st inspection date: 11 October 2016</p> <p>Latest follow up: 24 January 2017</p>	ONC (Closure Pending)	On 15 February 2017, NNP1PC received a revised DWP and SS-ESMMP for re-regulation, closing of the borrow pit at the corner of P1 and P1A road beside the re-regulation dam. It is under review by NNP1PC and will be implemented after receiving feedback from NNP1PC by mid-March 2017.
Aggregate Crushing Plant	<ul style="list-style-type: none"> - 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 leakage of 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) 	NCR Level 2 (Closure Pending)	<p>A discussion on corrective actions for leaking sediment ponds with OC was held on 28 February 2017 with following agreed temporary actions:</p> <ul style="list-style-type: none"> - During the dry season, a man-made sediment pond will be built using sandbags below the pond's embankment along Nam Ngiep banks to contain leaked turbid water. An automatic pump will be used to pump the waste water back to the first sediment pond; - A longer term solution was discussed which included sealing the bottom of the ponds by

Site ID	Issues	Reporting	Actions
	1 st inspection date: 08 November 2016 Latest follow up: 21 and 28 February 2017		concrete after compacting with sand/clay or pumping back to the quarry pit for infiltration into the ground if space is available.
Slurry disposal at an Area above CVC Plant Yard and Spoil Disposal Area No. 8	The required environmental remedial actions for the slurry disposal at areas above the CVC Plant and Spoil Disposal Area No. 8 were not implemented by the Contractor (Ref. Site Inspection Reports No.: NNP1-ESD-EMO-SIR-OC-0053 dated 24 November 2016 and NNP1-ESD-EMO-SIR-OC-0054 dated 16 December 2016) This issue was therefore escalated to NCR level 2 (NCR-OC-0014 on 27 January 2017) 1 st inspection date: 24 January 2017 Latest follow up: 21 February 2017	NCR-2 (Closure pending)	The Contractor installed hard timber fence around the temporary stockpiled area to contain disposed slurry in late February 2017. However, the Contractor has not submitted an official response and revised DWP & SS-ESMMP for the RCC Plant Operation to include these environmental mitigation measures for erosion and sediment controls. The first extension (15 March 2017) was given to Contractor to complete these corrective actions.
SongDa5 Camp No.1	There was evidence of grey water leakage and stagnant grey water from washing/bathing areas along drainage canals that connect to Nam Ngiep River. Note: This issue was resolved during the last two months. However, it became an issue again due to a lack of regular housekeeping practices (ON_OC-0247) 1 st inspection date: 07 February 2017 Latest follow up: 21 February 2017	ONC (New)	- Check and fix the leaking sources to avoid accumulation of stagnant waste water in the drainage channels; - Waste water from the camps shall be treated in the WWTS
HM Hydro Main Camp and Office	Unauthorised pumping of a total of 119 m ³ of sewage from the HM Hydro Main Camp and disposal at rice fields in Paksan District on 14 January 2017. This is a breach of their own ESMMP and NNP1PC's policies on Sewage Sludge Disposal (NCR-HM-0002) 1 st inspection date: 18 January 2017 Latest follow up: 21 February 2017	NCR-2 (New)	A first extension was given to the Contractor (by 15 March 2017) to complete and submit an official response to the NCR2.
Houy Soup Resettlement Access road to	An electricity generator was operated without any oil spill protection (ON_VRC-0007).	ONC (New)	The Contractor agreed to clean up the hydrocarbon contaminated soil and store in a secure facility for proper

Site ID	Issues	Reporting	Actions
HSRA's Landfill	1st inspection date: 01 February 2017 Latest follow up: 28 February 2017		disposal. In addition, an oil spill tray will be provided for the electricity generator.
Kenber Camp	The Waste Water Treatment System (WWTS) has malfunctioned. The piping system is clogged, which has caused the waste water to overflow the first wetland pond; and the planted reeds are dead due to a lack of maintenance (ON_OC-0248). 1 st inspection date: 07 February 2017 Latest follow up: 21 February 2017	ONC (New)	The WWTS are being renovated as follows: <ul style="list-style-type: none"> - Reinforce all wetland ponds with wire mesh and 10 cm concrete lining; - Properly check the ponds' elevations and piping systems; - Place new stones, gravel and sand that meet specifications in all wetland ponds; The renovation work shall be completed by the end of March 2017.
Main Quarry	Overburden from the quarry was pushed downslope towards Nam Ngiep. The existing bund along the Road T11 has collapsed and slipped downslope. The deposited overburden on the slope of Nam Ngiep is likely to cause severe erosion and sediment being washed down to Nam Ngiep during the rainy season (ON_OC-0249). 1 st inspection date: 01 February 2017 Latest follow up: 21 February 2017	ONC (New)	A meeting was held between NNP1PC (TD and EMO) and the Contractor (OC) on 01 February 2016 to discuss this issue. The Contractor agreed to immediately repair the existing bunds. The contractor explained that some of this was caused by fly-rock from blasting which is difficult to prevent; however, the contractor will consider and propose sound engineering methods to deal with these issues.
Biomass Clearance Zone	A 1,200 litres oil tank and some smaller oil containers were installed at a temporary workers' camp without a proper storage facility. This resulted in some minor oil spills and oil contaminated soil at the handling point (ON_UCC-0001). 1st inspection date: 23 February 2017 Latest follow up: Not available	ONC (New)	<ul style="list-style-type: none"> - Provide an impermeable oil collective tray to prevent oil dripping into the ground during fuel handling; - Clean up oil contaminated soil and store in the oil storage for proper elimination (such as incineration) by authorized NNP1PC vendor.
Houay Soup Resettlement Area Irrigation Dam	An electricity generator and a 20litres oil container were not provided with proper impermeable floors (ON_VSP-0005). 1 st inspection date: 28 February 2017	ONC (New)	Provide impermeable storage area or material such as a steel tray for the electricity generator to prevent soil contamination

Site ID	Issues	Reporting	Actions
	Latest follow up: Not available		

Photograph 1 and Photograph 2 Improvement of the Grey Water Ponds at IHI Camp



Figure 3-1: Site Inspection Locations

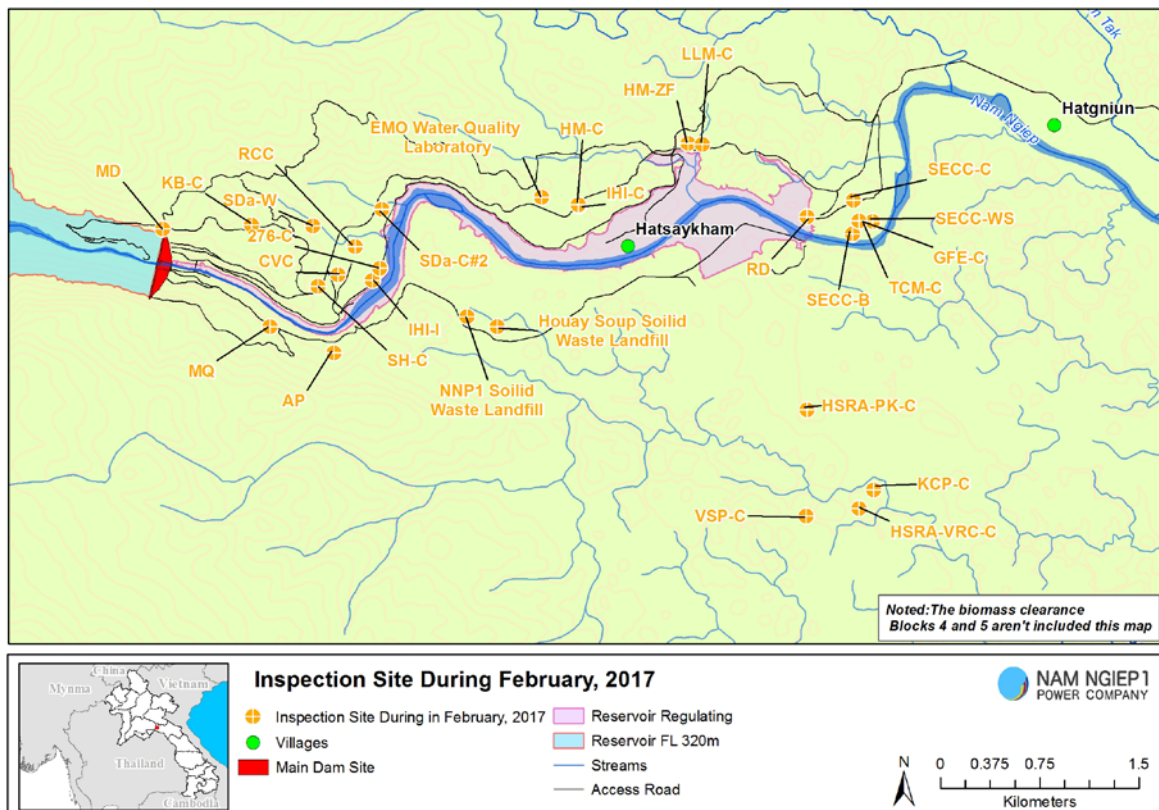


Figure 3-2: 230 kV Transmission Line Construction Monitoring

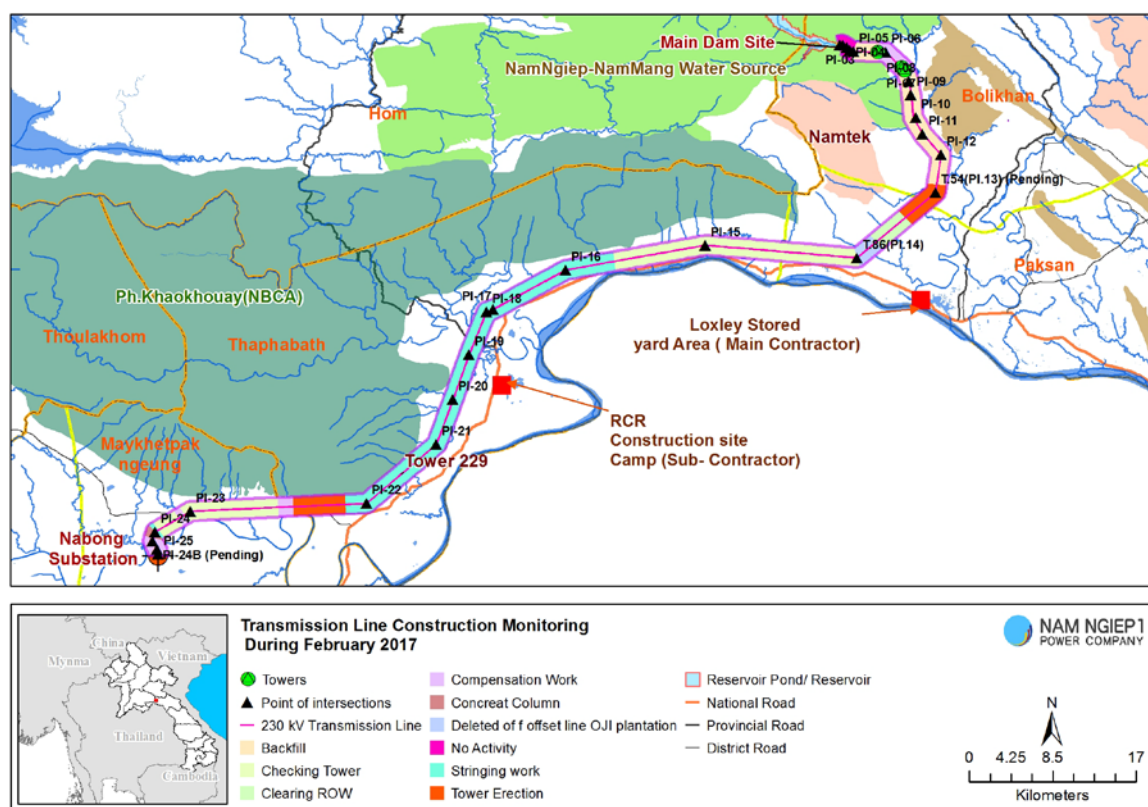
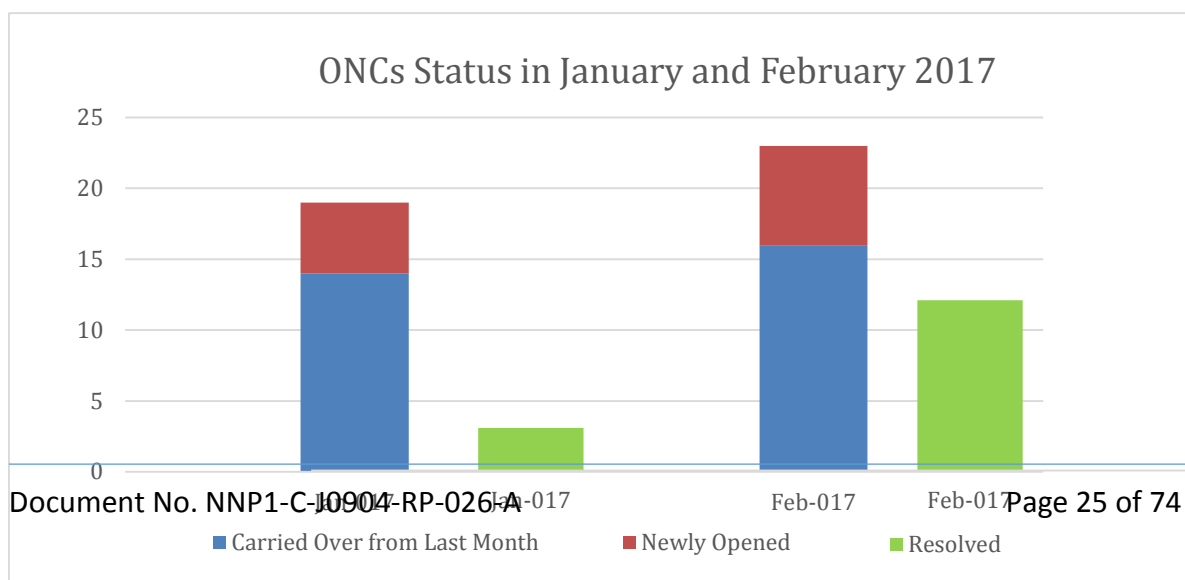


Table 3-3: Summary of ONCs and NCRs

Reporting Period (01-28 February 2017)	ONC	NCR-1	NCR-2	NCR-3
Carried over from January 2017	16	2	4	0
New issues this month	7	0	0	0
Resolved this month	12	1	0	0
Carried forward into March 2017	11	1	4	0
Unresolved exceeding deadline	6	1	4	0

Figure 3-3: Observations of non-compliance (ONCs) in January 2017 Compared with February 2017



- b) Turbid water discharge from the RCC Plant;
- c) Improper Site Decommissioning of the SECC Contractor;
- d) Incomplete construction of Waste Water Treatment Plant at LILAMA 10, and
- e) Stagnant grey water at Song Da 5 Camp No. 2.

3.1.5 Inspection by Environmental Monitoring Units

The Environmental Management Units (EMUs) from Xaysomboun and Bolikhamxay Provinces conducted two separate missions on 15 February 2017 and from 21 to 22 February 2017 respectively. The EMU from Xaysomboun Province focused on the biomass clearance activities in the main reservoir and four resettlement villages in Zone 2LR (Lower Reservoir). No key issues were identified. A draft mission report was submitted to NNP1P for prior review and comments on 18 February 2017.

The mission of EMU from Bolikhamxay Province covered main the construction sites and camps, Houay Soup Landfill and Houay Soup Resettlement Area (HSRA). A mission report was submitted to NNP1PC on 23 February 2017 for prior review and comments. During the site inspection and mission wrap-up, the EMU acknowledged efforts of the Contractor and NNP1PC to improve the sediment pond systems at the RCC Plant. NNP1PC provided the latest water quality results, which showed a turbidity of 2,200 NTU and a TSS of 1,200 mg/l on 14 February 2017. The EMU recommended NNP1PC to closely monitor the turbid water discharge and implement additional improvements if the turbidity and TSS levels remain high. The EMU identified the following additional environmental issues:

- a) Reeds in the wetland ponds at Song Da 5 Camp No. 2 were mostly wiped out and need to be replaced by healthy reeds to enable the treatment system to function as per the conceptual design;
- b) Excessive dust generation was still evident at the Aggregate Crushing Plant. Dust suppression needs to be used at the Aggregate Crushing Plant and along the haul road connecting the Main Quarry and the Aggregate Crushing Plant;
- c) An automatic pump was used to aid the flow of the waste water from Wetland Pond No. 3 to Wetland Pond No. 2. However, an existing connecting pipe was not closed which caused the reverse flow of the waste water through the pipe. The Contractor needs to close the pipe and consider the use of wetland ponds to allow gravity flow;
- d) The sediment ponds of the Aggregate Crushing Plant had leaked which allowed continuous turbid water to flow through the embankments of the ponds into Nam Ngiep. These leakages need to be repaired to prevent the turbid water from flowing into Nam Ngiep.

NNP1PC will submit response letters to the EMUs in March 2017 describing the progresses of implementing the required corrective actions.

3.2 Environmental Quality Monitoring

The construction of NNP1 Project laboratory was commenced in the third week of October 2016 at the Owner's Site Office and Village (OSO) and nearly completed by the end of February 2017. The laboratory is expected to be 100% completed in early March 2017 (see Photograph 3 and Photograph 4). Once it is completed, the laboratory equipment will be relocated from the warehouse, installed and operated at the new laboratory. The NNP1 Project laboratory, in collaboration with United Analysis and Engineering Consultant Company Limited (UAE) will conduct performance verification of its analyses for Total Suspended Solids starting from March 2017.

A part time local consultant will be hired to assist with the lab operation including performance verification in collaboration with the UAE laboratory, data analysis and Quality Assurance/Quality Control (QA/QC) for the laboratory.

