NAM NGIEP 1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Environmental Management Monthly Monitoring Report

December 2016

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BBREVIATIONS / ACRONYMS

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

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

EXECUTIVE SUMMARY

The finalisation of the Environmental and Social Management and Monitoring Plan for the Construction Phase (ESMMP-CP) is in progress, the final draft will be translated into Lao language before submission to the Ministry of Natural Resources and Environment (MONRE) by the end of February 2017 for their approval.

During December 2016, the Environmental Management Office (EMO) of NNP1PC received a total of six SS-ESMMPs for review and clearance. With 13 SS-ESMMPs and one ESMMP carried over from previous months, there were a total of 19 SS-ESSMPs and one ESMMP for EMO to review during December 2016. Out of these, 11 SS-ESMMPs were cleared with conditions, one ESMMP was cleared without comments, and the remaining eight SS-ESMMP will be reviewed in January 2017. NNP1PC-EMO issued a total of 11 Observations of Non-Compliances (ONCs). With a carry-over from November 2016, a total of 21 ONCs and two Non-Compliance Reports (NCRs) were active in December 2016. Out of these, seven ONCs were resolved, 14 ONCs and two NCRs will be carried over into January 2017, of these nine ONCs and two NCRs carried over were not resolved within the agreed deadlines.

During 21-23 December 2016, Provincial and District EMUs conducted a joint environmental monitoring mission together with NNP1PC, and submitted their mission report to NNP1PC on 29 December 2016. Main concerns were related to the risk of overflow of wastewater from the grey water ponds at Song Da 5 Camp No. 1 and No. 2 into the Nam Ngiep River, and the effluent discharge from the Waste Water Treatment Plant into the Nam Ngiep at the Main Dam with a pH value of 4.

By the end of December 2016, the progress of the construction of NNP1 Project laboratory reached 35%. The laboratory equipment was delivered to the Owner's Site Office and Village (OSOV) in the second week of December 2016 and the training for laboratory equipment operation and maintenance was held by ETU (Environmental Training Utility, an equipment supplier from Thailand) during 13-19 December 2016. EMU staff from both Xaysomboun and Bolikhamxay Provinces participated in this training.

The compliance monitoring conducted in December 2016 confirmed that all construction camps, excluding the Owner's Village and Site Office, continued to have higher concentrations of total coliforms than the allowable effluent standard. The improvements of the Wastewater Treatment Systems (WWTS) are in progress. By the end of December 2016, WWTS at the new Kenber Camp, IHI Camp, Song Da 5 Camp No. 1 and No. 2 were completed in accordance with the conceptual design prepared by the external consultant and the NNP1PC Instruction Letter (reference No. NNP1/0750-016/OBA/EPC-CE dated 12 October 2016) and the design drawings that were cleared by NNP1PC in November 2016. The principal Contractors have agreed to try to complete the improvement of WWTS for the remaining camps by the end of February 2017.

An approximately 257.7 m^3 quantity of solid waste was disposed at the NNP1 Project Landfill during December 2016, an increase of 112.5 m^3 compared with November 2016.

The overall progress of the Nam Ngiep 1 Watershed Management Plan (WMP) development was acknowledged as positive by the multiple mission of ADB, IAP, LTA, and BAC in December 2016. The preparation continued with the focus on finalizing Section 7– (Baseline and Trend Analysis) and improving Section 8 (Watershed Management Issues and Actions) including further analysis of the information collected concerning the socio-economic and land-use practices from 14 villages within the NNP1 watershed. The mission team had further recommended that consultation with GOL agencies is a high priority and should take place soon.

In the first week of December 2016, the biodiversity consultant hired by ADB submitted a preliminary report on the findings of a biodiversity survey of the Nam Chouan—Nam Xang watershed area. The report recommends that in order to meet the biodiversity related obligations of the Concession Agreement it is important to involve an experienced biodiversity conservation

organisation from the very early stages of project planning and implementation. The report further recommends to include additional areas of higher long-term biodiversity significance, and to consider investment in additional offset sites and/or other offset options.

In the second week of December 2016, ADB provided comments to the Terms of Reference for the preparation of the Biodiversity Offset Management Plan (BOMP) and the procurement process will be started in January 2017.

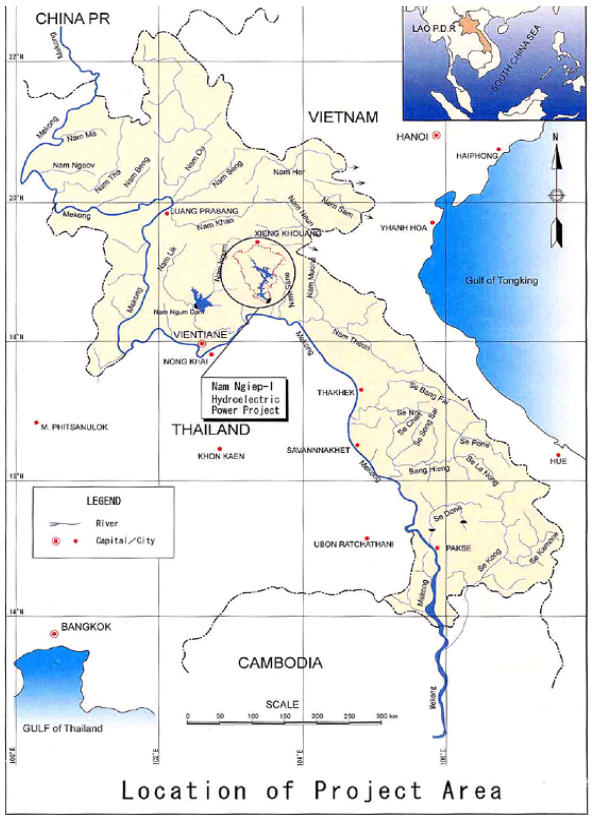
As of 31 December 2016, biomass clearance was completed for around 372 ha representing 61% of the target for 2016. The IAP/LTA mission in December 2016 strongly recommended NNP1PC and its biomass contractor to put more effort into settling the issues with local GOL and communities such as how to deal with the remaining trees with diameter greater than 20 cm and the compensation that has delayed the progress of biomass clearance.

The fishery monitoring programme is progressing, and a database has been developed to support the future fish management programme as part of the in Nam Ngiep 1 Watershed Management Plan. Two types of surveys were conducted during December 2016 including daily fish catch logbook monitoring and community interviews. 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 kg/household/day in November 2016. The estimated total fish catch in the Nam Ngiep basin for November 2016 is 25,000 kg. Around 63% of the catch was sold, 26% was consumed fresh, 7% processed and approximately 4% 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 (Figure 1-1).

Figure 1-1: Location Map



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

This Environmental Monthly Monitoring Report (EMMR) provides a summary of environmental monitoring activities and mitigation actions in December 2016. The EMMR was prepared by the Project's Environmental Management Office (EMO). It has been internally reviewed and cleared by EMO senior technical staff and management prior to submitting the report to the Government of Lao PDR (GoL) related agencies.

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

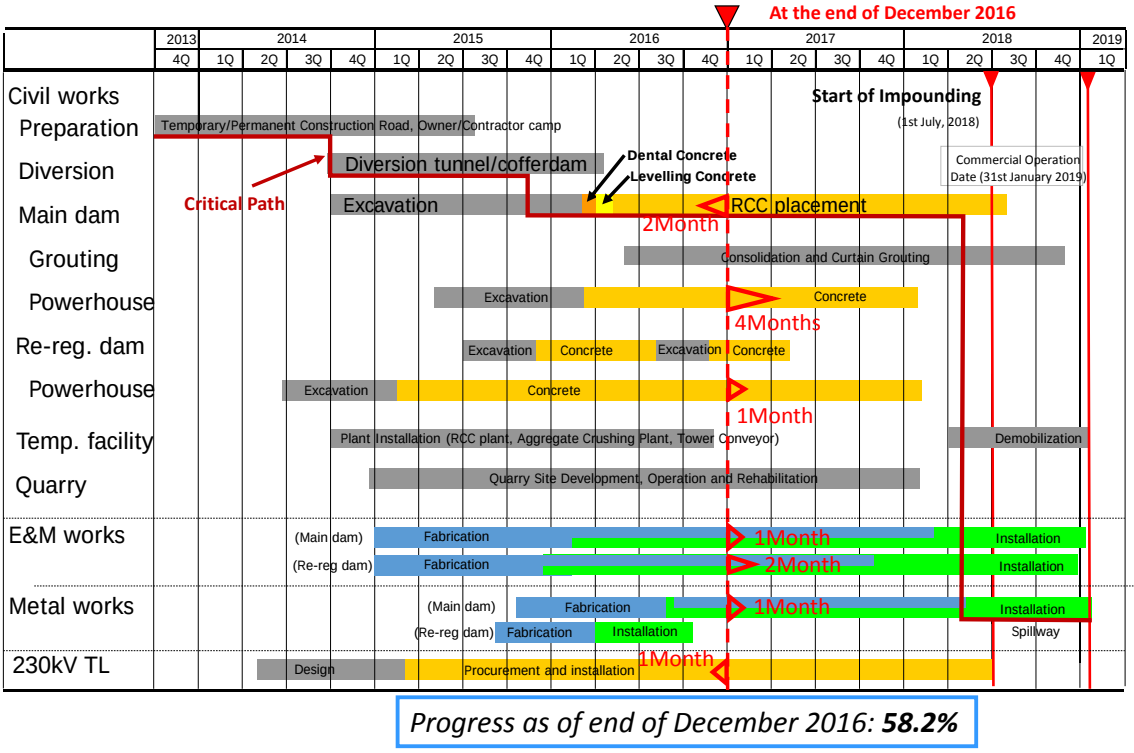
2. WORK PROGRESS OF PRINCIPAL CONTRACTORS

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

the Third Quarter of 2016 was 50.7%[1] (compared to the planned progress of 49.8%), based on achieved Interim Milestone Payments for all Contracts excluding the value of Advance Payments, varied works and other adjustments allowed under each Contract. In terms of the value of actual work done the percentage is slightly understated since work completed, but not paid, is not included.

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

Figure 2-1: Overall Construction Schedule



Progress as of end of December 2016: ***58.2%***

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.

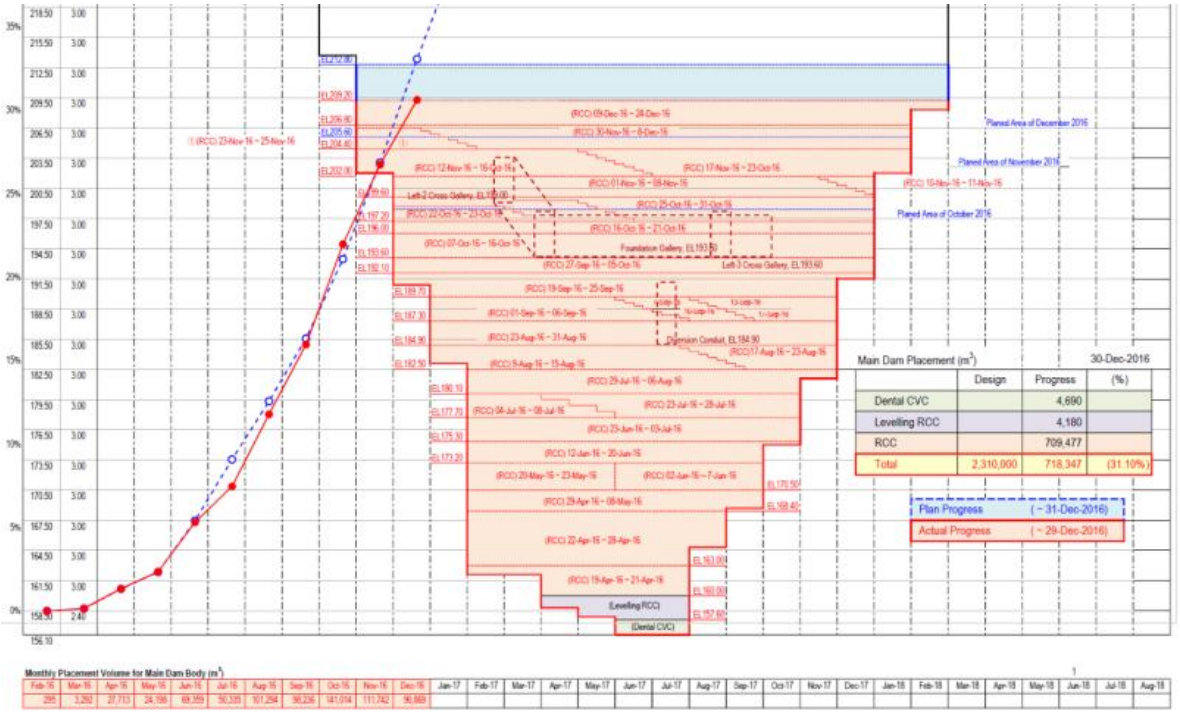
The cumulative actual work progress of the Civil Works until the end of December 2016 was 59.7% (compared to planned progress of 58.1 %) calculated in the same manner as described above for the value of achieved Interim Milestone Payments excluding advance payment.

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

2.1.1 Main dam and power house

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

Figure 2-2: Progress of Main Dam RCC Works as of 27 December 2016



The consolidation drilling and grouting for the main dam started in May 2016 and is ongoing. The progress is 66 % by achievement of total drilled length at the end of November 2016 as a proportion of the total expected drilling.

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

Item	Total Anticipated Drilling (m)	Completed (m)	Progress (%)
Consolidation Grouting	16,510	10,894	66.0
Curtain Grouting	27,945	240	< 1

*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 concreting works is proceeding well and is shown in Table 2-2 below.

Table 2-2: *Progress of Main Powerhouse Sub-Structure Concrete Works to 23 December 2016*.

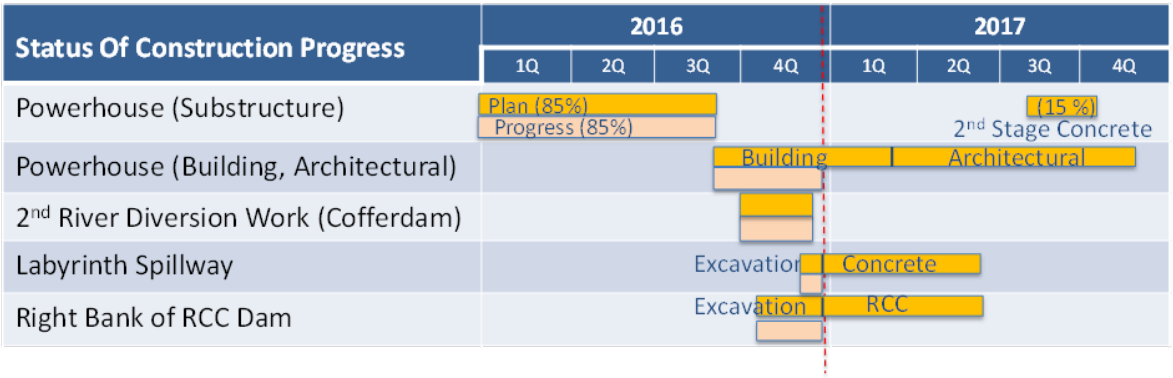
Location	Total Anticipated Volume (m^3)	Completed (m^3)	Progress (%)
Main Powerhouse	32,600	20,000	61
Penstock Embedment	6,977	5,266	75

2.1.2 Re-regulation dam and powerhouse

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

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

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



Structure	Civil Structure	Spillway			Building			Excavation			Left Bank Backfill
	Intake + PH + Tailrace	Right bank side concrete	Concrete Apron	Downstream Riprap Stone	Column	Beam	Block Wall over El.177	Right Bank RCC Area		River bed	Powerhouse and Switch Yard
	(m3)	(m3)	(m3)	(m3)	(m3)	(m3)	(m2)	Soil (m3)	Rock (m3)	(m3)	(m3)
Design	26,549	17,515	471	1,890	136	40	2,010	9,378	1,083	3,375	45,000
Completed	24,748	90	0	1,890	136	40	70	9,378	1,083	3,375	42,000
Progress %	**93**	**1**	**0**	**100**	**100**	**100**	**3**	**100**	**100**	**100**	**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

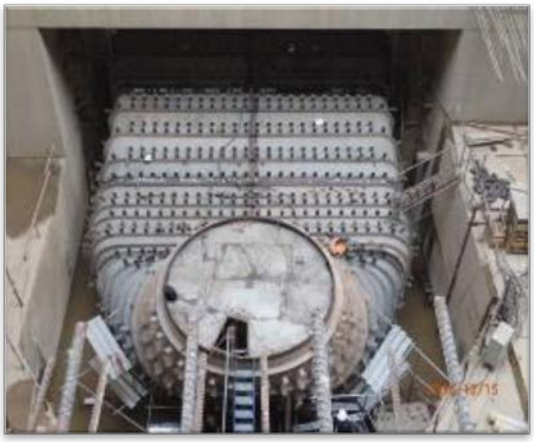
The disposal area on the right bank has been available for operation since January 2015, as was the adjacent waste disposal area. The Disposal Area No.9 along Road P1 near the entrance of Road T5 started operation in April 2015. Unsuitable material from the quarry continues to be hauled to Disposal area 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 December 2016 was 59.5% (the same when compared to planned progress of 59.5%).

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

Figure ***2-5: Installation of Draft Tube for Unit 2 at the Main Powerhouse***



2.3 Hydro-Mechanical Works

The HMWC was executed between IHI Infrastructure Systems (IIS) and NNP1PC on 18 April 2014 and the NTP was issued to the Contractor on 03 October 2014. The cumulative work progress of the Hydraulic Metal Works until the end of December 2016 was 30.1% (compared to planned progress of 30.1%).

The latest progress of penstock pipes fabrication at IHI field shop as of the end of December 2016 is shown ***in Table 2-3*** below.

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

Item No.	Work Description	Work Progress (%)	Remarks
1.1	Assembly & Welding	53.4 %	Straight pipes
1.1	Painting	45.5 %	"
1.1	Delivery to Main Dam Laydown Area	17.8 %	"
1.1	Site Erection at Main Dam	17.8 %	Inclined part

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

Table *2-4: progress of steel gate installation for each work item at the end of* December *2016*

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

2.4 230kV Transmission Line Works

The TLW Contract was executed between Loxley-Sri Consortium and NNP1PC on 11 July 2014 and the NTP was issued to the 230 kV TL Contractor on 03 October 2014. The cumulative work progress of the Transmission Line Works until the end of November 2016 was 67.9% (compared to planned progress of 69.8%).

