NAM NGIEP 1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Environmental Management Monthly Monitoring Report

March 2018

A	23 April 2018	Viengkeo Phetnavongxay	Peter G Jensen	Vilayhak Somsoulivong	
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BBREVIATIONS / ACRONYMS

AIP	Annual Implementation Plan
ADB	Asian Development Bank
BBS	Biodiversity Baseline Survey
BAC	Biodiversity Advisory Committee
BOF	Biodiversity Offset Framework
BOMC	Biodiversity Offset Management Committee
BOMP	Biodiversity Offset Management Plan
CA	Concession Agreement between the NNP1PC and GOL,
CAP	Corrective Action Plan
COD	Commercial Operation Date
CVC	Conventional Vibrated Concrete
CWC	Civil Works Contract
CTA	Common Terms Agreement
DEB	Department of Energy Business, MEM
DEPP	Department of Energy Policy and Planning, MEM
DEQP	Department of Environment and Quality Promotion, MONRE
DESIA	Department of Environmental and Social Impact Assessment, MONRE
DFRM	Department of Forest Resources Management, MONRE
DLA	Department of Land Administration, MONRE
DSRP	Dam Safety Review Panel
EC	Electrolytic Conductivity
ECOCD	EGAT Construction Obligation Commencement Date
EDL	Electricite du Laos
EDL PPA	Power Purchase Agreement between NNP1PC and EDL
EGAT	Electricity Generating Authority of Thailand
EGATi	EGAT International Company Limited
EIA	Environmental Impact Assessment
EMMR	Environmental Management and Monitoring Reports
EMO	Environmental Management Office of ESD within NNP1PC
EMU	Environmental Monitoring Unit
EMWC	Electrical-Mechanical Works Contract
EPF	Environmental Protection Fund
ERIC	Environmental Research Institute Chulalongkhorn University

ERM	Environmental Resource Management
ESD	Environmental and Social Division of NNP1PC
ESMMP	Environmental and Social Monitoring and Management Plan
FY	Fiscal Year
GOL	Government of Lao PDR
GIS	Geographic Information Systems
HH	Household
HMWC	Hydraulic Metal Works Contract
HR	Human Resources
IEE	Initial Environmental Examination
IMA	Independent Monitoring Agency
INRMP	Integrated Natural Resources Management Plan
ISP	Intergraded Spatial Planning
km	kilometre
kV	kilo-Volt
LEPTS	Lao Electric Power Technical Standard
LHSE	Lao Holding State Enterprise
LTA	Lender's Technical Advisor
M	million
m	metre
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mines, Lao PDR
MOF	Ministry of Finance, Lao PDR
MOM	Minutes of Meeting
MONRE	Ministry of Natural Resource and Environment, Lao PDR
MOU	Memorandum of Understanding
NBCA	National Biodiversity Conservation Area
NCI	Non-Compliance Issue
NCR	Non-Compliance Report
NN2	Nam Ngum 2 Power Company Limited
NNP1PC	Nam Ngiep 1 Power Company Limited
NPF	National Protection Forest
NTFP	Non-Timber Forest Products
NT2	Nam Theun 2 Hydropower Project
OC	Obayashi Corporation
ONC	Observation of Non-Compliance
PAFO	Provincial Department of Agriculture and Forestry

PAP	Project Affected People
PD	Property Damage
PONRE	Provincial Department of Natural Resource and Environment, MONRE
PvPA	Provincial Protection Area
RCC	Roller Compacted Concrete
SIR	Site Inspection Report
SLBMP	Salvage Logging Biomass Management Plan
SOP	Standard Operating Procedure
SMO	Social Management Office of ESD within NNP1PC
SS-ESMMP	Site Specific Environmental and Social Monitoring and Management Plan
TD	Technical Division of NNP1PC
TOR	Terms of Reference
TSS	Total Suspended Solids
UAE	United Analysis and Engineering Consultant Company Ltd.
UXO	Unexploded Ordinance
WMF	Watershed Management Fund
WMP	Watershed Management Plan
WRPC	Watershed and Reservoir Protection Committee
WRPO	Watershed and Reservoir Protection Office
WWTS	Waste Water Treatment System

EXECUTIVE SUMMARY

During March 2018, seven Site Specific Environmental and Social Management and Monitoring Plans (SS-ESMMP) and one camp decommissioning plan were active for EMO review. Out of these, four SS-ESMMPs and one drawing were cleared, one SS-ESMMP and the camp decommissioning plan are under review, and two SS-ESMMPs are on hold for the review and will be carried over to April 2018.

On 29 March 2018, the Environmental Management Unit (EMU) of Bolikhamxay Province carried out a site visit to NNP1. The EMU will issue a mission report for their comments by early April 2018.

The camps' effluents were monitored fortnightly, the results for March 2018 indicate that all key parameters (BOD, total coliform and faecal coliform) are in compliance with the relevant effluent standards, except at IHI Main Camp for 19 March 2018. The discharge from the sediment pond at the Aggregate Crushing Plant and RCC Plant was in compliance with the relevant standards.

Surface water samples were collected and analysed during the reported month at 10 stations in Nam Ngiep and four stations in the main tributaries including the lower Nam Chian, Nam Phouane, Nam Xao and Houay Soup. The results for March 2018 are within the normal ranges compared with previous data except for a case of high turbidity in Nam Siem – a right-bank tributary to Nam Ngiep upstream the reservoir. EMO undertook a special investigation of this case and measured turbidity of 23,580 NTU in Nam Siem 300 m downstream of Nam Ao Hydro Power Project.

In March 2018, a total of 163.3 m3 solid waste was disposed at the NNP1 Project Landfill, an increase of 6.4m3 compared to February 2018. Spot checks of the waste bags were conducted on a daily basis before disposal. The contractors sold a total of 400.5kg of recyclable waste to Khounmixay Processing Factory.

The PKC Contractor started the operation of Houay Soup Landfill on 01 December 2017 and, in March 2018, a total of 45 m3 solid waste from Phouhomxay, Thahuea and Hat Gniun Villages was received at the Houay Soup Landfill for disposal.

The Nam Ngiep 1 Watershed and Reservoir Protection Committee (WRPC) and its secretariat (WRPO) are expected to be reconstituted and therefore, the meeting for NNP1 Watershed Management Plan (WMP) approval was postponed. The revised Provincial Regulation was further reviewed by relevant GOL offices in March 2018 and the final presentation by technical committee is expected in the first week of April 2018 prior to submission to Justice Department for further review and approval of the Provincial Assembly.

The preparation of NNP1 Biodiversity Offset Management Plan (BOMP) has continued with several studies or surveys being undertaken since January 2018. The Total Protection Zone (TPZ) Survey, Aquatic Biodiversity Survey, and Forest Classification and Habitat Mapping in NCNX offset site were completed in March 2018. A herpetology survey in the NNP1 Watershed will be started in April 2018.

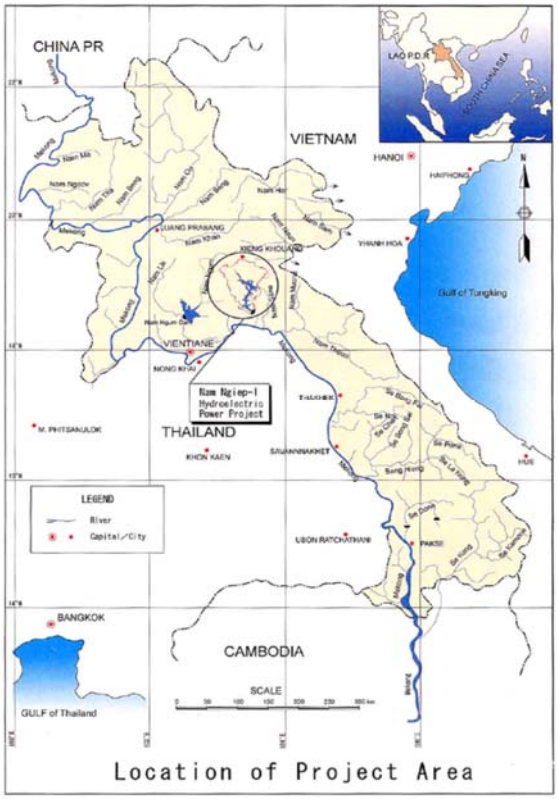
The biomass clearance continues to progress, as of 31 March 2018, a total of 1,547.31 ha out of 1,640 ha is accepted as fully cleared and another 93.44 ha remain to be fully completed.

The fishery monitoring programme has continued according to the plan. The data from the daily fish catch logbook monitoring indicates that the mean daily fish catch in Nam Ngiep River was 1.6 kg/household/day in February 2018. The estimated total fish catch in Nam Ngiep basin for February 2018 is 24,600 kg. Around 42% of the catch was sold, 52% was consumed fresh, 4% processed and approximately 2% was used for other purposes.

1. INTRODUCTION

The Nam Ngiep originates in the mountains of Xieng Khouang Province, flowing through Khoun District into Thathom District of Xaysomboun Province, through Hom District and into Bolikhan District of Bolikhamxay Province. The Nam Ngiep meets the Mekong River just upstream from Pakxan in Bolikhamxay Province (Fig. 1-1).

Figure 1-1: **Location Map**



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

This Environmental Monthly Monitoring Report (EMMR) provides a summary of environmental monitoring activities and mitigation actions in January 2017. The EMMR was prepared by the Project's Environmental Management Office (EMO). It has been internally reviewed and cleared by EMO senior technical staff and management prior to submitting the report to the Government of Lao PDR (GoL) related agencies.

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

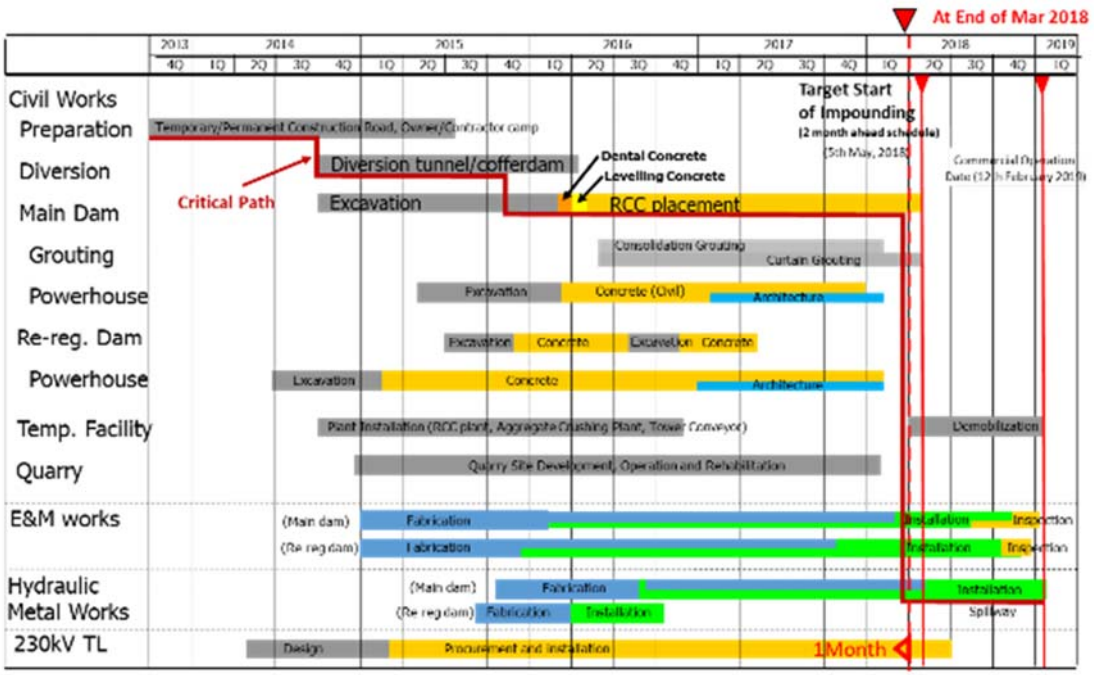
2. WORK PROGRESS OF PRINCIPAL CONTRACTORS

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

cumulative work progress until the end of March 2018 was 93.5 %[1] (compared to planned progress of 94.7 %), 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 understated since work completed, but not paid, is not included.

The overall construction schedule and progress curve (by achieved Milestone Payments) are shown in *Error! Reference source not found.*.

Figure 2-1: Overall Construction Schedule



2.1 Civil Work

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

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

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

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 March 2018 was 94.5 % (compared to planned progress of 96.3 %) calculated in the same manner as described above for the value of achieved Interim Milestone Payments excluding advance payment.

2.1.1 Main dam and power house

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

Figure 2-2: Main Dam and Powerhouse from Overhead Looking Upstream

The consolidation drilling and grouting for the main dam started in May 2016 and is ongoing. The progress is 99 % by achievement of total anticipated drilled length as of the end of March 2018 as a proportion of the total expected drilling

Table 2-1: Progress of consolidation and curtain drilling for grouting at the end of March 2018

Item	Description	Total Drilling (m)	Completed (m)	Progress (%)
Consolidation Grouting	Anticipated Quantity	17,769	17,723	99
Curtain Grouting	Original Design Quantity	27,945	46,168	165
	Anticipated Final Quantity	58,400	46,168	79

*The linear metres 'completed' are drilled and grouted.

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 and the penstock concrete encasement. Major concrete of the main powerhouse was substantially completed in December 2017 and Progress of the powerhouse concreting

works is shown in **Error! Reference source not found.** below. Dam Control Centre works is ongoing in March 2018

Table 2-2: Progress of Main Powerhouse Sub-Structure Concrete Works to as of the end of March 2018.