Photograph 3 NNP1 Project Laboratory (external view)



Photograph 4 Inside NNP1 Project Laboratory



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:

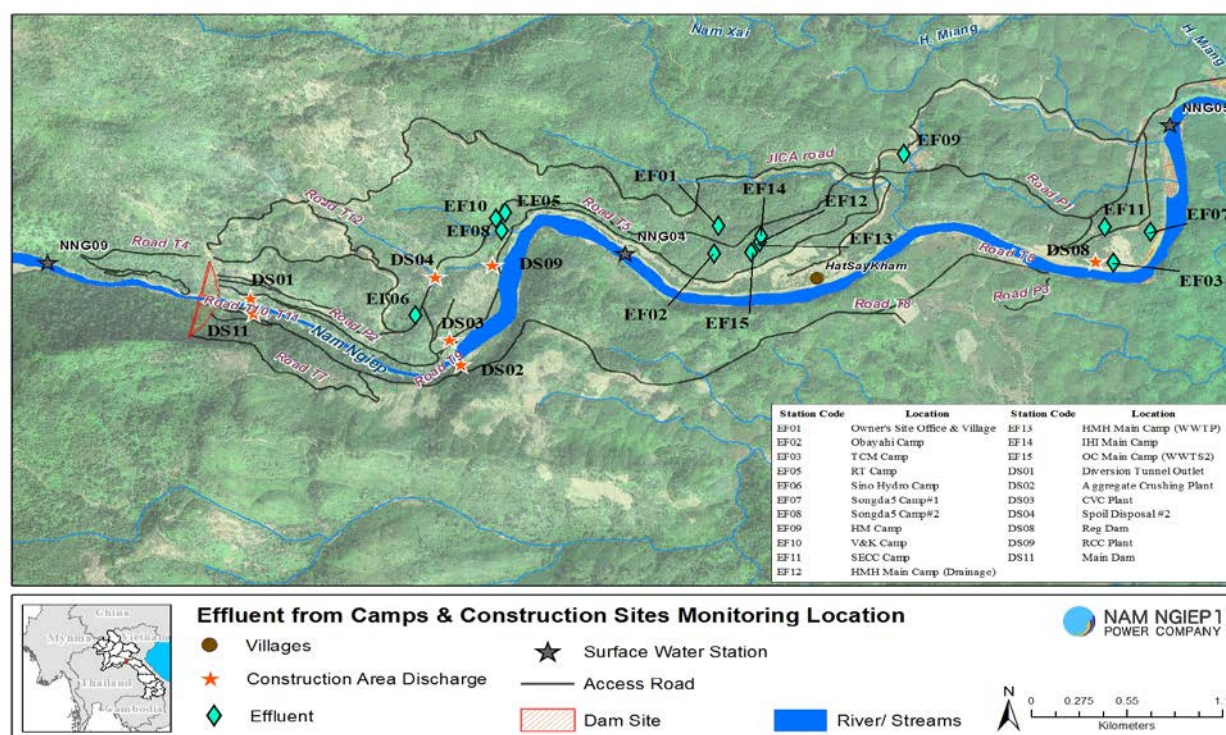
- a) Effluent discharge from camps and construction sites;
- b) Ambient surface water quality monitoring;
- c) Groundwater and community water supply;
- d) Landfill leachate;
- e) Ambient noise and noise emission monitoring.

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. During February 2017, effluent discharge from the new Kenber Camp WWTS was added. Results of effluent monitoring from the camps and construction sites are presented in **Table 3-4**, and the monitoring locations are displayed on the map in **Figure 3-4**.

Figure 3-4: Map of Effluent Discharge Monitoring Locations



Detailed monitoring results are provided in Annex 1 of this Report. The effluent monitoring results for February 2017 indicate that none of the camps, except the Owner's Site Office and Village and the Zhefu Camp complied with the effluent standards. However, both Song Da 5 Camp Waste Water Treatment System (WWTS) improvements are complete and subject only to chlorination adjustments, and those for Kenber, Lilama 10 and IIS are well advanced after extensive discussions with contractors about improving their WWTS were carried out, with remaining improvements scheduled to be completed in March 2017. A proposal for the WWTS improvement at Sino Hydro Camp was submitted for NNP1PC review on 23 February 2017. Discussions on improvements at the V&K and Obayashi Camps remain.

Progress on implementation of the corrective actions for the non-compliant camps and key construction areas is summarized below.

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

Site	Sampling ID	Non-Compliance with applicable effluent standards	Corrective Actions
Owner's Site Office and Village	EF01	Minor non-compliances: total nitrogen and total phosphorus	No corrective actions are needed. These are not likely to cause major impacts on the ambient water quality of Nam Ngiep.
OC Camp (WWTP1)	EF02	Significant non-compliances: Biochemical Oxygen Demand (BOD ₅), COD, ammonia nitrogen (NH ₃ -N), total nitrogen, total	The Contractor needs to improve its WWTS in accordance with the Owner's instruction letter issued in November 2016.

Site	Sampling ID	Non-Compliance with applicable effluent standards	Corrective Actions
		phosphorus and total coliforms	
Sino Hydro Camp	EF06	Significant non-compliance: Biochemical Oxygen Demand (BOD ₅), NH ₃ -N, total nitrogen, total phosphorus and total coliforms	The subcontractor submitted a WWTS improvement plan for NNP1PC review and comment on 23 February 2017. Feedback will be provided by early March 2017.
Song Da 5 Camp No. 1	EF07	Minor non-compliance: total nitrogen and total coliform	Chlorine dosing will be adjusted. Please refer to Table 3-2 for more details on corrective actions.
Song Da 5 Camp No. 2	EF08	Minor non-compliance: NH ₃ -N, total nitrogen, and total coliform	As above.
Hitachi-Mitsubishi Hydro (HMH) Worker Camp No.1	EF09	Significant non-compliance: total coliforms	The Contractor needs to improve its WWTS in accordance with the Owner's instruction letter issued in November 2016.
V&K Camp	EF10	Minor non-compliance: total coliforms and TSS	As above.
SECC Camp	EF11	Minor non-compliance: total nitrogen and total coliforms	Five workers are staying at the camp until the end of the Houay Soup Bridge defect warranty period in December 2017. The Contractor was instructed to apply 25 kg of lime to treat the grey water in the ponds.
H-MH Main Camp (WWTS)	EF13	Significant non-compliance: NH ₃ -N, BOD ₅ , COD, total nitrogen and total coliforms	The Contractor needs to improve its WWTS in accordance to the Owner's instruction letter issued in November 2016.
IHI Main Camp	EF14	Significant non-compliance: NH ₃ -N, BOD ₅ , COD, total nitrogen and total coliforms	Chlorination with sodium hypochlorite has commenced since 21 February 2017. Additional improvements of the wetland ponds have been carried out by the Contractor and will be completed by the end of February 2017.
OC Camp (WWTS2)	EF15	Significant non-compliance: BOD ₅ , COD and total coliforms	The Contractor needs to improve its WWTS in accordance with the Owner's instruction letter issued in November 2016.
Kenber Camp	EF16	Significant non-compliance: BOD ₅ ,	Repairing of the completed WWTS was being carried out by the

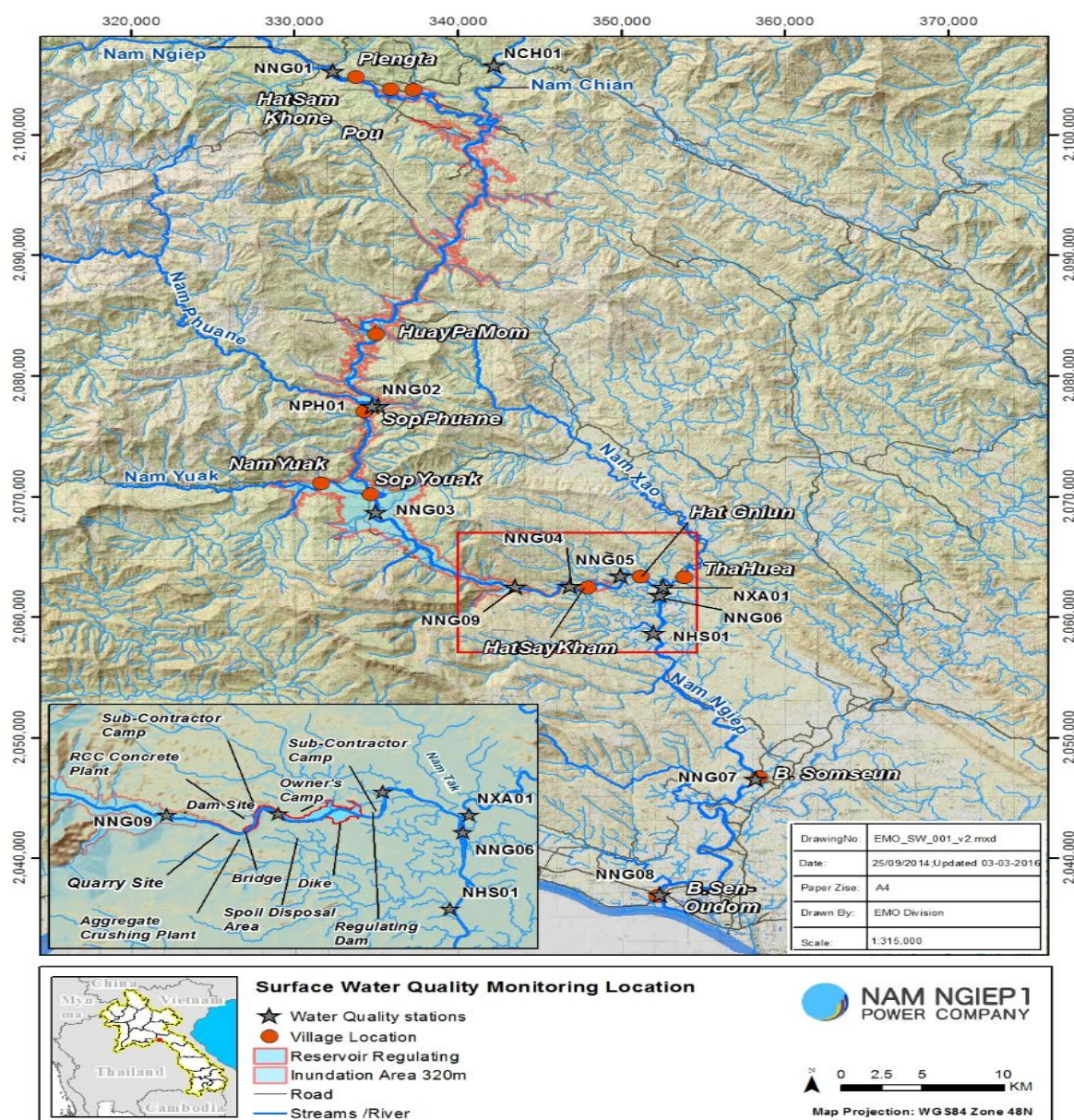
Site	Sampling ID	Non-Compliance with applicable effluent standards	Corrective Actions
		COD and total coliforms	Contractor and will be completed in March 2017.
Main Dam Construction Area (Lower Treatment Plant)	DS11	Minor non-compliance: pH and TSS	The Contractor informed that the high pH was due to a maintenance issue at the treatment plant. This issue was addressed.
Main Dam Construction Area (Upper Treatment Plant)	DS12	Minor non-compliance: TSS	
Re-Regulation Dam	DS08	Minor non-compliance: pH	The Contractor was advised to check the treatment plant and pump the waste water with high pH back to the treatment system.
Spoil Disposal Area No.2 (SongDa5 Workshop)	DS04	Minor non-compliance: TSS	This will be monitored for March 2017.
RCC Plant	DS09	Significant non-compliance: TSS.	Refer to Table 3-2 for corrective action.
Aggregate Crushing Plant	DS02	Significant non-compliance: TSS	See Table 3-2 for corrective actions.

3.2.2 Ambient Surface Water Quality Monitoring

Surface water samples are collected and analysed twice a month² 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 (total thirteen stations). From August 2016, weekly surface water quality monitoring (physical parameters only) has been undertaken with respect to Station NNG09 located immediately upstream of the Main Dam, NNG04 located in the reach within the Construction Area and NNG05 immediately downstream of Re-regulation Dam.

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 February 2017 are shown below.

Nam Ngiep

Most of the monitored parameters complied with the national surface water quality standards, except Chemical Oxygen Demand (COD) which continued to exceed the Standard for the station at Nam Ngiep Downstream of Ban Sopyuak (NNG03 – Upstream of Construction Sites) with a value recorded of 13.4 mg/l.

Since Nam Ngiep surface water quality monitoring programme commenced in September 2014, EMO has frequently found elevated levels of COD 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

Parameters (Unit)	Zone	Upstream of Construction Sites				Within Construction Site	Downstream of Construction Sites			
	Station Code	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08
	Date	06/02/17	07/02/17	07/02/17	08/02/17	08/02/17	08/02/17	08/02/17	08/02/17	08/02/17
	Standard									
pH	5.0 – 9.0	7.4	7.52	7.48	7.64	7.35	7.98	7.86	7.44	7.86
DO (%)		76.6	99.6	98.8	73.5	84.7	104.1	101.9	82.4	86.6
DO (mg/l)	>6.0	6.66	8.58	8.73	6.23	6.78	8.96	8.81	6.25	6.16
Conductivity (µs/cm)		107	103	106	99	100	39.8	40	104	103
TDS (mg/l)		53	51	53	50	50	20	20	52	52
Temperature (°C)		19.49	20.61	19.8	20.93	22.1	21.7	21.5	21.8	22.05
Turbidity (NTU)		6.13	7.20	5.36	3.17	3.66	9.03	4.6	5.8	13.6
TSS (mg/l)		11.7	10.2	6.6	5.1	6.6	13.3	6.7	10.2	37.4
BOD ₅ (mg/l)	<1.5	ND ¹³	1	ND ¹³	1.1	ND ¹³	ND ¹³	ND ¹³	ND ¹³	ND ¹³
COD (mg/l)	<5.0	ND ¹⁶	ND ¹⁶	13.4	ND ¹⁶	ND ¹⁶	ND ¹⁶	ND ¹⁶	ND ¹⁶	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	0.07	ND ⁹	ND ⁹	ND ⁹	ND ⁹	ND ⁹	ND ⁹	ND ⁹	ND ⁹
Total coliform (MPN/100 ml)	<5,000	1,300	130	170	49	79	130	70	130	210
Faecal coliform (MPN/100 ml)	<1,000	170	130	170	4.5	33	79	46	21	33

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 Physical Parameters of Nam Ngiep Surface Water Quality Monitoring – Weekly and Fortnightly

Parameters (Unit)	Zone	Upstream of Construction Sites	Within Construction Site	Downstream of Construction Sites
	Station Code	NNG09	NNG04	NNG05
	Date	01/02/17	01/02/17	01/02/17
	Guideline			
pH	5.0 – 9.0	8.17	7.57	7.93
DO (%)		86.5	92.8	96.2
DO (mg/l)	>6.0	6.6	7.7	7.59
Conductivity (µs/cm)		116	123	117
TDS (mg/l)		58	61	58
Temperature (°C)		23.85	22.92	25.38
Turbidity (NTU)		6.8	7.92	13.7

	Zone	Upstream of Construction Sites	Within Construction Site	Downstream of Construction Sites
	Station Code	NNG09	NNG04	NNG05
	Date	14/02/17	14/02/17	14/02/17
Parameters (Unit)	Guideline			
pH	5.0 – 9.0	7.41	7.56	7.75
DO (%)		98.7	77.3	84.3
DO (mg/L)	>6.0	8.5	6.22	7.31
Conductivity (µs/cm)		40	104	102
TDS (mg/l)		20	52	51
Temperature (°C)		21.27	22.45	21.48
Turbidity (NTU)		3.89	5.56	6

	Zone	Upstream of Construction Sites				Within Construction Site	Downstream of Construction Sites			
	Station Code	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08
	Date	22/02/17	23/02/17	23/02/17	24/02/17	24/02/17	24/02/17	24/02/17	24/02/17	24/02/17
Parameters (Unit)	Guideline									
pH	5.0 – 9.0	7.35	7.85	7.21	7.22	7.35	7.21	7.7	7.61	7.59
DO (%)		75.3	89.1	83.1	93.4	93	92.4	90.4	75.2	78.4
DO (mg/l)	>6.0	6.5	7.41	6.59	7.54	7.69	7.67	7.56	6.34	6.52
Conductivity (µs/cm)		108	105	109	108	117	102	104	112	106
TDS (mg/l)		54	53	55	54	58	51	52	56	53
Temperature (°C)		20.9	23.28	23.53	24.83	24.09	23.28	23.37	22.87	23.53
Turbidity (NTU)		5	4.42	4.19	4.08	4.84	14.1	11	5.94	7.93

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

Nam Chiane (NCH01) is located about 66 km upstream of the Main Dam. The COD exceeded the National Surface Water Quality Standard with recorded values of 8.3 mg/l.

Nam Phouan is located about 24 km upstream of NNP1 Project construction site. All parameters monitored complied with the relevant surface water quality standards.

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

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

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 a recorded value of 8.0 mg/l.

Table 3-7: 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 Houay Soup
	Zone	Tributaries Upstream		Tributaries Downstream	
	Station Code	NCH01	NPH01	NXA01	NHS01
	Date	06/02/17	07/02/17	08/02/17	08/02/17
Parameters (Unit)	Guideline				
pH	5.0 - 9.0	7.28	7.4	7.9	6.65
DO (%)		88.5	109	97.3	78.1
DO (mg/l)	>6.0	8.22	9.9	8.21	7.01
Conductivity (µs/cm)		53	81	64.2	45
TDS (mg/l)		26	41	32	23
Temperature (°C)		18.51	18.08	22.8	19.7
Turbidity (NTU)		20	1.83	2.87	4.57
TSS (mg/l)		57.8	ND ¹⁶	ND ¹⁶	ND ¹⁶
BOD ₅ (mg/l)	<1.5	ND ¹³	ND ¹³	ND ¹³	1.1
COD (mg/l)	<5.0	8.3	ND ¹⁶	ND ¹⁶	8
NH ₃ -N (mg/l)	<0.2	ND ¹²	ND ¹²	ND ¹²	ND ¹²
NO ₃ -N (mg/l)	<5.0	0.02	ND ⁹	ND ⁹	ND ⁹
Total coliform (MPN/100 ml)	<5,000	220	70	490	330
Faecal coliform (MPN/100 ml)	<1,000	79	46	33	4.5

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 3-8: 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	22/02/17	23/02/17	24/02/17	24/02/17
Parameters (Unit)	Guideline				
pH	5.0 - 9.0	7.3	8.17	7.65	7.4
DO (%)		82.4	97.6	82.1	70.9
DO (mg/L)	>6.0	7.23	8.2	6.77	6.21
Conductivity(µs/cm)		67	82	165	127
TDS (mg/L)		34	41	82	63
Temperature (°C)		19.93	22.46	24.45	21.36
Turbidity (NTU)		9	1.78	2.29	2.98

3.2.3 Groundwater Quality Monitoring

During February 2017, NNP1PC sampled and analysed the groundwater quality in eight boreholes. Out of these, two boreholes are community owned boreholes at Hatsaykham Village and six boreholes were built by the Project for re-settlers at Houay Soup Resettlement Area.

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

The monitored parameters complied with the standards, except pH which was lower than the Standard with recorded values of 5.77 and 5.67 for the borehole number GHSK01 and GHSK02 respectively. Other parameters complied with the standard.