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

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

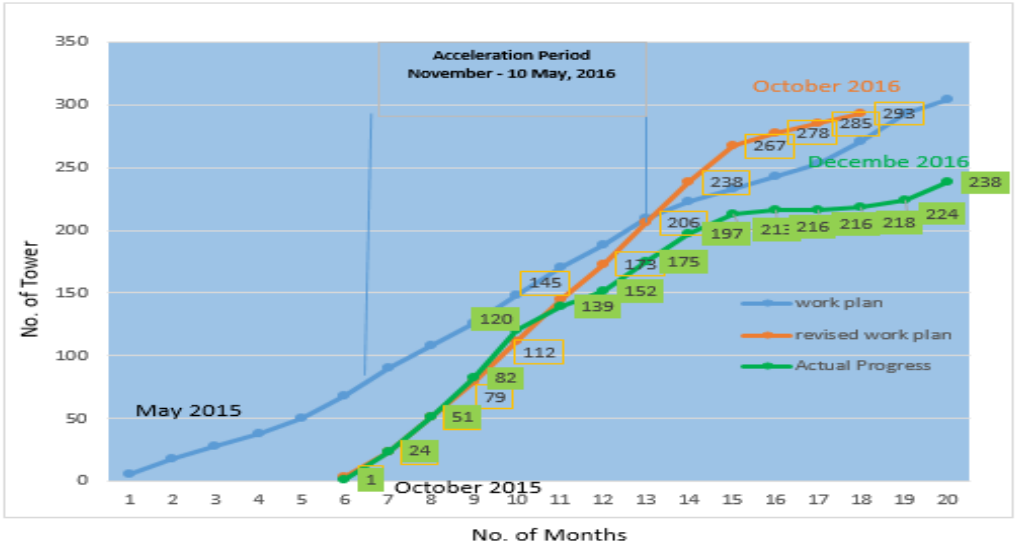


Figure 2-7: ***Cumulative Works Progress of tower foundation (Revised Planned & Actual)***

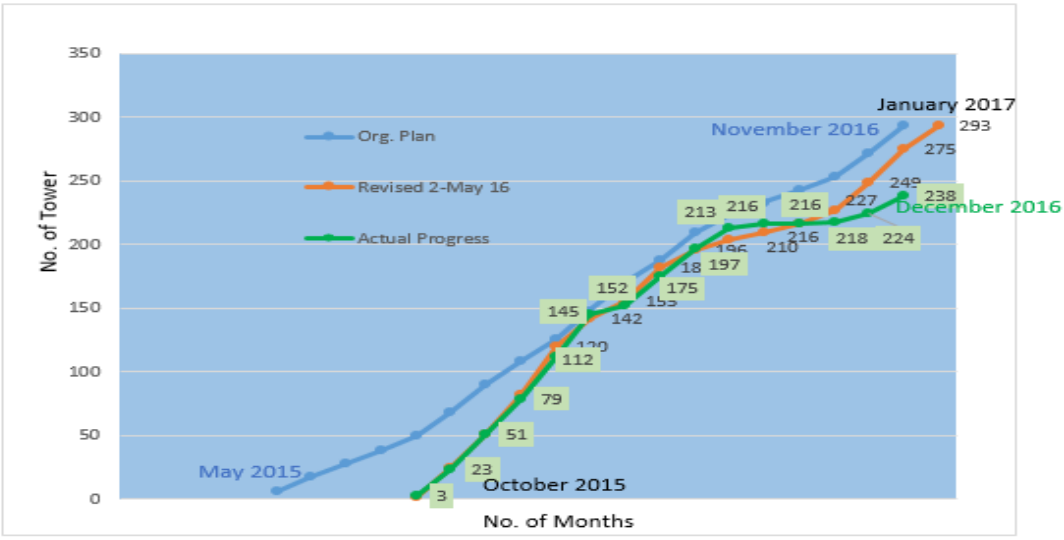
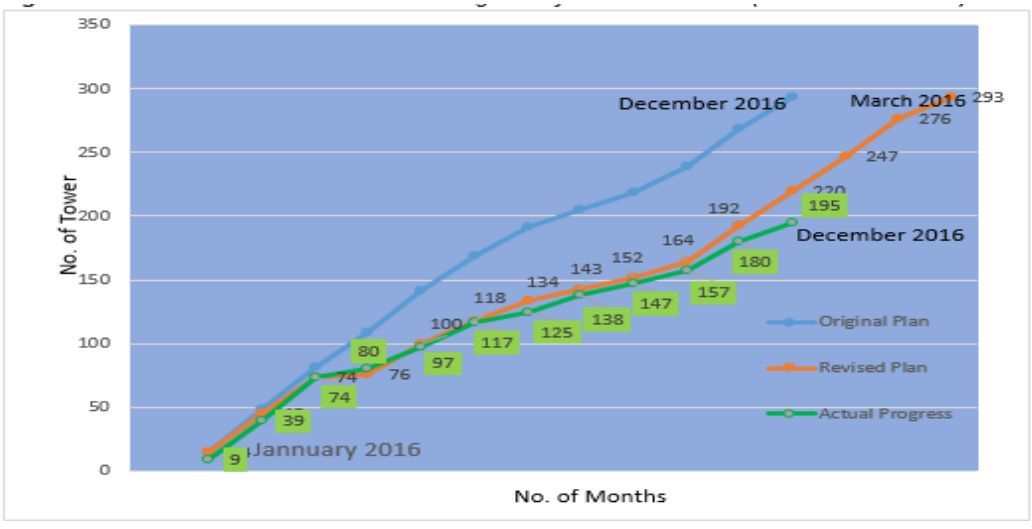


Figure 2-8: ***Revised Cumulative Works Progress of Tower Erection (Planned & Actual)***



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, the final draft will be translated into the Lao language before submission to the Ministry of Natural Resources and Environment (MONRE) by the end of February 2017 for their approval.

3.1.2 Site Specific Environmental and Social Management and Monitoring Plans

During December 2016, the Environmental Management Office (EMO) of NNP1PC received a total of six SS-ESMMPs for review and clearance. With 13 SS-ESMMPs and one ESMMP carried over from previous months, there was a total of 19 SS-ESMMPs and one ESMMP for EMO review during December 2016. Out of these, 11 SS-ESMMPs were cleared with conditions, one ESMMP was cleared without comment, and the remaining eight SS-ESMMP will be reviewed in January 2017.

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

Title	Date Received	Response Status	Comments
SS-ESMMP for Curtain Grouting Works at Main Dam	14 December 2016 (6th submission)	Under review	
SS-ESMMP for Re-Regulation Power Station Second River Diversion and Excavation at the Right Bank and Centre Bank	10 November 2016 (2nd submission)	Responded with 'No Objection with Conditions' on 06 December 2016	Revise the detailed design of the WWT S of the workers' camp and drainage control of the temporary and permanent spoil disposal area.
SS-ESMMP for Construction of Quarry Site	09 November 2016 (1st submission)	Responded with 'No Objection with Conditions' on 12 December 2016	- Confirm the location of topsoil stockpiles; - Include drawings of a diversion channel and a sediment retention basin; - Add an assessment of the stability of final slopes.
ESMMP update (R3) from HM Hydro Contractor	10 November 2016 (3rd submission)	Responded with 'No Objection and No Comment' on 27 December 2016	
SS-ESMMP for Construction of Tractor Road at HSRA	28 November 2016 (2nd submission)	Responded with 'No Objection with Conditions' on 05 January 2017	- Incorporate the plan for borrow pit closures or stabilisations in the revised DWP & SS-ESMMP; - Add a result of a survey and/or a plan to install a box culvert across the tractor road.

Title	Date Received	Response Status	Comments
SS-ESMMP for Construction of Intake Mouth at Houay Soup Resettlement Site	17 November 2016 (1st submission)	Responded with 'No Objection with Conditions' on 09 December 2016	- Revise the Environmental Assessment Checklist; - Revise a layout of the workers' camp and add environmental and social mitigation measures on the camp management.
SS-ESMMP for Labor Camp (Zhefu Camp)	15 November 2016 (3rd submission)	Responded with 'No Objection with Conditions' on 27 December 2016	Improve the WWTS by installing a Chlorine Contact Tank (1 m^3) and a Monitoring Tank (1 m^3).
SS-ESMMP for Biomass Clearance at Re-Regulation Pond	30 November 2016 (2nd submission)	Responded with 'No Objection with Conditions' on 05 January 2017	Revise the biomass cutting/clearing method and detailed design of sanitary facilities at the worker camp.
SS-ESMMP for Construction of Core Box House at Owner Site Office	30 November 2016 (1st submission)	Responded with 'No Objection with Conditions' on 15 December 2016	Provide a detailed design of a workers' camp, drainage control and sanitary facilities.
SS-ESMMP for installation of 360 Ton Electrical Overhead Traveling Crane for Main Power Station	05 December 2016 (1st submission)	Responded with 'No Objection with Conditions' on 27 December 2016	- Provide detailed information on the workers' camp location, operation and management.
SS-ESMMP for Construction of Health Centre at HSRA	18 August 2016 (1st submission)	Responded with 'No Objection with Conditions' on 27 December 2016 (the construction to be commenced in January 2017 after the land levelling is completed)	- Revise Environmental Assessment Checklist for Pre- Construction; - Provide design drawing of worker camp facilities, office, and toilet and sediment pond.
SS-ESMMP for Construction of Village Office and Hall at HSRA	18 August 2016 (1st submission)	Responded with 'No Objection with Conditions' on 27 December 2016 (the construction to be commenced in January 2017 after the land levelling is completed)	- Revise Environmental Assessment Checklist for Pre- Construction; - Provide design drawing of worker camp facilities, office, and toilet and sediment pond.
SS-ESMMP for UXO Clearance at HSRA	15 December 2016 (1st submission)	Responded with 'No Objection with Conditions' on 05 January 2017	Provide Environmental Assessment Checklist indicating the possible impact on local

Title	Date Received	Response Status	Comments
			environment and communities resulting from the UXO clearance works; submit a Preliminary Site/Camp Decommissioning Plan.
SS-ESMMP for Installation Work of Embedded Piping for Main Power Station	16 November 2016 (2nd submission)	Under review	
SS-ESMMP for Closing of Borrow Pit Area at Corner of P1 & P1A Road beside the Re-Regulation Dam	29 November 2016 (1st submission)	Under review	
SS-ESMMP for Operation and Maintenance Works of RCC Plant	10 November 2016 (3rd submission)	Under review	
SS-ESMMP for Building Construction at Main Powerhouse	30 November 2016 (2nd submission)	Under review	
SS-ESMMP for HM Hydro Worker Camp No.2 (LILAMA10)	27 December 2016 (4th submission)	Under review	
SS-ESMMP for Construction of Re-Regulation Power Station Building (Super Structure) Re-Regulation Powerhouse Station (B1)	21 December 2016 (3rd submission)	Under review	
SS-ESMMP for Adit Closure at Right Bank of Main Dam	28 December 2016 (1st submission)	Under review	

3.1.3 Compliance Report

During December 2016, NNP1PC-EMO issued a total of 11 Observations of Non-Compliance (ONC). The number of issues was almost double compared to November 2016. With a carry-over from November 2016, a total of 21 ONC and two NCR were active in December 2016. Out of these, seven ONC were resolved, 14 ONC and two NCR will be carried over into January 2017. Of these nine ONC and two NCR carried over were not resolved within the agreed deadlines. NNP1PC-EMO will follow up with the Contractors to resolve the remaining issues in January 2017.

The carried-over ONC and NCR from December 2016 into January 2017 are summarized in Table 3-2 below.

Table 3-2: Carry-over ONC from December 2016 to January 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). 1st inspection date: 02 June 2015 Latest follow up: 20 December 2016	ONC (Closure pending)	The Contractor completed a modification of all the WWTS ponds in December 2016 in accordance to the NNP1PC's instruction letter Ref. No.: NNP1/0750-016/OBA/EPC-CE dated 12 October 2016. NNP1PC (TD and EMO) inspected the site after completion and identified a minor issue on increasing the height of the berm of the last pond. The contractor shall complete the work before the next inspection in January 2017.
V&K Camp	Insufficient capacity of waste water treatment ponds to handle the operation of the V&K camp (ON_OC-0087). 1st inspection date: 02 June 2015 Latest follow up: 20 December 2016	ONC (Closure Pending)	The improvement of the WWTS in this camp shall follow the Thai expert's recommendations and be completed by the end of February 2017
HM Hydro Subcontract Worker Camp (LALIMA 10 Camp)	3. The LILAMA 10 Camp is accommodating 11 workers, but the construction of the Waste Water Treatment System (WWTS) remained incomplete (NCR_HM-0001) 1st inspection date: 28 September 2016 Latest follow up: 21 December 2016	NCR Level 1 (Closure Pending)	- The WWTS improvement was discussed during the Monthly Meeting held on 09 November 2016 to ensure that improvement actions are in full compliance with the NNP1's instruction letter Ref. No.: NNP1/0750-016/OBA/EPC-CE dated 12 October 2016; The contractor submitted a fourth (4th) revision DWP and SSESMMP.
RCC Plant	Lack of proper sedimentation facilities to improve the turbid water quality generated from the site (ONC_OC-0217) 1st inspection date: 28 June 2016 Latest follow up: 20 December 2016	ONC (Closure Pending)	- The 3rd submission of the SS-ESMMP for Operation and Maintenance of the RCC Plant is under review. The Contractor is required to: - Follow the agreed actions specified in previous Site Inspection Reports. The Contractor is required to frequently clean-up the sediment ponds when observed at 60% full, and regularly remove the dried sediment from drying beds.
	Sediment deposited in the first three sediment ponds was not cleaned up from on a daily basis as	ONC (New)	- The Contractor is required to clean up sediment deposit from all sediment ponds on a daily basis

Site ID	Issues	Reporting	Actions
	stated in the 2nd version of the RCC Plant's SS-ESMMP for the operation phase. In addition, the overflow section between pond No. 2 and pond No. 3 is too low and does not sufficiently retain highly turbid water. As a result, turbid water was discharged to Nam Ngiep River (ON_OC-0244) 1st inspection date: 06 December 2016 Latest follow up: 20 December 2016		and the frequency of clean-up of sediment shall be increased if the effluents continue to have high turbidity level; - A drawing for improving the sediment pond embankment at the RCC plant is required to be submitted in January 2017.
Aggregate Crushing Plant	Inadequate maintenance and implementation of agreed corrective actions on controlling the sediment pond at the Aggregate Plant below the Spoil Disposal Area No.7; improper monitoring and maintenance of the said sediment pond resulted in continuously discharging turbid water from the sediment pond into Nam Ngiep River. This is a serious non-compliance with CA annex C and ESMMP-CP 2014 (NCR_OC-0013) 1st inspection date: 08 November 2016 Latest follow up: 20 December 2016	NCR Level 2 (New)	On 23 December 2016, EMO provided further comments to the Civil Work Contractor's response letter Ref. No.: NNP1-PCL-02775 dated 08 December 2016 as the following: - The Contractor proceeded with the improvement work of the sediment pond without prior discussion on the detailed design with NNP1PC in order to avoid repeating the work if it is not proceeding as per NNP1PC's expectations; - NNP1PC recommendations on dividing the ponds into two sections allowing some passing through of the turbid water from the first to second pond and baffles with only one outlet is more effective in terms of maintenance and cost.
SECC Camp (Access Bridge Contractor)	SECC Contractor finished its main construction activities by the end of November 2016. To ensure that SECC site demolition is done properly, the Contractor was instructed to prepare and submit a Site Decommissioning Plan to EMO for review and approval at least 7 days prior to the commencement of decommissioning work (ONC_SECC-0039) 1st inspection date: 06 September 2016	ONC (Closure Pending)	- On 30 November 2016, EMO provided comments on the submitted Preliminary Site Decommissioning of Access Bridge Contractor, SECC; it is noted that the SECC's workshop, concrete batching plant and the workers' camp are to be removed. The site office and staff accommodation will be maintained until 25 December 2017 during the guarantee period of the bridge construction;

Site ID	Issues	Reporting	Actions
	Latest follow up: 27 December 2016		- It was agreed that the Contractor will submit a revised Preliminary Site Decommissioning Plan to EMO for review by the end of January 2017.
Re-Regulation Dam (Borrow Pit Area)	The Contractor started operating a borrow pit with inadequate environmental management practices as indicated below: - Topsoil was stockpiled at sensitive erosion area; - The cut slope area had no berm and cut-off drains; - Spoil was disposed and stockpiled on the access road to the SECC waste disposal pit. No information and management measures on the excavation of this borrow pit was included in the two approved SS-ESMMPs for the Re-Regulation Dam (i.e. the Re-Regulation Dam Left Bank Excavation and Re-Regulation Dam Power Station (ON_OC-0232). 1st inspection date: 30 August 2016 Latest follow up: 20 December 2016	ONC (Closure Pending)	The Contractor needs to take the following immediate actions: - Stockpile topsoil in an appropriate location to be used for rehabilitation of the borrow pit after operation; - Install borrow pit berms, cut-off drains and sediment pond where feasible to prevent landslide and retain the sediment. - Revised SS-ESMMP to include information on this borrow pit. - The latest followed up confirmed that the SS-ESMMP for the re-regulation dam was not revised as recommended and was not submitted. In addition, it was observed that there was no action taken by the Contractor, but instead informed the NNP1PC-EMO that there will be no closure activities for this borrow pit. This issue will be followed up internally in January 2017.
Re-regulation dam (spoil disposal area)	There was a land levelling activity for permanent spoil disposal from the excavation of left bank coffer-dam behind the SECC camp (ON_OC-0236). 1st inspection date: 11 October 2016 Latest follow up: 20 December 2016	ONC (Closure Pending)	- A DWP & SS-ESMMP for re-regulation dam was submitted, the document indicating the closing of the borrow pit at the corner of P1 and P1A road beside the re-regulation dam. However, the spoil disposal management plan stated in ESMMP-CP 2014 and Draft Updated ESMMP-CP 2016 Vol. III and IV, SP10 Spoil Disposal was not complied with. This issue will be followed up internally in January 2017.
Area above CVC Plant Yard	The slurry from the RCC plant was removed and placed at areas above the CVC plant for drying purposes (at the junction of Road P1 and P2). Some slurry has already been washed into the road-side drainage lines which are connected directly	ONC (New)	- The Contractor is required to clear the slurry from the temporary drying areas and taken to Spoil Disposal Area No.6; - During the latest inspection, the CW Contractor informed that sand

Site ID	Issues	Reporting	Actions
	to the Nam Ngiep River (ON_OC-0240). 1st inspection date: 22 November 2016 Latest follow up: 05 December 2016		and some slurry would be rewashed and reused though this appears to be an unlikely event. The Contractor was, therefore, asked to propose proper mitigation measures for erosion and sediment control of the mentioned sand and slurry disposal. This will be closely followed up at the next joint bi-weekly inspection scheduled on 24 January 2017. If no improvement is observed, a NCR Level 2 will be issued.
Aggregate Plant Yard	It was observed during this inspection that the Contractor did a good job of removing sediment from drainage lines and storing into heaps for easy drying ready for removal and disposal to Spoil Disposal Area No. 6. However, these sediment heaps along open ditches need to be removed to disposal regularly (ON_OC-0237). 1st inspection date: 11 October 2016 Latest follow up: 22 November 2016	ONC (Pending)	- The Contractor is required to clean up sediment removed from the open ditches and move sediment heaps more frequently. In the meantime, sufficient sandbags are to be provided along the road to prevent the washing back into the ditches and creation of turbid water.
	During the improvement of the aggregate crushing plant's sediment pond below Spoil Disposal Area No.7, sand bags were installed in the drainage ditch to slow down flow and create additional small sediment retention ponds. However, all the sediment retention ponds were 100% full of sediment and the wastewater which overflowed from these ponds, was diverted to Nam Ngiep River directly without sufficient settlement time (ON_OC-0241). 1st inspection date: 06 December 2016 Latest follow up: 20 December 2016	ONC (New)	- Clean up the sediment from all ponds along the drainage line on a daily basis to create space for sediment deposit while working on the larger pond; - Record the frequency and volume of sediment being disposed of at Spoil Disposal Area No. 6. This issue will be followed up in January 2017.
	The improvement of the aggregate crushing plant's sediment pond below Spoil Disposal Area No.7 was	ONC (New)	On 23 December 2016, EMO commented to the CW Contractors' response letter Ref No: NNP1-PCL-

Site ID	Issues	Reporting	Actions
	not consistent with NNP1PC's recommendations stating in the NCR level 2 (Document No. NNP1-ESD-EMO-NCR-OC-0013, dated 08 November 2016) (ON_OC-0242) 1st inspection date: 06 December 2016 Latest follow up: 20 December 2016		02775 dated 08 December 2016 and proposed the following actions: - The Contractor to submit the design for the improvement of aggregate crushing plant's sediment pond for EMO review prior to the implementation. It is to avoid repeating works if not meeting the EMO requirements; - Provide access to the last pond for cleaning; - Divide the pond into two sections allowing the turbid water passing from the first to second section and baffles with only one outlet.
	No dust suppression was observed during the operation of the aggregate crushing plant. As a result, dust emission was observed covering the Sino Hydro Camp located 30 m west from the crushing plant and surrounding vegetation (ON_OC-0243) 1st inspection date: 06 December 2016 Latest follow up: 20 December 2016	ONC (New)	- Spray water at the aggregate crushing plant to suppress dust; - Monitor and ensure that all workers working at the aggregate crashing plant are equipped and used roper PPEs including masks and safety glasses in accordance to Contractor's SS-ESMMP on dust management.
Spoil Disposal Area No.8	It was observed that slurry from the RCC Plant was disposed of at Spoil Disposal Area No. 8. This practice breached the agreed terms and conditions for the operation of the RCC Plant, which states that sediment shall be disposed at Spoil Disposal Area No. 6 (ON_OC-0245). 1st inspection date: 06 December 2016 Latest follow up: 20 December 2016	ONC (New)	- Remove the sediment from Spoil Disposal Area No. 8 and dispose at Spoil Disposal Area No.6. - No slurry disposal is allowed in other areas except the designated Spoil Disposal Area No. 6. The drying areas should be appropriately identified to avoid the run-off into other areas nearby.
PK Camp (Contractor for the Paddy Field Develop-ment at HSRA)	The workers camp was not built as proposed in the DWP & SSESMMP for Paddy Field Development of 48 ha for 2LR People in the Resettlement Site. There were no cooking, bathing and toilet facilities.	ONC (New)	The Contractor is required to: - Establish a toilet facility as per design proposed in the DWP & SSESMMP; - Provide a layout of drainage control system (diversion canal) surrounding the camp, oil/grease trap and pipe line from the kitchen to the sediment pond.