Location	Total Anticipated Volume (m^3)	Completed (m^3)	Progress (%)
Main Powerhouse	34,800	34,500	99
Penstock Embedment	11,885	10,387	87
Spillway	35,500	19,650	55

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 ***Figure 2-3*** below

Figure 2-3: Progress of Re-regulation Dam Powerhouse Works to 31 March 2018

Powerhouse Building Works	Punch List	Door Fitting	Water Supply	Electrical Conduits and Wiring
	Item	(Unit)	(%)	(m)
Designed	100	18	100	2,510
Completed	98	18	99	2,500
Progress	98 %	100 %	99 %	99 %

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 at the end of March 2018 was 96.5 % (compared to planned progress of 96.5 %).

Figure 2-4: Preparation for installation of stay ring of Stay Cone at the re-regulation powerhouse

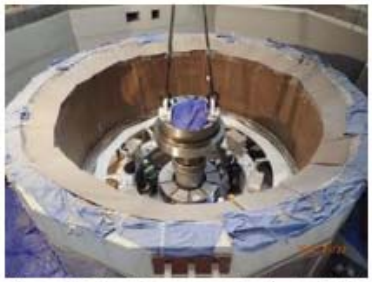


Figure 4.2-1: Placement of main shaft for Unit 1

Figure 4.2-2: High potential test for Unit1

Figure 4.2-3: Current progress of rotor for Unit 1

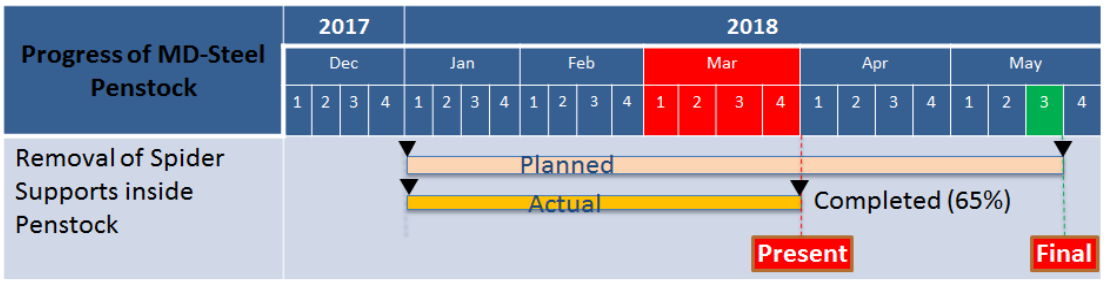
Figure 4.2-4: Placement of stator for Unit 2

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 actual cumulative work progress of the Hydro-Mechanical Works until the end of March 2018 was 66.9 % (compared to planned progress of 67.0 %).

The latest progress of penstock pipe fabrication at IHI field shop and erection at main dam as of the end of November 2017 ***in Figure 2-5*** below:

Figure 2-5: Progress of the penstock pipe fabrication at the IHI field shop as at the end of March 2018



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 March 2018 was 98.8 % (compared to planned progress of 99.0 %).

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 May, 2016 (See ***Figure 2-6*** below)

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

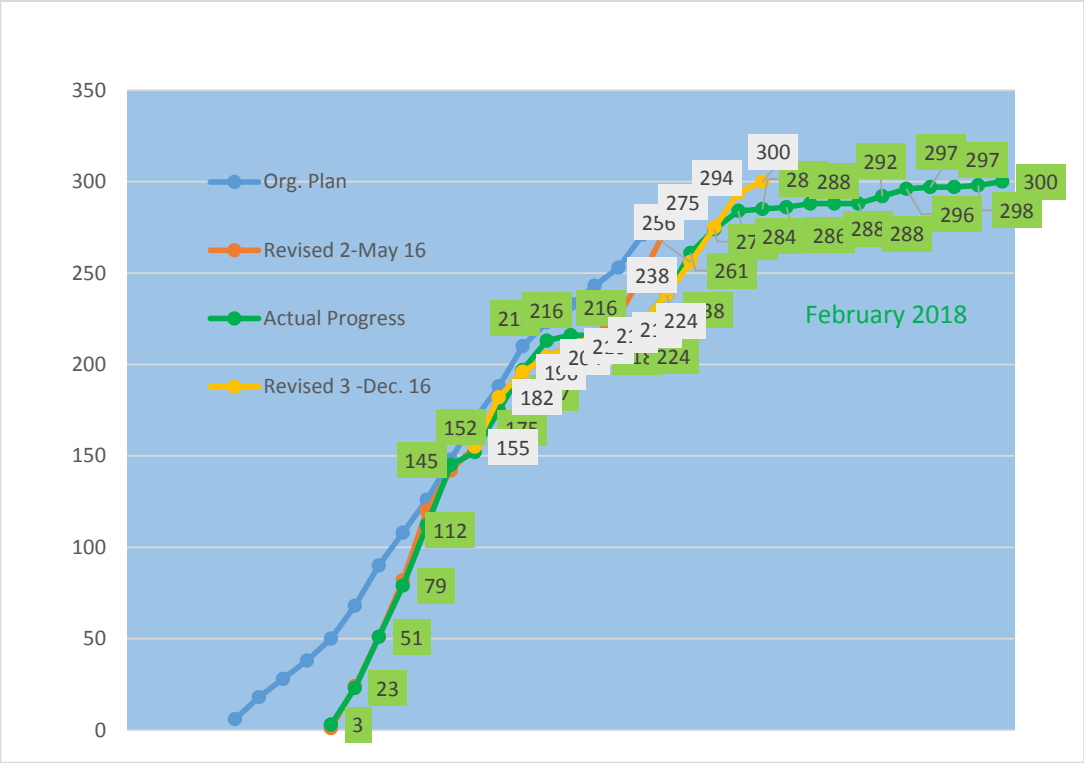


Figure 2-7: Revised Cumulative Work Progress of Tower Erection (Planned and Actual)

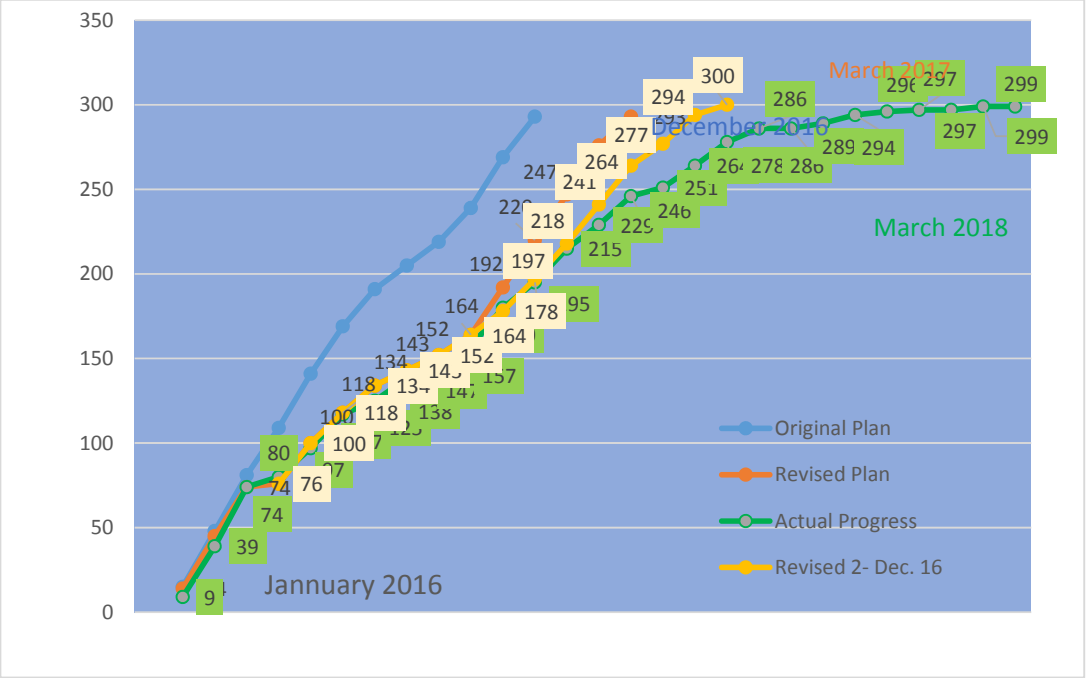
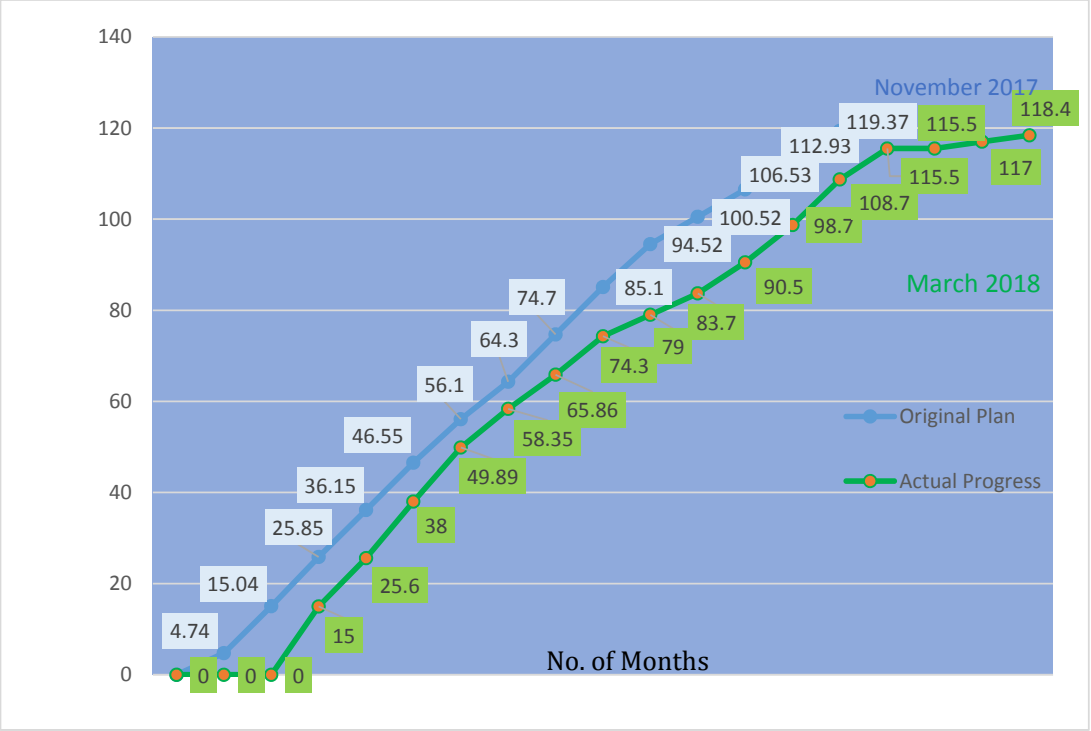


Figure 2-8: Cumulative Progress of Stringing Works (Planned & Actual)



3. ENVIRONMENTAL MANAGEMENT MONITORING

3.1 Compliance Management

3.1.1 Site Specific Environmental and Social Management and Monitoring Plans

During March 2018, EMO received seven Site Specific Environmental and Social Management and Monitoring Plans (SS-ESMMP) and one camp decommissioning plan from

the contractors for review. Out of these, four SS-ESMMPs and one drawing were cleared, one SS-ESMMP and the camp decommissioning plan are under review and two SS-ESMMPs are on hold for additional information.

Table 3-1: SS-ESMMP review status in March 2018

Title	Date Received	Status
SS-ESMMP for 115kV transmission line	23 March 2018 (2nd submission)	Cleared with no further comments on 26 March 2018.
SS-ESMMP for Re-regulation Powerhouse Building	09 February 2018 (4th submission)	Cleared with no further comments on 13 March 2018.
SS-ESMMP for the Main Dam Monitoring System	02 February 2018 (3rd submission)	Cleared with no further comments on 13 March 2018.
SS-ESMMP for Construction of the Main Dam	02 February 2018 (Reply to the Owner's comments)	Cleared with no further comments on 14 March 2018.
Drawing of Temporary / mobile toilets at Main Dam	28 March 2018 (1st submission)	Cleared with no further comments on 29 March 2018.
SS-ESMMP for Construction of Quarry Site	17 March 2018 (Version A6)	Under review (Preliminary document review revealed that the revised document did not properly address EMO's previous comments).
TCM Camp Decommissioning Plan	22 March 2018 (1st submission)	Under review.
SS-ESMMP for Closing of the Dyke at Borrow Pit No.7	03 February 2018 (Reply to Owner's comment)	This document relates to site closure; therefore, it is on hold for further discussion on the scope of re-vegetation and rehabilitation.
SS-ESMMP–RRPS for Closing of Borrow Pit at the Corner of Road P1 & P1A	03 February 2018 (Reply to Owner's comment)	This document relates to site closure; therefore, it is on hold for further discussion on the scope of re-vegetation and rehabilitation.

3.1.2 Compliance Report

The Observation of Non-Compliance (ONC) and Non-Compliance Report (NCR) are summarized in ***Table 3-2***, ***Table 3-3*** and ***Figure 3-1*** below.