Houay Soup Resettlement Area (HSRA)

The pH for the borehole number GHSP04 and GHSP06 with the values recorded of 5.96 and 6.41 respectively (same boreholes with similar pH level as the previous month). Other parameters complied with the standard.

Figure 3-6: Groundwater Quality Monitoring Locations

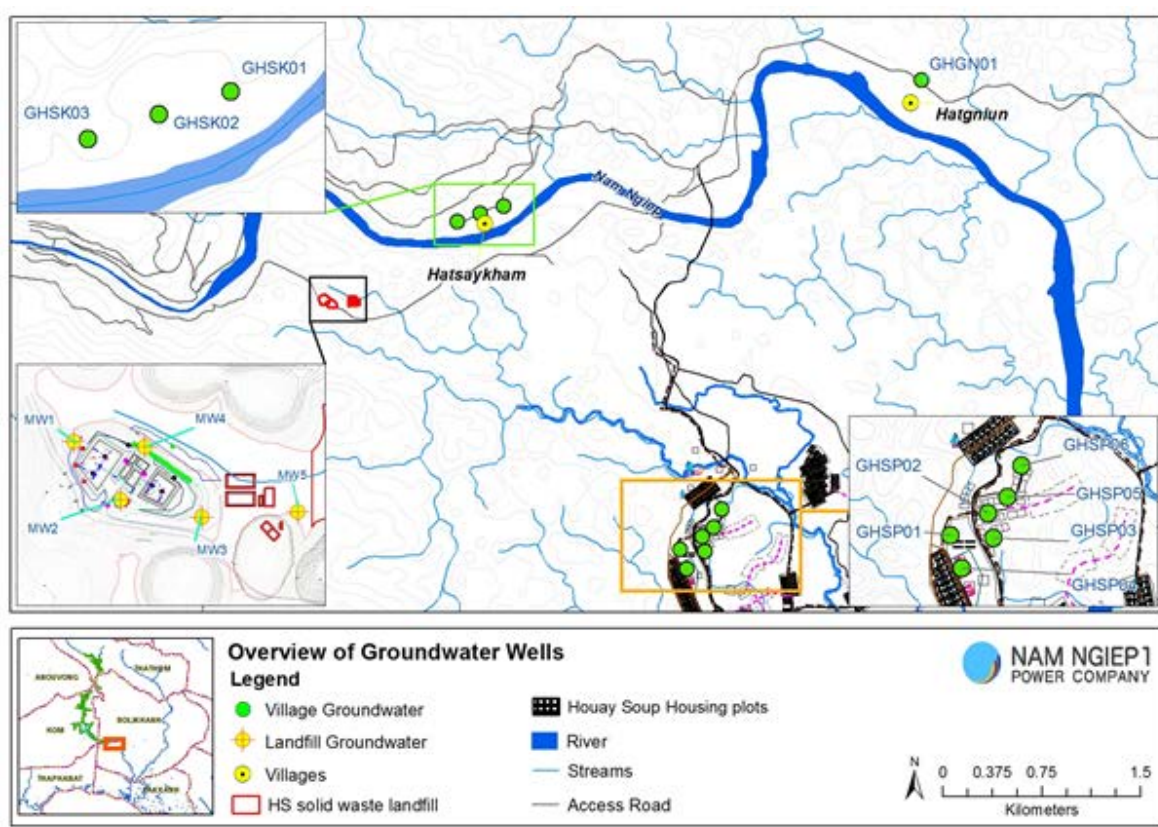


Table 3-9: Groundwater Quality Monitoring Results Hatsaykham and Hat Gniun Villages in February 2017

	Site Name	Hatsaykham Village		
	Station Code	GHSK01	GHSK02	GHSK03
	Date	02/02/2017	02/02/2017	
Parameter (Unit)	Guideline			
pH	6.5-9.2	5.77	5.67	a pump was broken
Sat. DO (%)		50	39.2	
DO (mg/l)		3.96	2.94	
Conductivity (µs/cm)		112	94	
TDS (mg/l)	<1,200	56	47	
Temperature (°C)		26.66	27.44	
Turbidity (NTU)	<20	0.94	1.1	
Faecal coliform (MPN/100 ml)	0	0	0	
E. Coli Bacteria (MPN/100 ml)	0	0	0	

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 3-10: Groundwater Quality Monitoring Results for Houay Soup Resettlement Area in February 2017

	Site Name	Houay Soup Resettlement					
	Station Code	GHSP01	GHSP02	GHSP03	GHSP04	GHSP05	GHSP06
	Date	02/02/17	02/02/17	02/02/17	02/02/17	02/02/17	02/02/17
Parameter (Unit)	Guideline						
pH	6.5-9.2	7.11	6.53	7.17	5.96	6.75	6.41
Sat. DO (%)		55.9	60	74	14.3	70.6	63.2
DO (mg/l)		4.54	5	5.86	1.13	5.72	5.04
Conductivity (µs/cm)		491	246	538	151	212	185
TDS (mg/l)	<1,200	242	123	269	76	106	92
Temperature (°C)		24.92	23.65	24.98	25.85	25.15	25.54
Turbidity (NTU)	<20	1.19	0.76	0.99	1.7	1.03	0.84
Faecal coliform (MPN/100ml)	0	0	0	0	0	0	0
Ecoli Bacteria (MPN/100ml)	0	0	0	0	0	0	0

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)			

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 February 2017, 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 13 MPN/100 ml for both parameters.

Ban Hat Gnuin (WHGN2): All parameters complied with the National Drinking Water Standards except for faecal coliforms and E. Coli, which were found to be 110 MPN/100 ml for both parameters.

Table 3-11: Results of the Gravity Fed Water Supply Quality Monitoring

	Site Name	Tha Heua Village	Hat Gnuin Village
	Station Code	WTHH02	WHGN02
	Date	02/02/2017	02/02/2017
Parameter (Unit)	Guideline		
pH	6.5-8.5	6.56	7.12
Sat. DO (%)		91	73.4
DO (mg/l)		7.89	6.02
Conductivity (µs/cm)	<1,000	83	112
TDS (mg/l)	<600	41	56
Temperature (°C)	<35	24.37	24.07
Turbidity (NTU)	<10	1.48	2.9
Faecal coliform (MPN/100 ml)	0	13	110
E. Coli Bacteria (MPN/100 ml)	0	13	110

3.2.5 Landfill Leachate Monitoring

During February 2017, water samples were taken from the last landfill leachate ponds of the NNP1 Project Landfill (LL4). 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 COD.

Figure 3-7: Landfill Leachate Monitoring Location

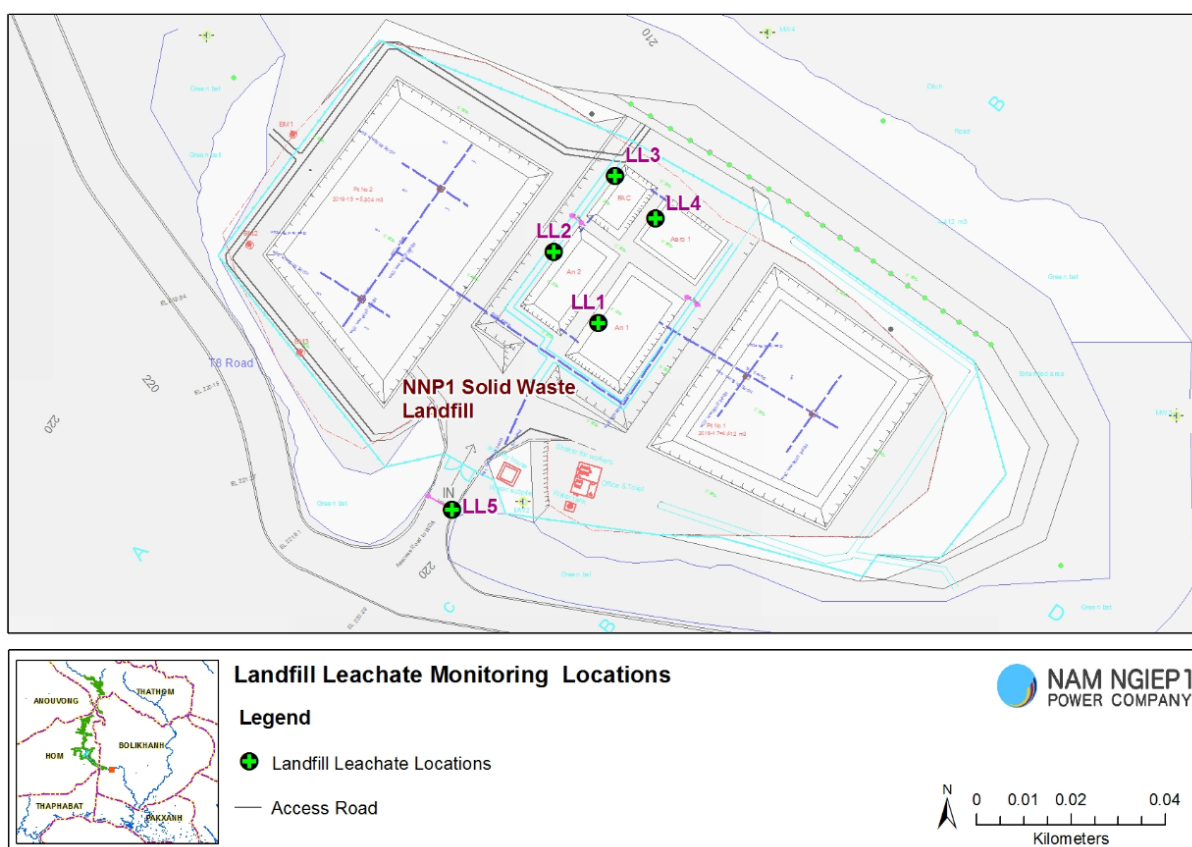


Table 3-12: Landfill Leachate Monitoring Results

Parameters (Unit)	Site Name	NNP1 Landfill (Leachate Ponds)
	Station Code	LL4
	Date	09/02/2017
	Guideline	
pH	6.0 - 9.0	7.38
Sat. DO (%)		3.56
DO (mg/l)		0.53
Conductivity (µs/cm)		386
TDS (mg/l)		193
Temperature (°C)		19.92
Turbidity (NTU)		0.27
BOD (mg/l)	<30	25.2
COD (mg/l)	<125	296
Total coliform (MPN/100ml)	<400	0

3.2.6 Dust Monitoring

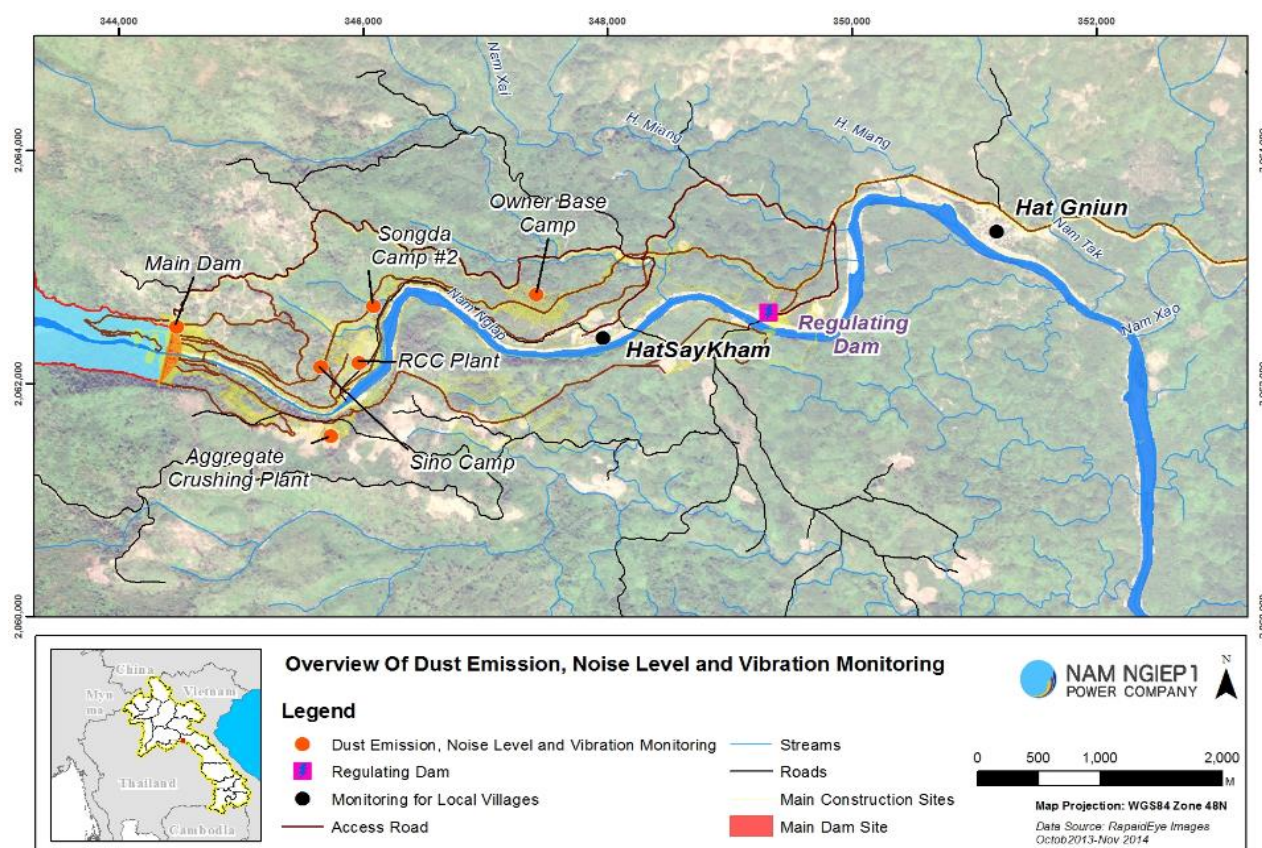
The monitoring points are indicated on the map in **Figure 3-8**. All average dust results during the monitored period complied with the National Standard, except at the Aggregate Crushing Plant. The results are presented in **Annex B**.

3.2.7 Noise Monitoring

During February 2017, noise monitoring was conducted in Ban Hat Gnuin and Houay Soup Resettlement Village for at least 72 consecutive hours. Noise monitoring was also conducted at the Aggregate Crushing Plant, RCC Plant, Sino Hydro Camp, Song Da 5 Camp No. 2, Sino Hydro Temporary Worker Camp and Lilama 10 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 noise levels recorded at the monitoring stations indicated full compliance with the National Standard for the period of 06:01-22:00, except at the Aggregate Crushing Plant and Sino Hydro Temporary Worker Camp. The noise levels during the period of 22:01-06:00 were higher than the Standard at the Aggregate Crushing Plant, RCC Plant, Song Da 5 Camp No. 2, Sino Hydro Camp, Sino Hydro Temporary Worker Camp, Lilama 10 Camp and the Main Dam [between 55.60 – 82.52 dB(A)] compared to the Standard of 50 dB(A)].

3.3 PROJECT WASTE MANAGEMENT

3.3.1 Solid Waste Management

In February 2017, NNP1PC closely supervised the landfill operations including waste disposal, compaction and soil cover activities using a crawler excavator. The solid waste delivered and disposed at the NNP1 Project Landfill was spot-checked and found that the HM Hydro's LILAMA 10 (subcontractor) attempted to dispose of construction waste (large plastic sheets) at the NNP1 Landfill which is not permitted but allowed at the Spoil Disposal Area No.6. This Subcontractor was instructed to collect the construction waste for proper disposal in the designated area of Spoil Disposal Area No.6 (See Photograph 5 and Photograph 6 below). Approximately 136.3 m³ of solid waste was disposed at the NNP1 Project Landfill during February 2017, an increase of 4.6 m³

compared to January 2017.

The construction of a second stage of NNP1 Project Landfill will be commenced in March 2017. A revised Detailed Works Programme (DWP) and Site Specific Environmental and Social Management and Monitoring Plan (SS-ESMM) was submitted by the Contractor for review and clearance by NNP1PC on 21 February 2017.

Photograph 5: Waste compaction and soil cover at the NNP1 Project Landfill



Photograph 6: Contractors Collected Disposed Construction Waste from NNP1 Project Landfill



3.3.2 Hazardous Materials and Waste Management

During February 2017, joint hazardous materials and waste inventories were carried out at the main construction sites and subcontractors' camps as indicated in Table 3-13.

Hazardous materials generated at construction sites and camps continued to be sold to new vendors (Saysana and Xiengkhouane Processing Factory in the Vientiane capital) by a few subcontractors for disposal. An environmental audit was not carried out as planned in February 2017 for the new vendors selected by the Contractor. NNP1PC will send an official letter to the Contractor in March 2017 to instruct stoppage of sales to the proposed new vendors until they are audited and confirmed by the NNP1PC-EMO. Besides, approximately 200 litres of used hydraulic and engine oil, seven units of used oil filters and nine bags (30 kg/bag) of contaminated soil from the site decommissioning cleaning up was sold to Khoumixay Processing Factory (authorised vendor) by SECC Contractor.

Table 3-13: Results of hazardous material inventory

No.	Hazardous Waste Type	Unit	Total in February 2017 (A)	Disposal by Selling (B)	Remainder (A - B)
1	Used hydraulic and engine oil	litre (l)	8,654	200	8,454
2	Empty used chemical drum/container	drum (20 l)	2,000	0	2,000
3	Used oil filters	No.	656	17	639
4	Used tyre	No.	384	30	354

No.	Hazardous Waste Type	Unit	Total in February 2017 (A)	Disposal by Selling (B)	Remainder (A - B)
5	Ink cartridge	No.	254	0	254
6	Empty paint and spray cans	can	191	13	178
7	Cement bag	bag	150	0	150
8	Empty used oil drum/container	drum (20 l)	106	24	82
9	Empty contaminated bitumen drum/container	drum (200 l)	82	0	82
10	Empty used chemical drum/container	drum (200 l)	31	0	31
11	Empty used oil drum/container	drum (200 l)	35	7	28
12	Contaminated soil, sawdust and concrete	bag	30	9	21
13	Halogen/fluorescent bulbs	No.	25	0	25
14	Contaminated textile and material	Bag	21	0	21
15	Car battery	No.	11	0	11
16	Clinical waste	kg	11	0	11
17	Acid and caustic cleaners	bottle	0	0	0
18	Used oil mixed with water	liter (l)	0	0	0

In February 2017, the amount of recyclable waste was recorded at each NNP1 Project construction site and offices including Song Da 5 Camp No. 1, TCM Camp, GFE Camp, Re-regulation Dam, V&K Camp, Song Da5 Camp No.2, Song Da 5 Workshop at Disposal Area No.2, RCC Plant, Sino Hydro Worker's Camp, Sino Hydro Camp, Kenber Camp, SECC Camp and each Contractor's Camp at Houay Soup Resettlement Area (HSRA). The amount of sold recyclable waste is shown in Table 3-14:

Table 3-14: Amounts of Recyclable Waste Sold

No.	Type of Recycled Waste	Unit	Sold	Cumulative Total by February 2017
1	Scrap metal	kg	5,000	13,173
2	Glass	kg	239	353
3	Plastic bottles	kg	188	168.5
4	Aluminium	kg	104	80.5
5	Paper/Cardboard	kg	54	168

A total of 5,000 kg of scrap metal from a local Contractor - SECC was sold to the local Khoum Mixay Processing Factory in Pakxan District, Bolikhamxay Province and the remaining recycled waste from other Contractors was sold to a local vender at Hat Gniun villagel (See Photograph 7 and Photograph 8 below).