Site ID	Issues	Reporting	Actions
	1st inspection date: 13 December 2016 Latest follow up: 27 December 2016		

Figure 3-1: Site Inspection Locations

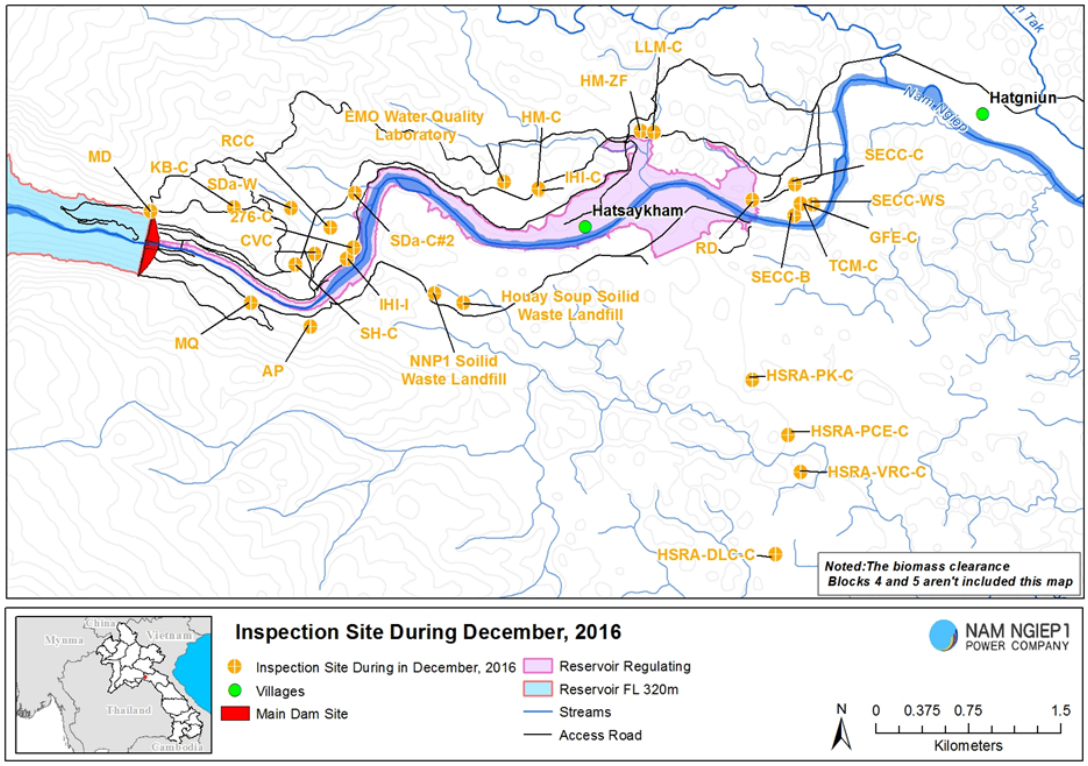


Figure 3-2: 230 kV Transmission Line Construction Monitoring

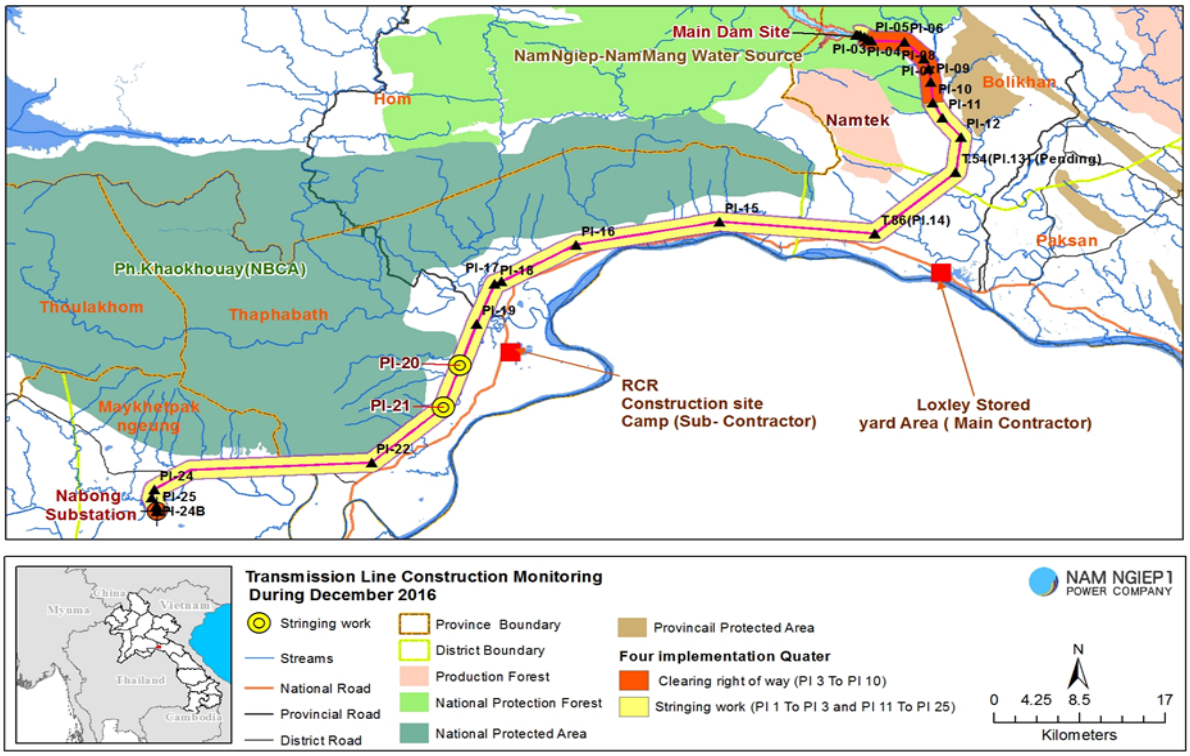
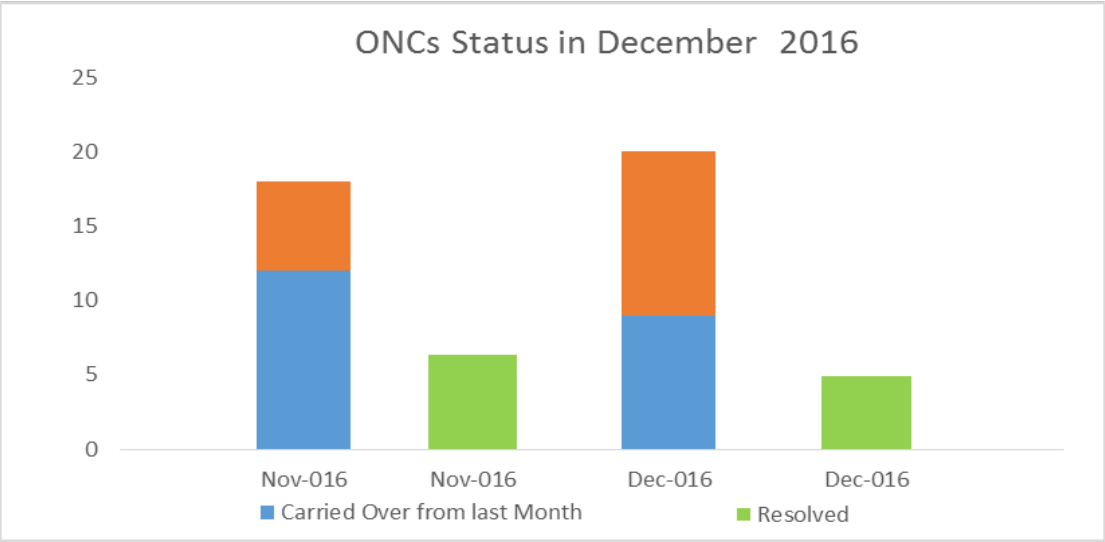


Table 3-3 Summary of ONCs and NCRs

Reporting Period (01-31 December 2016)	ONC	NCR-1	NCR-2	NCR-3
Carried over from November 2016	10	1	1	0
New issues this month	11	0	0	0
Resolved this month	7	0	0	0
Carried forward into January 2017	14	1	1	0
Unresolved exceeding deadline	9	1	1	0

Figure 3-3: Observations of non-compliance (ONCs) this December 2016 Compared with November 2016



3.1.4 Environmental Monitoring Unit Inspection

During 21 to 23 December 2016, Provincial and District EMUs conducted a joint environmental monitoring mission together with NNP1PC covering the main construction sites and camps, Houay Soup Landfill, Houay Soup Resettlement Area and the 230 kV Transmission Line. The EMUs mission report was submitted to NNP1PC on 29 December 2016. Main environmental issues identified by the EMUs are the following:

a) Unstable embankment of the grey water pond at Song Da 5 Camp No. 1 and Camp No.2 which posed a risk of wastewater overflowing into the Nam Ngiep River;
b) Effluent was discharged from the Waste Water Treatment Plant at the Main Dam with a pH of 4;
c) An existing hydrocarbon storage area at the IHI Industrial Area does not have sufficient roofing structure to protect it from rain and used hydrocarbon drums are stored outside the storage area;
d) The 230 kV Transmission Line Contractor utilises a used chemical drum for storage of drinking water (tower#193 and #205); and
e) The collapsed vertical pond walls of the Waste Water Treatment System at LILAMA 10 Camp have not been repaired.
f) NNP1PC had followed up with the relevant Contractors on the implementation of corrective actions.

NNP1PC will submit a response letter to the EMUs in January 2017 describing the progresses of solving the issues.

3.2 Environmental Quality Monitoring

The construction of the NNP1 laboratory was commenced in the third week of October 2016 with progress of 35% by the end of December 2016. The laboratory equipment was delivered to the Owner's Office and Village in the second week of December 2016 and the training for laboratory equipment operation and maintenance was held by ETU (Environmental Training Utility, an equipment supplier from Bangkok) during 13-19 December 2016, allowing limited testing to take place. EMU staff from both Xaysomboun Province and Bolikhamxay Province participated in this training (see ***Photograph 1*** and ***Photograph 2***). Thus, tests on effluent water sampling were carried out from one mission during December 2016.

Photograph 1: Laboratory equipment training was conducted by ETU staff (Thailand)	*Photograph 2: An IAP member visited the laboratory equipment training*
	

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

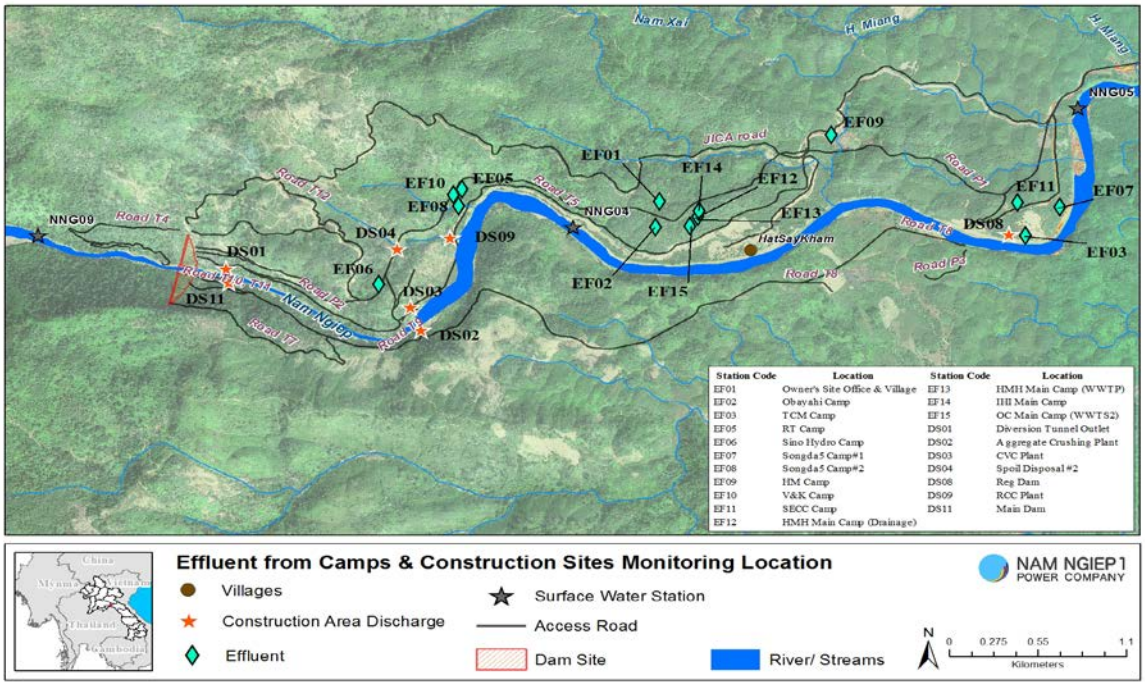
a) Effluent discharge from camps and construction sites;
b) Ambient surface water quality monitoring;
c) Groundwater and community water supply;
d) Landfill leachate;
e) Ambient noise and noise emission monitoring.

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

3.2.1 Effluent Discharge from Camps and Construction Sites

Since July 2016, the frequency of effluent monitoring has increased from monthly to fortnightly at all the camps, and from fortnightly to weekly at the construction sites. Results of the monitoring of effluents from the camps and construction sites are presented in **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 included in ***Annex A*** of this Report. The results show that none of the camps excluding the Owner's Site Office and Village complied with all of the applicable effluent standards. However, improvements of the Wastewater Treatment Systems (WWTS) are progressing. By the end of December 2016, the WWTS at a the new Kenber Camp, IHI Camp, Song Da 5 Camp No. 2 and No. 1 have been completed in accordance to the conceptual design prepared by an external consultant, the NNP1PC Instruction Letter (reference no. NNP1/0750-016/OBA/EPC-CE dated 12 October 2016) and design drawings cleared by NNP1PC in early November 2016. Discussions between NNP1PC and contractors were carried out and the Contractors have agreed to complete the improvement of WWTS for the remaining camps by the end of February 2017. Corrective actions are summarized below.

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

Site	Sampling ID	Non-Compliance	Corrective Actions
Owner's Site Office and Village	EF01	Total nitrogen slightly exceeded the Standard with a value of 16.8 mg/l.	This is unlikely to cause any significant impact
OC Camp (WWTP1)	EF02	Biochemical Oxygen Demand (BOD_5), COD, Ammonia nitrogen (NH_3-N), total nitrogen and total coliforms exceeded the Standards.	The improvement of the WWTS at this camp will commence in early 2017. The exact date of completion has not been confirmed by the Contractor. A joint IAP/ADB/LTA mission carried out during 12-16 December 2016 recommended a deadline by the end of February 2017.
Sino Hydro Camp	EF06	Ammonia nitrogen (NH_3-N), total nitrogen and total coliforms exceeded the Standard.	As above.
Song Da 5 Camp No. 1	EF07	Total nitrogen and total coliforms exceeded the standard.	The improvement of the wetland ponds to be sub-surface flow systems and installation of a chlorine contact tank and monitoring tank was completed a few days before the joint IAP/ADB/LTA mission during 12-16 December 2016. The first two wetland ponds are being filled..
Song Da 5 Camp No. 2	EF08	NH_3-N, total nitrogen and total coliforms did not comply with the Standard.	The improvement of the wetland ponds to be a sub-surface flow system and installation of a chlorine contact tank and monitoring tank was completed by the end of November 2016. All wetland ponds were filled up and treatment with sodium hypochlorite commenced in mid-December 2016. However, the dosing needs to be adjusted and NNP1PC is working closely with the Contractor to identify a sufficient chlorine dosage. This work will be finalised by the end of January 2017.
Hitachi-Mitsubishi Hydro (HMH) Worker Camp No.1	EF09	Total coliforms and total nitrogen did not comply with the Standard.	A meeting was held between NNP1PC and HM Hydro to discuss the WWTS improvement plan at its main camp and sub-contractors' camps. No conclusion was reached.
V&K Camp	EF10	TSS, Total Nitrogen and Total Coliforms were higher than the applicable Standards.	The improvement of the WWTS at this camp will commence in early 2017. The exact date has yet to be confirmed by the Contractor. The joint IAP/ADB/LTA mission carried

Site	Sampling ID	Non-Compliance	Corrective Actions
			out during 12-16 December 2016 recommended a deadline by the end of February 2017.
SECC Camp	EF11	Total coliforms did not comply with the Standard (> 160,000 MPN/100 ml).	This camp was mostly decommissioned in early December 2016. By the end of December, the number of workers remained 10 people. NNP1PC will continue to monitor the waste water quality at this camp and instruct the application of sodium hypochlorite in January 2017 if needed.
H-MH Main Camp (WWTS)	EF13	TSS, BOD_5, COD, Ammonia Nitrogen, Total Nitrogen and Total Coliforms did not comply with the Standard.	The negotiation on the improvement of the WWTS at HM Hydro main and its Contractors' camps is ongoing and will conclude by January 2017.
IHI Main Camp	EF14	BOD_5, COD, Ammonia Nitrogen, Total Nitrogen and Total Coliforms exceeded the Standard.	A conclusion was reached with IHI Contractor for the improvement of its camp's WWTS. Construction of a chlorine contact tank and a monitoring tank was completed on 10 December 2016 before the joint IAP/ADB/LTA mission during 12-16 December 2016. Chlorination will start in January 2017.
OC Camp (WWTS2)	EF15	Total coliforms were higher than the Standards at 160,000 MPN/100 ml	The improvement of the WWTS at this camp will commence in early 2017. The exact date is yet to be confirmed by the Contractor. The IAP/ADB/LTA mission during 12-16 December 2016 recommended a deadline of 28 February 2017.
Main Dam Construction Area	DS11	The pH values measured on 08 December 2016 was 4.31 which was much lower than the Standard (6.0-9.0)	The Contractor was notified to ensure that the wastewater from the main dam is properly treated. NNP1PC will continue to monitor this in January 2017.
Re-regulation Dam	DS08	No water sampling due to no discharge from this construction site	
Spoil Disposal Area No.2 (Song Da 5 Workshop)	DS04	The pH value (measured on 08 December 2016) was 5.49, lower than standard range	The low pH values in the past 4 months confirm the natural water quality condition of the creek which passes this sampling site. Similar cases happened in the last dry season (2015).
RCC Plant	DS09	The TSS result in December 2016 were higher than the Standard	A 3rd revision of the SS-ESMMP was submitted to NNP1PC for comments. The Contractor was instructed to