Table 3-2: Summary of ONC and NCR

Items	ONC	NCR-1	NCR-2	NCR-3
Carried over from February 2018	09	1	0	0
Newly Opened in March 2018	04	1	0	0
Total in February 2018	**13**	**2**	**0**	**0**

Resolved in March 2018	05	1	0	0
Carried over into April 2018	08	1	0	0
Unsolved Exceeding Deadlines	**06**	**1**	**0**	**0**

Figure 3-1: Summary of ONC and NCR

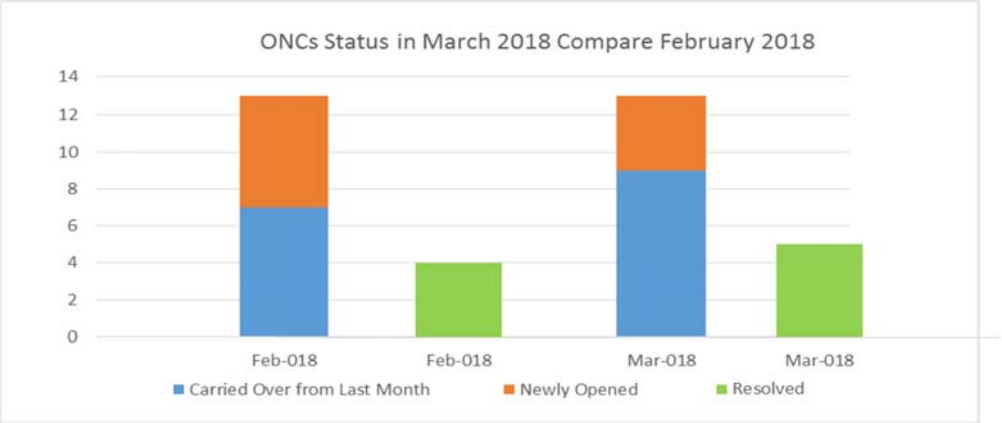


Table 3-3: Carried-Over ONC and NCR from March 2018 into April 2018

Site ID	Issues	Reporting	Actions
Re-regulation Dam (Borrow Pit Area at Corner of P1 & P1A Road)	The borrow pit slopes had no berm and cut-off drains. Lack of closure plan for the borrow pit. First inspection: 30 August 2016 Latest inspection: 15 February 2018	ONC (Closure Pending)	A Response to Owner's comment was submitted on 03 March 2018. However, actual work did not properly reflect on the Owner's comments.
Temporary Accommodation for 44 HH from Zone 2LR at Phouhomxay Village	Incomplete decommissioning of the temporary accommodation at HSRA. (ON_INFRA-0001). First inspection: 07 September 2017 Latest inspection: 20 March 2018	ONC (Closure Pending)	Decommissioning and clean-up work is ongoing and expected to be completed by early April 2018.
Main Quarry Site	Waste rock had been pushed down the slope towards Nam Ngiep. The operation has damaged riparian vegetation. (ONC_OC-0273) First inspection: 13 February 2018	ONC (Closure Pending)	- Clean up and remove discarded rocks to designated spoil disposal No. 6; - Carry out mitigation measures for erosion and sediment control at the main quarry site area to restore and prevent further

Site ID	Issues	Reporting	Actions
	Latest inspection: 27 March 2018		damage to riparian vegetation; - The revised DWP and SS-ESMMP submitted on 17 March 2018 did not properly address EMO's previous comments).
KCP Camp	No waste bins were provided at the camp site for daily waste collection resulting in scattering of garbage, burning of plastic waste was also observed. (ONC_KCP-0004) First inspection: 20 February 2018 Latest inspection: 19 March 2018	ONC (Closure pending)	The contractor was reminded a 3rd time to take corrective action before the next joint inspection on 03 April 2018. Otherwise NCR will be issued immediately. - Provide sufficient waste bins on site for daily waste collection; - Regularly remove / transport general waste to Houay Soup Landfill, and construction waste to spoil disposal No: 6 - Stop burning of plastic and non-segregated waste.
Main Dam and Powerhouse	Improper operation and maintenance of electricity generators and air compressors at the main dam left and right banks causing oil spillage and soil contamination (NCR_OC-0022) First inspection: 06 March 2018 Latest inspection: 27 March 2018	NCR Level 1 (New)	- Repair / fix the sources of oil spillage; - Refuelling of the electricity generator and air compressor shall be undertaken with appropriate protection measures to prevent oil spillage; - Provide spill clean-up materials such as absorbent pads and dry sand on site if spills or leaks occur, undertake immediate the clean-up; - Clean-up of any disposed oil contaminated soil for proper elimination by authorized vendor (Khounmixay Factory).

Site ID	Issues	Reporting	Actions
Top Abutments of Main Dam (Right and Left Banks)	No mobile toilet provided for an approximate of 50 workers of Songda5 and Kenber contractors (ONC_OC-0274) First inspection: 06 March 2018 Latest inspection: 27 March 2018	ONC (New)	- Civil Works Subcontractor Kenber agreed to arrange the mobile toilet for its workers within one week, by 20 March 2017; - Obayashi Cooperation was required to instruct Civil Works Subcontractor Song Da 5 to provide the mobile toilet for their workers by 10 April 2018.
Sino Hydro Workers' Camp	Poor hygiene in cooking and washing areas; a total of 50 workers are staying in the camp, but only two toilet rooms are usable, other seven toilet rooms were blocked due to poor or no maintenance. (ONC_OC-0275) First inspection: 06 March 2018 Latest inspection: 27 March 2018	ONC (New)	- Provide daily cleaning at cooking and washing areas to keep the location tidy in orderly; - Repair the clogged toilet rooms, wall and door for proper use. In addition, water sink, bowl and water tap need to be provided in each toilet room.
HM Hydro Labour Camp No. 1 (ZHEFU Camp)	Wastewater was discharged into the outside environment without proper treatment, a chlorination container was not properly maintained and currently is out of services. (ONC_HM-0014) First inspection: 27 March 2018 Latest inspection: Not available	ONC (New)	The following action was raised to the contractor to take corrective action by 05 April 2018: - It is noted that the Wastewater Treatment Plant is operated as a "Sequencing Batch Reactor process (SBR) in which the effluent does not continuously flow, this would not be suitable for a manual chlorine injection. Therefore, the contractor is required to prepare and submit a chlorination manual for Owner's review and approval; - Chlorine container has to be installed in a secure

Site ID	Issues	Reporting	Actions
			stand with proper roof to prevent sun light, heat and evaporation.
IHI's Labour Camp No.2 (276 Camp)	The WWTS design proposed in the DWP & SS-ESMMP Ref no.: 0-0065 submitted on 23 January 2018 has not been constructed. Instead, the chlorine contact tank and monitoring tank were set up and no chlorination was performed. (ONC_OC-0275) First inspection: 27 March 2018 Latest inspection: Not available	ONC (New)	The following action was raised to the contractor to take corrective action by 05 April 2018: - The contractor is required to clarify the reason why the actual construction of the Waste Water Treatment System is not consistent with the proposed design which was approved by NNP1PC; - EMO will conduct the effluent monitoring at this site around the beginning of April 2018. Renovation/improvement work will be required in case of noncompliance with effluent standards.

Figure 3-2: Site Inspection Locations

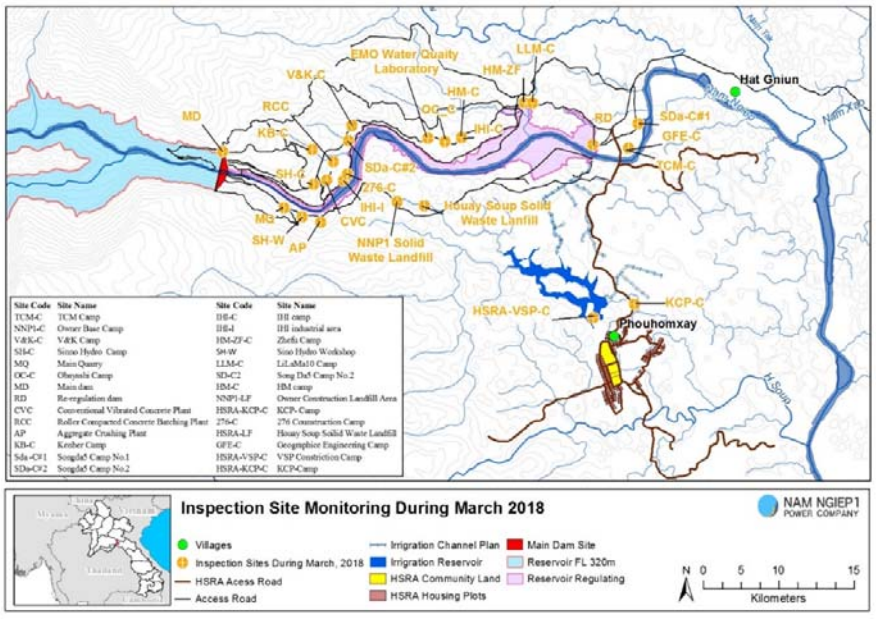
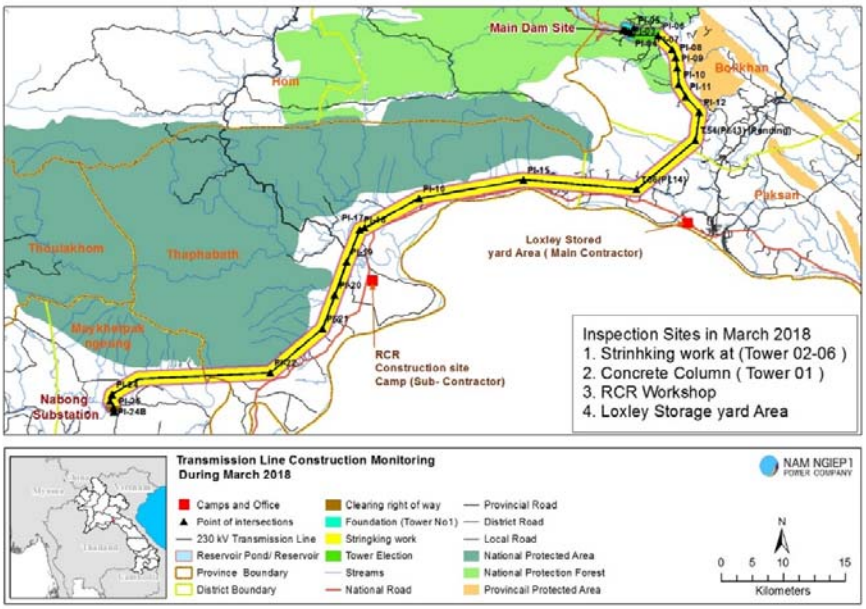


Figure 3-3: 230 kV Transmission Line Construction Monitoring



3.1.3 Inspection by Environment Management Unit

On 29 March 2018, the Environmental Management Unit (EMU) of Bolikhamxay Province carried out a Site visit to NNP1. The EMU will issue a mission report for the comment of EMO by early April 2018.

3.2 Environmental Quality Monitoring

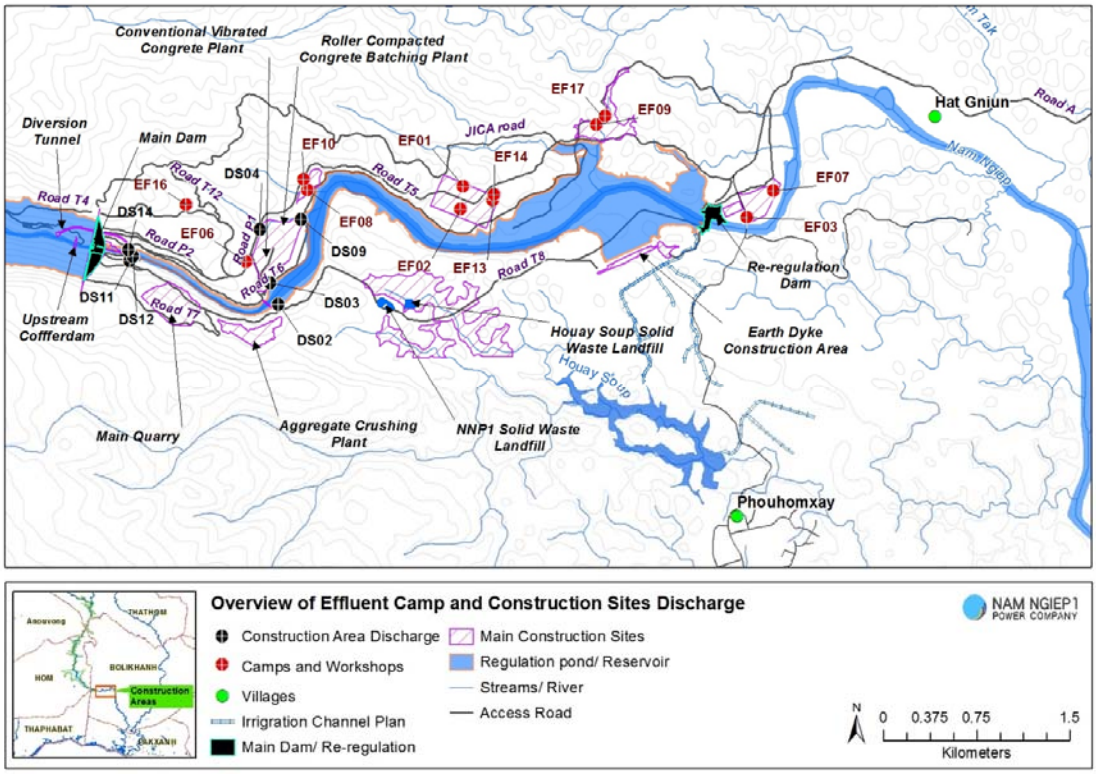
The analyses of Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD5), faecal coliform, E. Coli bacteria and total coliform have been carried out by NNP1PC Environmental Laboratory since August 2017.

All data are reported to the Ministry of Natural Resources and Environment (MONRE) and the Project Lenders on a monthly and quarterly basis and published on the Company website https://namngiep1.com/resources/monitoring-reports/.

3.2.1 Effluent Discharge from Camps and Construction Sites

During March 2018, all camp effluents were monitored. Results of effluent monitoring from the camps and construction sites are presented and the monitoring locations are displayed in *Error! Reference source not found.*.

Figure 3-4: Map of Effluent Discharge Monitoring Locations



Detailed monitoring results are provided in ***Annex 1*** of this Report. The camps' effluent monitoring results for March 2018 indicate that all key parameters (BOD, total coliform and faecal coliform) are in compliance with the relevant effluent standards, except at HMH Main Camp (for 19 March 2018).

The sediment control facilities at the Aggregate Crushing Plant and RCC Plant continue to be in compliance with the relevant effluent limit values.

Status of implementation of the corrective actions addressing non-compliances at the camps.