Photograph 7: Scrap metal of SECC Contractor was Sold to Khounmixay Process Factory in Paksan, Bolikhamxay Province



Photograph 8: Some Hazardous Waste of SECC Contractor was Sold to Khounmixay Process Factory in Paksan, Bolikhamxay Province



The food waste generated from the Owner's Site Office and Village (OSOV), selected camps of Contractors and subcontractors continues to be collected by Hatsaykham villagers for use as animal feed (pig and poultry). A total of 5,212 kg was collected in February 2017 as shown in Table 3-15.

Table 3-15: Amount of Food Waste Collected by Villagers

NO.	SITE NAME	UNIT	TOTAL
1	Song Da5 Camp No. 2	kg	2,240
2	Song Da5 Camp No. 1	kg	1,599
3	Obayashi Corporation Camp	kg	820
4	Owner's Village and Site Office (OSOV)	kg	331
5	LILAMA 10 Camp	kg	191
6	HSRA-DLC-C	kg	31
Total		kg	5,212

In February 2017, NNP1PC-EMO together with administration staff from OSOV produced a total of 30 kg of compost made from leaves, cow dung, rice husks, molasses, bio-effect (BE), water and discarded vegetables and fruits from the canteens of OSOV, selected Contractors and subcontractors (See Photograph 9 and Photograph 10 below). The compost will be used as organic fertilisers for grasses, plants and flowers in the OSOV.

Photographs 9 and 10: NNP1PC Staff Make Compost at NNP1 Project Landfill**3.4 Community Waste Management****3.4.1 Community Recycling Programme**

By the end of February 2017, a total of 593 kg of recyclable waste was received in the Community Recycle Bank. During February 2017 alone, a total of 519 kg of recyclable waste was recorded, an increase of 35 kg compared to January 2017. 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 as 87% for Hat Gniun Village, 64% for Hatsaykham Village and 64% for Thahuea Villag.

The types and amounts of waste recycled in February 2017 are presented in Table 3-16

Table 3-16: *Types and amounts of waste traded*

Types of Waste	Unit	Remaining In January 2017	Additions In February 2017	Sold	Remaining In February 2017
Scrap metal	kg	0	208	0	208
Glass	kg	394	181	410	165
Paper/cardboard	kg	90	17	0	107
Aluminium cans	kg	0	62	0	62
Plastic bottle	kg	0	51	0	51
Total	kg	484	519	410	593

NNP1PC-EMO continued to carry out trial trading of recyclable waste with new residents at Houay Soup Resettlement Area (HSRA) and host village such as Ban Thaheua, Hat Gniun and Hatsaykham Villages. This was also an opportunity to raise their awareness on the waste management which includes waste segregation, reduction and disposal in a temporary waste pit at each household as well as how to manage recyclable waste before selling to the Community Recyclable Waste Bank at Hat Gniun Village (see Photograph 11 and Photograph 12 below):

Photograph 11: Students members Sold Recyclable Waste to Hat Gniun Recyclable Waste bank



Photograph 12: NNP1PC Bought Recyclable Waste from New Residents at HSRA



3.4.2 Houay Soup Resettlement Area Waste Management

In February 2017, a total of 0.39 m³ of solid waste from HSRA's Contractors was disposed of at Houay Soup Landfill. The Contractors were not permitted to dispose of their waste permanently in their camps. The Houay Soup Landfill is opened every Tuesday and Thursday from 09:30 am to 10:30 am through individual arrangement with NNP1PC-EMO staff. NNP1PC-EMO, Infrastructure team and the Contractor carried out a final joint inspection for the second phase of Houay Soup Landfill construction in February 2017, the completed construction works include lining of 2nd and 3rd waste pits with HDPE, a guardhouse, permanent fence, internal road and other related facilities (see Photograph 4 and Photograph 5 below). Additional work on erosion control and slope stabilisation is being processed by NNP1PC using the same Contractor (see Photograph 13 and Photograph 14 below).

Photograph 73: NNP1PC and a Local Contractor carried out a Final Inspection for 2nd Stage Houay Soup Landfill Construction



Photograph 84: Completion of the 2nd Stage Houay Soup Landfill Construction



3.5 Watershed and Biodiversity Management

3.5.1 Preparation of the Nam Ngiep 1 Watershed Management Plan

Obligations ³	Status by February 2017
Prepare: 1) Full draft Nam Ngiep 1 Watershed Management Plan by 15 November 2016	Completed - It was confirmed by ADB on 16 February 2017 that this CP was met.
Prepare draft Watershed Management Regulations by 15 November 2016	There is no further progress on Watershed Management regulation this month after the draft was submitted to ADB on 13 January 2017.
Final Watershed Management Plan by 23 December 2016	As agreed between ADB and NNP1PC, this target date is moved to the First Quarter of 2017.

³ All previous deadlines on preparation of the Nam Ngiep 1 Watershed Management Plan and watershed management regulations were revised and agreed with ADB in August 2016. The Table only shows the current required submissions and their respective target dates

Obligations ³	Status by February 2017
2) A draft provincial regulation submitted to Provincial Justice Department by 23 December 2016	As agreed between ADB and NNP1PC, this target date is moved to the First Quarter of 2017.
3) Start of public hearing process by 10 January 2017	

Activities in February 2017	Results
Data and Information Collection and Analysis for WMP Development	<ul style="list-style-type: none"> The approach to continue with WMP finalization using the existing delineation of NNP1 watershed area was accepted by ADB in the first week of February 2017. The key comments on Section 7 was provided by ADB Consultant in the second week of February 2017: <ul style="list-style-type: none"> To shorten and simplify the themes of management plan To consider that 'No Net Loss' achievement should be funded from different source because it is not under CA obligation for watershed management To clarify the status of land uses within the proposed biodiversity hot spot area. <ul style="list-style-type: none"> There are areas identified as mining concessions situated within National Protection Forest and the proposed biodiversity hot spot area. The progress of WMP finalization includes: <ul style="list-style-type: none"> Analysis on the updated land use / land cover classification from Department of Forestry. Improvements to the Biodiversity and Fishery Section to elaborate the requirement of meeting the No Net Loss. Draft budget for the entire concession period. Finalize the overall section per latest comments / recommendation from ADB Consultant.
Prepare draft Watershed Management Regulations by 15 November 2016	<ul style="list-style-type: none"> There is no further progress on Watershed Management regulation this month after the draft was submitted to ADB on 13 January 2017.
WRPO Activities	<ul style="list-style-type: none"> Xaysomboun WRPO submitted the draft village land-use plan from the exercise at three villages (Thamlo, Ohm, Korhai) to

Activities in February 2017	Results
	<p>Anouvong District Authority for review and approval.</p> <ul style="list-style-type: none"> It was noted by NNP1 EMO Team on the WRPO reorganization that: <ul style="list-style-type: none"> DFRM and Bolikahmxay are in pending agreement internally on the changes. The new organization structure and assignment for Xaysomboun WRPO are being reviewed by MAF and MONRE. These arrangements future affect fund disbursement for the existing pre-WMP activities.
Xaysomboun ISP	<ul style="list-style-type: none"> Xaysomboun ISP team has submitted the draft report to MONRE DEQP in the second week of January 2017. The team also submitted the budget proposal to MONRE DEQP on the activities to finalize ISP report. There is no feedback from MONRE DEQP on the budget and activity proposal to finalize ISP report until end of February 2017. NNP1 EMO Team proposed that the review and comments provided by NNP1 EMO team to be further considered and put into action by March 2017.

3.5.2 Biodiversity Offset Management

Obligations ⁴	Status by February 2017
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 advertised for expression of interests in the second week of January 2017. Four applicants expressed their interest by the end of January 2017.

⁴ The biodiversity offset obligations were revised and agreed with ADB in August 2016. The Table only shows the current near term obligations up to end of January 2017

Obligations ⁴	Status by February 2017
	<p>The TOR was further revised in February elaborating the recommendations and comments from IAP and BAC.</p> <p>The procurement process will be extended and it is expected that the consultant will be on board by early April 2017.</p>
Issuance of the Boundary Confirmation Baseline Survey preliminary report by 30 November 2016.	Completed - It was confirmed by ADB on 16 February 2017 that this CP was met.
Issuance of the Boundary Confirmation Baseline Survey draft final report by 31 January 20.	Completed - It was confirmed by ADB on 16 February 2017 that this CP was met.
ADB approval on the NNP1PC's draft legal agreement with the government by 31 January 2017 and execute the legal agreement by 15 February 2017	<ul style="list-style-type: none"> The first draft was prepared on 14 October 2016 and the revised version elaborating BAC comments was submitted to ADB on 28 November 2016. It was confirmed by ADB on 16 February 2017 that the CP of approval of draft legal agreement was met.
Baseline survey for summer (observations during March and April 2017) starts by 28 February.	It was confirmed by ADB on 21 February 2017 to reschedule the summer baseline survey as part of BOMP implementation.

Activities in February 2017	Results
Boundary Confirmation Baseline Survey led by ADB Consultant.	It was confirmed by ADB on 16 February 2017 that this CP was met.
ADB approval on the NNP1PC's draft legal agreement with the government by 31 January 2017 and execute the legal agreement by 15 February 2017	<ul style="list-style-type: none"> The first draft was prepared on 14 October 2016 and the revised version elaborating BAC comments was submitted to ADB on 28 November 2016. It was confirmed by ADB on 16 February 2017 that the CP of approval of draft legal agreement was met while the CP of execution of draft legal agreement will await for GOL signing but ADB will consider to release the funds if company requires in March 2017.
Consultant acceptable to ADB is engaged as technical consultant for preparation of biodiversity offset management plan by 30 November 2016.	<ul style="list-style-type: none"> NNP1 advertised for expression of interests in the second week of January 2017. Four applicants expressed their interest by the end of January 2017.

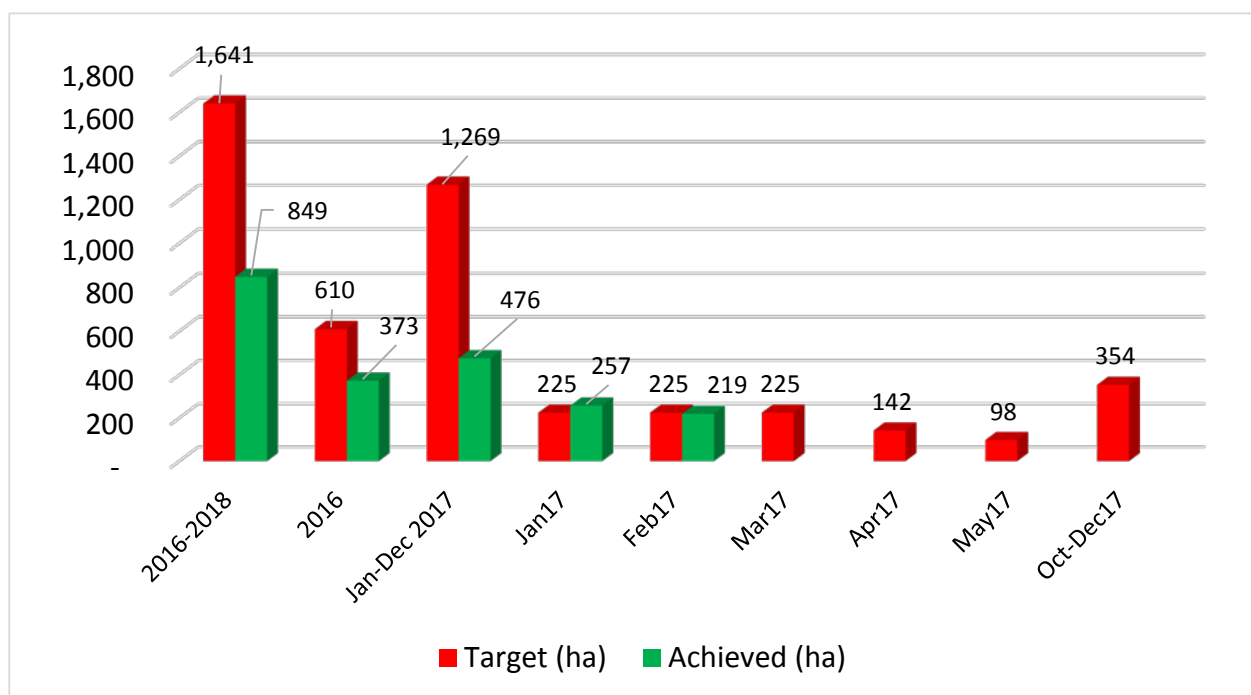
Activities in February 2017	Results
	<ul style="list-style-type: none"> • The TOR for BOMP Consultant was revised by NNP1 EMO in the first week of February 2017 based on the comments from IAP. • The TOR was further revised elaborating the comments from BAC received on 20 February 2017 and per discussion with ADB on 21-23 February 2017. <ul style="list-style-type: none"> ○ The scope of work was simplified to exclude the baseline survey, to present only baseline and trend analysis most relevant to BOMP, and to focus mainly on the group species in achieving No Net Loss objective. ○ The Consultant is also tasked to provide technical advice to NNP1PC for biodiversity related matters during the period of assignment. • The revised TOR will be circulated to ADB and IAP for review and approval in the first week of March 2017. • The procurement process will be extended and the selected Consultant is expected to be on board in early April 2017.
Activities pre-BOMP period of 1 October 2016 – 31 September 2017	<ul style="list-style-type: none"> • BOMC completed the process to create the bank account for fund transfer in the middle of February 2017. The fund was transferred on 28 February 2017. • BOMC drafted the TOR for Consultancy Service to support pre-BOMP implementation in early February 2017. <ul style="list-style-type: none"> ○ The TOR was updated based on NNP1 EMO inputs in the middle of February 2017 and translated to English for further review by BAC, ADB and IAP. ○ The TOR was further updated based on the comment from BAC received on 17 February 2017. ○ ADB and IAP accepted the TOR per confirmation on 24 and 26 February 2017 respectively. ○ BOMC will initiate the advertisement process in the first week of March 2017 after receiving the fund from NNP1.

3.5.3 Biomass Clearance

Activities in February 2017	Results
Labour recruitment.	<ul style="list-style-type: none"> • Three groups totalling around 38 labourers from Phalavek and Longsan District were contracted with lump-sum payment to continue biomass clearance in Block 2 and Block 3 of 2LR. • There were around 129 villagers from Nong Village and 45 villagers from Houaypamom Village were contracted with lump-sum payment for biomass clearance in Block 2, Block 3 Block 5, and Block 10 & 11 of 2RL. • About 50 villagers from Hatsamkhone Village were contracted with lump-sum payment to continue biomass clearance in Block 13 of 2UR. • 19 villagers from Nahong Village were contracted with daily payment to continue biomass clearance in Block 18 of 2UR.
Perform UXO work on priority biomass clearance areas.	<ul style="list-style-type: none"> • There was no UXO found during the reporting period. • QA/QC was undertaken and documented by Field Supervisor and Field Manager. • At the end of reporting period, the overall UXO search and clearance has been completed for around 1,320 ha from the total target of 1,500 ha. The UXO work progress to date is showed in Table 1-18.
Perform biomass clearance.	<ul style="list-style-type: none"> • During the reporting period, the biomass clearing was completed for around 219 ha, fall short from the target in February of 225 ha. • To date, the overall biomass clearance (cutting and burning) has been completed for around 849 ha. The biomass clearance work progress to date is showed in Figure 3-9, Figure 3-10 and Table 3-17 <p>Biomass Clearance at 2UR:</p> <ul style="list-style-type: none"> • Vegetation cutting in the 6 Blocks (203 ha) was completed. • Biomass Clearance Contractor and Thathom District Government's Contractor (Xayakhue Company) are completing the harvesting of tree with diameter greater than 20 cm in priority biomass clearance blocks. There are around 112 logs recorded. • Piling of waste biomass and setting up firebreak are being completed. It is planned that biomass burning will take place in March 2017.