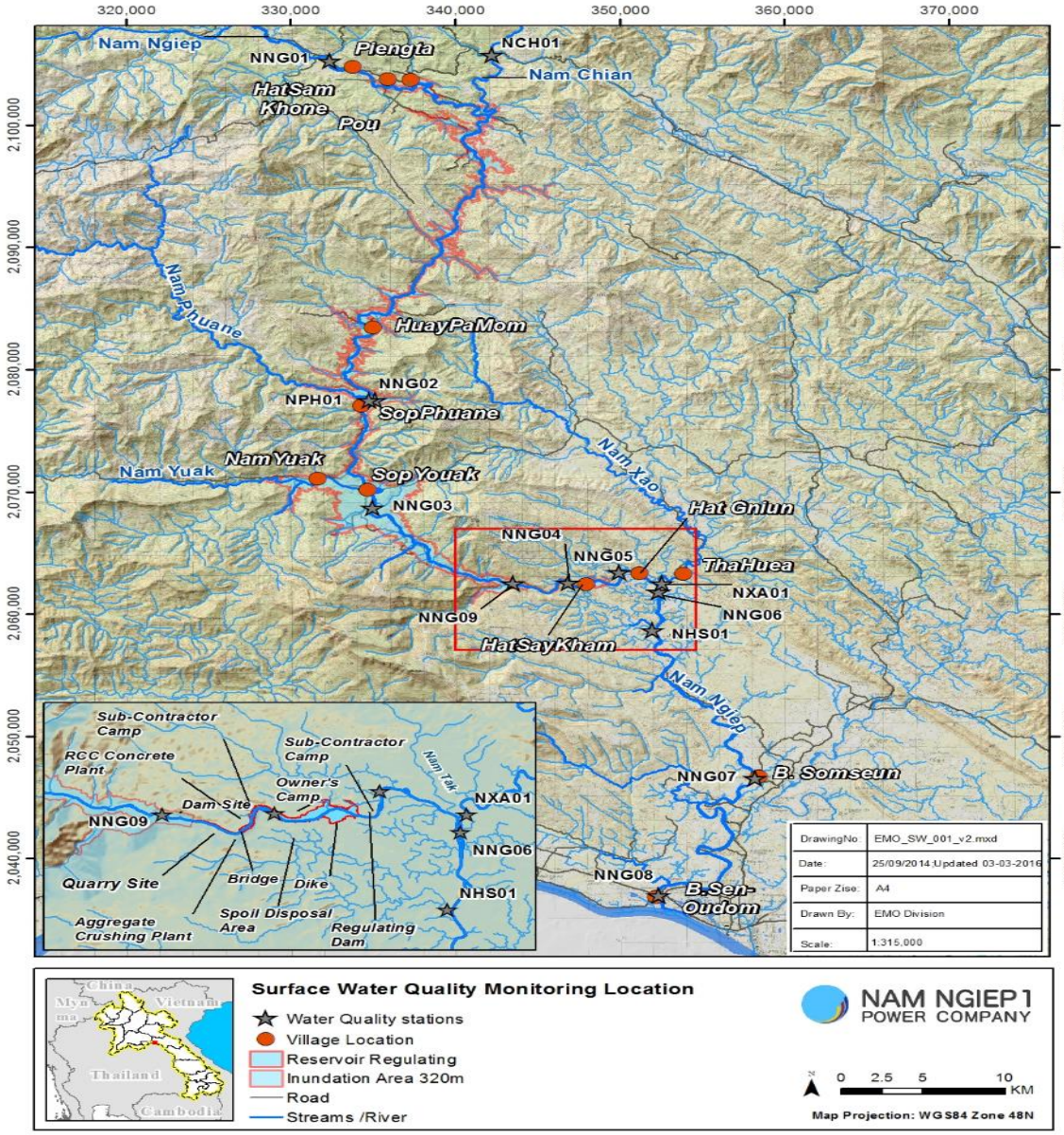
Site	Sampling ID	Non-Compliance	Corrective Actions
		(<50 mg/l) with recorded values of 60,000 mg/l.	propose improvement of the first 3 ponds by early January 2017.
CVC Plant	DS03	Wastewater was retained in the ponds and no discharge to the environment was observed.	
Aggregate Crushing Plant	DS02	The TSS value sampled on 08 December 2016) exceeded the standard with values recorded of 1,778 mg/l, 14,107 mg/l, 1,699 mg/l and 2,227 mg/l respectively.	Improvements of this sediment pond was underway but the construction was not in line with the NNP1PC recommendations as stated in Part 1 of a NCR level 2. This issue was discussed during the joint IAP/ADB/LTA mission in December 2016 where the Contractor agreed to complete the improvement work by February 2017.

3.2.2 Surface (Ambient) Water Quality Monitoring

Surface water samples are collected and analysed twice a month[2] from nine stations in Nam Ngiep and four stations in the main tributaries including the lower Nam Chian, Nam Phouane, Nam Xao and Houay Soup (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 December 2016 are shown below.

Nam Ngiep

Most of the parameters monitored complied with the national relevant surface water quality standards, except Chemical Oxygen Demand (COD) which exceeded the Standard for the stations of Nam Ngiep Upstream Ban Phiengta (NNG01 – Upstream Construction Sites), Nam Ngiep Upstream Main Dam (NNG09 – Upstream Construction Sites), Nam Ngiep Downstream of RT Camp (NNG04 – Within Construction Sites) and Nam Ngiep at the Bridge of Road 13 (NNG08 – Downstream the Construction Area). The highest amount of COD recorded was at the Nam Ngiep Upstream Ban Phiengta (NNG01 – Upstream Construction Sites) at 8.3 mg/l.

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

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

	River Name	Nam Ngiep								
	Zone	Upstream of Construction Sites				Within Construction Site	Downstream of Construction Sites			
	Station Code	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08
	Date	06/12/16	07/12/16	07/12/16	08/12/16	08/12/16	08/12/16	08/12/16	08/12/16	08/12/16
Parameters (Unit)	**Guideline**									
pH	5.0 – 9.0	6.97	7.18	7.32	7.3	6.85	7.15	7.37	7.3	7.25
DO (%)		73.8	89.9	88.7	70.9	68.8	84.3	85.5	75.2	86.3
DO (mg/l)	>6.0	6.47	7.28	6.96	6.23	6.12	6.35	6.46	7.28	6.16
Conductivity (µs/cm)		126	141	150	114	112	156	114	120	114
TDS (mg/l)		63	71	75	57	56	77	57	60	57
Temperature (°C)		20.61	22.3	21.5	20.77	22.5	22.03	22.8	23.3	23.4
Turbidity (NTU)		46.3	32.90	250	29.8	40.4	23	24.1	30.8	24
TSS (mg/l)		88.6	No results due to the samples were damaged during transportation by the car accident.	No results due to the samples were damaged during transportation by the car accident.	55.4	96.9	44.3	43.5	44.9	46.6
BOD_5 (mg/l)	<1.5	ND[13]			ND[13]	ND[13]	ND[13]	ND[13]	ND[13]	ND[13]
COD (mg/l)	<5.0	8.3			6.9	7.1	ND[16]	ND[16]	ND[16]	5.5
NH_3-N (mg/l)	<0.2	ND[12]			ND[12]	ND[12]	ND[12]	ND[12]	ND[12]	ND[12]
NO_3-N (mg/l)	<5.0	0.13			0.1	0.1	0.09	0.09	0.09	0.16
Total Kjeldahl Nitrogen (mg/l)		ND[9]			ND[9]	ND[9]	ND[9]	ND[9]	ND[9]	ND[9]
Chloride (mg/l)		ND[13]			ND[13]	ND[13]	ND[13]	ND[13]	ND[13]	ND[13]
Sulphate(mg/l)	<500	5.2			4	4.5	4.2	4.1	4.3	4
Alkalinity (mg/l)		57.1			47.8	51.7	49.8	49.8	48.8	48.8
Arsenic (mg/l)	<0.01	ND[2]			ND[2]	ND[2]	ND[2]	ND[2]	ND[2]	ND[2]
Calcium (mg/l)		12.2			10.5	10.5	11.1	11	11.5	10.9
Manganese (mg/l)	<1	0.065			ND[4]	0.058	ND[4]	ND[4]	ND[4]	ND[4]
Mercury (mg/l)	<0.002	ND[3]			ND[3]	ND[3]	ND[3]	ND[3]	ND[3]	0.0005
Magnesium (mg/l)		2.58			2.28	2.5	2.36	2.41	2.42	2.37
Lead (mg/l)	<0.05	ND[10]			ND[10]	ND[10]	ND[10]	ND[10]	ND[10]	ND[10]
Potassium (mg/l)		0.911			0.952	1.16	0.946	0.946	0.981	0.949
Sodium (mg/l)		2.11			2.32	2.27	2.41	2.37	2.64	2.48
Total Iron (mg/l)		4.51			3.26	4.33	2.32	2.04	2.42	1.85
Total phoshorus (mg/l)		0.03			0.08	0.04	0.07	0.08	0.04	0.07
Total coliform (MPN/100ml)	<5,000	330			230	330	1,700	1,100	490	2,300
Faecal coliform (MPN/100ml)	<1,000	170			230	170	700	310	330	70

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

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

Nam Chiane (NCH01) is located about 66 km upstream of the Main Dam. 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 8.8 mg/l.

Table 3-6: Results of Physical and Chemical Parameters of Nam Chian, Nam Phouan, Nam Xao and Nam Houay Soup

	Site Name	Nam Chain	Nam Phouan	Nam Xao	Nam Houaysoup
	Zone	Tributaries Upstream		Tributaries Downstream	
	Station Code	NCH01	NPH01	NXA01	NHS01
	Date	06/12/16	07/12/16	08/12/16	08/12/16
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	6.98	7.75	7.33	7.49
DO (%)		74.6	96.8	73.6	73.7
DO (mg/l)	>6.0	6.16	8.61	6.09	6.36
Conductivity(µs/cm)		53	93	148	65
TDS (mg/l)		27	46	74	32
Temperature (°C)		19.3	19.66	20.69	20.35
Turbidity (NTU)		845	3.18	6.24	14.44
TSS (mg/l)		515	No results due to the samples were damaged during transportation by the car accident.	ND[16]	9.8
BOD_5 (mg/l)	<1.5	1.4		ND[13]	ND[13]
COD (mg/l)	<5.0	13.3		ND[16]	8.8
NH_3-N (mg/l)	<0.2	ND[12]		ND[12]	ND[12]
NO_3-N (mg/l)	<5.0	0.12		0.05	0.11
Total Kjeldahl Nitrogen (mg/l)		ND[9]		ND[9]	ND[9]
Chloride (mg/l)		ND[13]		3.4	2.9
Sulphate(mg/l)	<500	5.4		3.9	3.8
Alkalinity (mg/l)		22.4		61.7	22.9
Arsenic (mg/l)	<0.01	0.0259		ND[2]	ND[2]
Calcium (mg/l)		4.25		12	5.7
Manganese (mg/l)	<1	0.4		ND[4]	ND[4]
Mercury (mg/l)	<0.002	0.0009		ND[3]	ND[3]
Magnesium (mg/l)		2.26		3.34	1.09
Lead (mg/l)	<0.05	ND[10]		ND[10]	ND[10]
Potassium (mg/l)		3.52		0.602	0.355
Sodium (mg/l)		1.8		3.98	1.58
Total Iron (mg/l)		19.9		0.425	1.22
Total phoshorus (mg/l)		0.04		0.03	0.03
Total coliform (MPN/100ml)	<5,000	790		330	330
Faecal coliform (MPN/100ml)	<1,000	330		2	11

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

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

Table 3-7: Physical Parameters Results of Surface Water Quality – Nam Chian, Nam Phouan, Nam Xao and Nam Houay Soup (measured Every Fortnight)

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

3.2.3 Groundwater Quality Monitoring

During December 2016, NNP1PC sampled and analysed the groundwater quality in 14 boreholes. Out of these, two boreholes are community owned boreholes at Hatsaykham Village, one borehole is a private well at Hat Gniun Village, six boreholes are built by the Project for re-settlers at Houay Soup Resettlement Area, and five boreholes are built by NNP1PC around NNP1 Project Landfill and Houay Soup Landfill.

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

Ban Hatsaykham

Most of the monitored parameters complied with the standards, except pH which was lower than the Standard with recorded values of 5.36 and 5.3 for the borehole number GHSK01 and GHSK03 respectively (the same boreholes as previous months).

Ban Hat Gnuin

The faecal coliforms and E.coli bacteria contamination were 23 MPN/100 ml which was much lower than the previous month but still exceeded the National Standard. In addition, pH result was 5.49 which was slightly lower than the Standard (the same as the previous months). Other parameters monitored complied with relevant groundwater quality standards.

Houay Soup Resettlement Area (HSRA)

All parameters monitored complied with the relevant standards except pH for the borehole number GHSP04, GHSP05 and GHSP06 ranging from 5.3-5.49.

NNP1 Solid Waste Landfill

Lead was detected in two out of four boreholes at NNP1 Project Landfill (that is, MW1 and MW3) to be slightly higher than the standard at 0.017 mg/l. The same was detected at Houay Soup Landfill (MW5) at 0.113 mg/l. These results are similar to the levels found in September, October and November 2016. Initial assessments of the results find it highly unlikely that the elevated levels of lead could be caused by seepage of leachate from the landfills – not least because lead has not been detected in the leachate. NNP1PC will continue to monitor and assess the groundwater quality.

Figure 3-6: Groundwater Quality Monitoring Locations

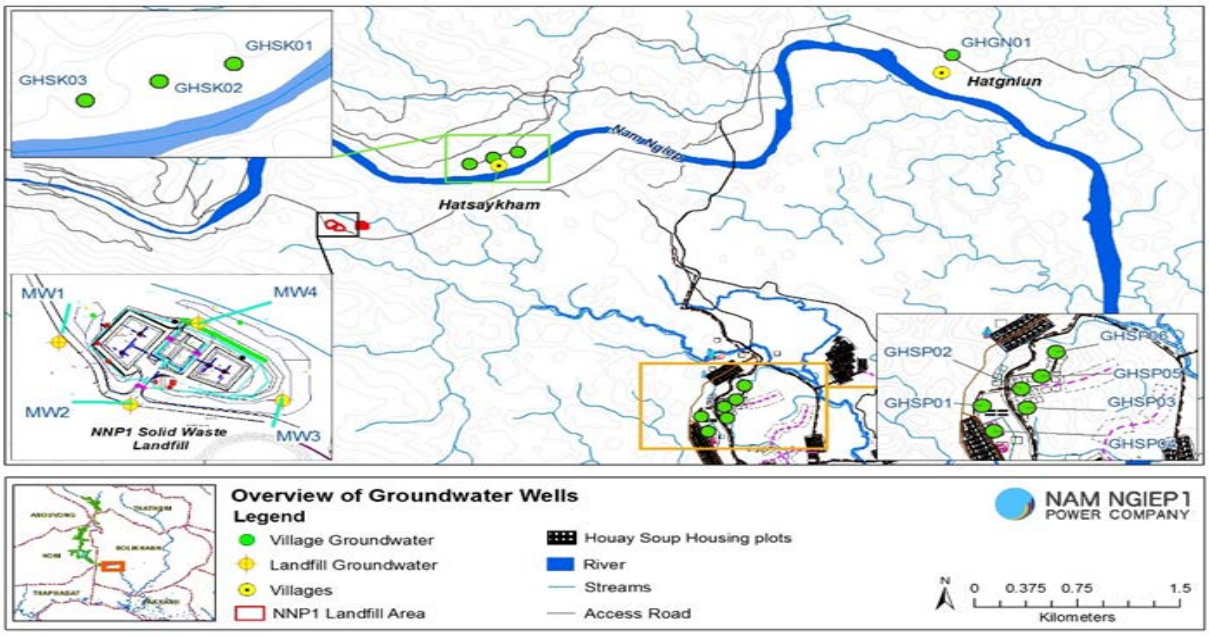


Table 3-8: Groundwater Quality Monitoring Results Hatsaykham and Hat Gniun Villages in December 2016

	Site Name	Ban Hatsaykham			Ban Hat Gniun
	Station Code	GHSK01	GHSK02	GHSK03	GHGN01
	Date	05/12/2016		05/12/2016	05/12/2016
Parameter (Unit)	**Guideline**				
pH	6.5-9.2	5.36	Hand Pump Broken	5.3	5.49
Sat. DO (%)		77.3		55.2	64.6
DO (mg/l)		6.19		4.35	5.12
Conductivity (µs/cm)		166		102	254
TDS (mg/l)	<1,200	83		51	127
Temperature (°C)		26.34		26.5	25.9
Turbidity (NTU)	<20	0.77		0.79	3.16
Nitrate (mg/l)	<45	0.26		0.25	0.63
Total Hardness (mg/l)	<500	46.8		32.4	ND[15]
Nitrite (mg/l)		ND[7]		ND[7]	ND[7]
Fluoride (mg/l)	<1	ND[9]		ND[9]	ND[9]
Arsenic (mg/l)	<0.05	ND[2]		ND[2]	ND[2]
Calcium (mg/l)		12.1		11.3	0.956
Manganese (mg/l)	<0.5	ND[4]		ND[4]	0.094
Magnesium (mg/l)		1.11		1	0.404
Cadmium (mg/l)	<0.01	ND[5]		ND[5]	ND[5]
Potasium (mg/l)		0.359		0.546	1.42
Sodium (mg/l)		0.842		0.933	2.36
Iron (mg/l)	<1	ND[10]		ND[10]	0.123
Faecal coliform (MPN/100ml)	0	0		0	23
Ecoli Bacteria (MPN/100ml)	0	0		0	23

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 *3-9: Groundwater Quality Monitoring Results for Houay Soup Resettlement Area in December 2016*

	Site Name	Houay Soup Resettlement					
	Station Code	GHSP01	GHSP02	GHSP03	GHSP04	GHSP05	GHSP06
	Date	05/12/2016	05/12/2016	05/12/2016	05/12/2016	05/12/2016	05/12/2016
Parameter (Unit)	Guideline						
pH	6.5-9.2	6.92	6.55	6.67	5.51	6.26	6.27
Sat. DO (%)		66.9	68.2	70.4	51.8	79	75.1
DO (mg/l)		5.7	5.53	5.68	5.01	6.3	6
Conductivity (µs/cm)		553	251	576	220	210	210
TDS (mg/l)	<1,200	277	125	287	110	105	104
Temperature (°C)		25.05	25.2	25.68	25.53	25.5	25.87
Turbidity (NTU)	<20	1.42	1.23	1.06	1.74	0.91	0.67
Nitrate (mg/l)	<45	0.27	0.29	0.25	0.24	0.25	0.16
Total Hardness (mg/l)	<500	223	109	256	67.5	79.2	98.1
Nitrite (mg/l)		ND[7]	ND[7]	ND[7]	ND[7]	ND[7]	ND[7]
Fluoride (mg/l)		0.13	ND[9]	0.13	0.02	0.07	ND[9]
Arsenic (mg/l)	<0.05	ND[2]	ND[2]	ND[2]	ND[2]	ND[2]	ND[2]
Calcium (mg/l)		69	30.1	76.4	13.4	18.9	26.8
Manganese (mg/l)	<0.5	ND[4]	ND[4]	ND[4]	ND[4]	ND[4]	ND[4]
Magnesium (mg/l)		4.02	1.93	4.08	1.41	2.16	2.39
Cadmium (mg/l)	<0.01	ND[5]	ND[5]	ND[5]	ND[5]	ND[5]	ND[5]
Potasium (mg/l)		0.671	0.842	0.706	0.274	0.637	0.524
Sodium (mg/l)		5.57	3.31	5.86	1.08	2.37	3.13
Iron (mg/l)	<1	ND[10]	ND[10]	ND[10]	0.098	ND[10]	ND[10]
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)			

Table 3-10: Groundwater Monitoring Results for NNP1 Project Landfill and Houay Soup Landfill

	Site Name	NNP1 Landfill				Houaysoup Landfill
	Station Code	MW1	MW2	MW3	MW4	MW5
	Date	09/12/2016	09/12/2016	09/12/2016	09/12/2016	09/12/2016
Parameters (Unit)	Guideline					
pH		5.75	5.05	5.85	4.76	5.7
Sat. DO (%)		56.76	30.5	38.9	50.7	60
DO (mg/l)		4.46	2.47	3.06	4	4.67
Conductivity (µs/cm)		292	45	550	123	272
TDS (mg/l)		146	22	275	61	136
Temperature (°C)		26	24.78	26	26.01	25.76
Turbidity (NTU)		8.97	2.85	4.51	16.9	7.41
Biochemical Oxygen Demand(mg/l)		ND[13]	ND[13]	ND[13]	ND[13]	ND[13]
Amonia-Nitrogen (mg/l)		ND[12]	ND[12]	ND[12]	ND[12]	ND[12]
Total Nitrogen (mg/L)		0.5	0.45	0.47	0.63	0.52
Copper (mg/l)		ND[18]	ND[18]	ND[18]	ND[18]	ND[18]
Lead (mg/l)	<0.01	0.017	ND[10]	0.017	0.01	0.113
Total Phosphorus (mg/l)		0.05	0.04	0.08	0.05	0.08
Faecal Coliform (MPN/100ml)		0	0	0	32	0
Ecoli Bacteria (MPN/100ml)		0	0	0	22	0
Total Petroleum Hydrocarbons (mg/l)		ND[13]	ND[13]	ND[13]	ND[13]	ND[13]

3.2.4 Gravity Fed Water Supply (GFWS) Quality Monitoring

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

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

Thahuea Village (WTHH02): All parameters complied with the National Drinking Water Standards except for faecal coliforms and E. coli which were found to be 23 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 23 MPN/100 ml for both parameters.