Table 3-4: Status of Corrective Actions at Camps and Construction Sites

Site	Sampling ID	Status	Corrective Actions
Owner's Site Office and Village (OSOV)	EF01	Non-compliance for total nitrogen and ammonia nitrogen for the second fortnightly mission.	No corrective action is required.
Obayashi Corporation Camp	EF02	Non-compliances for ammonia nitrogen (NH_3-N) and total nitrogen.	As above.
Sino Hydro Camp	EF06	Non-compliances for ammonia nitrogen (NH_3-N) and total nitrogen.	As above.
Song Da 5 Camp No. 1	EF07	Non-compliances for ammonia nitrogen (NH_3-N) and total nitrogen.	As above.

Site	Sampling ID	Status	Corrective Actions
Song Da 5 Camp No. 2	EF08	Non-compliance for COD, ammonia nitrogen and total nitrogen.	As above.
Zhefu Camp (Subcontractor of Hitachi-Mitsubishi Hydro)	EF09	No discharge during the missions.	
V&K Camp	EF10	Full compliance.	
H-MH Main Camp (WWTS)	EF13	Non-compliance for COD, NH_3-N and total nitrogen.	As above.
IHI Main Camp	EF14	Non-compliance for BOD_5, COD, total nitrogen and total coliform.	The effluent monitoring result is being shared with the contractor to improve the operation of the WWTS.
Kenber Camp	EF16	Full compliance.	
Main Dam Construction Area (Waste Water Treatment Plant No.1)	DS11	No discharge during the missions.	
Main Dam Construction Area (Waste Water Treatment Plant No.2)	DS12	Non-compliance for pH and TSS.	
Main Dam Construction Area (Waste Water Treatment Plant No.3)	DS14	Non-compliance for pH and TSS.	
Spoil Disposal Area No.2 (Song Da 5 Workshop)	DS04	Minor non-compliance for pH.	
CVC Plant	DS03	No discharge during the sampling.	
RCC Plant (discharge point at the weirs)	DS09	Full compliance.	
Aggregate Crushing Plant	DS02	Full compliance.	

3.2.2 Ambient Surface Water Quality Monitoring

The surface water quality monitoring programme comprises 14 monitoring stations. The March 2018 programme is summarized in ***Table 3-5*** and the location of the monitoring stations are shown in ***Table 3-5***: *Monitoring Frequency for Surface Water Quality Parameters*

Frequency of Monitoring	Parameters (Unit)	Monitoring Sites
Weekly	pH, DO (%), DO (mg/l), Conductivity (µs/cm), TDS (mg/l), Temperature (°C), Turbidity (NTU), TSS (mg/l), BOD5 (mg/l), Faecal coliform (MPN/100 ml) and Total coliform (MPN/100 ml)	- NNG09, Nam Ngiep Upstream Main Dam (NNG09); - R6, Re-regulation Reservoir; - R7, Re-regulation Reservoir 0.3 km Upstream the Re-Regulation Dam; - NNG05, Nam Ngiep Downstream the Re-regulation Dam at Ban Hat Gniun.
Fortnightly	pH, DO (%), DO (mg/l), Conductivity (µs/cm), TDS (mg/l), Temperature (°C), Turbidity (NTU)	All 14 stations.
Monthly	TSS (mg/l), BOD_5 (mg/l), COD (mg/l), NH_3-N (mg/l), NO_3-N (mg/l), total coliform (MPN/100 ml), faecal coliform (MPN/100 ml)	All 14 stations.
Quarterly	Total Iron (mg/l) and Manganese (mg/l)	All 14 stations.

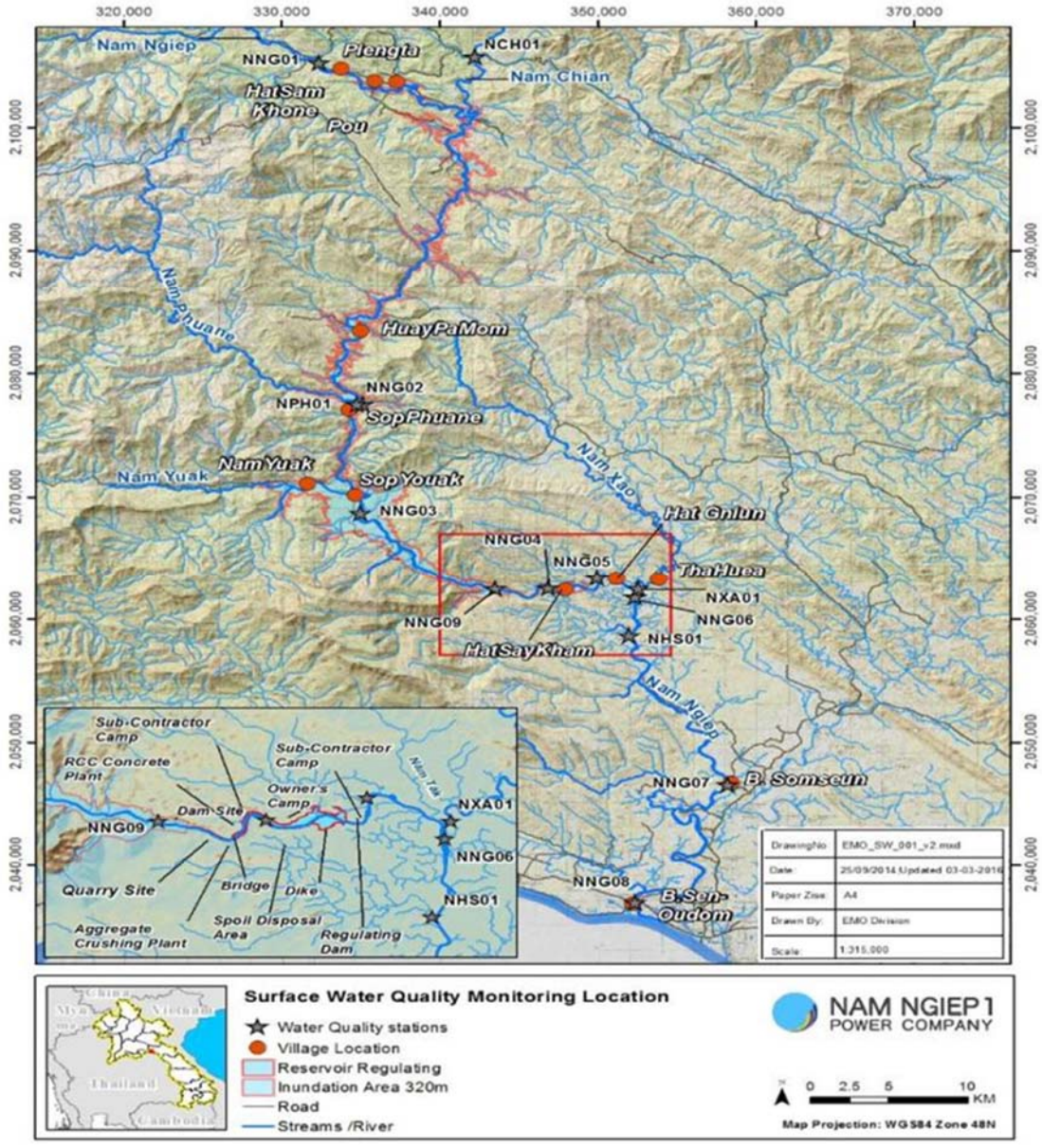
Figure 3-5 below.

In addition, EMO noticed that Nam Ngiep River at Thaviengxay Village became more turbid on 29 March 2018. Therefore, a turbid water investigation was carried out at upper Nam Ngiep and its upstream tributaries (Nam Chian and Nam Siem) on 30 March 2018, combined with monitoring at Nam Ngiep upstream the main dam (NNG09) and downstream the re-regulation dam (NNG05) on 30-31 March and 2 April 2018.

Table 3-5: Monitoring Frequency for Surface Water Quality Parameters

Frequency of Monitoring	Parameters (Unit)	Monitoring Sites
Weekly	pH, DO (%), DO (mg/l), Conductivity (µs/cm), TDS (mg/l), Temperature (°C), Turbidity (NTU), TSS (mg/l), BOD5 (mg/l), Faecal coliform (MPN/100 ml) and Total coliform (MPN/100 ml)	- NNG09, Nam Ngiep Upstream Main Dam (NNG09); - R6, Re-regulation Reservoir; - R7, Re-regulation Reservoir 0.3 km Upstream the Re-Regulation Dam; - NNG05, Nam Ngiep Downstream the Re-regulation Dam at Ban Hat Gniun.
Fortnightly	pH, DO (%), DO (mg/l), Conductivity (µs/cm), TDS (mg/l), Temperature (°C), Turbidity (NTU)	All 14 stations.
Monthly	TSS (mg/l), BOD_5 (mg/l), COD (mg/l), NH_3-N (mg/l), NO_3-N (mg/l), total coliform (MPN/100 ml), faecal coliform (MPN/100 ml)	All 14 stations.
Quarterly	Total Iron (mg/l) and Manganese (mg/l)	All 14 stations.

Figure 3-5: Surface Water and Re-Regulation Reservoir Water Quality Monitoring Stations



The surface water quality data for February 2018 are all within the normal ranges as compared with previous data and there are no unusual results. Key findings for surface water quality monitoring (including the re-regulation reservoir) in March 2018.

Table 3-6: Results of the Physical and Chemical Parameters of Nam Ngiep Surface Water Quality Monitoring

	Station Code	NNG01	NNG02	NNG03	NNG09	NNG04 / R6	R7	NNG05	NNG06	NNG07	NNG08
	Date	06 March 2018	07 March 2018	07March2018	08 March 2018	08 March2018	08 March 2018	08 March 2018	08 March 2018	08 March 2018	080 March 2018
Parameters (Unit)	**Guideline**										
pH	5.0 - 9.0	7.42	7.11	7.27	7.19	7.33	7.51	7.42	7.33	7.37	7.4
Sat. DO (%)		96.9	100.8	101.8	101.1	94.6	96.1	102.9	102.3	103.2	102.6
DO (mg/l)	>6.0	8.53	8.3	8.29	8.08	7.49	7.49	8.26	8.08	7.98	7.83
Conductivity (µs/cm)		78.2	82.5	77.2	79.3	92	101	77.8	78.6	82.6	79.3
TDS (mg/l)		39	41	38	39	46	50	38.9	39.3	41	40
Temperature (°C)		19.6	23.6	24.3	25.5	25.4	26.9	25.5	26.3	27.3	28.1
Turbidity (NTU)		8.03	8.2	6.46	5.79	4.16	3.86	5.07	5.31	5.15	8.26
TSS (mg/l)		12.11	9.91	8.87	8.59	4.85	3.13	5.33	4.74	5.37	13.22
BOD_5 (mg/l)	<1.5	1.37	1.4	1.06	1.47	1.75	1.97	1.85	1.8	1.46	1.34
COD (mg/l)	<5	<5.0	<5.0	<5.0	<5.0	11.2	<5.0	<5.0	6.3	<5.0	15.3
NH_3-N (mg/l)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
NO_3-N (mg/l)	<5	0.04	0.03	0.03	0.03	0.03	0.05	0.03	0.02	<0.02	0.03
Faecal coliform (MPN/100ml)	<1,000	170	350	130	540	240	350	23	240	23	33
Total Coliform (MPN/100ml)	<5,000	540	350	130	540	540	350	350	240	350	350
Manganese (mg/l)	<1	0.036	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Potassium (mg/l)		0.02	0.02	0.04	0.03	0.03	0.02	0.02	0.02	0.03	0.02
Total Iron (mg/l)		0.822	0.65	0.603	0.41	0.218	0.17	0.219	0.28	0.331	0.536
TOC (mg/l)		0.72	0.79	0.62	0.66	0.76	2.03	0.66	0.69	0.71	0.68

Table 3-7: Results of Nam Ngiep Surface Water Quality Monitoring

	Station Code	NNG09	NNG04 / R6	R7	NNG05
	Date	01 March 2018	01 March 2018	01 March 2018	01 March 2018
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	6.9	6.98	7.13	7.09
Sat. DO (%)		103.3	104	126.1	104.8
DO (mg/l)	>6.0	8.3	8.03	9.75	8.17
Conductivity (µs/cm)		74.3	111	118	72.8
TDS (mg/l)		37	55	59	36.4
Temperature (°C)		25	27.01	26.98	26.2
Turbidity (NTU)		16.8	11.6	7.7	15.6
TSS (mg/l)		29.96	13.4	9.39	18.11
BOD_5 (mg/l)	<1.5	<1.0	1.21	1.51	1.21
Faecal coliform (MPN/100ml)	<1,000	240	130	9	130
Total Coliform (MPN/100ml)	<5,000	350	240	17	240

	Station Code	NNG09	NNG04 / R6	R7	NNG05
	Date	15 March 2018	15 March 2018	15 March 2018	15 March 2018
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.38	7.45	7.6	7.45
Sat. DO (%)		100.8	102.3	100.3	106.4
DO (mg/l)	>6.0	8.65	8.62	8.24	8.61
Conductivity (µs/cm)		70.9	73.1	75.2	68.1
TDS (mg/l)		35.45	36.55	37.6	34.05
Temperature (°C)		21.8	22.9	24.2	25
Turbidity (NTU)		8.03	6.56	4.84	6.71
TSS (mg/l)		16.42	8.59	5.31	9.18
BOD_5 (mg/l)	<1.5	<1.0	1.07	1.1	<1.0
Faecal coliform (MPN/100ml)	<1,000	240	240	79	240
Total Coliform (MPN/100ml)	<5,000	350	540	170	350