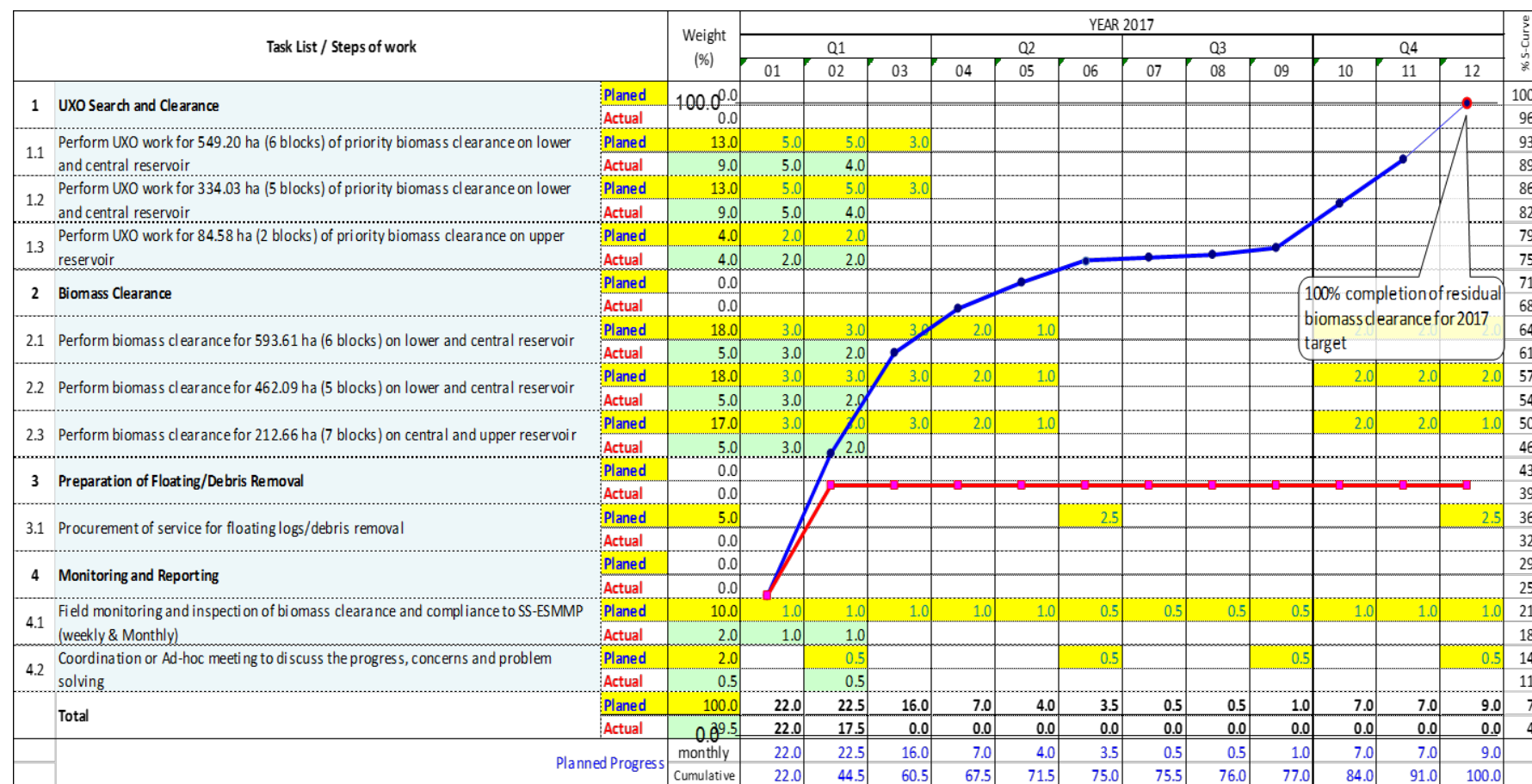
Activities in February 2017	Results
	<ul style="list-style-type: none"> Full biomass clearance in 2UR is expected before wet season of 2017. <p>Biomass Clearance at 2LR:</p> <ul style="list-style-type: none"> Biomass Clearance Contractor continues with harvesting the trees with diameter greater than 20 cm in Block 1 and 4. There are around 1,547 logs recorded. The Hom and Thathom district authorities are processing paperwork requesting approval from the Provincial authorities to remove the piled logs (with diameter greater than 20 cm) into identified GOL log yards in their respective administrative area at 2LR and 2UR for further utilization. The biomass clearance work progress to date of 18 Blocks in 2UR and 2RL is showed in Figure 3-9, Figure 3-10 and Table 3-17

Figure 3-9: Biomass Clearance work Progress in figure as of 28 February 2017



The overall progress of biomass clearance programme is demonstrated in Figure 3-10 below.

Figure 3-10: Gantt Chart of Biomass Clearance Programme in 28 February 2017



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

Table 3-17: Biomass and UXO clearance progress in each priority area as of 28 February 2017

Priority Area	Zone	Total Area (ha)	Island & Buffer Zone (315-320 m ASL)	Priority Biomass Clearance Area			Completed UXO Clearance as of 28 Feb 2017	Status of Biomass Clearance as of 28 Feb 2017 (ha)	
				Forests	Fallow-shifting Cultivation and Garden-Plantation Lands	Total			
Block 01	1	115.38	6.15	29.35	79.88	109.24	103.31	58.30	<ul style="list-style-type: none"> - Completed vegetation cutting and burning of 19 ha of forest area and 39.30 ha of communities' lands - Under completion for harvesting of tree with diameter greater than 20 cm. There are around 1,547 logs recorded
Block 02	1	165.92	7.30	38.72	119.89	158.62	112.27	107.00	<ul style="list-style-type: none"> - Completed vegetation cutting of 69 ha of communities' lands and 38 ha of forest area - Fire break is under preparation
Block 03	1	88.86	8.51	14.43	65.92	80.35	59.19	46.50	<ul style="list-style-type: none"> - Completed vegetation cutting of 32.50 ha of communities' lands and 14 ha of forest - Fire break is under preparation
Block 04	1	167.68	3.94	122.97	40.77	163.74	152.21	132.28	<ul style="list-style-type: none"> - Completed vegetation cutting and burning of 35.38 ha of communities land and 96.90 ha of forest - Waste woods is being piled and re-burned - 12 logs left from the first round of burning in April 2016 were piled
Block 05	1	350.72	10.61	66.53	273.58	340.11	207.73	123.37	<ul style="list-style-type: none"> - Completed vegetation cutting and burning of around 83.37 ha of communities land and around 40 ha of forest

Priority Area	Zone	Total Area (ha)	Island & Buffer Zone (315-320 m ASL)	Priority Biomass Clearance Area			Completed UXO Clearance as of 28 Feb 2017	Status of Biomass Clearance as of 28 Feb 2017 (ha)	
				Forests	Fallow-shifting Cultivation and Garden-Plantation Lands	Total			
									- Fire break is under preparation
Block 06	1	46.71	14.87	20.31	11.54	31.84	26.37	10.00	- Completed vegetation cutting and burning (bush and small trees) of 10 ha of communities land in 2016 - Further clearing will be resumed in the fourth quarter of 2017
Block 07	2	43.03	3.39	18.48	21.17	39.65	37.73		Not yet started
Block 08	2	41.00	3.40	14.64	22.97	37.61	32.01	4.00	- Completed vegetation cutting and burning (bush and small trees) of 4 ha of communities land in 2016 - Further biomass clearing will be resumed in the fourth quarter of 2017
Block 09	2	54.13	1.38	11.67	41.08	52.75	43.47		Not yet started
Block 10	2	317.39	48.28	128.97	140.14	269.10	234.64	88.62	- Completed vegetation cutting of around 68.62 ha of communities land and around 20 ha of forest area - Fire break is under preparation
Block 11	2	98.05	8.07	24.06	65.92	89.98	62.60	60.00	- Completed vegetation cutting of around 45 ha of communities land and around 15 ha of forest area - Fire break is under preparation
Block 12	3	84.23	20.13	64.11		64.11	64.11	15.42	- Completed vegetation cutting of 15.42 ha. - Fire break is under preparation
Block 13	3	131.35	30.10	76.44	24.81	101.24	101.36	101.24	- Completed vegetation cutting of 101.24 ha - Fire break is under preparation

Priority Area	Zone	Total Area (ha)	Island & Buffer Zone (315-320 m ASL)	Priority Biomass Clearance Area			Completed UXO Clearance as of 28 Feb 2017	Status of Biomass Clearance as of 28 Feb 2017 (ha)	
				Forests	Fallow-shifting Cultivation and Garden-Plantation Lands	Total			
									- Under completion for harvesting of tree with diameter greater than 20 cm. There are around 40 logs recorded
Block 14	3	53.00	9.66	7.79	35.54	43.33	35.67	43.33	- Completed vegetation cutting of 43.33 ha - Fire break is under preparation - Under completion for harvesting of tree with diameter greater than 20 cm. There are around 60 logs recorded
Block 15	3	93.27	49.54	13.52	30.21	43.73	37.21	43.73	- Completed vegetation cutting of 43.73 ha - Fire break is under preparation - Under completion for harvesting of tree with diameter greater than 20 cm. There are around 12 logs recorded
Block 16	3	9.86	6.53	1.30	2.02	3.32	3.32	3.32	- Completed vegetation cutting of 15.23 ha of Block 16, 17 and 18 - Fire prevention was being prepared - Under completion for harvesting of tree with diameter greater than 20 cm.
Block 17	3	44.25	36.29	1.33	6.63	7.96	3.35	7.96	
Block 18	3	7.18	3.23	3.95		3.95	3.95	3.95	
Total		1,912.01	271.38	658.55	982.08	1,640.63	1,320.51	849.02	

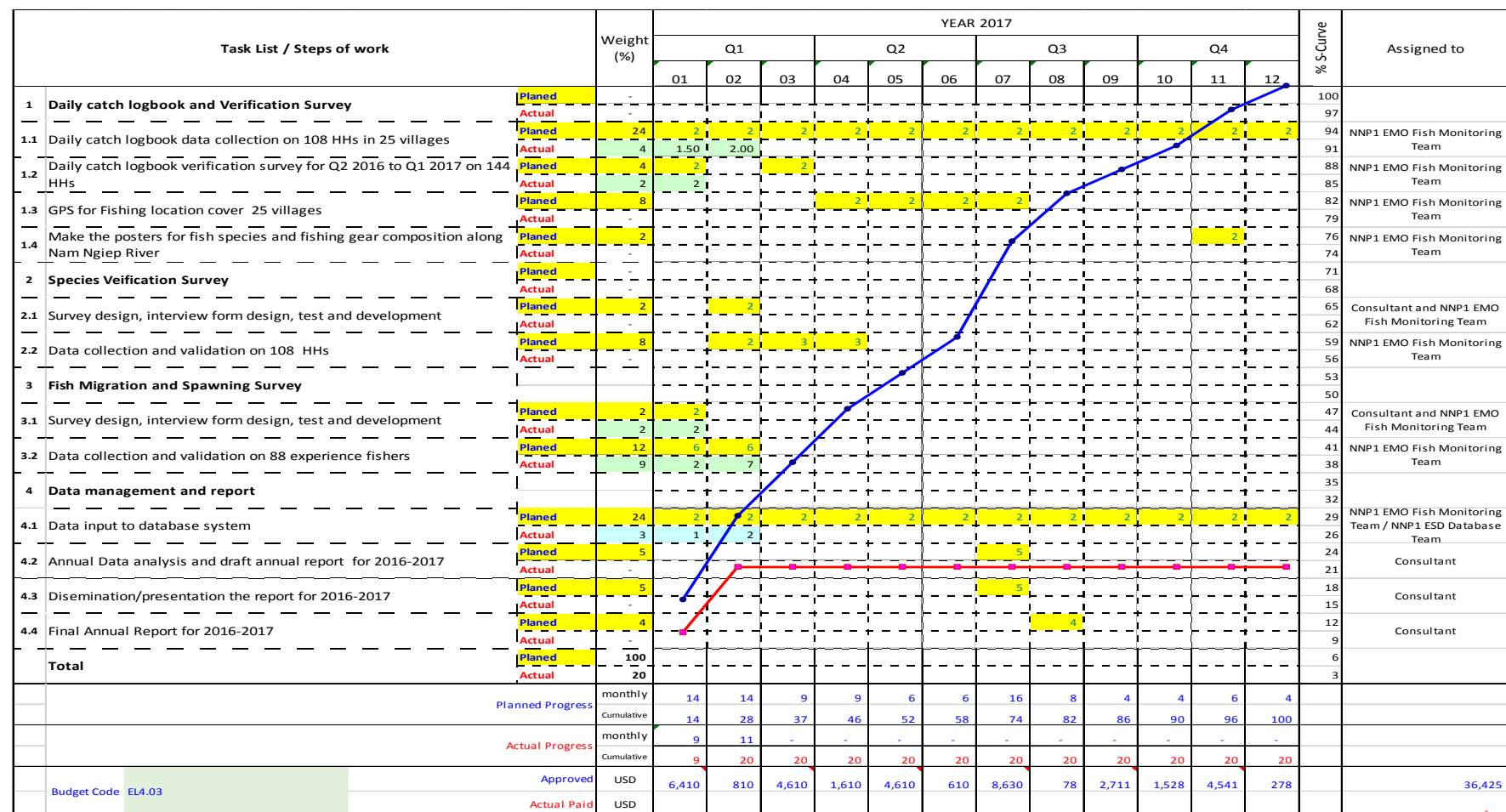
3.5.4 Fishery Monitoring

The fisheries 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 the survey were conducted during February 2017 including daily fish catch logbook monitoring, daily catch logbook verification survey and fish migration and spawning survey. The gathered information is being put into the database.

The data from the daily fish catch logbook monitoring indicates that the mean daily fish catch in Nam Ngiep River was 2.5 kg/fishing household/day in January 2017. The estimated total fish catch in Nam Ngiep basin for January 2017 is 42,800 kg. Around 33% of the catch was sold, 56% was consumed fresh by the fishing households, 6% processed and approximately 5% was used for other purposes.

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 28 February 2017



The blue line and yellow highlights represent the planned activity, and the red line and green highlight represent the actual progress

Activities in February 2017	Results
Daily Catch Logbook and Verification Survey	<ul style="list-style-type: none"> • Completed the daily catch logbook survey in 108 households out of the total target of 108 households. 4,317 forms were used in the survey. • A fishery database has been developed. • The daily household catch on average for Nam Ngiep in January 2017 is 2.5 kg/household/day. The median catch for all fishing zone is presented in Figure 3-12. • The estimated total catch for Nam Ngiep in January 2017 is approximately 42,800 kg as shown in Figure 3-13.
Household Catch Assessment Survey	<ul style="list-style-type: none"> • On progress for data analysis and reporting by fishery consultant.
Village Community Interview	<ul style="list-style-type: none"> • On progress for data analysis and reporting by fishery consultant.
Fish Migration and Spawning survey	<ul style="list-style-type: none"> • Completed the first round of interview on fish migration and spawning survey for 2 trial villages and 7 target villages with 37 total fishermen. • Completed the second round of interview on 3 villages with 12 fishermen. • Database is being developed.
Gillnet Sampling Survey	<ul style="list-style-type: none"> • In preparation for the survey including procurement of equipment and service for fishery taxonomist.

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

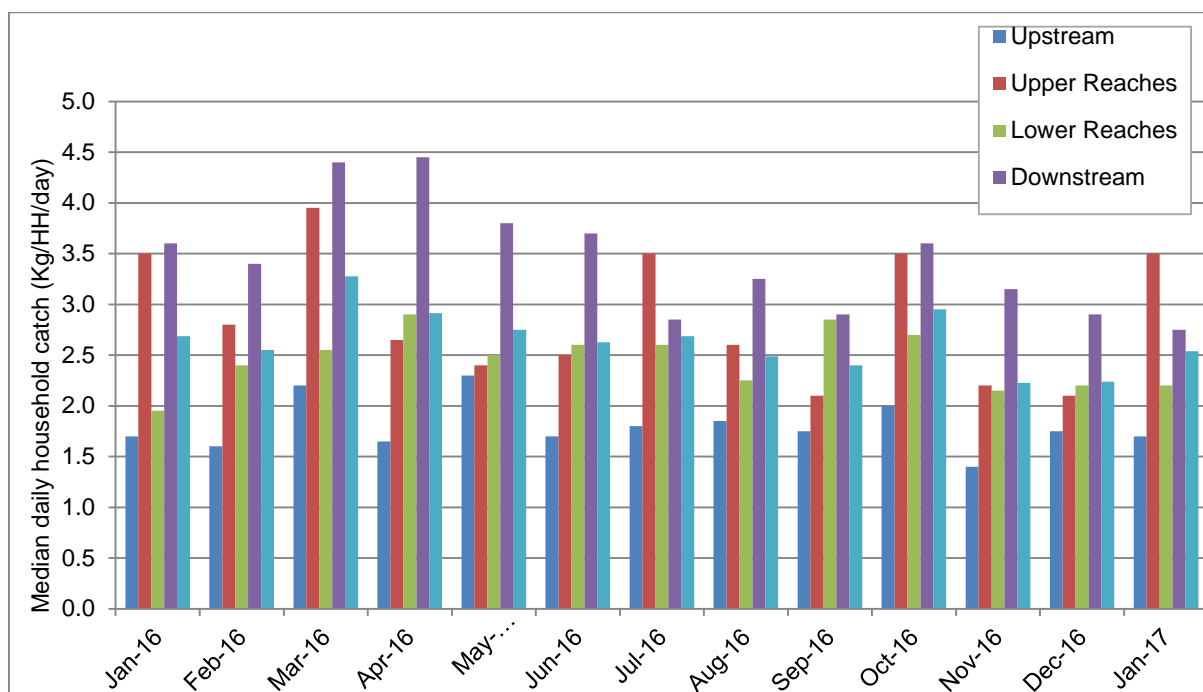
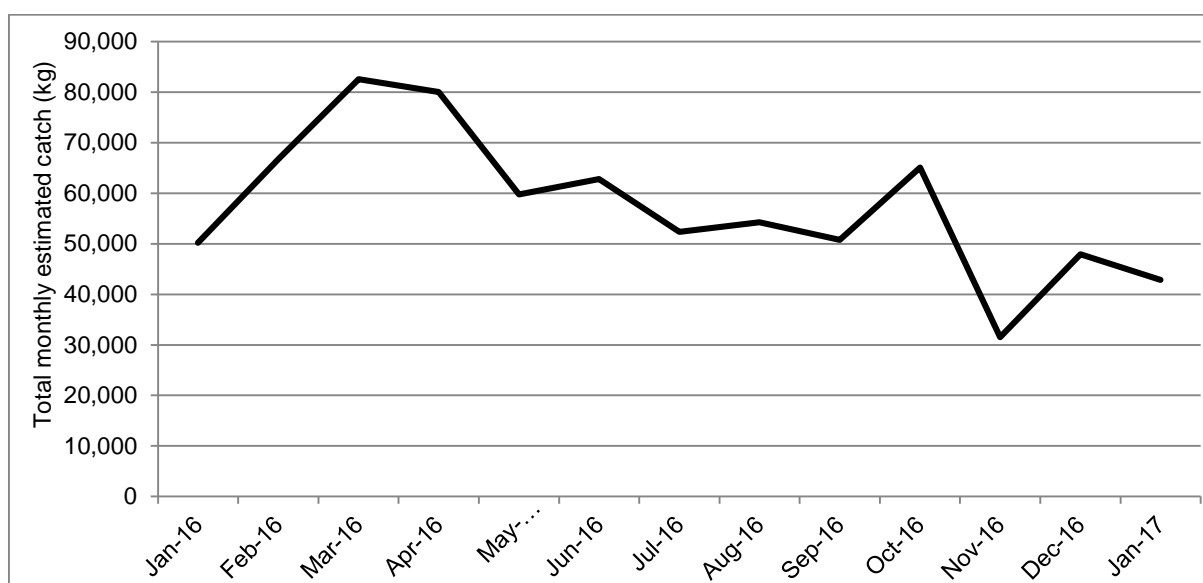


Figure 3-13: Total estimated fish catch for Nam Ngiep by month (Kg)



3.6 Other Obligations and Support Programmes

3.6.1 Environmental Protection Fund (EPF)

EPF held a meeting on 6 February 2017 with the provincial authorities of Bolikhamxay, Xaysomboun, and Xieng Khuang as well as NNP1 representative to discuss the overall EPF Project.