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

	Site Name	Ban Thaheua	Ban Hat Gnuin
	Station Code	WTHH02	WHGN02
	Date	05/12/2016	05/12/2016
Parameter (Unit)	**Guideline**		
pH	6.5-8.5	7.04	6.99
Sat. DO (%)		65.8	74.4
DO (mg/l)		5.33	5.72
Conductivity (µs/cm)	<1,000	74	170
TDS (mg/l)	<600	37	85
Temperature (°C)	<35	25.26	27.8
Turbidity (NTU)	<10	1.52	1.05
Nitrate (mg/l)	<50	0.1	0.09
Total Hardness (mg/l)		36.9	56.7
Nitrite (mg/l)	<3	ND[7]	ND[7]
Fluoride (mg/l)	<1.5	0.13	ND[9]
Arsenic (mg/l)	<0.05	ND[2]	ND[2]
Manganese (mg/l)	<0.5	0.007	ND[4]
Mercury (mg/l)	<0.001	ND[3]	ND[3]
Magnesium (mg/l)		1.36	1.82
Selenium (mg/l)		ND[1]	ND[1]
Cadmium (mg/l)	<0.003	ND[5]	ND[5]
Lead (mg/l)	<0.01	ND[10]	ND[10]
Iron (mg/l)	<1	ND[10]	ND[10]
Faecal coliform (MPN/100ml)	0	23	130
Ecoli Bacteria (MPN/100mL)	0	23	130

3.2.5 Landfill Leachate Monitoring

During December 2016, water samples were taken from all four landfill leachate ponds of the NNP1 Project Landfill. 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).

Figure 3-7: Landfill Leachate Monitoring Location

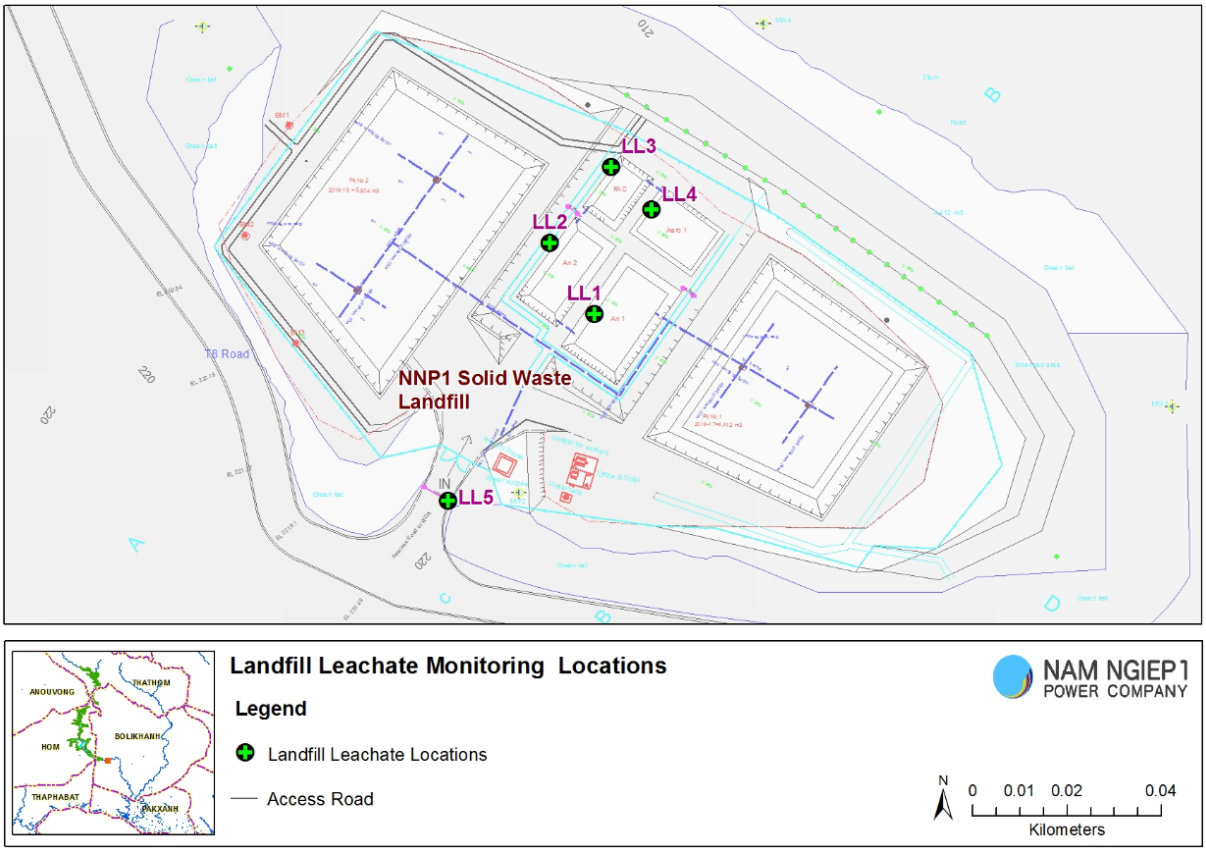


Table 3-12: Landfill Leachate Monitoring Results

	Site Name	NNP1 Landfill (Leachate Ponds)			
	Station Code	LL1	LL2	LL3	LL4
	Date	09/12/2016	09/12/2016	09/12/2016	09/12/2016
Parameters (Unit)	**Guideline**				
pH	6.0 - 9.0	8.1	8.38	8.45	8.01
Sat. DO (%)		82.6	82.9	69.9	75
DO (mg/l)		7.02	7	5.97	6.37
Conductivity (µs/cm)		518	266	242	259
TDS (mg/l)		259	133	171	129
Temperature (°C)		22.2	22.28	21.7	22.4
Turbidity (NTU)		15.9	12	9.51	4.55
BOD (mg/l)	<30	5.6	6	3.1	14.1
COD (mg/l)	<125	52	49.8	44.7	104
NH_3-N (mg/l)	<10.0	ND[12]	ND[12]	ND[12]	ND[12]
Total nitrogen (mg/l)	<10.0	4.7	1.56	1.2	1.88
Oil & Grease (mg/l)	<10	2	1	1	2
Copper (mg/l)	<0.3	ND[18]	ND[18]	ND[18]	ND[18]
Lead (mg/l)	<0.2	ND[10]	ND[10]	ND[10]	ND[10]
Total phoshorus (mg/l)	<2	0.06	0.04	0.05	0.08
Total coliform (MPN/100ml)	<400	79	0	5	13
Faecal Coliform (MPN/100ml)		23	0	0	0
Total petroleum hydrocarbons (mg/l)		ND[13]	ND[13]	ND[13]	1

3.2.6 Dust Monitoring

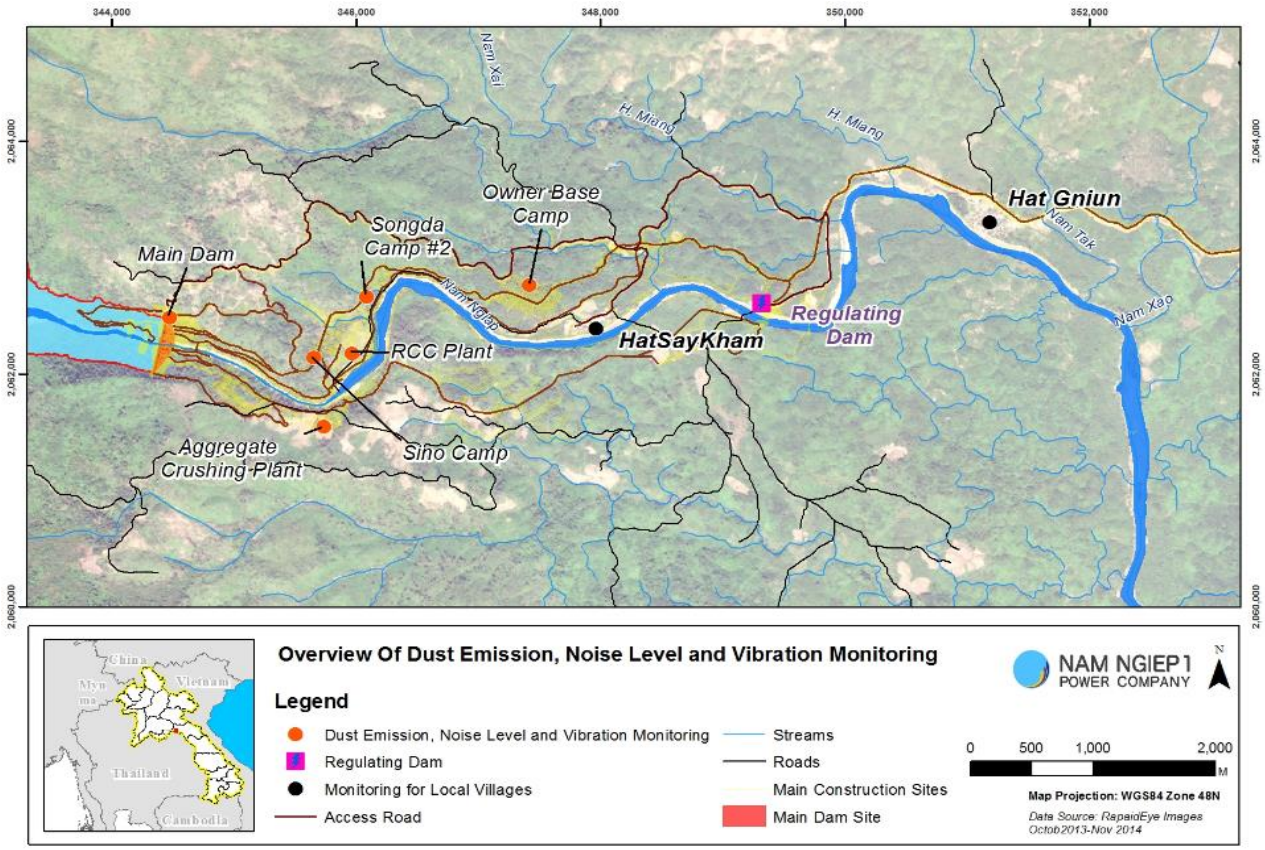
The monitoring points are indicated on the map in ***Figure 3-8***. All average dust results during the monitored period complied with the National Standard. The results are presented in ***Annex B***.

3.2.7 Noise Monitoring

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

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

Figure 3-8: Noise and Dust Emission Monitoring Locations



The recorded noise levels indicate full compliance with the National Standard for the period of 06:01-22:00 in all stations monitored. For the period of 22:01-06:00, slightly higher levels than the Standard were recorded at the RCC Plant, Song Da5 Camp No.2, Sino Hydro Camp, Sino Hydro Temporary Worker Camp and the Main Dam [between 53.20 – 60.41 dB(A) compared to the Standard of 50 dB(A)].

3.3 PROJECT WASTE MANAGEMENT

3.3.1 Solid Waste Management

In December 2016, NNP1PC closely supervised the landfill operations including waste disposal, compaction and soil cover activities using a crawler excavator. Solid waste being delivered to the NNP1 Project Landfill is regularly checked by NNP1PC staff. Approximately 257.7 m^3 of solid waste was disposed at the NNP1 Project Landfill during December 2016, an increase of 112.5 m^3 compared with November 2016 (See ***Photograph 3*** and ***Photograph 4*** below).

Photograph 3: Waste Compaction and Soil Cover at the NNP1 Project Landfill

Photograph 4: Waste Disposal Spot Checking by NNP1PC staff at NNP1 Project Landfill

3.3.2 Hazardous Materials and Waste Management

During December 2016, joint hazardous materials and waste inventories were carried out at the main construction sites and subcontractors' camps including Loxley's Stockyard (230 kV Transmission Line), Loxley Subcontractor's site office (RCR) and Workshop, TCM Camp, V&K Camp, RCC plant, CVC Plant, Sino Hydro's fuel station, Sino Hydro's worker camp, Song Da5 Industrial Area, HM Hydro's sub-contractor Camp, HM Hydro Workers' Camp, IHI's sub-contractor Camp, IHI Workers' Camp, SECC Workshop, GFE Camp and Kenber Camp.

The types and amounts of hazardous materials generated at different construction sites and camps are sold to an authorised vendor (Khounmixay Processing Factory) for disposal as indicated in ***Table 3-13***

Table 3-13: Results of hazardous material inventory

No.	Hazardous Waste Type	Unit	Total in December 2016 (A)	Disposal by Selling (B)	Remainder (A - B)
1	Used hydraulic and engine oil	Littre (l)	8,120	2,400	5,720
2	Cement bag	Bag	2,800	0	2,800
3	Empty used chemical drum/container	Drum (20 l)	1,500	0	1,500
4	Used oil filters	Piece	561	0	561
5	Used tyre	Piece	314	0	314
6	Used oil mixed with water	Littre (l)	200	200	0
7	Ink cartridge	Unit	208	0	208
8	Empty contaminated bitumen drum/container	Drum (200 l)	82	0	82
9	Empty paint and spray cans	Can	73	0	73
10	Empty used oil drum/container	Drum (20 l)	84	5	79

No.	Hazardous Waste Type	Unit	Total in December 2016 (A)	Disposal by Selling (B)	Remainder (A - B)
11	Empty used oil drum/container	Drum (200 l)	45	6	39
12	Empty used chemical drum/container	Drum (200 l)	31	0	31
13	Contaminated soil, sawdust and concrete	Bag	24	0	24
14	Halogen/fluorescent bulbs	Unit	23	0	23
15	Contaminated textile and material	Bag	16	0	16
16	Car battery	Unit	10	0	10
17	Acid and caustic cleaners	Bottle	0	0	0
18	Clinical waste	kg	26	0	26

In December 2016, 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's Worker's Camp, Sino Hydro Camp, Kenber Camp, SECC Camp and each Contractor's Camps 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

N0.	Recycled Waste Type	Unit	Sold	Cumulative Total at November 2016
1	Scrap metal	kg	12,814	25,274
2	Glass	kg	155	678
3	Plastic bottles	kg	83	242
4	Aluminium	kg	157	73
5	Paper/Cardboard	kg	26	241

In addition, a total of 5,000 kg of recyclable waste (scrap metal) of Sino Hydro Camp was sold to a new vender (Saysana Factory) and a total of 425 kg of recyclable waste (glass bottles) from Hat Giun Recyclable Waste Bank was sold to Keo Lao Company. The NNP1PC-EMO also carried out an audit for a new proposed vender located at kilometre 21 of Road 13S in Vientiane Capital. However, NNP1PC staff was not allowed to enter the industrial premise of this new vender. Therefore, a joint inspection with GOL (EMU) and Contractor will be organised to visit this new vendor in January 2017 (See ***Photograph 5*** and ***Photograph* 6** below).

Photograph 5: Recyclable waste of a sub-contractor and Hat Ngiun waste bank was sold to new vender, Saysana Factory and Keo Lao Company respectively

Photograph 6: NNP1PC carried out a new vender audit at Saysana Factory in Vientiane Capital

The food waste generated from the Owner's Site Office and Village, selected camps of contractors and subcontractors was collected by Hatsaykham villagers for use as animal feed (pig and poultry). A total of 3,591 kg was collected in December 2016 as shown in Table 3-15.

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

NO.	SITE LOCATION NAME	UNIT	TOTAL
1	Song Da 5 Camp No. 2	kg	2,127
2	Song Da 5 Camp No. 1	kg	1,211
3	Obayashi Corporation Camp	kg	205
4	Owner's Village and Site Office	kg	48
Total		**kg**	**3,531**

During December 2016, NNP1PC-EMO conducted a waste management awareness training for ESD and OSO staff and a total of 123 staff participated. The main purpose of the training was to raise waste management awareness (both non-hazardous and hazardous waste) and improve NNP1 Project good waste management practices in workplaces (See ***Photograph 7*** and ***Photograph* 8** below).

Photograph 7: Waste Management Awareness Training at ESD office

Photograph 8: Waste Management Awareness Training at OSO office

In addition, NNP1PC-ESD handed over 15 waste bins (120 litres each) to Borikhamxay Province Urban Development Administration Authority (PUDAA) to express involvement and support for community waste management.

3.4 Community Waste Management

3.4.1 Community Recycling Programme

By December 2016, an accumulated total of 2,173 kg of recyclables were stored in the Community Recycle Bank. During December 2016 alone, a total of 539 kg of recyclable waste was recorded, a reduction of 208 kg comparing to November 2016. A total of 121 households hold accounts at the Community Recycle Bank (no increase in membership since October 2016). The percentages of participation in the programme for each village remain to be 87% for Hat Gniun Village, 64% for Hatsaykham Village and 64% for Thahuea Village.