	Station Code	NNG01	NNG02	NNG03	NNG09	NNG04 / R6	R7	NNG05	NNG06	NNG07	NNG08
	Date	20 March2018	21 March2018	21 March2018	22 March2018	22 March2018	22 March2018	22 March2018	22 March2018	22 March2018	22 March2018
Parameters (Unit)	**Guideline**										
pH	5.0 - 9.0	7.38			7.00	7.85	7.06	7.42	7.57	7.43	7.26
Sat. DO (%)		96.6			100.7	96	98.8	105.3	101.5	104.2	100.3
DO (mg/l)	>6.0	8.23			8.37	7.77	7.92	8.59	8.34	8.2	7.8
Conductivity (µs/cm)		78.3			75.2	100	98	81.3	77.9	77.6	79.2
TDS (mg/l)		39			37	50	49	40.65	38.95	38.8	39.6
Temperature (°C)		21.5			23.5	24.9	25.4	24.7	24.3	26.4	27.1
Turbidity (NTU)		11.43			5.26	4.92	3.07	4.25	5.08	4.88	9.15
TSS (mg/l)					8.68	5.34	2	4.45			
BOD_5 (mg/l)	<1.5				<1.0	<1.0	<1.0	<1.0			
Faecal coliform (MPN/100ml)	<1,000				79	33	49	130			
Total Coliform (MPN/100ml)	<5,000				170	540	110	280			

	Station Code	NNG09	NNG04 / R6	R7	NNG05
	Date	29 March 2018	29 March 2018	29 March 2018	29 March 2018
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.52	7.87	7.83	7.97
Sat. DO (%)		99.7	99.2	98.3	102.2
DO (mg/l)	>6.0	8.33	8.2	7.92	8.16
Conductivity (µs/cm)		75.8	74	75.4	76.1

	Station Code	NNG09	NNG04 / R6	R7	NNG05
	Date	29 March 2018	29 March 2018	29 March 2018	29 March 2018
Parameters (Unit)	**Guideline**				
TDS (mg/l)		38	37	37	38
Temperature (°C)		23.2	23.8	25.3	25.6
Turbidity (NTU)		4.42	3.22	2.43	3.21
TSS (mg/l)		7.37	3.86	2.54	3.96
BOD_5 (mg/l)	<1.5	<1.0	<1.0	<1.0	<1.0
Faecal coliform (MPN/100ml)	<1,000	70	33	7.8	33
Total Coliform (MPN/100ml)	<5,000	350	350	33	79

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

	Station Code	NCH01	NPH01	NXA01	NHS01
	Date	06 March 2018	07 March 2018	08 March 2018	08 March 2018
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.27	7.17	7.29	7.25
Sat. DO (%)		100.4	7.17	87.4	97.1
DO (mg/l)	>6.0	8.9	8.48	6.83	7.81
Conductivity (µs/cm)		48.4	59	144	44.9
TDS (mg/l)		24.2	29	72	22.45
Temperature (°C)		19.2	22.6	27.2	25.5
Turbidity (NTU)		3.04	2.24	2.74	4.82
TSS (mg/l)		1.34	3.26	4.06	6.25
BOD_5 (mg/l)	<1.5	1.35	1.88	2.12	1.89
COD (mg/l)	<5	<5.0	7.5	5.9	11.6
NH_3-N (mg/l)	<0.2	<0.2	<0.2	<0.2	<0.2
NO3-N (mg/l)	<5	0.05	<0.02	0.06	0.08
Faecal coliform (MPN/100ml)	<1,000	350	79	350	33
Total Coliform (MPN/100ml)	<5,000	2,400	79	350	240
Manganese (mg/l)	<1	0.019	<0.005	0.06	<0.005
Potassium (mg/l)		0.01	0.03	0.03	0.02
Total Iron (mg/l)		0.211	0.151	0.251	0.536
TOC (mg/l)		0.61	0.62	1.68	1.59

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

	Station Code	NCH01	NPH01	NXA01	NHS01
	Date	20 March 2018	21 March 2018	22 March 2018	22 March 2018
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.55		7.3	7.26
Sat. DO (%)		101.1		88	94.5
DO (mg/l)	>6.0	8.68		7.05	8.04
Conductivity (µs/cm)		38.7		137.6	28.45
TDS (mg/l)		19		68.8	22.5
Temperature (°C)		20.9		25.7	22.5
Turbidity (NTU)		2.09		2.55	5.5

Table 3-10: ***Results of Special Turbid Water Investigation Upper Nam Ngiep***

	River Name	Nam Siem 300 m downstream of Nam Ao	Nam Siem Upstream Nam Ngiep Confluence	Nam Ngiep Upstream Nam Siem Confluence	Nam Ngiep At Phiengta Village	Nam Chian At the bridge of Road 1D
	Code	NS 300-Nam Ao	NS-NNG	NNG00	NNG01	NCH01
	Date	30 March 2018	30 March 2018	30 March 2018	30 March 2018	30 March 2018
Parameter (Unit)	**Standard**					
pH		7.93	7.78	7.82	7.96	8.16
Sat.DO (%)		99.5	96.5	99.9	95.4	99.7
DO (mg/l)		7.93	7.91	8.07	8.07	8.33
Conductivity (µS/cm)		19.10	58.6	43	67.2	35.2
TDS (mg/l)		10	29	21	38	17
Temperature (°C)		24.5	23.1	23.9	21.8	22.1
Turbidity (NTU)		23,580	3,574	5.29	1,467	3.87
TSS (mg/l)		13,365	2,266	7.71	824.37	8.33

Table 3-11: ***Results of Turbid Water Investigation***

	Code	NNG09	NNG09	NNG09	NNG05	NNG05	NNG05
	Date	30 March 2018	31 March 2018	02 April 2018	30 March 2018	31 March 2018	02 April 2018
Parameter (Unit)	**Standard**						
pH		7.90	7.86	7.81	7.80	7.85	7.91
Sat.DO (%)		97.9	107.5	102.2	103.2	103.3	104.7
DO (mg/l)		7.88	8.12	8.11	8.23	7.91	8.16
Conductivity (µS/cm)		80.0	83.6	77.1	70.0	73.3	71.4

	Code	NNG09	NNG09	NNG09	NNG05	NNG05	NNG05
	Date	30 March 2018	31 March 2018	02 April 2018	30 March 2018	31 March 2018	02 April 2018
Parameter (Unit)	**Standard**						
TDS (mg/l)		40	41.53	38.5	35	36.5	35.5
Temperature (°C)		25.2	28.7	26.0	25.7	28.2	26.9
Turbidity (NTU)		5.54	22	25.2	4.08	3.97	25.0
TSS (mg/l)		9.35	158.22	88.69	4.89	6.50	51.26

The results of the special investigation on turbid water presented clearly show that the source of the high turbidity is at the confluence of Nam Ao with Nam Siem, and that there was a measurable impact on the water quality at the main dam. This further indicates that there are activities in the Nam Ao catchment causing very high loads of particulate matter in Nam Ao and further downstream into Nam Siem and Nam Ngiep. NNP1PC will inform the relevant authorities about this situation.

3.2.3 Groundwater Quality Monitoring

During March 2018, groundwater quality was monitored at four monitoring wells at NNP1 Project Landfill and one monitoring well at Houay Soup Landfill, and one community (GHSP03) water well of the originally six water wells installed for Phouhomxay Village. The other five community water wells have been taken out of use and replaced by the permanent water supply system based on water from the headwaters of Houay Soup. In addition, analyses were carried out for two new boreholes at Somsuen Village, one at Nam Pa Village, and one at Thong Noi Village.

All results complied with the groundwater quality standards for water supply purposes. The results of Phouhomxay groundwater were communicated to villagers and the local health centre as part of public health programme, whilst the groundwater monitoring results for Somsuen, NamPa and ThongNoi Villages will be communicated to villagers using those new boreholes.

Figure 3-6: Groundwater Quality Monitoring Locations

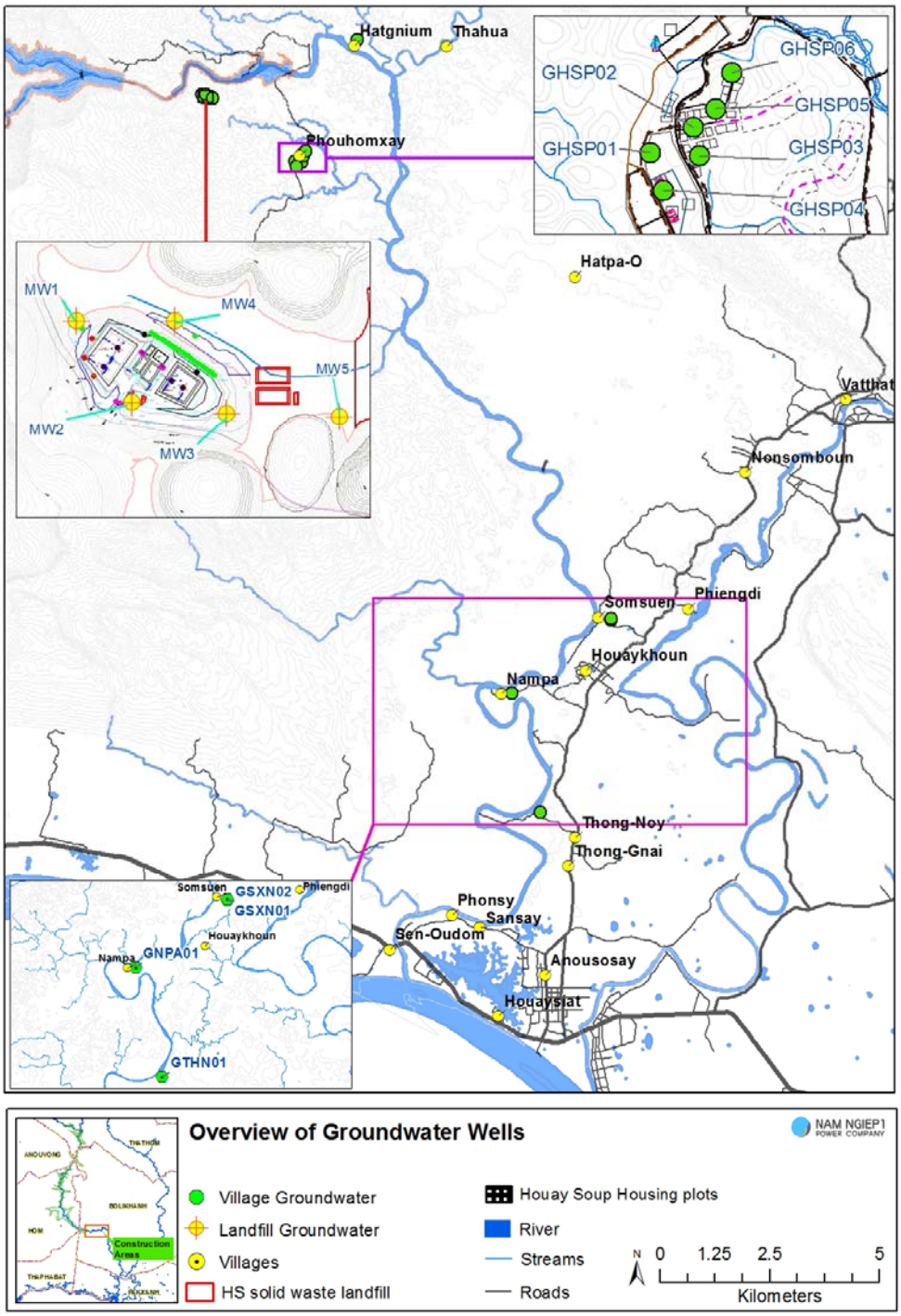


Table 3-12: Groundwater Quality Monitoring Results in Phouhomxay Village, Somsuen, Nam Pa and Songkhone Villages

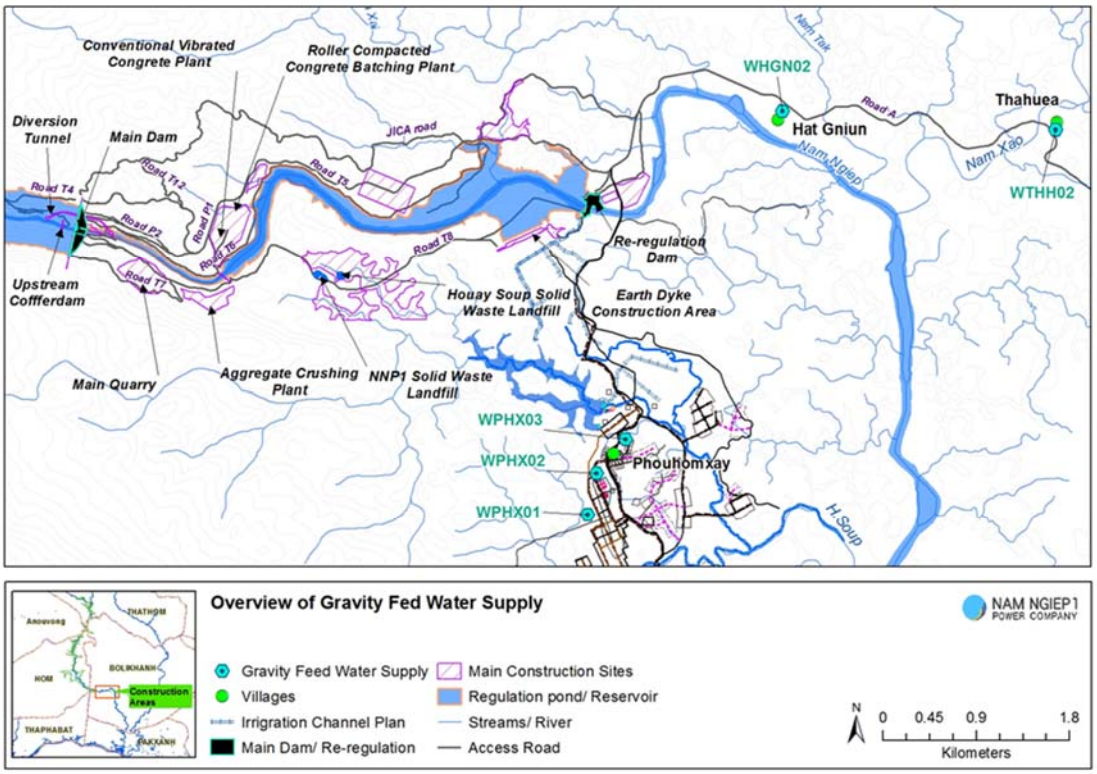
Parameter (Unit)	Guideline	GHSP03 Phouhomxay
		20-March-18
pH	6.5 - 9.2	7.06
Sat. DO (%)		79.3
DO (mg/l)		6.65
Conductivity (µS/cm)		385
TDS (mg/l)	1200	192
Temperature (°C)		24.4
Turbidity (NTU)	<20	0.78
Fecal coliform (MPN/100ml)	0	0
E.coli Bacteria (MPN/100ml)	0	0
Arsenic (mg/)	<0.05	0.0004
Fluoride (mg/l)	<1	0.47
Total hardness (mg/l)	<500	226
Nitrate (mg/l)	<45	1.28
Nitrite (mg/l)	<3	<0.02
Lead (mg/l)	<0.05	<0.008