It was noted and agreed that Bolikhamxay Province will provide further clarification on the overall status of EPF Project Implementation work: the latest issues within and surrounding Houay Ngoua Provincial Protected Area (PPA) as well as detailed implementation plan for the key targets and overall timeframe.

Bolikhamxay Province held a kick-off meeting on 10 February 2017 for the EPF Project Implementation Work with the key notes as follow:

- To re-survey the boundary of Houay Ngoua PPA in accordance with the Agreement of Bolikhamxay Governor, No.0294/BLX, dated 24 June 2010 on boundary of protected area.
- To conduct a joint survey between Houay Ngoua PPA project team and village authorities to deal with issue on 62 ha of eucalyptus plantation within Houay Ngoua Protected Area that was managed by encroachers.
- PPA management should apply a participatory approach with engagement of district authorities and surrounding villages in patrolling and law enforcement.

NNP1PC EMO provided the latest feedback on the Xaysomboun and Xieng Khuang EPF Proposal in the second week of February 2017. The provinces is in progress to update the proposal until end of February 2017.

3.6.2 115 kV Transmission Line IEE Due Diligence Assessment

There was no further update on the progress of the IEE revision at the end of February 2017.

3.6.3 Nabong Substation Upgrade Due Diligence Assessment

The signed version of Nabong Sub-Station Environmental and Social DDA was sent to ADB for their record on 6th February 2017. This obligation is closed.

3.7 External Monitoring

Draft response to the IAP report was circulated internally for NNP1PC review and sent to IAP on 13 February and the final response is expected be sent to IAP in March 2017. NNP1PC comments and response to the last LTA mission's report was sent to LTA on 24 February 2017.

3.7.1 Independent Monitoring Agency

There was no IMA mission and activity update during the month of February 2017.

3.7.2 Biodiversity Advisory Committee

BAC provided comments on: 1) TOR for Consultancy Service to Assist GOL in pre-BOMP implementation, and 2) Revised TOR for preparation of BOMP.

BAC also submitted the 5th BAC mission report in the first week of February 2016. NNP1PC EMO is reviewing the report prior to presenting it to BOMC.

ANNEXES

ANNEX A: RESULTS OF EFFLUENT ANALYSES

Table A- 1: Results of Camp Effluents in February 2017 (first mission)

	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	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17
Parameters (Unit)	Guideline						
pH	6.0 - 9.0	6.93	7.44	8.34	No water	7.23	6.85
Sat. DO (%)		8.6	0	33.5		0	4.4
DO (mg/l)		0.53	0	2.82		0	0.31
Conductivity (µs/cm)		439	837	741		776	360
TDS (mg/l)		220	419	371		388	180
Temperature (°C)		26.17	26.44	23.16		24.42	23.51
Turbidity (NTU)		0.73	16.7	32.9		9.12	6
TSS (mg/l)	<50	ND ¹⁶	19.4	32.1		22.4	10.4
BOD (mg/l)	<30	ND ¹³	72.3	83.2		43	4.1
COD (mg/l)	<125	ND ¹⁶	144	214		91.9	ND ¹⁶
NH ₃ -N (mg/l)	<10.0	6	36	ND ¹²		40	2
Total Nitrogen (mg/l)	<10.0	15.4	36.4	5.01		40.7	3.16
Total Phosphorus (mg/l)	<2	2.61	2.32	0.1		3.39	0.16
Oil & Grease (mg/l)	<10.0	ND ¹³	3	2		1	ND ¹³
Total coliform (MPN/100ml)	<400	110	160,000	160,000		160,000	92,000
Faecal Coliform (MPN/100ml)		110	160,000	160,000		160,000	4,900
Discharge Volume (m3/day)		17.3	0	0		0	0

	Site Name	SongDa5 Camp#1	SongDa5 Camp#2	Zhefu Camp	SECC Camp	HMH Main Camp WWTP	IHI Camp
	Station Code	EF07	EF08	EF09	EF11	EF13	EF14
	Date	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17
Parameters (Unit)	Guideline						
pH	6.0 - 9.0	7.76	7.3	7.61	8.18	7.44	7.73
Sat. DO (%)		0	0	32.5	51.1	0	0
DO (mg/L)		0	0	2.28	3.84	0	0
Conductivity (µs/cm)		774	755	185	365	412	551
TDS (mg/L)		387	378	92	182	206	275
Temperature (°C)		23.36	24.84	30.5	29.08	27.59	25.25
Turbidity (NTU)		8.83	13	2.2	8.34	21.9	16.4
TSS (mg/l)	<50	14.6	15.4	ND ¹⁶	13.4	36.6	22.5
BOD (mg/l)	<30	14.2	ND ¹³	ND ¹³	6.1	69	91.5
COD (mg/l)	<125	41.2	100	ND ¹⁶	50.5	134	179
NH ₃ -N (mg/l)	<10.0	17	27	ND ¹²	8	17	16
Total Nitrogen (mg/l)	<10.0	20.4	29.5	4.43	11.1	20.5	18.6
Total Phosphorus (mg/L)	<2	0.81	1.45	1.11	0.31	1.46	1.3
Oil & Grease (mg/l)	<10.0	ND ¹³	ND ¹³	ND ¹³	ND ¹³	5	7

Final- 22 March 2017

	Site Name	SongDa5 Camp#1	SongDa5 Camp#2	Zhefu Camp	SECC Camp	HMH Main Camp WWTP	IHI Camp
	Station Code	EF07	EF08	EF09	EF11	EF13	EF14
	Date	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17	09/02/17
Parameters (Unit)	Guideline						
Total coliform (MPN/100ml)	<400	11,000	22,000	1,300	160,000	160,000	160,000
Faecal Coliform (MPN/100ml)		2,100	22,000	1,300	3,900	160,000	160,000
Discharge Volume (m3/day)		0	0	0	0	0	0

Table A- 2: Results of Camp Effluents in February 2017 (second mission)

	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	21/02/17	21/02/17	21/02/17	21/02/17	21/02/17	21/02/17
Parameters (Unit)	Guideline						
pH	6.0 - 9.0	7.02	7.74	8.31	No water	7.26	7.09
Sat. DO (%)		13	0	43.5		0	24
DO (mg/L)		1.05	0	3.63		0	1.93
Conductivity (µs/cm)		507	861	727		728	352
TDS (mg/L)		253	431	363		364	176
Temperature (°C)		23.55	25.95	22.73		23.85	24.89
Turbidity (NTU)		1.14	20.5	31.6		8.97	15.6
TSS (mg/l)	<50	ND ¹⁶	26.1	15.56		16.6	55.2
BOD (mg/l)	<30	ND ¹³	64.5	62.8		43.5	6.2
COD (mg/l)	<125	ND ¹⁶	142	161		95.2	38.4
NH ₃ -N (mg/l)	<10.0	5	29	ND ¹²		36	2
Total Nitrogen (mg/l)	<10	23.8	39.6	6.69		44.4	5.11
Total Phosphorus (mg/l)	<2	1.39	2.55	0.69		2.96	0.15
Total coliform (MPN/100ml)	<400	49	160,000	160,000		160,000	3,300
Faecal Coliform (MPN/100ml)		49	160,000	160,000		160,000	1,700
Discharge Volume (m3/day)		17.3	0	0		0	0

	Site Name	SongDa5 Camp#1	SongDa5 Camp#2	Zhefu Camp	SECC Camp	HMH Main Camp WWTP	IHI Camp	Kenber Camp
	Station Code	EF07	EF08	EF09	EF11	EF13	EF14	EF16
	Date	21/02/17	21/02/17	21/02/17	21/02/17	21/02/17	21/02/17	21/02/17
Parameters (Unit)	Guideline							
pH	6.0 - 9.0	7.79	7.45	8.05	8.53	7.17	8.48	7.28
Sat. DO (%)		46.3	10.2	41.5	35.9	0	0	0
DO (mg/L)		3.59	0.8	3.24	2.83	0	0	0
Conductivity (µs/cm)		404	800	186	198	436	550	557

Final- 22 March 2017

	Site Name	SongDa5 Camp#1	SongDa5 Camp#2	Zhefu Camp	SECC Camp	HMH Main Camp WWTP	IHI Camp	Kenber Camp
	Station Code	EF07	EF08	EF09	EF11	EF13	EF14	EF16
	Date	21/02/17	21/02/17	21/02/17	21/02/17	21/02/17	21/02/17	21/02/17
Parameters (Unit)	Guideline							
TDS (mg/L)		202	400	93	99	218	275	278
Temperature (°C)		27.06	24.84	26.69	26.41	26.18	25.41	23.66
Turbidity (NTU)		12.8	33	1.66	5.07	18.2	26.1	6.8
TSS (mg/l)	<50	34	20.6	ND ¹⁶	5.6	33.9	41.3	11.3
BOD (mg/l)	<30	16.7	11.1	ND ¹³	4.4	97	83.7	145
COD (mg/l)	<125	48.8	100	ND ¹⁶	38.2	178	168	258
NH ₃ -N (mg/l)	<10.0	10	40	ND ¹²	5	15	16	10
Total Nitrogen (mg/l)	<10	16.9	46.2	5.02	9.8	25.9	22.3	15.4
Total Phosphorus (mg/l)	<2	0.49	2.97	1.01	0.54	1.49	1.13	1.29
Total coliform (MPN/100ml)	<400	1,700	160,000	330	1,700	160,000	160,000	160,000
Faecal Coliform (MPN/100ml)		490	160,000	330	490	160,000	160,000	92,000
Discharge Volume (m ³ /day)		0	17.3	0	0	0	4.3	4.3

Table A- 3: Results of the Construction Area Discharge in February 2017

	Site Name	Aggregate Crushing Plant				Spoil Disposal #2			
	Station Code	DS02				DS04			
	Date	01/02/17	08/02/17	14/02/17	24/02/17	01/02/17	08/02/17	14/02/17	24/02/17
Parameter (Unit)	Guideline								
pH	6.0 - 9.0	7.3	7.89	7.18	6.91	6.04	6.13	7.28	6.72
Sat. DO (%)		31.3	63.9	81.8	68.4	68.4	42.6	45.5	67.3
DO (mg/l)		2.63	5.6	7.01	5.56	5.9	3.21	3.6	5.44
Conductivity (µs/cm)		110	96	120	125	90	80	67	87
TDS (mg/l)		55	48	60	63	45	40	34	44
Temperature (°C)		23.14	19.98	22.18	24.4	21.22	26.21	26.6	25.1
Turbidity (NTU)		10,930	5,200	6,430	2,567	12.1	37	44	6.95
TSS (mg/l)	<50	3,980	2,432	3,606	2,000	5.4	114	108	21
Oil & Grease (mg/l)	<10	N/A	ND ¹³	N/A	N/A	N/A	ND ¹³	N/A	N/A
Discharge Volume (m ³ /day)		86.40	86.40	86.40	0.00	172.80	86.40	86.40	43.20

	Site Name	RCC Plant				Regulating Dam			
	Station Code	DS09				DS08			
	Date	01/02/17	08/02/17	14/02/17	24/02/17	01/02/17	08/02/17	14/02/17	24/02/17
Parameter (Unit)	Guideline								
pH	6.0 - 9.0	7.01	6.72	7.51	7.48	9.95	11.24	6.86	6.57
Sat. DO (%)		63.4	53.1	57.9	85.8	31.2	56.9	99.7	75.5
DO (mg/l)		5.55	4.17	4.24	7.11	2.55	4.47	7.75	6.13
Conductivity (µs/cm)		146	114	154	112	287	418	279	349
TDS (mg/l)		73	57	77	56	143	209	139	174
Temperature (°C)		20.97	26.65	29	24.22	24.09	25.61	25.83	24.9
Turbidity (NTU)		11,900	1,544	2,199	773	1.57	10.46	2.55	8

Final- 22 March 2017

	Site Name	RCC Plant				Regulating Dam			
	Station Code	DS09				DS08			
	Date	01/02/17	08/02/17	14/02/17	24/02/17	01/02/17	08/02/17	14/02/17	24/02/17
Parameter (Unit)	Guideline								
TSS (mg/l)	<50	52,571	1,036	1,226	486	8	21.3	6	18
Oil & Grease (mg/l)	<10	N/A	ND ¹³	N/A	N/A	N/A	ND ¹³	N/A	N/A
Discharge Volume (m ³ /day)		259.20	86.40	172.80	172.80	86.40	129.60	17.30	86.40

	Site Name	Main Dam - Lower Treatment Plant				Main Dam - Upper Treatment Plant			
	Station Code	DS11				DS12			
	Date	01/02/17	08/02/17	14/02/17	24/02/17	01/02/17	08/02/17	14/02/17	24/02/17
Parameter (Unit)	Guideline								
pH	6.0 - 9.0	11.18	6.13	8.93	6.05	No water discharge	7.24	6.13	No water discharge
Sat. DO (%)		43.3	63	90.6	80		62.1	83.6	
DO (mg/l)		3.35	5.56	7.52	6.38		5.64	7	
Conductivity (µs/cm)		1,553	508	1,893	1008		812	1,673	
TDS (mg/l)		776	254	952	504		406	836	
Temperature (°C)		27.1	19.88	24.07	25.06		18.29	22.88	
Turbidity (NTU)		5.49	8.75	30	31.7		1,046	67.2	
TSS (mg/l)	<50	16.5	28.7	67	45		1,506	447	
Oil & Grease (mg/l)	<10	N/A	ND ¹³	N/A	N/A		ND ¹³	N/A	
Discharge Volume (m ³ /day)		6,000	6,000	6,000	6,000		17.30	17.30	

ANNEX B: AMBIENT DUST QUALITY

Table B- 1: 24-hour Average Dust Concentrations Measured in Ban Hat Gnuin

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	05/02/2017 10:12	06/02/2017 10:12	07/02/2017 10:12
End Time	06/02/2017 10:12	07/02/2017 10:12	09/02/2017 09:51
Average Data Record in 24h (mg/m ³)	0.04	0.06	0.07
Guideline Average in 24h (mg/m ³)	0.12	0.12	0.12

Figure B- 1: Dust Monitoring Results at Ban Hat Gnuin in February 2017

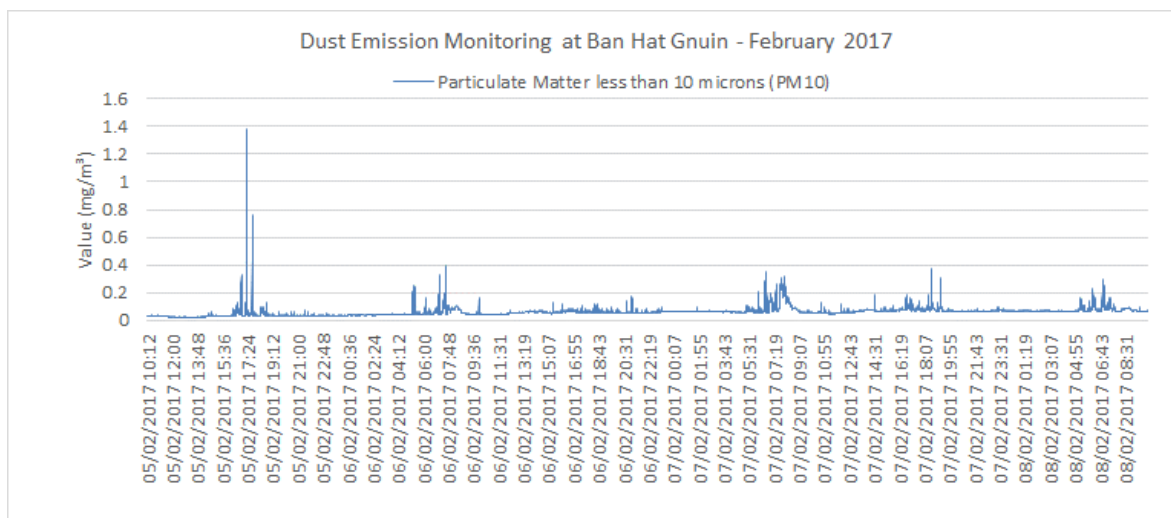


Figure B- 2: Dust Monitoring Results at Houay Soup Resettlement Village in February 2017

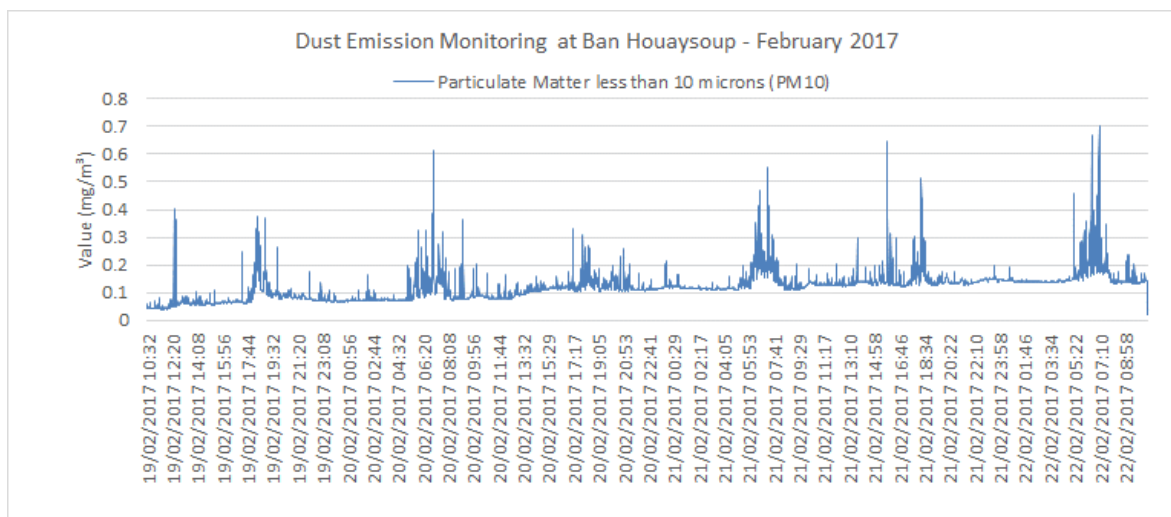


Figure B- 3: Dust Monitoring Results at the Aggregate Crushing Plant in February 2017