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

Table 3-16: Types and amounts of waste traded

Types of Waste	Unit	Accumulation In November	Additions In December	Sold	Accumulation In December
Scrap metal	kg	774	209	0	983
Glass	kg	448	187	425	210
Plastic bottle	kg	207	52	0	259
Paper/cardboard	kg	357	40	0	397
Aluminium cans	kg	273	51	0	324
Total	kg	2,059	539	425	2,173

NNP1PC's ESD conducted a trial trading of recyclable waste with new residents at Houay Soup Resettlement Area (HSRA). This was also an opportunity to provide the villagers with waste management recommendations, which included waste segregation, waste generation reduction and waste disposal in a temporary waste pit at each household as well as how to manage waste before selling recyclables to a Community Recyclable Waste Bank at Hat Gniun village (see ***Photograph 9*** and ***Photograph 10*** below):

Photograph 9: Waste management recommendation for new residents at HSRA

Photograph 10: NNP1PC bought recyclable waste from new residents at HSRA

3.4.2 Houay Soup Resettlement Area Waste Management

In December 2016, a total of 0.81 m^3 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 the temporary waste pit at their camps. NNP1PC-EMO has, therefore, refreshed the instruction on solid waste disposal at Houay Soup Landfill. The Houay Soup Landfill opens every Tuesday and Thursday from 09:30 am to 10:30 am through individual arrangement with NNP1PC-EMO staff.

3.5 Watershed and Biodiversity Management

3.5.1 Preparation of the Nam Ngiep 1 Watershed Management Plan

Obligations[3]	**Status by December 2016**
Prepare: **1)** Full draft Nam Ngiep 1 Watershed Management Plan by 15 November 2016	It was agreed with ADB that the condition precedent for disbursement of the loan amount related to the delivery of the full draft Nam Ngiep 1 Watershed Management Plan has been met, although some parts of the plan still need more work
Prepare draft Watershed Management Regulations by 15 November 2016	The Watershed Management Committee has prepared a first draft Watershed Management Regulation and NNP1PC has reviewed the draft and added comments
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
1) Draft provincial regulation submitted to Provincial Justice Department by 23 December 2016. **2)** Start of public hearing process by 10 January 2017	As agreed between ADB and NNP1PC, this target date is moved to the First Quarter of 2017
Activities in December 2016	**Results**
Data and Information Collection and Analysis for WMP Development	• The plan preparation continues with the focus on finalizing: Section 7 - baseline and trend analysis and improving Section 8 - Watershed Management Issues and Actions including further analysis on the collected information on the socio-economic and land-use practices from 14 villages within NNP1 watershed. • The overall WMP development was acknowledged by the ADB, IAP, LTA mission, and BAC in the middle of December 2016 in positive way. The mission team feel confident

[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 December 2016
	with the engagement of international watershed management consultant who leads the plan development and further recommended that consultation with GOL agencies is a high priority and should take place soon.
Prepare draft Watershed Management Regulations by 15 November 2016	• It was agreed during the mission that further discussions on the draft regulation submitted by GOL in November 2016 needs to wait until the completion of full draft of WMP in late January 2017.
WRPO Activities	• NNP1PC completed fund transfer of USD 47,226.88 to DFRM WRPO, Xaysomboun WRPO, and Bolikhamxay WRPO for the implementation of 2nd pre-WMP proposal for the period up to April 2017. • Xaysomboun WRPO is preparing tools and equipment for village land-use planning exercise at three villages including Ban Thamlo, Om and Kohai in Anouvong District, Xaysomboun Province. The village land-use planning is expected to conduct in early January 2017.
Xaysomboun ISP	• There is no further progress on XSB ISP from DEQP and XSB ISP Team during this month. • NNP1 EMO followed up with Xaysomboun ISP team and noted that Xaysomboun ISP Team prefers the fund for finalizing the Xaysomboun ISP in especially for Anouvong, Hom, and Thathom Districts to be transferred to Xaysomboun ISP Committee directly instead of through DEQP.

3.5.2 Biodiversity Offset Management

Obligations[4]	Status by December 2016
Start of the Boundary Confirmation Baseline Survey by 20 September 2016	• Completed
Consultant acceptable to ADB is engaged as technical consultant for preparation of biodiversity offset	• ADB provided comments to the TOR in the second week of December and it was discussed during the mission that this deadline will be waived.

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

management plan by 30 November 2016	
Issuance of the Boundary Confirmation Baseline Survey preliminary report by 30 November 2016	• Completed
Issuance of the Boundary Confirmation Baseline Survey draft final report by 31 January 2017	Not relevant at this time
Activities in December 2016	**Results**
Boundary Confirmation Baseline Survey led by ADB Consultant	• The preliminary report was submitted by ADB Consultant in the first week of December 2016. The report notes that: - The offset site is noteworthy in a Lao context for its populations of gibbons, Phayre's Leaf Monkeys and large hornbills. In the context of other Annamite areas the conservation significance of the ground living large mammal community is well above average. - There is still some biodiversity conservation significance in the river system and its associated species within the offset site - The great majority of the forest in the offset site has little to no significant affinity with Wet Evergreen Forest - In order to fulfil the obligation of the Project Concession Agreement (CA) and its wider implications for both company and ADB then it requires such involvement of an experienced biodiversity conservation organisation from the very earliest stages of project planning and implementation, revision of boundaries to include additional areas of higher long-term biodiversity significance, and/or investment in additional offset sites and or other offset options. • It was agreed with GOL to wait for the final report before drawing any conclusions or making any decisions based on the report
Consultant acceptable to ADB is engaged as technical consultant for preparation of biodiversity offset management plan by 30 November 2016	• The TOR has been updated based on the comments from ADB in the second week of December. • The TOR was acknowledged by ADB during the mission for further process and the deadline will be waived accordingly. The procurement will be initiated in January 2017.
Activities pre-BOMP period of 1 October 2016 – 31 September 2017	• The final version of Pre-BOMP has been updated by BOMC in discussion with EMO according to the comments provided by ADB in the first week of December.

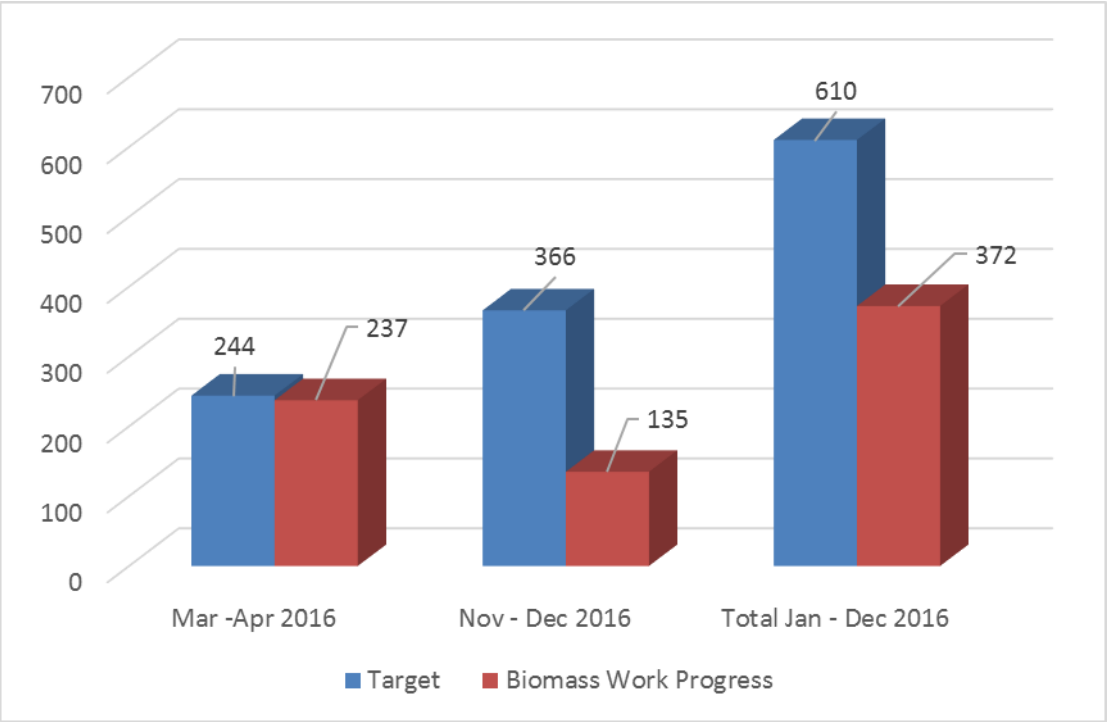
	• The proposal was discussed and agreed during the mission in the second week of December. • The fund flow mechanism has been arranged by BOMC through Ministry of Finance in the last week of December.

3.5.3 Biomass Clearance

Activities in December 2016	**Results**
Labour recruitment	• 85 households (around 187 labourers) were contracted with lump-sum payment for biomass clearance work in Block 14. • 35 village labourers from Longsan District were employed for biomass clearing in Block 1. • The daily contract was signed with 30 village labourers from Ban Houaypamom for vegetation clearing in Block 10. • The recruitment of additional village labourers from Ban Pou and Ban Phiengta for biomass clearing in Block 16 to 18 is ongoing.
Perform UXO work on priority biomass clearance areas	• There was no UXO found during the reporting period. • QA/QC research of 10% by Field Supervisor and 2% by Field Manager was undertaken and documented. • At the end of reporting period, the overall UXO search and clearance has been completed for around 907 ha. The UXO work progress to date is showed in Table 3-17.
Perform biomass clearance	• During the reporting period, the biomass clearing increased slightly. Biomass clearance was completed in 5 ha in Block 2, 18 ha in Block 3, 16 ha in Block 5, 23 ha in Block 11, 42 ha in Block 14, and 13 ha in Block 15. • To date, the biomass clearance (cutting and burning) has been completed for around 372 ha. The biomass clearance work progress to date is showed in Figure 3-9 and Figure 3-10. • The IAP/LTA/ADB mission in December 2016 strongly recommended NNP1PC and the biomass contractor to put more efforts to settle the issues with local GOL and communities such as to deal with tree diameter >20 cm and the compensation that delayed the progress of biomass clearance. The mission raised concerns that further delays in completion of biomass clearance may delay reservoir impoundment.

Figure 3-9: Biomass Clearance work Progress in figure as of 31 December 2016

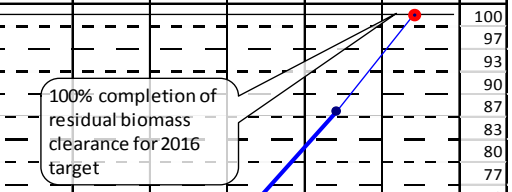
Biomass Clearance Target 2016 (in ha)	610 ha
Completion	372 ha
Percentage of completion	61%



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

Figure 3-10: Gantt Chart of Biomass Clearance Programme in 31 December 2016

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



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

Table 3-17: Biomass and UXO clearance progress in each priority area as of 31 December 2016

Priority Area	Zone	Total Area (ha)	Island & Buffer Zone (315-320 m ASL)	Priority Biomass Clearance Area			Completed UXO Clearance as of 31 December 2016	Status of Biomass clearance as of 31 December 2016 (ha)	
				Forests	Fallow-shifting Cultivation and Garden-Plantation Lands	Total			
Block 01	1	115.38	6.15	29.35	79.88	109.24	38.97	30.00	- Completed cutting and burning vegetation (bush and small trees) 30 ha in April and then paused in May 2016 due to rainy season. - Cutting re-growth vegetation by 35 outside workers
Block 02	1	165.92	7.30	38.72	119.89	158.62	43.68	15.00	- Completed cutting and burning vegetation (bush and small trees) 10 ha. Remaining wood to be piled and burned in Jan 2017 - Further biomass clearing in Dec 2016 completed around 5 ha
Block 03	1	88.86	8.51	14.43	65.92	80.35	21.97	27.00	Under clearing with progress 27 ha
Block 04	1	167.68	3.94	122.97	40.77	163.74	110.36	132.28	- Completed cutting and burning vegetation clearance completed 132.28 ha as at April 2016. Remaining wood to be piled and burned in January 2017 - Further biomass clearing will be resumed in Jan 2017
Block 05	1	350.72	10.61	66.53	273.58	340.11	110.75	76.00	- Completed cutting and burning vegetation clearance completed 50 ha as April 2016. Remaining

Priority Area	Zone	Total Area (ha)	Island & Buffer Zone (315-320 m ASL)	Priority Biomass Clearance Area			Completed UXO Clearance as of 31 December 2016	Status of Biomass clearance as of 31 December 2016 (ha)	
				Forests	Fallow-shifting Cultivation and Garden-Plantation Lands	Total			
									wood to be piled and burned in January 2017 - Further biomass clearing resumed in December 2016 and completed around 26 ha
Block 06	1	46.71	14.87	20.31	11.54	31.84	8.96	10.00	- Completed cutting and burning vegetation (bush and small trees) 10 ha. Remaining wood to be piled and burned - Further biomass clearing to be commence in January 2017
Block 07	2	43.03	3.39	18.48	21.17	39.65	33.23		Not yet started
Block 08	2	41.00	3.40	14.64	22.97	37.61	17.68	4.00	- Completed cutting and burning vegetation (bush and small trees) 4 ha. Remaining wood to be piled and burned - Further biomass clearing to be commence in January 2017
Block 09	2	54.13	1.38	11.67	41.08	52.75	25.05		Not yet started
Block 10	2	317.39	48.28	128.97	140.14	269.10	139.20		Not yet started
Block 11	2	98.05	8.07	24.06	65.92	89.98	89.98	23.00	Under clearing (manual clearing) by village workers from Ban Houay Pamom
Block 12	3	84.23	20.13	64.11		64.11	64.11		Not yet started

Priority Area	Zone	Total Area (ha)	Island & Buffer Zone (315-320 m ASL)	Priority Biomass Clearance Area			Completed UXO Clearance as of 31 December 2016	Status of Biomass clearance as of 31 December 2016 (ha)	
				Forests	Fallow-shifting Cultivation and Garden-Plantation Lands	Total			
Block 13	3	131.35	30.10	76.44	24.81	101.24	101.25		Under recruitment of local labourers
Block 14	3	53.00	9.66	7.79	35.54	43.33	43.34	42.00	Under vegetation clearing (manual clearing) by 88 hhs (187 village workers) from Ban Hat Samkhone
Block 15	3	93.27	49.54	13.52	30.21	43.73	43.73	13.00	Under clearing using bulldozer
Block 16	3	9.86	6.53	1.30	2.02	3.32	3.32		Under recruitment of local labourers
Block 17	3	44.25	36.29	1.33	6.63	7.96	7.96		
Block 18	3	7.18	3.23	3.95		3.95	3.95		
Total		1,912.01	**271.38**	**658.55**	**982.08**	**1,640.63**	**907.48**	**372.28**	

3.5.4 Fishery Monitoring

The fishery monitoring programme is progressing, and a database has been developed to support the future fish management programme as part of the in Nam Ngiep 1 Watershed Management Plan. Two types of survey were conducted during December 2016 including daily fish catch logbook monitoring and community interview. 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 kg/household/day in November 2016. The estimated total fish catch in Nam Ngiep basin for November 2016 is 25,000 kg. Around 63% of the catch was sold, 26% was consumed fresh, 7% processed and approximately 4% 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 31 December 2016

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

Activities in December 2016	**Results**
Daily Catch Logbook and Verification Survey	• Completed the daily catch logbook survey in 152 households out of the total target of 162 households. 6,156 forms were used in the survey • Conducted daily catch logbook survey for round 5 on 144 households • A fishery database has been developed • The daily household catch on average for Nam Ngiep in November 2016 is 2.2 kg/household/day. The median catch for all fishing zone is presented in Figure 3-12. • The estimated total catch for Nam Ngiep in November 2016 is approximately 25,000 kg as shown in Figure 3-13
Household Catch Assessment Survey	• Completed households catch assessment for 121 households • Completed data input both household catch assessment survey and exit interview • Data is analyzing by fisheries consultant
Village Community Interview	• Completed village community interview in total 35 target villages. • Completed data entry and submit to fishery consultant for analysis and report
Gillnet Sampling Survey	• The Consultant (FishBio) submit the final annual gillnet survey report to NNP1 on 28 December 2016

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

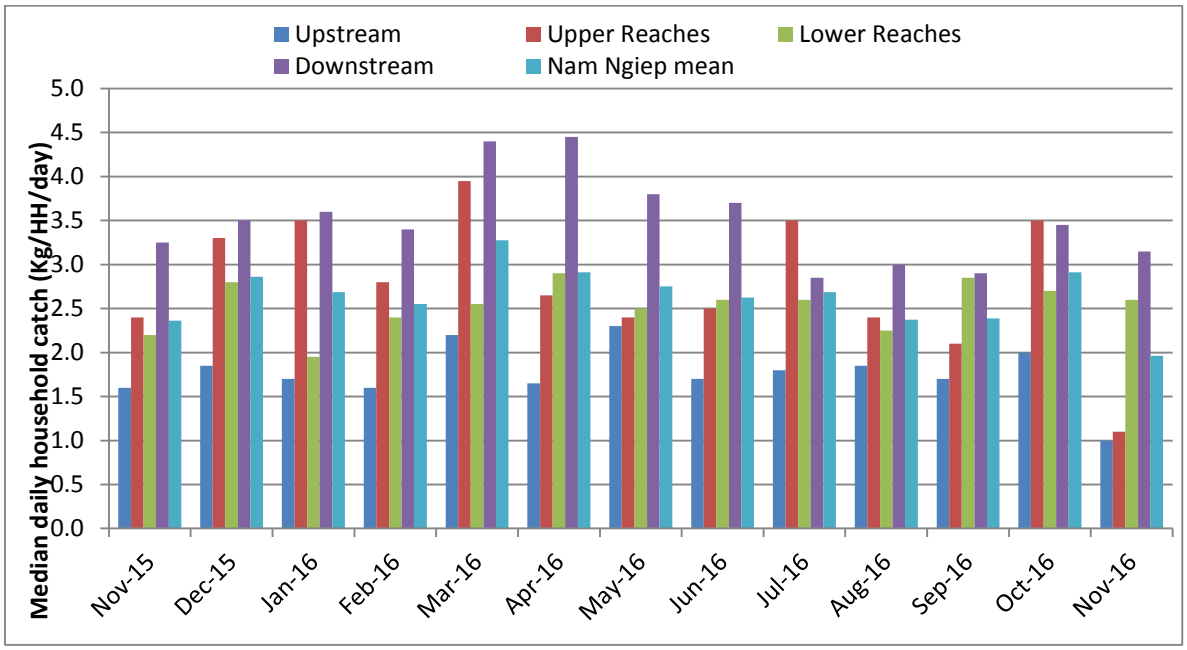
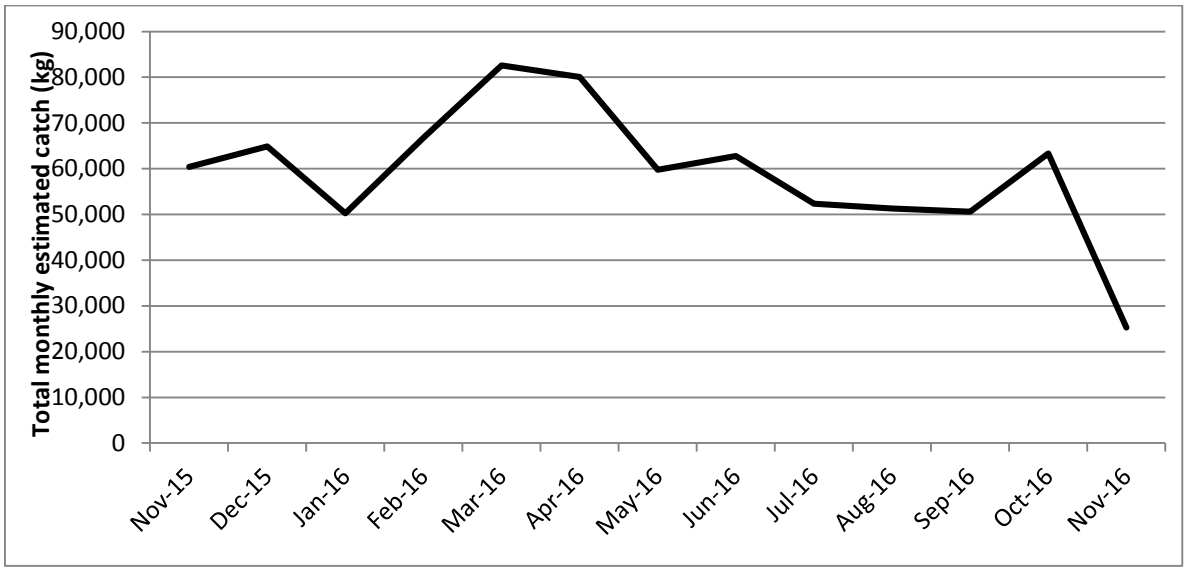


Figure 3-13: Total estimated fish catch for Nam Ngiep by month (Kg)



3.6 Other Obligations and Support Programmes

3.6.1 Environmental Protection Fund (EPF)

There was no update from the EPF and Provinces on the development and implementation of EPF's subprojects. Further follow up will be done and reported in January 2017.