	Village Name	Somseun Village		NamPa Village	ThongNoi Village
	Station	GSXN01	GSXN02	GNPA01	GTHN01
	Date	13 March 2018	13 March 2018	13 March 2018	13 March 2018
Parameter (Unit)	Guideline				
pH	6.5 - 8.6	6.59	6.86	6.87	6.82
Sat. DO (%)		34.6	27.7	19.6	29.9
DO (mg/l)		2.61	2.06	1.47	2.27
Conductivity (µS/cm)	<1,000	153.4	263	334	322
TDS (mg/l)	<600	76.7	131.5	167	161
Temperature (°C)	<35	28.9	29.6	29	28.7
Turbidity (NTU)	<10	1.6	3.1	2.13	8.39
Faecal Coliform (MPN/100ml)	0	0	0	0	79
E.coli Bacteria (MPN/100ml)	0	0	0	0	4.5

3.2.4 Gravity Fed Water Supply (GFWS) Quality Monitoring

The results of the chemical analyses are still pending. Coliform bacteria were not detected in the samples.

Figure 3-7 Gravity Fed Monitoring Locations



All parameters complied with the National Drinking Water Standards for Thahuea, Hat Gniun and Phouhomxay Villages except for faecal coliforms and E.Coli. Presence of E.Coli in the GFWS system is a normal situation and it should be noted that according to the Law on Hygiene, Disease Prevention and Health Promotion No 01/NA of 10 April 2001, domestic water supply for daily use is not required to be readily drinkable, but would normally have to be boiled or otherwise treated before drinking. The local villagers were informed about the results and encouraged to boil the water before drinking.

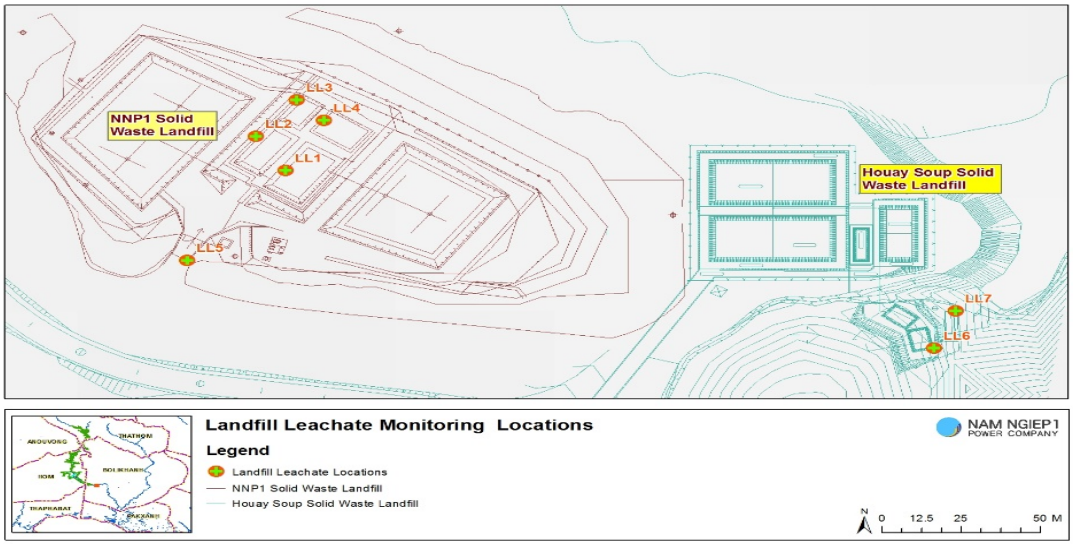
Table 3-13: Result Gravity Fed Water Supply (GFWS) Quality Monitoring

	Village Name	Thahuea	Hat Gniun	Phouhomxay		
	Station	WTHH02	WHGN02	WPHX01	WPHX02	WPHX03
	Date	20 March 2018	20 March 2018	20 March 2018	20 March 2018	20 March 2018
Parameter (Unit)	Guideline					
pH	6.5 - 8.6	6.94	6.75	7.32	7.63	7.77
Sat. DO (%)		90.3	62.2	93	94.1	93.7
DO (mg/l)		7.15	4.99	7.65	7.74	7.66
Conductivity (µS/cm)	<1,000	59	86.9	25.8	21.73	22.7
TDS (mg/l)	<600	30	43	13	11	11
Temperature (°C)	<35	26.2	25.4	23.9	24	24.3
Turbidity (NTU)	<10	1	1.14	1.28	1.29	1.26
Faecal Coliform (MPN/100ml)	0	9.3	79	33	79	33
E.coli Bacteria (MPN/100ml)	0	9.3	79	33	49	33
Arsenic (mg/l)	<0.05	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Lead (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride (mg/l)	<1.5	0.32	0.49	0.39	0.42	0.59
Nitrate (mg/l)	<50	0.22	<0.09	1.37	1.28	1.33
Nitrite (mg/l)	<3	<0.02	<0.02	<0.02	<0.02	<0.02
Total hardness (mg/l)	<300	55.2	69	21.9	29.6	19.5

3.2.5 Landfill Groundwater Monitoring

During March 2018, water samples were taken from water taps at Thahuea, Hat Gniun and Phouhomxay villages.

Figure 3-8 Landfill Leachate Monitoring Location



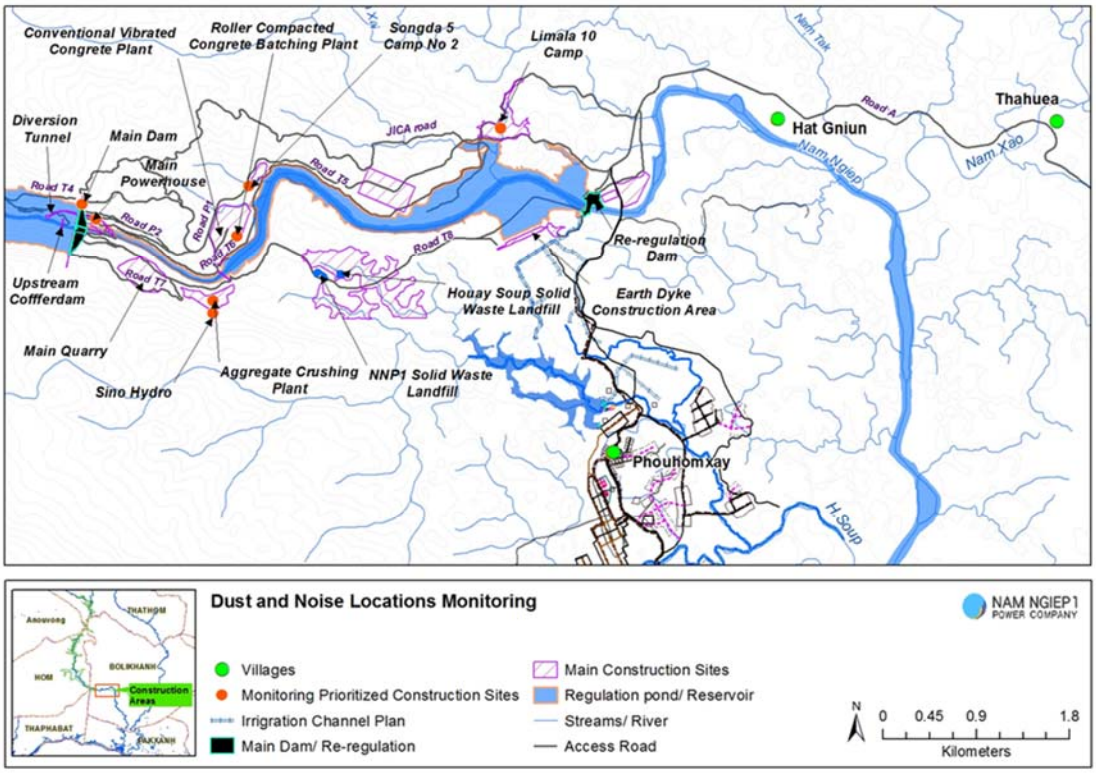
3.2.6 Dust Monitoring

The monitoring points are indicated on the map in ***Figure 1-9***. The results indicate compliance with the National Standard at all monitored stations, except at the main powerhouse and Phouhomxay Village. All staff were advised to wear dust masks while working in the area of the main powerhouse. In addition, the elevated ambient dust concentrations at Phouhomxay Village is likely caused by slash-and-burn activities in the agriculture area. The results are presented in ***Annex 2***.

3.2.7 Noise Monitoring

During February 2018, noise monitoring was conducted for 72 consecutive hours at Hat Gniun; and 24 consecutive hours at the Aggregate Crushing Plant, RCC Plant, Sino Hydro Main Camp, Sino Hydro Temporary Worker Camp, Main Dam, Lilama 10 Camp, and the main powerhouse.

Figure 3-9: Noise and Dust Emission Monitoring Locations



The results at all stations indicated compliance with National Standard.

3.3 PROJECT WASTE MANAGEMENT

3.3.1 Solid Waste Management

In March 2018, a total of 163.3 m3 solid waste was disposed at the NNP1 Project Landfill, an increasing of 6.4 m3 compared to February 2018. Spot checks of the waste bags were conducted on a daily basis before disposal.

A total of 400.5 kg of recyclable waste was sold to Khounmixay processing factory by the Contractors as shown in ***Table 3-14.***

Table 3-14: Amounts of Recyclable Waste Sold

Source and Type of Recycled Waste		Unit	Sold	Cumulative Total by 31 March 2018
Construction activity				
1	Scrap metal	kg	0	64,218
Sub-Total 1		**kg**	**0**	**64,218**
Operation camp				
2	Glass bottles	kg	168	4,091
3	Plastic bottles	kg	118	199
4	Paper/Cardboard	kg	84	151
5	Aluminium can	kg	30.5	58
Sub-Total 2		**kg**	**400.5**	**4,499**
Grand Total 1+2		**kg**	**400.5**	**68,717**

A total of 6,765 kg food waste was collected in March 2018 from selected camps by villagers of Phouhomxay for animal feeding – a decrease of 1,711 kg compared to February 2018.

Table 3-15 Amounts of Food Waste Collected by Villagers

NO.	SITE NAME	UNIT	TOTAL
1	Song Da 5 Camp No. 2	kg	2,610
2	Song Da 5 Camp No. 1	kg	2,129
3	Obayashi Corporation Camp	kg	1,038
4	Owner's Village and Site Office (OSOV)	kg	637
5	LILAMA 10 Camp	kg	189
6	Kenber Camp	kg	162
Total		**kg**	**6,765**

3.3.2 Hazardous Materials and Waste Management

The types and amounts of hazardous waste collected and transported for offsite treatment and final disposal at Khounmixay processing factory are shown in ***Table 3-16***.

Table 3-16: Results of Hazardous Material Inventory

No.	Hazardous Waste Type	Unit	Total in March 2018 (A)	Disposed (B)	Remainder (A - B)
1	Used hydraulic and engine oil	litre (l)	8,516	540	7,976
2	Contaminated soil, sawdust and concrete	kg	680	0	680
3	Used tire	No.	326	1	325
4	Used oil filters	No.	281	0	281
5	Empty used chemical drum/container	Drum (20 litre)	211	41	170
6	Empty paint and spray cans	can	220	66	154
7	Halogen/fluorescent bulbs	No.	120	0	120
8	Empty used oil drum/container	drum (20 l)	167	66	103
9	Ink cartridge	No.	120	19	101

No.	Hazardous Waste Type	Unit	Total in March 2018 (A)	Disposed (B)	Remainder (A - B)
10	Empty used oil drum/container	drum (200 l)	106	06	100
11	Empty used chemical drum/container	drum (200 l)	99	30	69
12	Contaminated textile and material	kg	31	0	31
13	Empty contaminated bitumen drum/container	drum (200 l)	248	221	27
14	Lead acid batteries	No.	22	0	22
15	Clinical waste	kg	20	0	20
16	Lithium-ion batteries	No.	7	0	7
17	Acid and caustic cleaners	Bottle	3	0	3
18	Cement bag	bag	0	0	0
19	Used oil mixed with water	litre (l)	0	0	0

3.4 Community Waste Management

3.4.1 Community Recycling Programme

In March 2018, a total of 441 kg of recyclable waste was recorded at the Community Waste Bank, an increasing of 174.5 kg compared to February 2018 show in ***Table 3-17***.