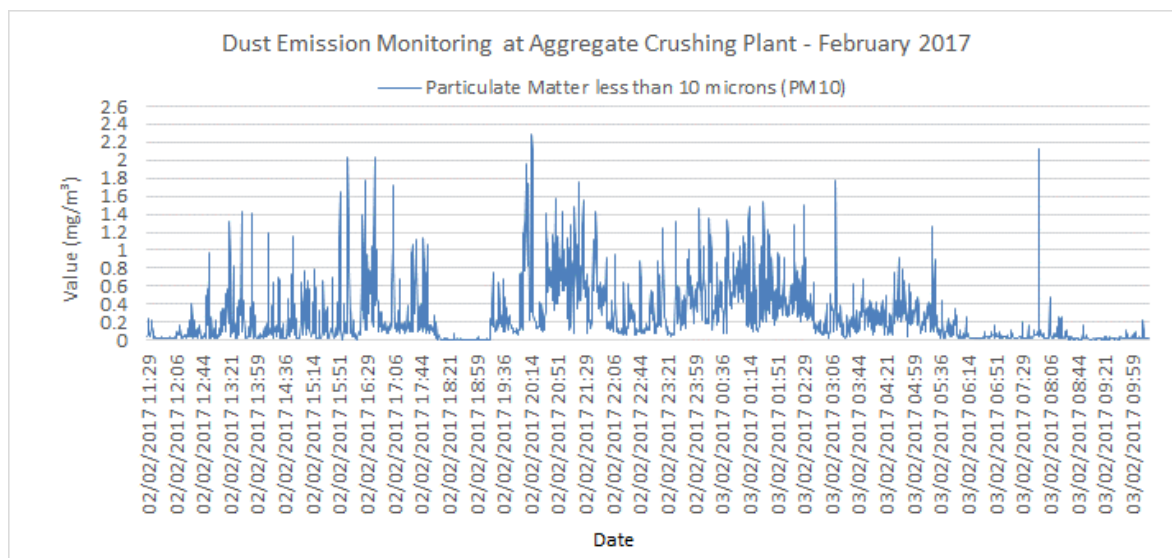


Figure B- 4: Dust Monitoring Results at the RCC Plant in February 2017

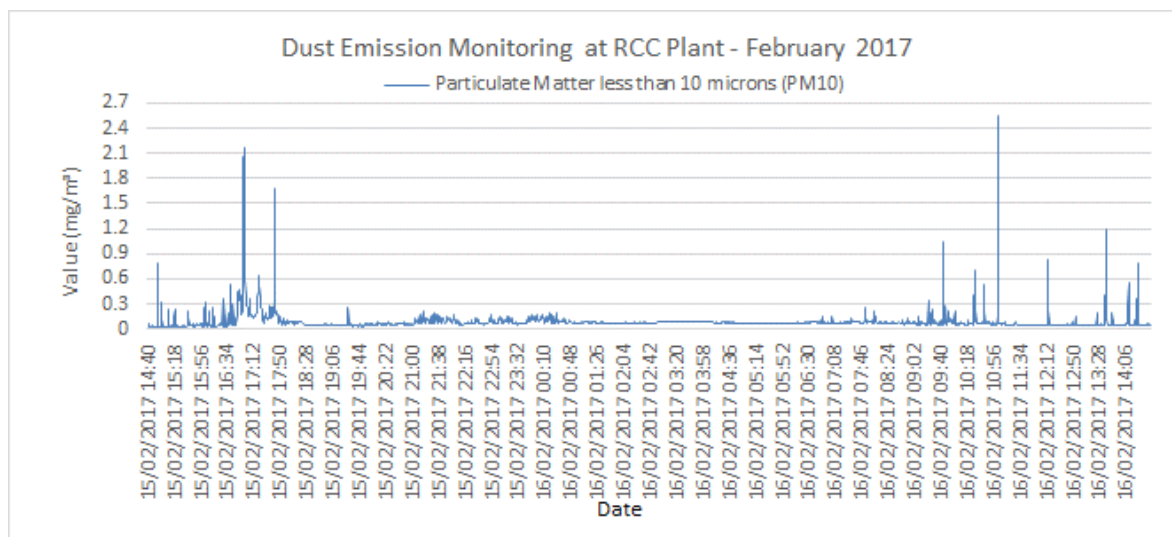


Figure B- 5: Dust Monitoring Results at the Sino Hydro Camp in February 2017

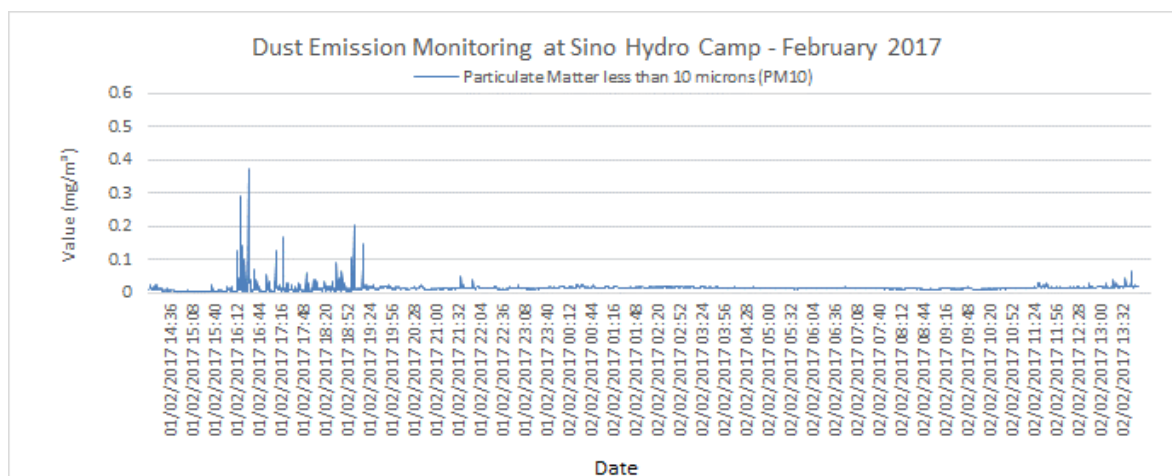


Figure B- 6: Dust Monitoring Results at the Sino Hydro Temporary Camp in February 2017

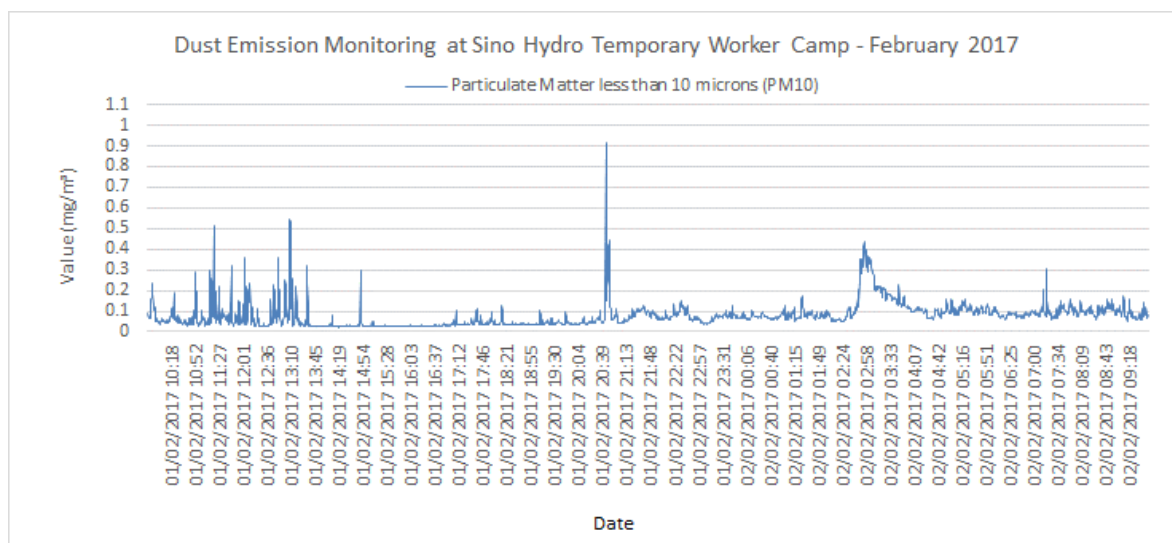


Figure B- 7: Dust Monitoring Results at the SongDa5 No.2 Camp in February 2017

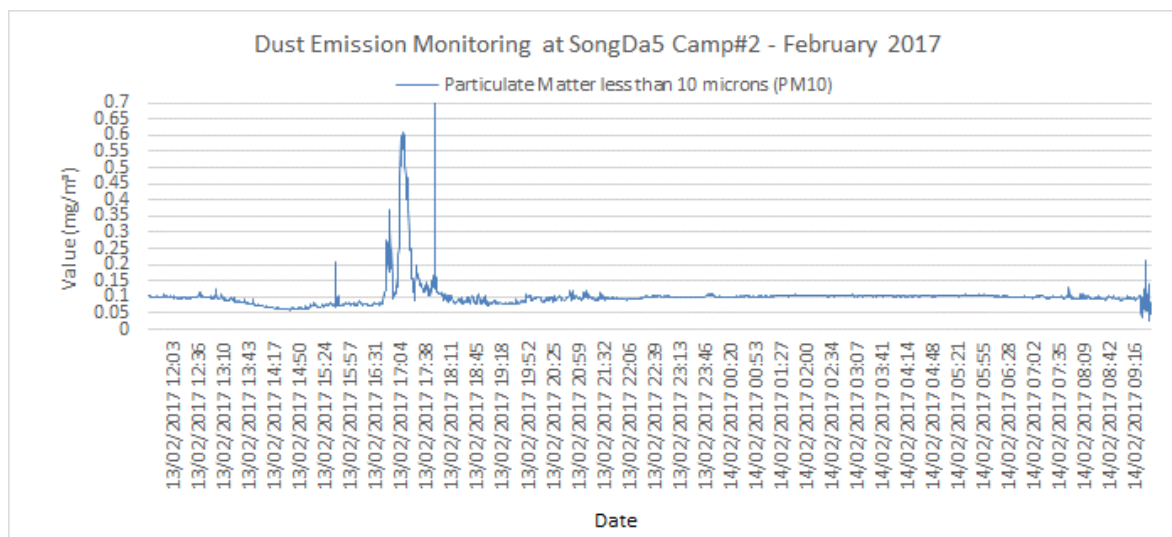


Figure B- 8: Dust Monitoring Results at Main Dam in February 2017

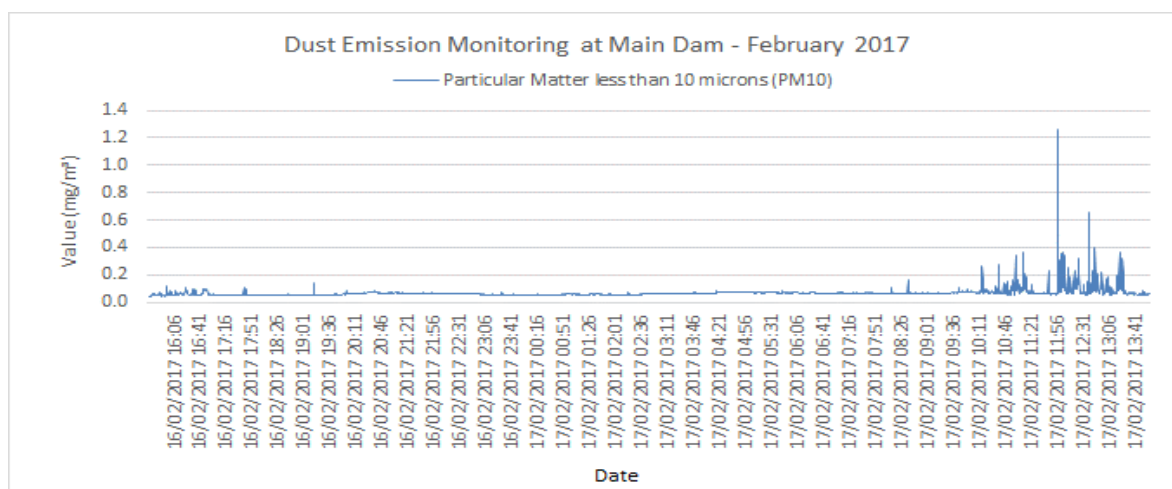
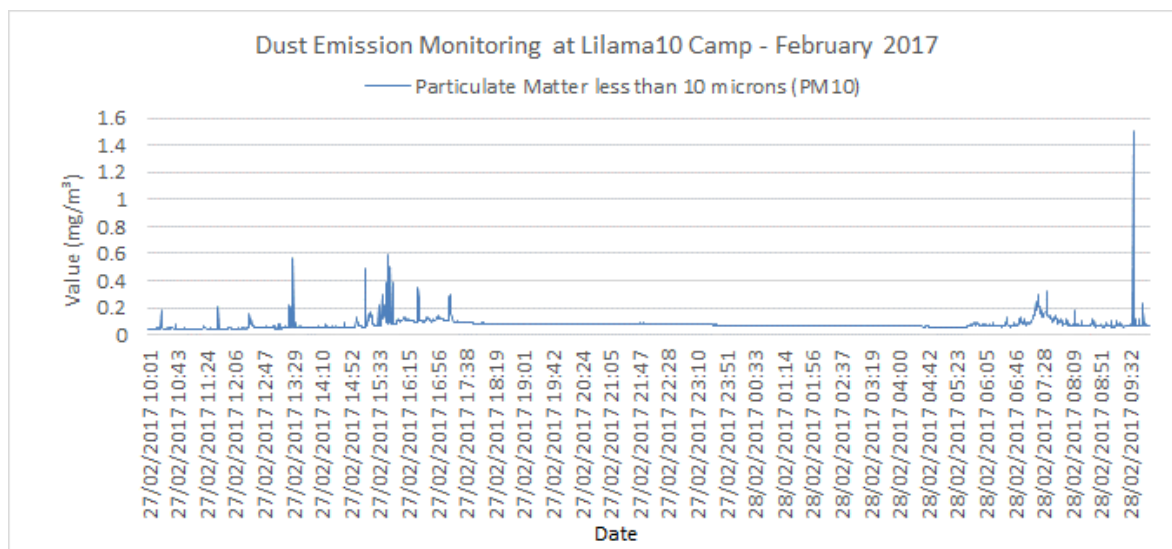


Figure B- 9: Dust Monitoring Results at the Lilama10 Camp in February 2017



ANNEX C: AMBIENT NOISE DATA

Table C- 1: Average Results of Noise Monitoring at Ban Hat Gnuin in February 2017

Noise Level (dB)	05-06/02/2017			06-07/02/2017			07-08/02/2017			08/02/2017
	10:56-18:00	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	06:01-10:56
Maximum Value Recorded	67.50	68.30	67.10	73.20	72.20	60.30	73.60	66.10	54.40	71.00
Guideline Max	115	115	115	115	115	115	115	115	115	115
Average Data Recorded	49.39	48.49	41.02	49.01	48.00	39.77	46.17	44.80	36.56	43.43
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 February 2017

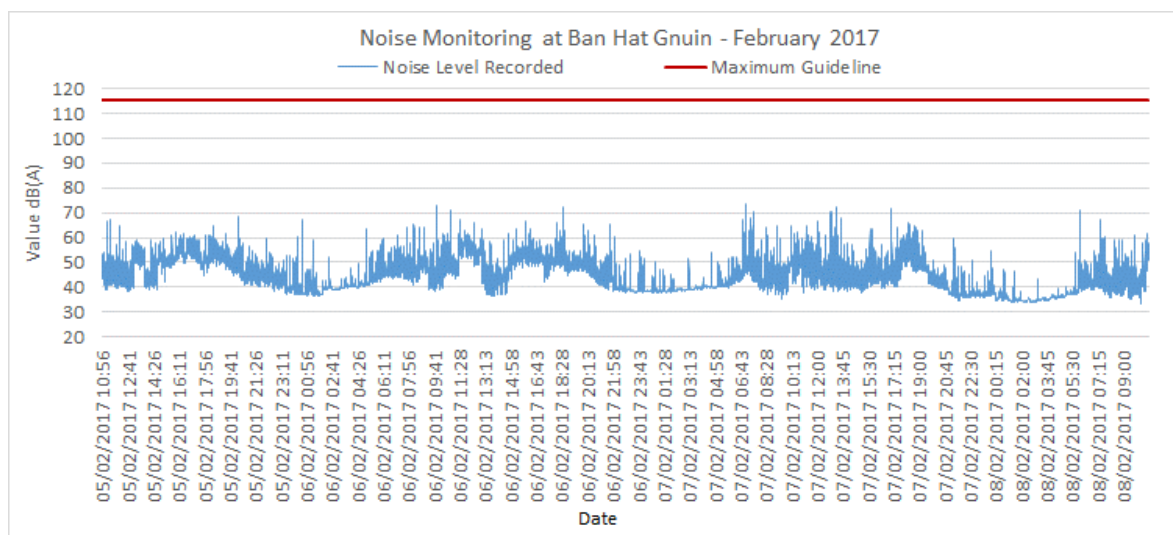


Figure C- 2: Result of Noise Level Monitoring at Houay Soup Resettlement Village in February 2017

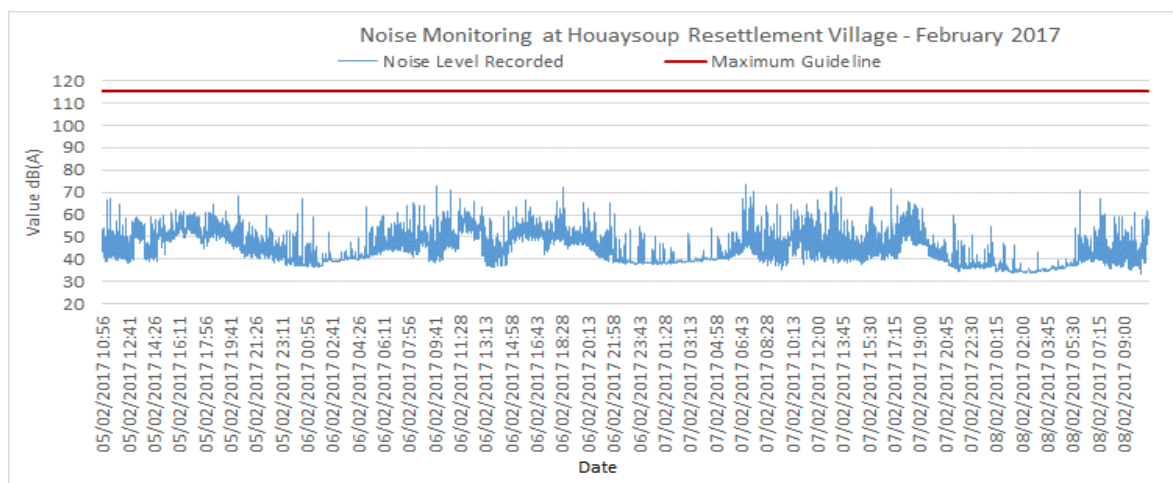


Table C- 2 and Table C-3: Average Results of Noise Monitoring at Aggregate Crushing Plant and RCC Plant in February 2017