3.6.2 115 kV Transmission Line IEE Due Diligence Assessment

NNP1PC (TD, EMO and SMO) has initiated a discussion with EDL and its Contractor (Dong Fang Company), a meeting was held on 23 December 2016 to discuss the survey of new alignment at the Houay Soup Resettlement Area and revision of the IEE. The survey of new alignment was completed, further development on IEE revision will be followed up and reported in January 2017.

3.6.3 Nabong Substation Upgrade Due Diligence Assessment

Further to the follow up with EDL and Nam Ngiep 2 Power Company on the permission letters for the upgrade works in the Nabong Substation, the NNP1PC has discussed with ADB on 17 December 2016 on way forward to conclude the DDA process. A follow up email was sent to ADB describing how this DDA report will be concluded and asked ADB concurrent. Further development on this issue will be reported in January 2017.

3.7 External Monitoring

A joint IAP, LTA, ADB, mission was conducted from 11 to 18 December 2016. Mission findings and recommendations is expected to provide separately I their report which is expected to be in January 2017.

3.7.1 Independent Monitoring Agency

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

3.7.2 Biodiversity Advisory Committee

The new BAC Chairman together with other BAC members conducted offset site visitation at Ban Vangphieng in Viengthong District from 19 to 21 December 2016.

BAC chairman conducted debriefing meeting with GOL and NNP1 Team on 22 December 2016 with key notes that additional area should be considered and the on-site management plan particularly for

the endemic species found in NNP1 watershed including small endemic fish (*Laubuca caeruleostigmata*), *Luciocyprinus owston*).

BAC will have further internal discussion and agreement to provided single concrete comment to GOL BOMC and NNP1.

ANNEXES

ANNEX A: RESULTS OF EFFLUENT ANALYSES

Table A- 1: Results of Camp Effluents in December 2016 (one mission only)

	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	01/12/16	01/12/16	01/12/16		01/12/16	01/12/16
Parameters (Unit)	Guideline						
pH	6.0 - 9.0	6.35	7.47	7.82	No water sample	6.95	6.91
Sat. DO (%)		61.3	32.1	54.7		1.6	14.5
DO (mg/l)		5.13	2.62	4.89		0.13	1.21
Conductivity (µs/cm)		638	1052	830		710	533
TDS (mg/l)		319	528	414		355	266
Temperature (°C)		26.08	24.4	23.2		23.9	21.9
Turbidity (NTU)		2.75	15.4	19.1		14.53	34
TSS (mg/l)	<50	ND[16]	24.6	17		22.3	88.9
BOD (mg/l)	<30	6.4	57.8	14		29.2	18.6
COD (mg/l)	<125	10	134	54.4		63.4	77.6
NH_3-N (mg/l)	<10.0	6	36	ND[12]		21	9
Total Nitrogen (mg/l)	<10.0	16.8	37.2	3.72		25.2	12.9
Oil & Grease (mg/l)	<10.0	ND[13]	5	ND[13]		2	1
Manganese (mg/l)		0.095	ND[4]	ND[4]		0.09	0.273
Total Iron (mg/l)	<2	ND[10]	ND[10]	0.127		0.379	3.5
Total Phosphorus (mg/l)		1.33	1.6	0.41		1.34	0.29
Total coliform (MPN/100ml)	<400	17	160,000	160,000		160,000	160,000
Faecal Coliform (MPN/100ml)		17	160,000	35,000		92,000	54,000
Discharge Volume (m3/day)		***15.2***	***0***	***0***		***0***	***0***

	Site Name	Songda5 Camp#1	Songda5 Camp#2	HMH Worker Camp #1	SECC Camp	HMH Main Camp - Drainage	HMH Main Camp WWTP	IHI Camp
	Station Code	EF07	EF08	EF09	EF11	EF12	EF13	EF14
	Date	01/12/16	01/12/16	01/12/16	01/12/16		01/12/16	01/12/16
Parameters (Unit)	Guideline							
pH	6.0 - 9.0	6.9	6.6	6.91	6.01	No water sample	7.74	7.46
Sat. DO (%)		86	21.9	73.1	12.4		76.9	37.4
DO (mg/L)		7	1.85	5.29	1.05		6.16	3.01
Conductivity (µs/cm)		1096	612	372	551		833	972
TDS (mg/L)		531	306	184	275		417	486
Temperature (°C)		24.8	22.9	30.9	22.7		22.73	25.8
Turbidity (NTU)		11.8	42.9	6.15	3.44		27.7	40.3
TSS (mg/l)	<50	49.3	106	9.5	5		85.8	21.5
BOD (mg/l)	<30	17.2	59.8	3.9	4.2		57	74.9
COD (mg/l)	<125	102	139	20.4	14.9		190	172
NH_3-N (mg/l)	<10.0	3	20	ND[12]	5		23	37
Total Nitrogen (mg/L)	<10.0	13.8	22.5	10.6	9.56		25.9	27.6
Oil & Grease (mg/l)	<10.0	ND[13]	3	ND[13]	ND[13]		3	5
Manganese (mg/l)		0.073	0.083	ND[4]	ND[4]		ND[4]	0.065
Total Iron (mg/l)	<2	0.912	1.56	0.204	0.497		0.152	ND[10]
Total Phosphorus (mg/L)		1.6	0.67	1.32	0.14		1.18	1.62
Total coliform (MPN/100ml)	<400	160,000	160,000	160,000	160,000		160,000	160,000
Faecal Coliform (MPN/100ml)		35,000	54,000	160,000	1,100		160,000	160,000
Discharge Volume (m3/day)		***0***	***0***	***0***	***0***		***0***	0

Table A- 2: Results of the Construction Area Discharge in December 2016

	Site Name	Aggregate Crushing Plant	Spoil Disposal #2	RCC Plant	Main Dam
	Station Code	DS02	DS04	DS09	DS11
	Date	08/12/16	08/12/16	08/12/16	08/12/16
Parameter (Unit)	**Guideline**				
pH	6.0 - 9.0	6.2	5.49	6.15	4.31
Sat. DO (%)		72.4	56.4	63.5	60.6
DO (mg/l)		6.28	4.44	5.12	5.11
Conductivity (µs/cm)		102	109	92	584
TDS (mg/l)		51	55	46	290
Temperature (°C)		21.42	25.3	23.78	23.12
Turbidity (NTU)		24,680	11.16	66,000	9.79
TSS (mg/l)	<50	23,000	N/A	60,000	N/A
Oil & Grease (mg/l)	<10	N/A	N/A	N/A	N/A
Discharge Volume (m^3/day)		***86.4***	***172.8***	***259.2***	***6,000***

ANNEX B: AMBIENT DUST QUALITY

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

Ban Hat Gnuin - 24 Hours Average Particulate Matter (PM10) Concentration			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	04/12/2016 10:28	05/12/2016 10:28	06/12/2016 10:28
End Time	05/12/2016 10:28	06/12/2016 10:28	07/12/2016 10:28
Average Data Record in 24h (mg/m3)	0.03	0.05	0.08
Guideline Average in 24h (mg/m3)	***0.12***	***0.12***	***0.12***

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

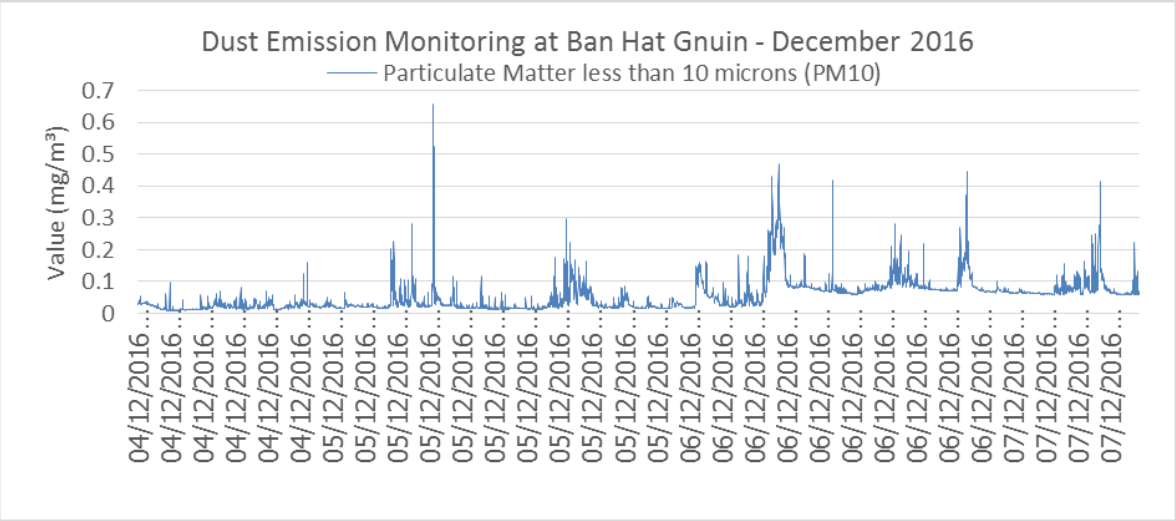


Figure B- 2: Dust Monitoring Results at the Aggregate Crushing Plant in December 2016

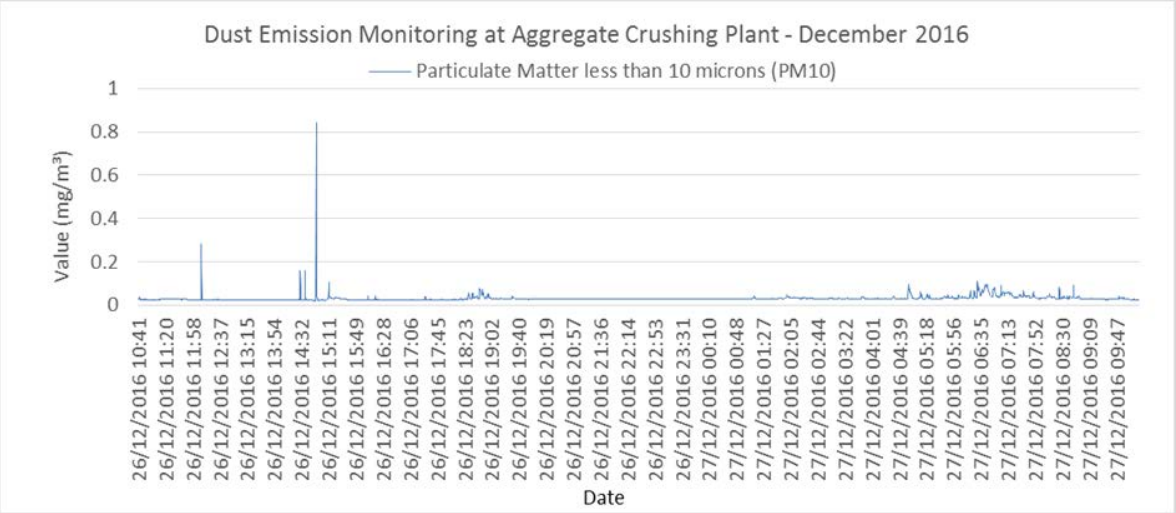


Figure B- 3: Dust Monitoring Results at the RCC Plant in December 2016

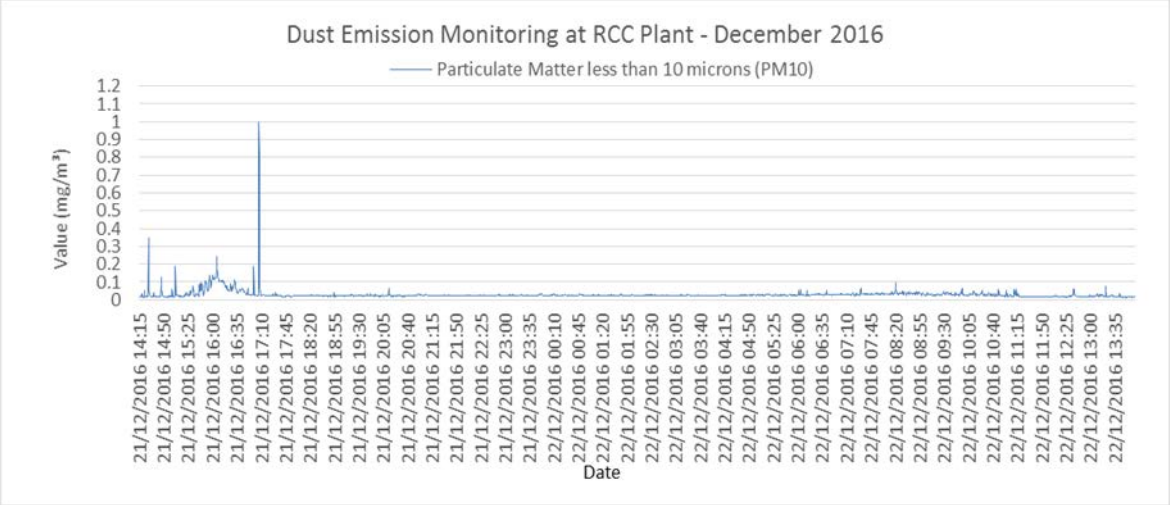


Figure B- 4: Dust Monitoring Results at the Sino Hydro Camp in December 2016

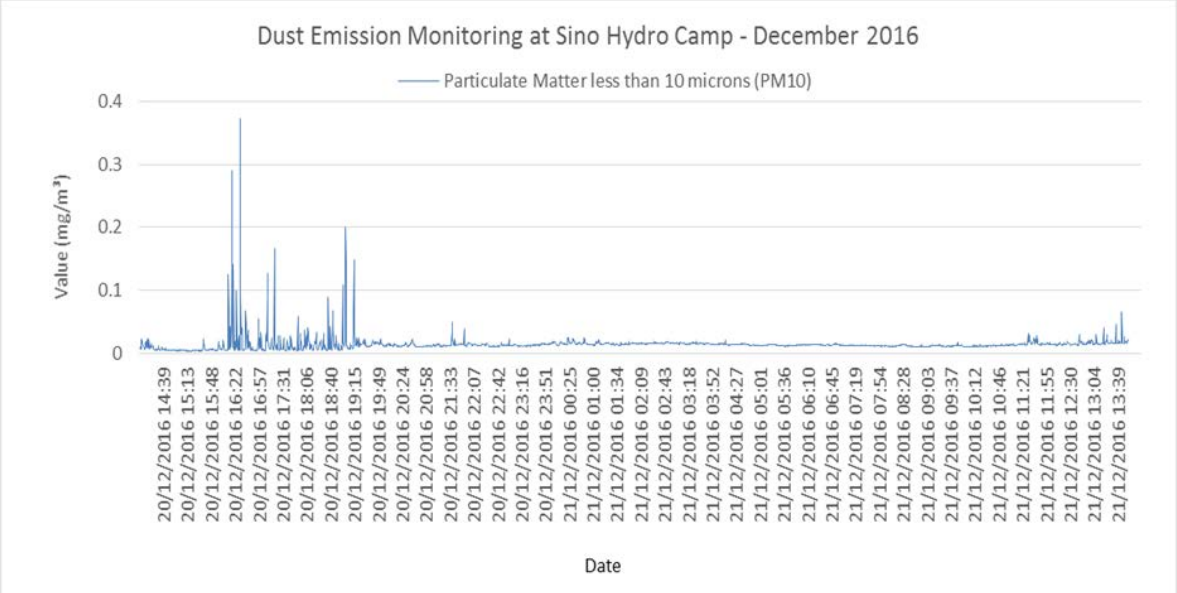


Figure B- 5: Dust Monitoring Results at the Sino Hydro Temporary Camp in December 2016