Table 3-17: Types and Amounts of Recyclable Waste Traded at the Community Waste Bank

Types of Waste	Unit	Remaining in February 2018	Additions in March 2018	Sold	Remaining in March 2018
Scrap metal	kg	4	12	0	16
Glass bottles	kg	1,335	234.5	0	1,569.5
Paper/cardboard	kg	0	83	0	83
Aluminium cans	kg	0	23	0	23
Plastic bottles	kg	0	88.5	0	88.5
Total	**kg**	**1,339**	**441**	**0**	**1,780**

3.4.2 Houay Soup Resettlement Area Waste Management

In December 2017, the Phoukham Chanvong (PKC Co. Ltd) started operation of Houay Soup Landfill under a one-year contract. The works include solid waste collection and transportation from Phouhomxay, Thahuea, Hat Gniun villages to Houay Soup Landfill for three days/week (Mondays, Wednesdays and Fridays), waste segregation, waste compaction and waste covering at the Houay Soup Landfill.

In March 2018, approximate of 45 m3 of solid waste was collected from Phouhomxay, Thahuea and Hat Gniun Villages disposed at the Houay Soup Landfill.

3.4.3 Waste Clean-up in Four Villages at 2LR

The waste clean-up in four villages at zone 2LR namely Houaypamom, Sopphouane, Sopyouk (Nong) and Namyouak villages, Hom District, Xaysomboun Province was started on 29 November 2017, the work progress was 82.04 % as of 28 March 2018. The waste clean-up activities including combustible waste collection and stockpiling before burning, waste segregation, and toilet waste treatment using lime 15 kg/m3 – 20 kg/m.

3.5 Watershed and Biodiversity Management

3.5.1 Watershed Management

The Nam Ngiep 1 Watershed and Reservoir Protection Committee (WRPC) and its secretariat (WRPO) are expected to be reconstituted and therefore the meeting for plan approval will only be decided once the reconstituted organization is in place. The plan was further improved to elaborate the management activities addressing the No Net Loss (NNL) objective and will be discussed during the final technical and approval workshops once it is confirmed by GOL.

3.5.1.1 PREPARATION OF PROVINCIAL REGULATION FOR THE WATERSHED MANAGEMENT

The final draft of Provincial Regulations for NNP1 watershed management was further improved through a workshop from 20 to 22 February 2018. The improved final draft was further commented by relevant GOL offices in March 2018 and the final presentation by technical committee is expected in the first week of April 2018 prior to submission to Justice Department for further review and Provincial Assembly for approval.

3.5.2 Biodiversity Offset Management

3.5.2.1 PREPARATION OF BIODIVERSITY OFFSET MANAGEMENT PLAN

The preparation of NNP1 Biodiversity Offset Management Plan (BOMP) continues with several studies/surveys started since January 2018. At the end of February 2018, the land use and natural resources survey and the threat assessment survey in Nam Chouane – Nam Xang (NCNX) offset site were completed. The Totally Protected Zone (TPZ) survey, aquatic biodiversity survey, and Forest Classification and Habitat Mapping in NCNX offset site were completed in March 2018. The last survey, herpetology survey in NNP1 Watershed will be started in April 2018.

3.5.2.2 IMPLEMENTATION OF PRE-BIODIVERSITY OFFSET MANAGEMENT PLAN

NNP1PC has disbursed the fund on 16 March 2018 for the implementation of second pre-BOMP until June 2018.

3.5.3 Biomass Clearance

As of 31 March 2018, a total of 1,547.31 ha out of 1,640 ha was accepted as fully cleared. The remaining area of 93.44 ha is in expected to be fully completed in April 2018. The certification of complete clearance work by the Ministry of Natural Resource and Environment (MONRE) is expected by the end of April 2018 prior to reservoir impounding.

Table 3-18 *Biomass Clearance Progress in Each Priority Area as of March 2018.*

Target Area		Progress as of 31 March 2018	
Block	**Total area to be cleared (Ha)**	**Total area in progress (Ha)**	**100% completed within the total area in progress (Ha)**
B1	109.24	109.24	105.00
B2	158.63	158.63	152.19
B3	80.35	80.35	80.35
B4	163.74	163.74	163.74
B5	340.14	340.14	333.22
B6	31.92	31.92	31.92
B7	39.65	39.65	39.65
B8	37.61	37.61	37.61
B9	52.75	52.75	48.58
B10	269.10	269.10	197.43
B11	89.98	89.98	89.98
B12	64.11	64.11	64.11
B13	101.24	101.24	101.24
B14	43.33	43.33	43.33
B15	43.73	43.73	43.73
B16	3.32	3.32	3.32
B17	7.96	7.96	7.96
B18	3.95	3.95	3.95
Total	**1,640.75**	**1,640.75**	**1,547.31**

4. FISHERY MONITORING

The fishery monitoring programme is a continuous activity by daily fish catch logbook monitoring and gillnet survey. However, only daily catch logbook was conducted for March 2018. The gathered information is being put into the database system.

The data from the daily fish catch logbook monitoring indicates that the mean daily fish catch in Nam Ngiep River was 1.6 kg/household/day in February 2018. The estimated total fish catch in Nam Ngiep basin for February 2018 is 24,600 kg. Around 42 % of the catch was sold, 52% was consumed fresh, 4% processed and approximately 2% was used for other purposes.

ANNEXES

ANNEX A: RESULTS OF EFFLUENT ANALYSES

Table A- 1: Results of Camp Effluents in March 2018

	Site Name	Owner's Site Office and Village		Obayashi Camp		Sino Hydro Camp	
	Station Code	EF01		EF02		EF06	
		05-Mar-18	19-Mar-18	05-Mar-18	19-Mar-18	05-Mar-18	19-Mar-18
Parameter (Unit)	Guideline in the CA						
pH	6.0-9.0	6.95	6.9	7.53	7.61	7.15	7.33
Sat. DO (%)		56.1	44.3	83.9	39.1	55.9	90.6
DO (mg/l)		4.22	3.37	6.38	3.6	4.49	6.85
Conductivity (µS/cm)		395	370	708	650	586	644
TDS (mg/l)		197.5	185	354	325	293	322
Temperature (°C)		28.7	27.6	27.9	29.5	25	28.3
Turbidity (NTU)		1.19	1	13.7	8.36	4.45	12.5
TSS (mg/l)	<50	<5	<5	9.3	7.43	4.1	4.75
BOD_5 (mg/l)	<30	<6	<6	<6	<6	<6	<6
COD (mg/l)	<125	<25	<25	55.4	38.4	37.2	37
NH_3-N (mg/l)	<10	5.6	12.3	24.6	40.8	21.1	34.2
Total Nitrogen (mg/l)	<10	5.89	16	25.3	41.4	24.4	34.6
Total Phosphorus (mg/l)	<2.0	1.15	1.4	1.36	1.15	1.51	1.45
Faecal Coliform (MPN/100 ml)		4.5	2	0	0	0	0
Total Coliform (MPN/100 ml)	<400	32	350	0	0	0	2
Oil & Grease (mg/l)	<10	<1	n/a	<1	n/a	<1	n/a
Residual Chlorine (mg/l)		n/a	n/a	0.61	1.29	0.57	0.45
Chlorination Dosing Rate (ml/mn)		n/a	n/a	430	350	160	85
Effluent Discharge Volume (l/mn)		15	4	20	6	12	2.7

	Site Name	Song Da5 Camp No.1		Song Da5 Camp No.2		V & K Camp	
	Station Code	EF07		EF08		EF10	
		05-Mar-18	19-Mar-18	05-Mar-18	19-Mar-18	05-Mar-18	19-Mar-18
Parameter (Unit)	Guideline in the CA						
pH	6.0-9.0	7.21	6.71	7.32	7.63	7.14	6.98
Sat. DO (%)		66.6	61.4	77.6	77	45.5	64.7
DO (mg/l)		4.98	4.31	5.76	5.76	3.59	4.91
Conductivity (µS/cm)		1,610	1,912	644	771	299	284
TDS (mg/l)		805	956	322	385	149	142
Temperature (°C)		27.4	32.6	25.9	29	26	28.2
Turbidity (NTU)		32.6	16.7	29.1	29..2	3.07	3.38
TSS (mg/l)	<50	23.47	27.81	19.49	21.1	3.7	3.76
BOD_5 (mg/l)	<30	<6	<6	<6	<6	16.86	<6
COD (mg/l)	<125	122	110	79.1	128	<25	<25
NH_3-N (mg/l)	<10	19.4	20.2	31.8	24.4	4.1	2.1
Total Nitrogen (mg/l)	<10	20.1	21	32.2	25.1	4.32	3.06
Total Phosphorus (mg/l)	<2.0	1.26	1.19	1.42	1.55	0.48	0.33
Faecal Coliform (MPN/100 ml)		0	0	0	0	240	0
Total Coliform (MPN/100 ml)	<400	0	0	0	0	240	0

	Site Name	Song Da5 Camp No.1		Song Da5 Camp No.2		V & K Camp	
	Station Code	EF07		EF08		EF10	
		05-Mar-18	19-Mar-18	05-Mar-18	19-Mar-18	05-Mar-18	19-Mar-18
Parameter (Unit)	Guideline in the CA						
Oil & Grease (mg/l)	<10	<1	n/a	<1	n/a	<1	n/a
Residual Chlorine (mg/l)		0.41	0.99	0.8	1.84	0.02	1.21
Chlorination Dosing Rate (ml/mn)			113	285	180	30	50
Effluent Discharge Volume (l/mn)		15	30	20	12	12	6

	Site Name	HM Main Camp		IHI Camp		Kenber Camp	
	Station Code	EF13		EF14		EF16	
		05-Mar-18	19-Mar-18	05-Mar-18	19-Mar-18	05-Mar-18	19-Mar-18
Parameter (Unit)	Guideline in the CA						
pH	6.0-9.0	7.02	7.24	6.98	6.76	7.63	8.12
Sat. DO (%)		52.7	82.9	49.8	49	100.8	93.6
DO (mg/l)		4.03	6.13	3.72	3.59	7.72	7.17
Conductivity (µS/cm)		882	996	974	477	287	439
TDS (mg/l)		441	498	487	238	143.5	219
Temperature (°C)		27.4	29.3	28.9	29.7	27.2	27.1
Turbidity (NTU)		18.3	18.5	23.98	20	12.5	5.84
TSS (mg/l)	<50	35.2	25.32	23.98	38.14	15.46	16.26
BOD_5 (mg/l)	<30	<6	27.12	<6	104	<6	<6
COD (mg/l)	<125	187	214	240	275	<25	47.2
NH_3-N (mg/l)	<10	18.2	33.2	9.9	5.3	4.3	8.2
Total Nitrogen (mg/l)	<10	19	33.5	10.6	13.2	4.52	8.36
Total Phosphorus (mg/l)	<2.0	1.48	1.29	1.29	0.95	0.62	1.18
Faecal Coliform (MPN/100 ml)		0	0	0	2.4	0	0
Total Coliform (MPN/100 ml)	<400	0	0	0	3,500	0	0
Oil & Grease (mg/l)	<10	11	n/a	19	n/a	<1	n/a
Residual Chlorine (mg/l)		0.82	0.55	0.23	0	0.79	2.04
Chlorination Dosing Rate (ml/mn)		3.1	3.1	6	0	45	140
Effluent Discharge Volume (l/mn)		4.2	4.2	10	2.4	0	3

Table A- 2: Results of the Construction Area Discharge in March 2018

	Site Name	Spoil Disposal No.2				
	Station Code	DS04				
	Date	01-Mar-18	08-Mar-18	15-Mar-18	22-Mar-18	29-Mar-18
Parameter (Unit)	**Guideline**					
pH	6.0 - 9.0		6.15		5.93	6.16
Sat. DO (%)			57.2		49.3	60.1
DO (mg/l)			4.59		3.86	4.61
Conductivity (µs/cm)			58		56.2	68.7
TDS (mg/l)			29		28	34
Temperature (°C)			25.2		26.3	27.3
Turbidity (NTU)			7.18		8.56	9.06
TSS (mg/l)	<50		7.69		8.61	11.33
Oil & Grease (mg/l)	<10		<1			

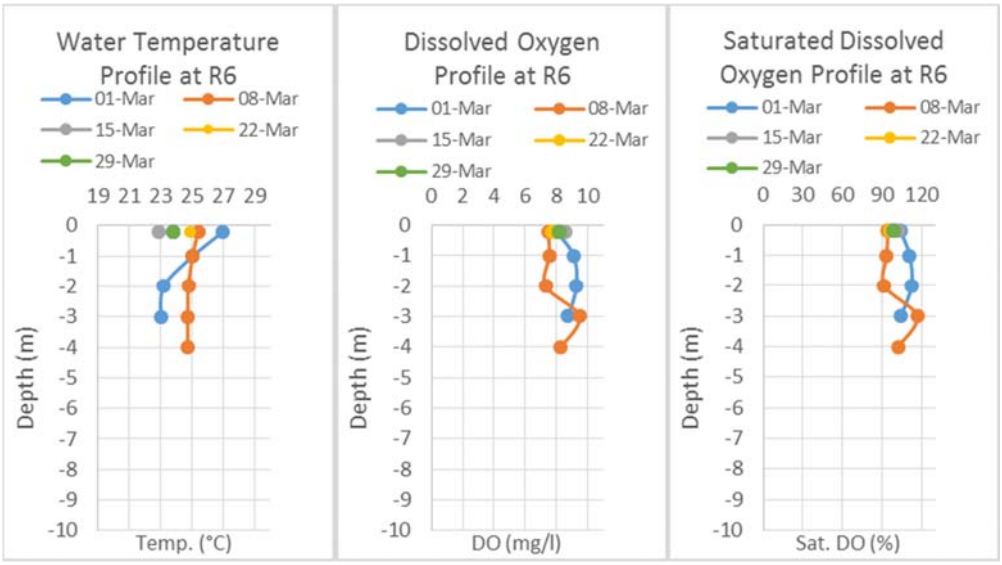
	Site Name	RCC Plant Discharge at lower ponds				
	Station Code	DS09				
	Date	01-Mar-18	08-Mar-18	15-Mar-18	22-Mar-18	29-Mar-18
Parameter (Unit)	**Guideline**					
pH	6.0 - 9.0	6.79	7.08	6.91	7.12	7.44
Sat. DO (%)		85.7	93.7	81.1	87.6	80.8
DO (mg/l)		6.29	7.17	6.3	6.69	6.15
Conductivity (µs/cm)		289	301	295	299	312
TDS (mg/l)		144.5	150	147	149	156
Temperature (°C)		29.9	27.9	26.9	27.9	28
Turbidity (NTU)		7.5	7.7	11.3	9.2	8.2
TSS (mg/l)	<50	8.94	12.66	26.79	10.61	14.11
Oil & Grease (mg/l)	<10		<1			