Aggregate Crushing Plant

Noise Level (dB)	02-03/01/2017		03/01/2017
	12:08-22:00	22:01-06:00	06:01-11:07
Maximum Value Recorded	86.5	84.7	88
Guideline Max	115	115	115
Average Data Recorded	75.49	82.52	63.49
Guideline Averaged	70	50	70

RCC Plant

Noise Level (dB)	15-16/02/2017		16/02/2017
	15:25-22:00	22:01-06:00	06:01-15:25
Maximum Value Recorded	71.8	69.9	75.5
Guideline Max	115	115	115
Average Data Recorded	65.45	66.51	63.31
Guideline Averaged	70	50	70

Figure C- 3: Results of Noise Level Monitoring at the Aggregate Crushing Plant in February 2017

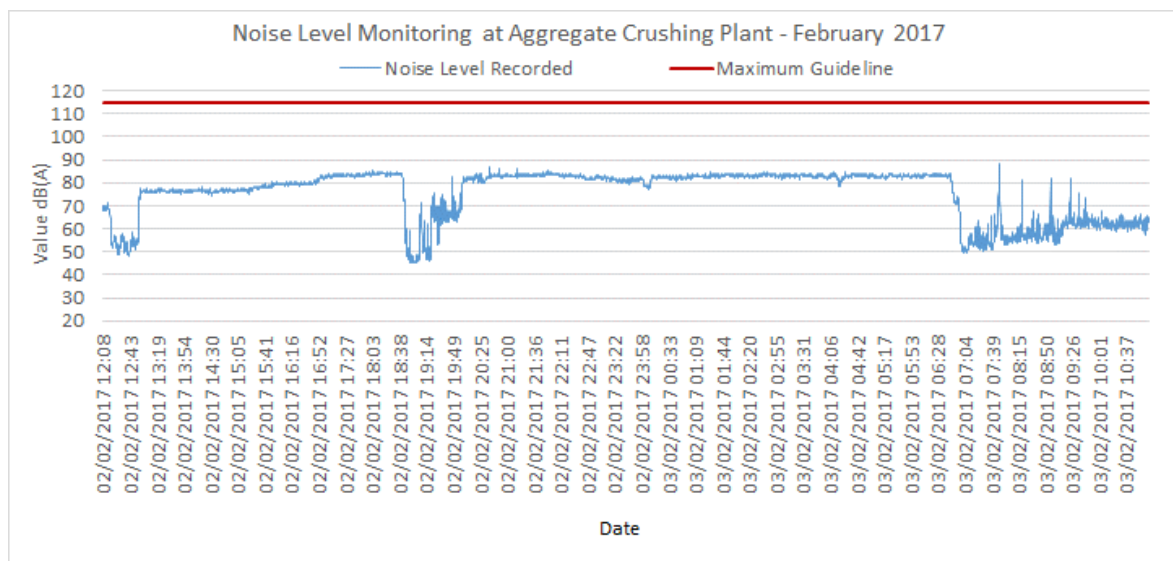


Figure C- 4: Results of Noise Level Monitoring at the RCC Plant in February 2017

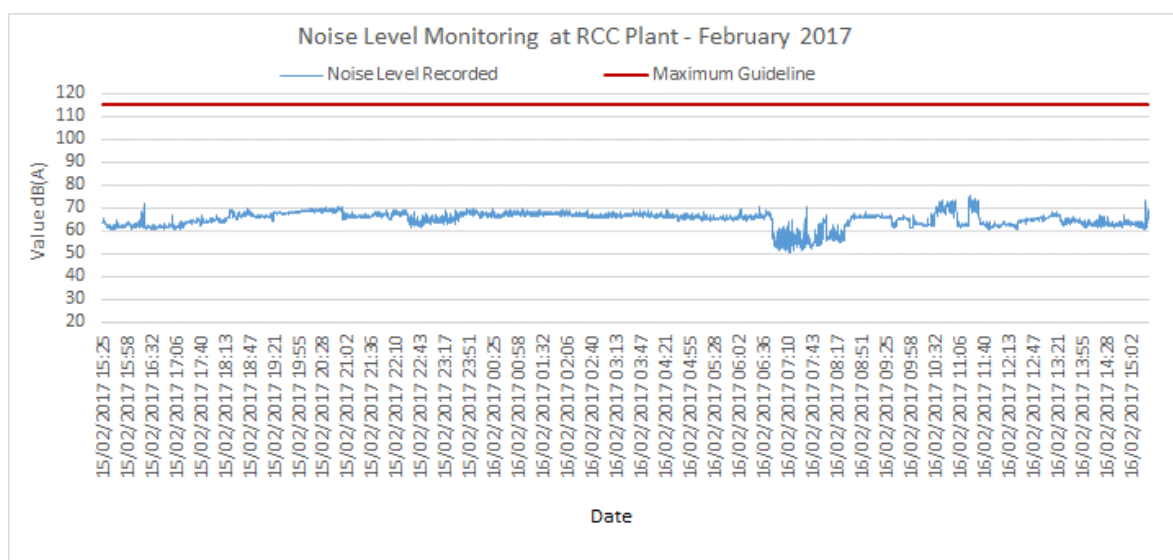


Table C- 5 and Table C- 6: Average Results of Noise Monitoring at Songda Camp#2 and Sino Hydro Camp in February 2017

Songda5 Camp No.2**Sino Hydro Camp**

Noise Level (dB)	13-14/02/2017		14/02/2017
	12:14 – 22:00	22:01 – 06:00	06:01-12:12
Maximum Value Recorded	71.8	60.5	62.8
Guideline Max	115	115	115
Average Data Recorded	51.14	55.60	51.19
Guideline Averaged	70	50	70

Noise Level (dB)	01-02/02/2017		02/02/2017
	14:41 – 22:00	22:01 – 06:00	06:01-14:33
Maximum Value Recorded	70.9	75.3	75.6
Guideline Max	115	115	115
Average Data Recorded	54.27	57.80	53.69
Guideline Averaged	70	50	70

Figure C- 5: Results of Noise Level Monitoring at Songda5 Camp#2 in February 2017

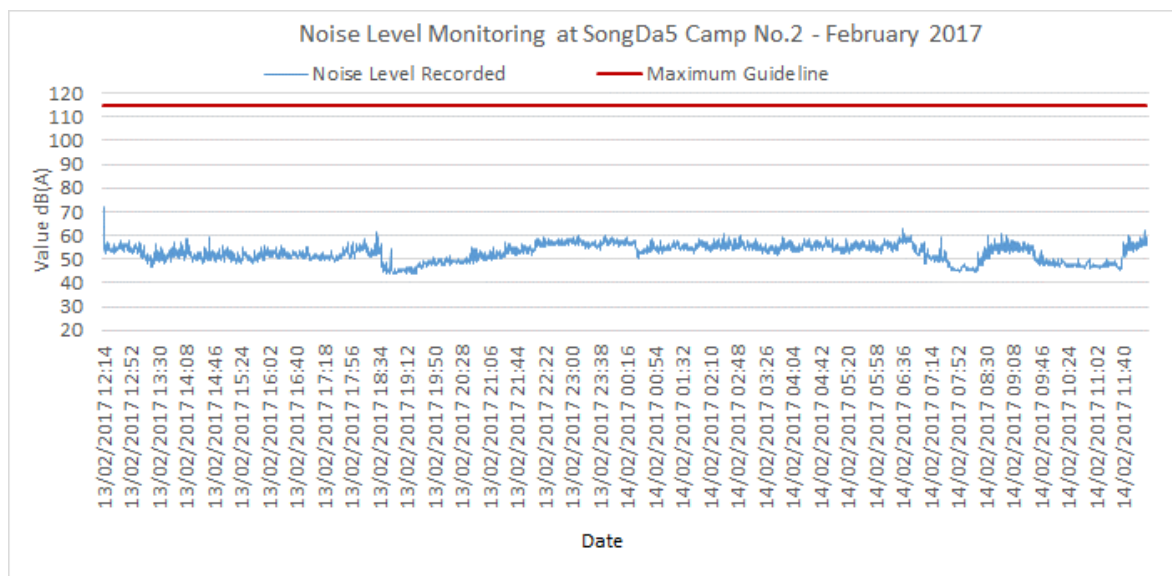


Figure C- 6: Results of Noise Level Monitoring at Sino Hydro Camp in February 2017

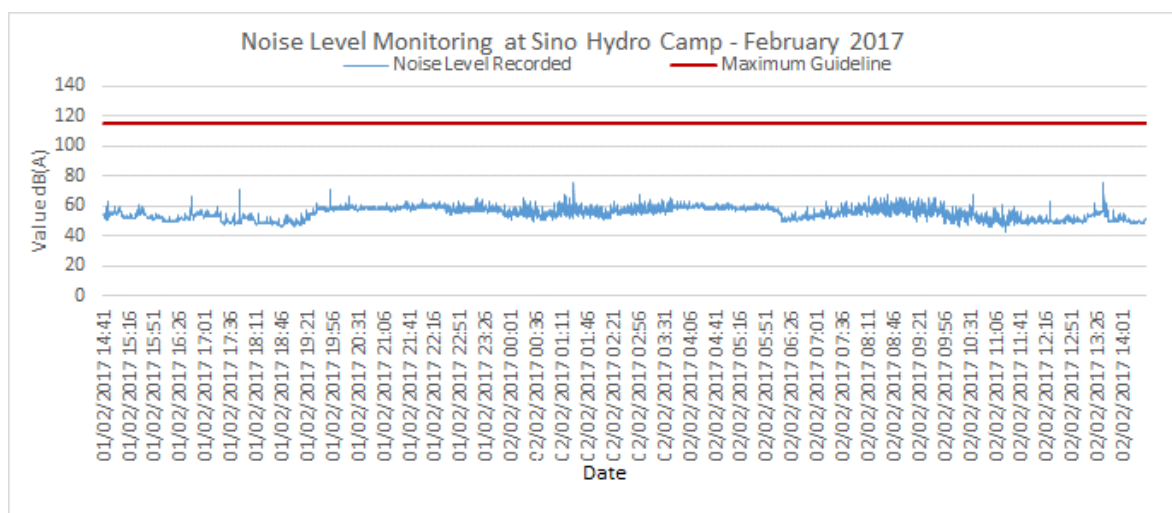


Table C- 7 and Table C- 8: Average Results of Noise Monitoring at the Owner's Site Office and Village and, the Main Dam in February 2017

Owner's Site Office and Village**Main Dam**

Noise Level (dB)	10-11/02/2017		11/02/2017	Noise Level (dB)	16-17/02/2017		17/02/2017
	10:56 – 22:00	22:01 – 06:00	06:01-10:56		16:17 – 22:00	22:01 – 06:00	06:01-16:17
Maximum Value Recorded	57.5	45.6	61.4	Data Record Max	68.2	68.1	68.3
Guideline Max	115	115	115	Guideline Max	115	115	115
Average Data Recorded	36.91	38.87	39.85	Data Record Average	55.82	61.09	58.39
Guideline Averaged	70	50	70	Guideline Averaged	70	50	70

Figure C- 7: Results of Noise Level Monitoring at Owner's Site Office and Village in February 2017

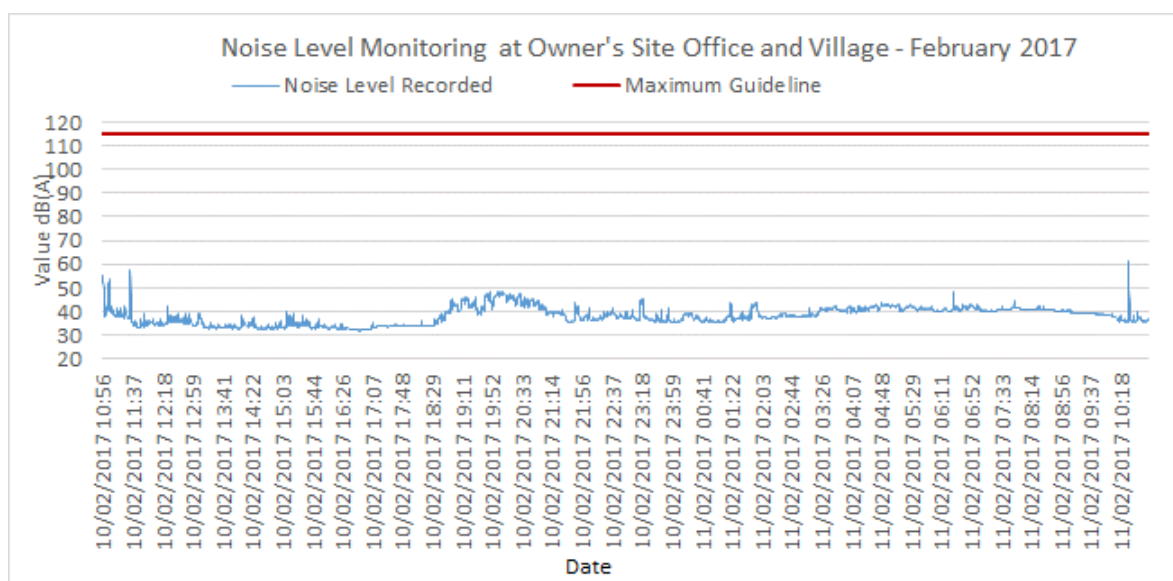


Figure C- 8: Results of Noise Level Monitoring at Main Dam in February 2017

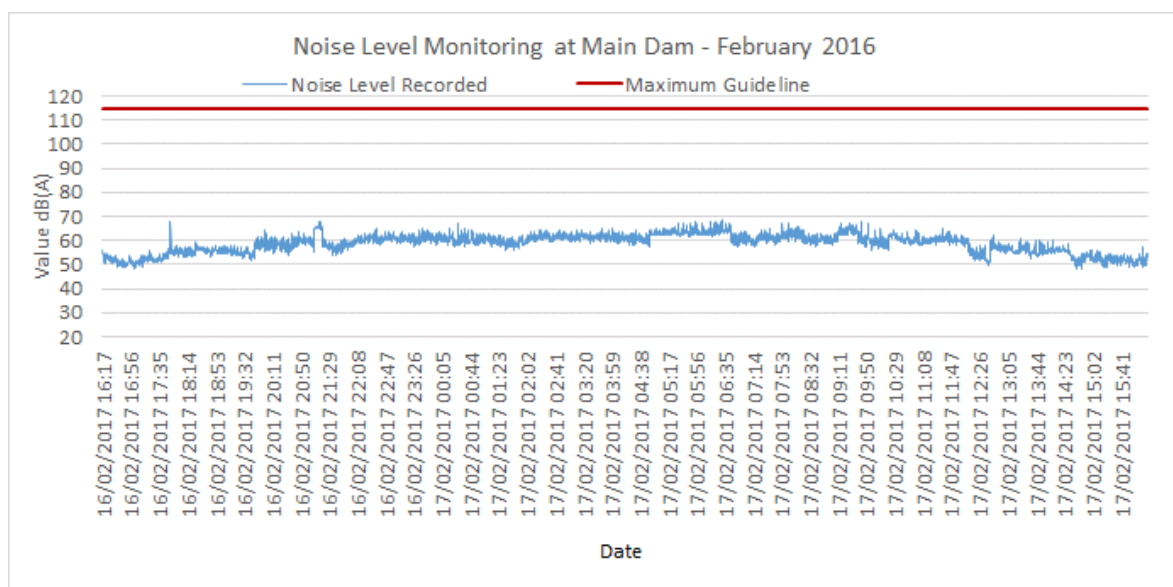


Table C- 9: Average Results of Noise Monitoring at the Sino Hydro Temporary Worker Camp and Lilama10 Camp in February 2017

Sino Hydro Temporary Worker Camp

Noise Level (dB)	01-02/01/2017		02/01/2017
	10:27 – 22:00	22:01 – 06:00	06:01-10:27
Maximum Value Recorded	73.9	71.8	71.2
Guideline Max	115	115	115
Average Data Recorded	73.90	63.65	59.13
Guideline Averaged	70	50	70

Lilama10 Camp

Noise Level (dB)	27-28/02/2017		28/02/2017
	10:50 – 22:00	22:01 – 06:00	06:01-10:50
Maximum Value Recorded	63.6	52.8	65
Guideline Max	115	115	115
Average Data Recorded	41.18	41.33	43.78
Guideline Averaged	70	50	70

Figure C-9: Results of Noise Level Monitoring at Sino Hydro Temporary Worker Camp

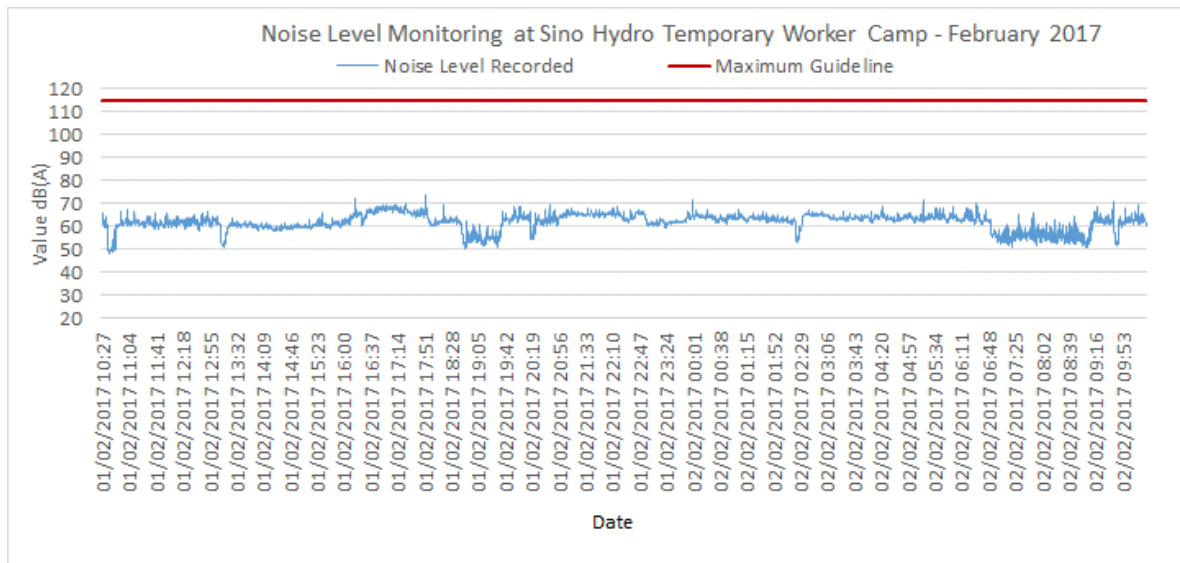


Figure C-10: Results of Noise Level Monitoring at Lilama10 Camp in February 2017