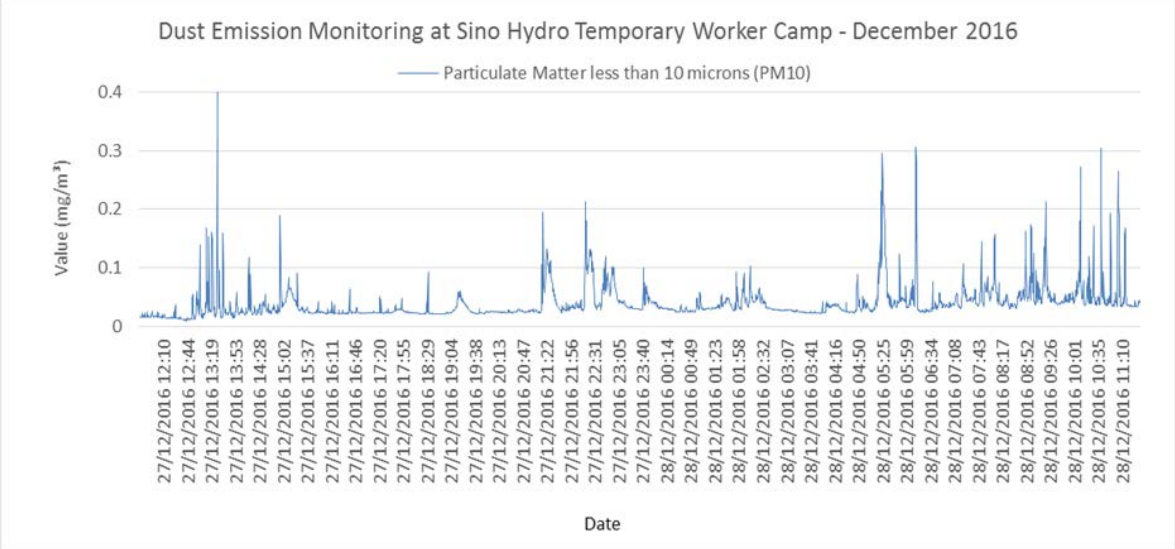


Figure B- 6: Dust Monitoring Results at the SongDa5 No.2 Camp in December 2016

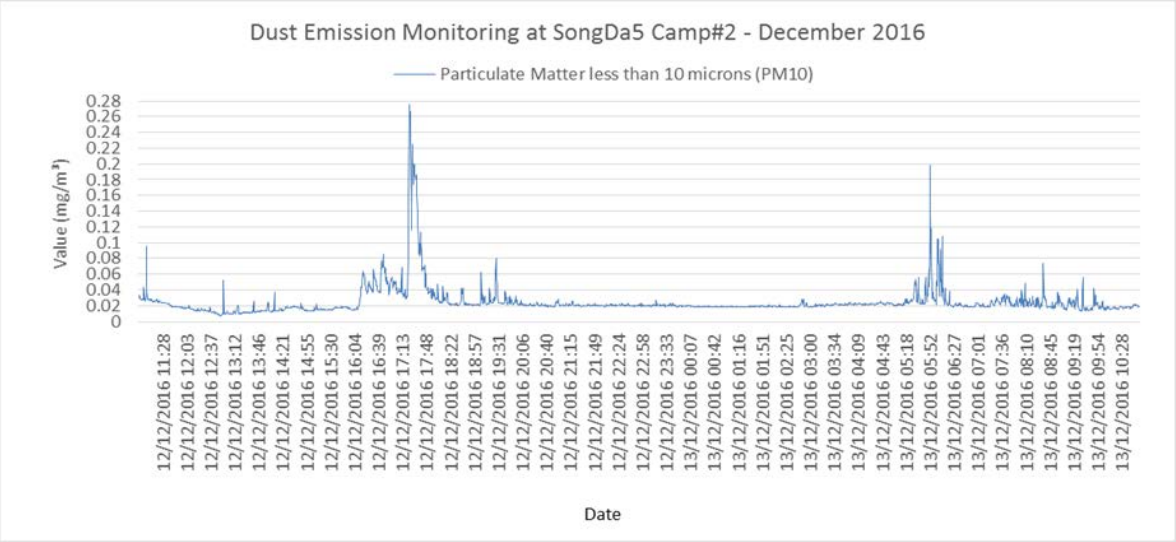
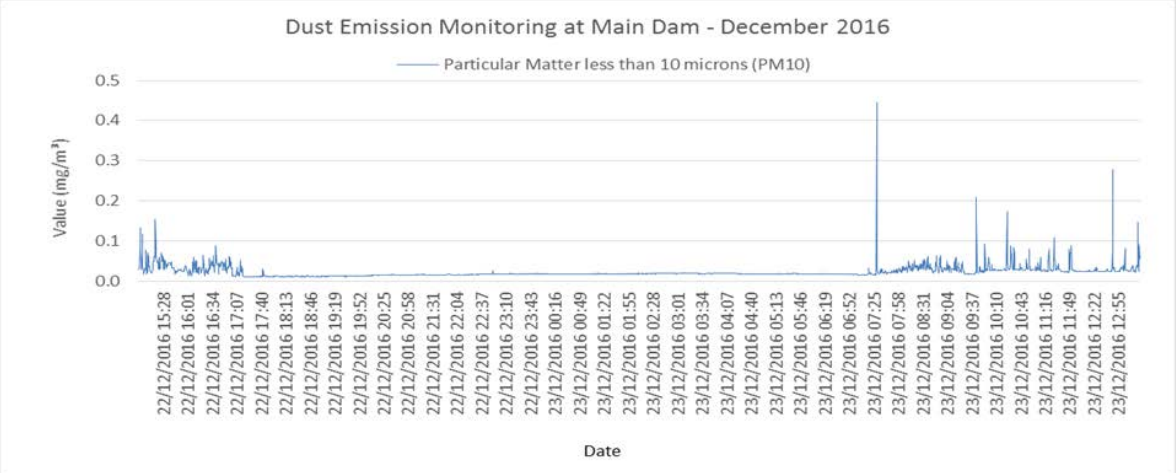


Figure B- 7: Dust Monitoring Results at the Main Dam in December 2016



ANNEX C: AMBIENT NOISE DATA

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

Noise Level (dB)	04-05/12/2016			05-06/12/2016			06-07/12/2016			07/12/2016
	10:58-18:00	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 - 10:58
Maximum Value Recorded	76.20	63.00	61.90	73.00	64.40	60.60	77.20	60.00	60.10	75.50
Guideline Max	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***
Average Data Recorded	51.60	46.37	41.79	49.21	42.90	37.87	47.95	42.07	40.17	50.44
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 December 2016

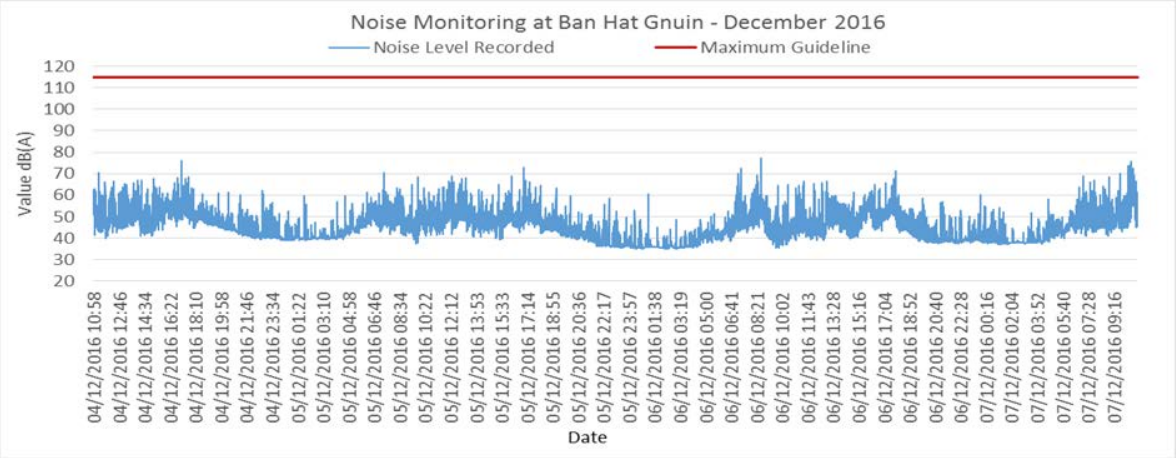


Table C- 2 and Table C-3: Average Results of Noise Monitoring at Aggregate Crushing Plant and RCC Plant in December 2016

Aggregate Crushing Plant

Noise Level (dB)	26-27/12/2016		27/12/2016
	11:09 – 22:00	22:01 – 06:00	06:01-11:09
Maximum Value Recorded	71.7	67.8	73.6
Guideline Max	***115***	***115***	***115***
Average Data Recorded	44.14	43.34	47.13
Guideline Averaged	***70***	***50***	***70***

RCC Plant

Noise Level (dB)	21-22/12/2016		22/12/2016
	14:59 – 22:00	22:01 – 06:00	06:01-14:59
Maximum Value Recorded	70.9	71.5	73.9
Guideline Max	***115***	***115***	***115***
Average Data Recorded	61.40	60.41	56.83
Guideline Averaged	***70***	***50***	***70***

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

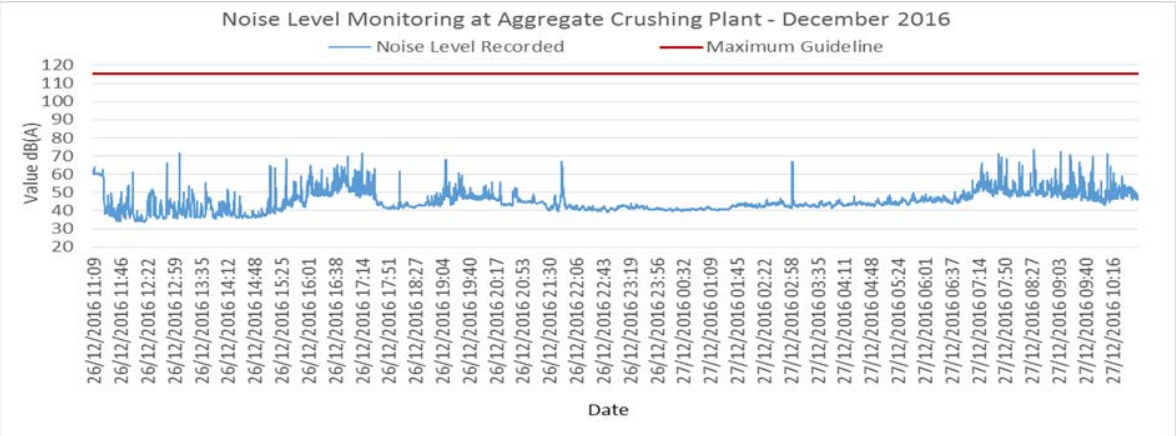


Figure C- 3: Results of Noise Level Monitoring at the RCC Plant in December 2016

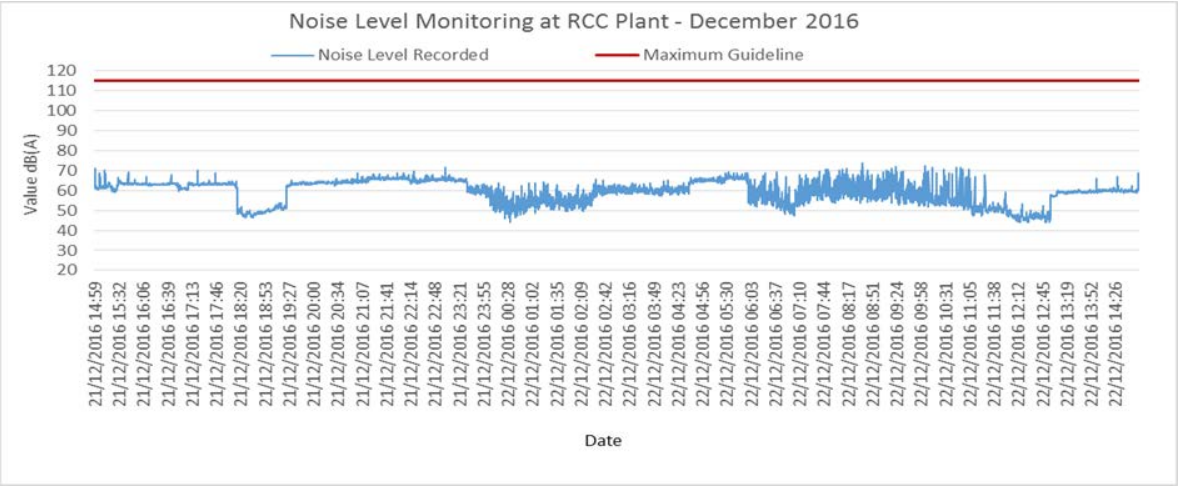


Table C- 5 and Table C- 6: ***Average Results of Noise Monitoring at Songda Camp#2 and Sino Hydro Camp in December 2016***

Song Da5 Camp No.2

Noise Level (dB)	12-13/12/2016		13/12/2016
	11:28 – 22:00	22:01 – 06:00	06:01-11:28
Maximum Value Recorded	78.8	61	67.8
Guideline Max	***115***	***115***	***115***
Average Data Recorded	50.86	53.20	51.15
Guideline Averaged	***70***	***50***	***70***

Sino Hydro Camp

Noise Level (dB)	20-21/12/2016		22/12/2016
	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	54.32	57.80	53.69
Guideline Averaged	***70***	***50***	***70***

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

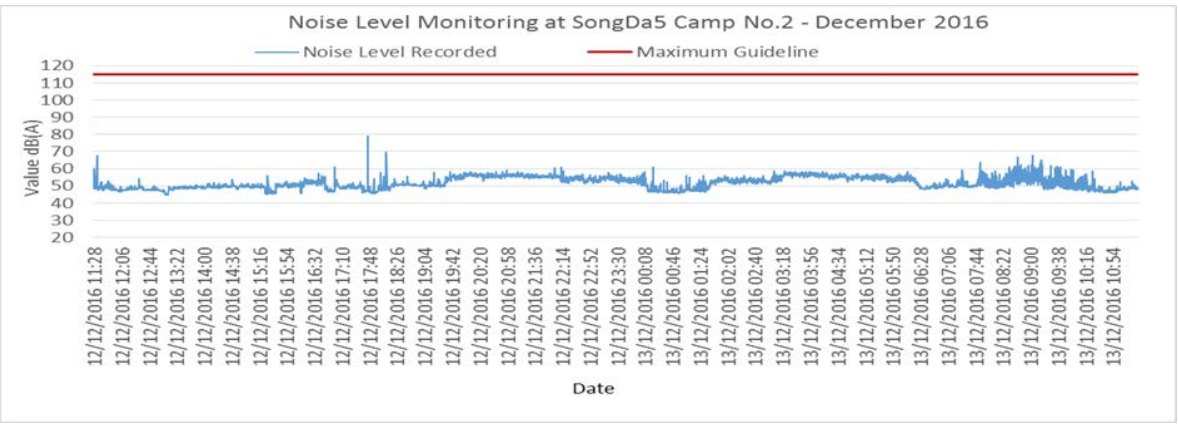


Figure C- 5: Results of Noise Level Monitoring at Sino Hydro Camp in December 2016

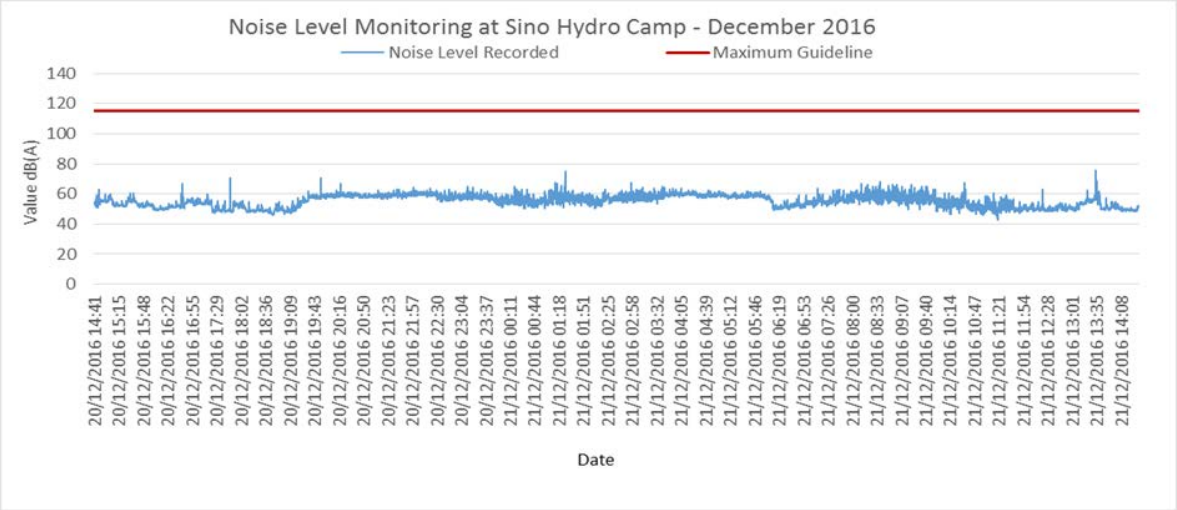


Table C- 7 and Table C- ***8: Average Results of Noise Monitoring at the Owner's Site Office and Village and, the Main Dam in December 2016***

Owner's Site Office and Village

Noise Level (dB)	09-10/12/2016		10/12/2016
	13:50 – 22:00	22:01 – 06:00	06:01-13:50
Maximum Value Recorded	55.6	43.9	56.6
Guideline Max	***115***	***115***	***115***
Average Data Recorded	36.10	37.37	35.16
Guideline Averaged	***70***	***50***	***70***

Main Dam

Noise Level (dB)	22-23/12/2016		23/12/2016
	15:38 – 22:00	22:01 – 06:00	06:01-15:38
Data Record Max	64.8	68.4	66
Guideline Max	***115***	***115***	***115***
Data Record Average	56.60	55.06	59.95
Guideline Averaged	***70***	***50***	***70***

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

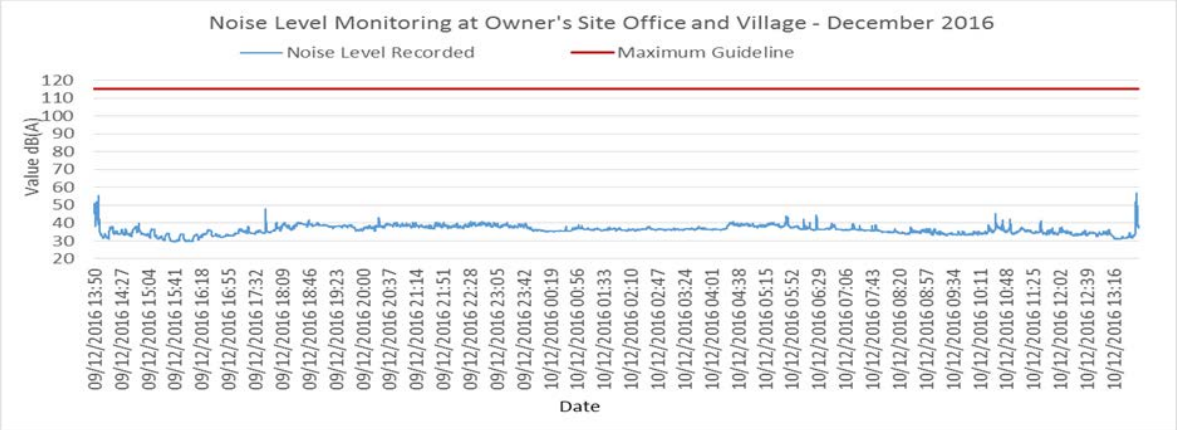


Figure C- 7: Results of Noise Level Monitoring at Main Dam in December 2016

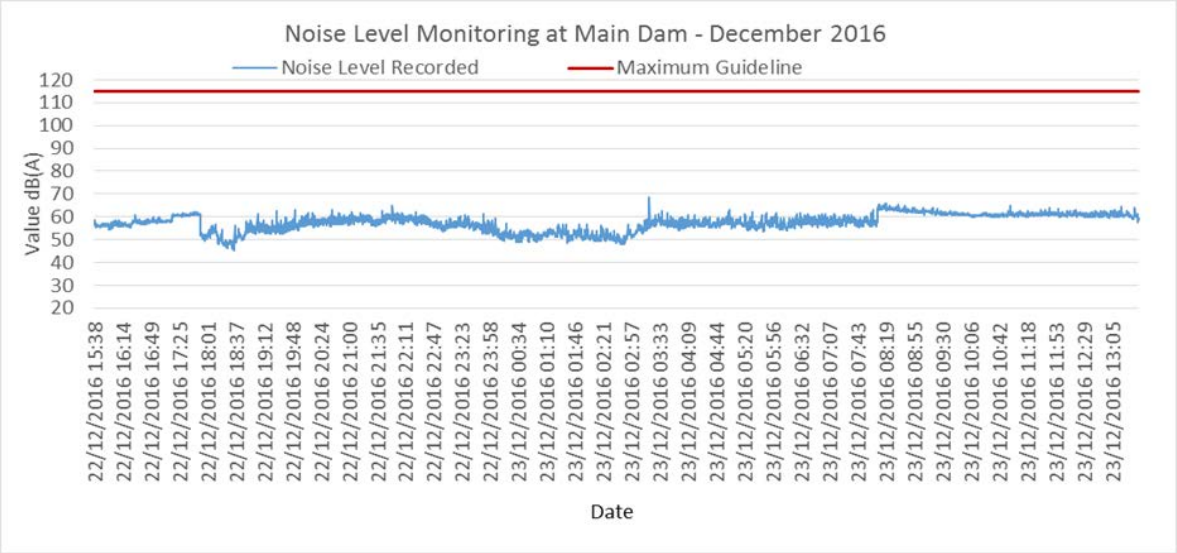


Table C- 9: Average Results of Noise Monitoring at the Sino Hydro Temporary Worker Camp in December 2016

Sino Hydro Temporary Worker Camp

Noise Level (dB)	27-28/12/2016		28/12/2016
	12:16 – 22:00	22:01 – 06:00	06:01-12:16
Maximum Value Recorded	82.5	66.9	73
Guideline Max	***115***	***115***	***115***
Average Data Recorded	50.61	59.66	55.75
Guideline Averaged	***70***	***50***	***70***

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