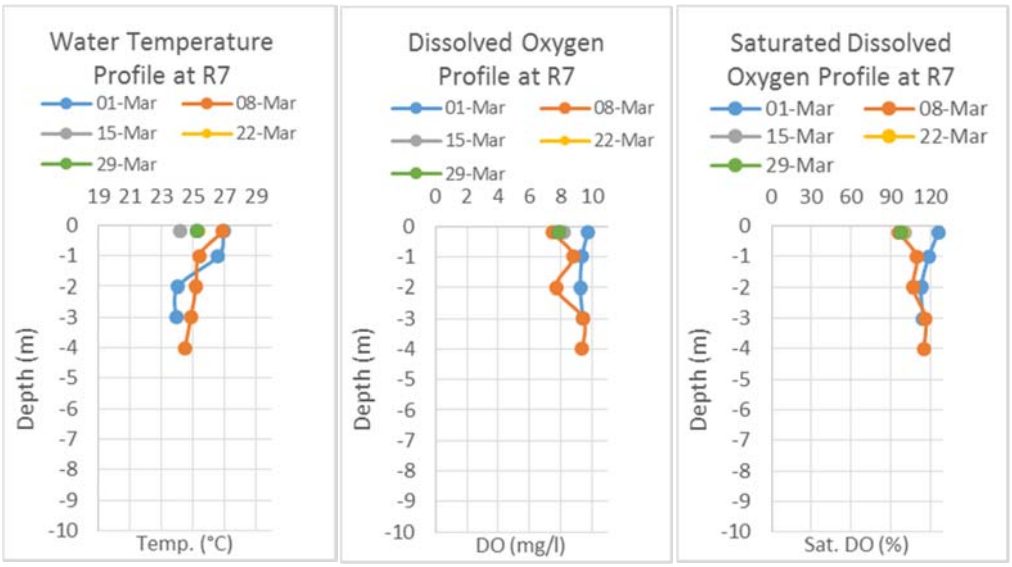
	Site Name	Aggregate Crushing Plant				
	Station Code	DS02				
	Date	01-Mar-18	08-Mar-18	15-Mar-18	22-Mar-18	29-Mar-18
Parameter (Unit)	**Guideline**					
pH	6.0 - 9.0	6.7	7.31	6.88		
Sat. DO (%)		111.6	97.7	105		
DO (mg/l)		7.98	7.52	7.67		
Conductivity (µs/cm)		205.1	324	331		
TDS (mg/l)		102.5	162	165.5		
Temperature (°C)		31.7	27.5	30.4		
Turbidity (NTU)		2.56	8.19	13		
TSS (mg/l)	<50	18.37	24.81	37.57		
Oil & Grease (mg/l)	<10		<1			

	Site Name	Main Dam Treatment Plant No.2 (DS12)				
	Station Code	DS12				
	Date	01-Mar-18	08-Mar-18	15-Mar-18	22-Mar-18	29-Mar-18
Parameter (Unit)	**Guideline**					
pH	6.0 - 9.0	4.85	7.0	4.87	6.65	7.83
Sat. DO (%)		98.5	97.3	100.5	100	99.1
DO (mg/l)		7.27	7.64	7.41	7.63	7.44
Conductivity (µs/cm)		1,125	2	1270	1,337	1,008
TDS (mg/l)		562.5	1	635	668	504
Temperature (°C)		29.4	26.3	29.7	27.9	28.7
Turbidity (NTU)		7.7	5.83	8.98	4.64	8.31
TSS (mg/l)	<50	18.37	45.43	62.68	13.73	77.89
Oil & Grease (mg/l)	<10		<1			

	Site Name	Main Dam's Waste Water Treatment Plant No.3				
	Station Code	DS14				
	Date	01-Mar-18	08-Mar-18	15-Mar-18	22-Mar-18	29-Mar-18
Parameter (Unit)	**Guideline**					
pH	6.0 - 9.0		11.2	2.36	8.59	7.25
Sat. DO (%)			100.6	102	100.1	97.7
DO (mg/l)			7.96	7.51	7.71	7.43
Conductivity (µs/cm)			523	3090	1,984	1,242
TDS (mg/l)			261	1500	994	621
Temperature (°C)			26	29.8	27.3	27.9
Turbidity (NTU)			29.6	22.4	13.4	5.17
TSS (mg/l)	<50		125.57	97.38	79.34	11.52
Oil & Grease (mg/l)	<10		<1			

Table A- 3: ***Temperature and Dissolved Oxygen Depth Profile Results of the Re-regulation Reservoir Monitoring in*** **March 2018**





ANNEX B: AMBIENT DUST QUALITY

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

Ban Hat Gnuin - 24 Hours Average Particulate Matter (PM10) Concentration			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	05-Mar-18 18:00	06-Mar-18 18:01	07-Mar-18 18:01
End Time	06-Mar-18 18:00	07-Mar-18 18:00	08-Mar-18 18:00
Average Data Record in 24h (mg/m3)	0.180	0.140	0.123
Guideline Average in 24h (mg/m3)	***0.12***	***0.12***	***0.12***

Figure B- 1: Dust Monitoring Results at Ban Hat Gniun in March 2018

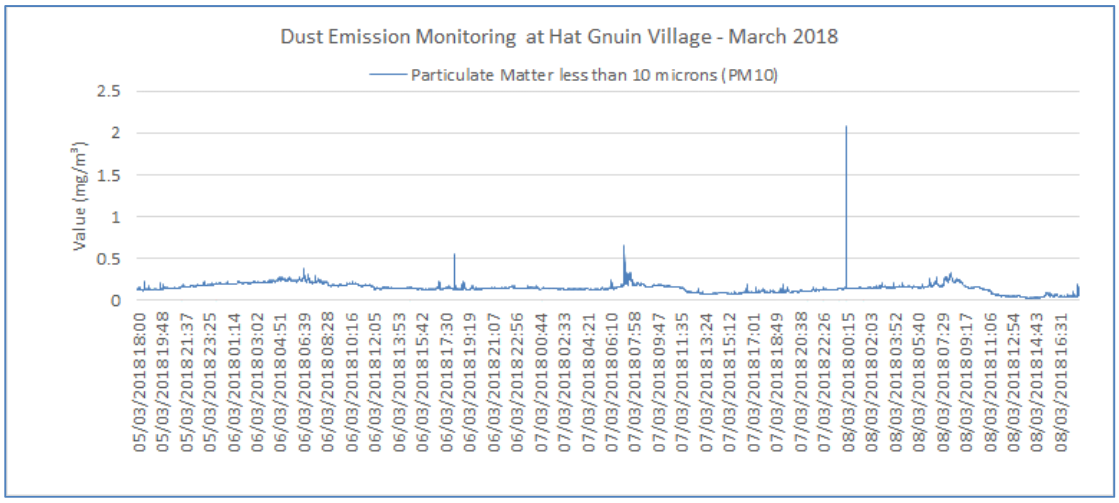


Table B- 2: 24-hour Average Dust Concentrations Measured in Phouhomxay Village

Phouhomxay village - 24 Hours Average Particulate Matter (PM10) Concentration			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	20-Mar-18 18:00	21-Mar-18 18:00	22-Mar-18 18:00
End Time	21-Mar-18 18:00	22-Mar-18 18:00	23-Mar-18 18:00
Average Data Record in 24h (mg/m3)	0.101	0.091	0.128
Guideline Average in 24h (mg/m3)	***0.12***	***0.12***	***0.12***

Figure B- 2: Dust Monitoring Results at the Aggregate Crushing Plant in March 2018

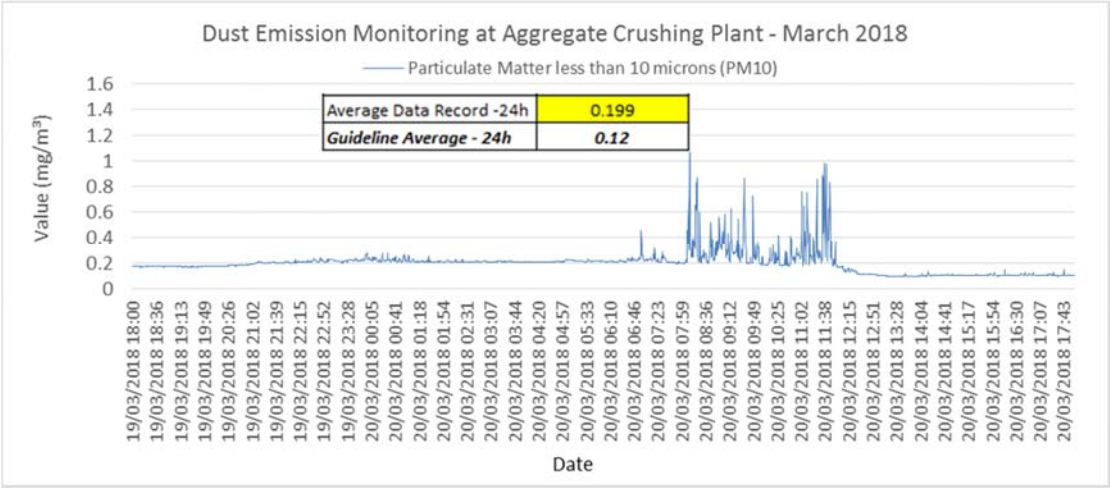


Figure B- 3: Dust Monitoring Results at the RCC Plant in March 2018

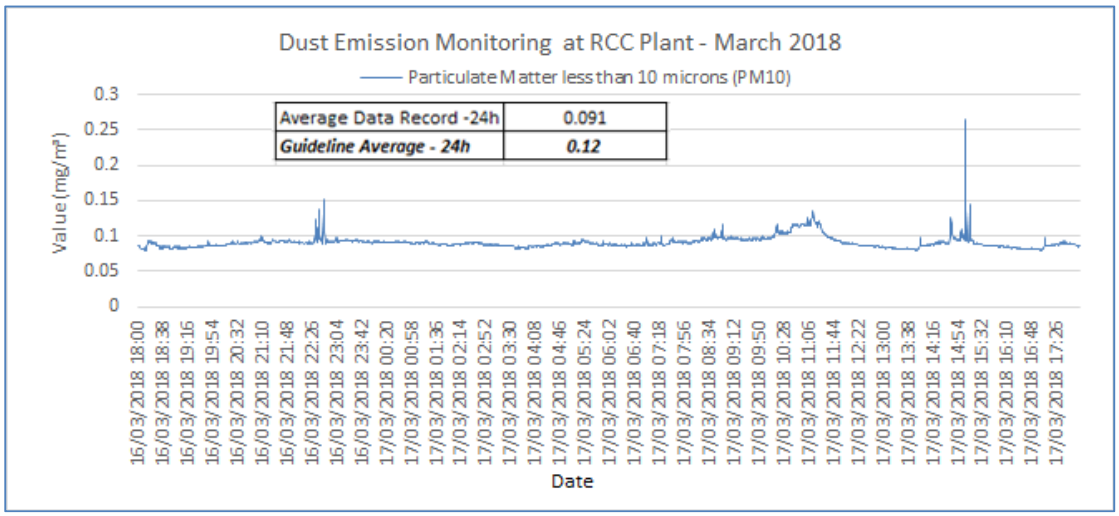


Figure B- 4: Dust Monitoring Results at the Sino Hydro Temporary Camp in March 2018

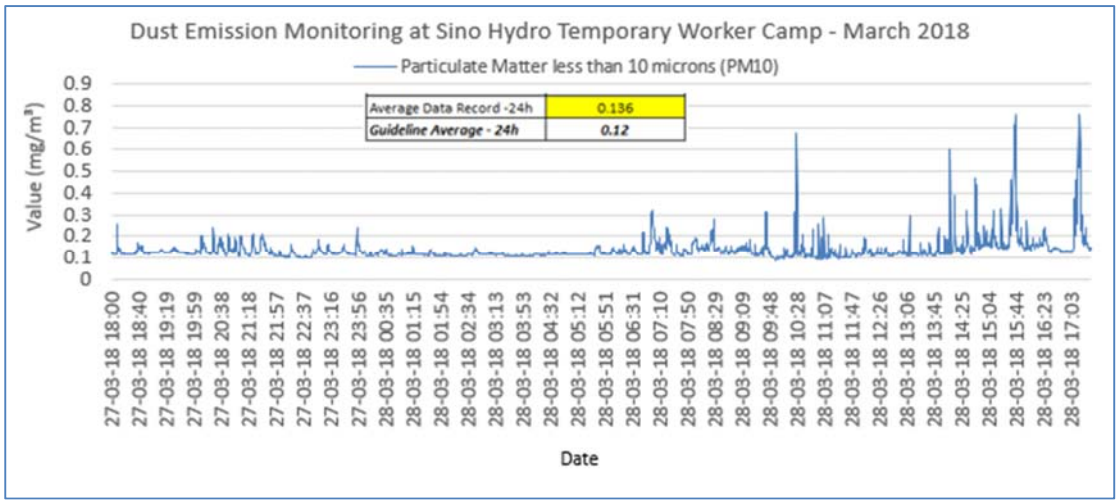


Figure B- 5: Dust Monitoring Results at the SongDa5 No.2 Camp in March *2018*

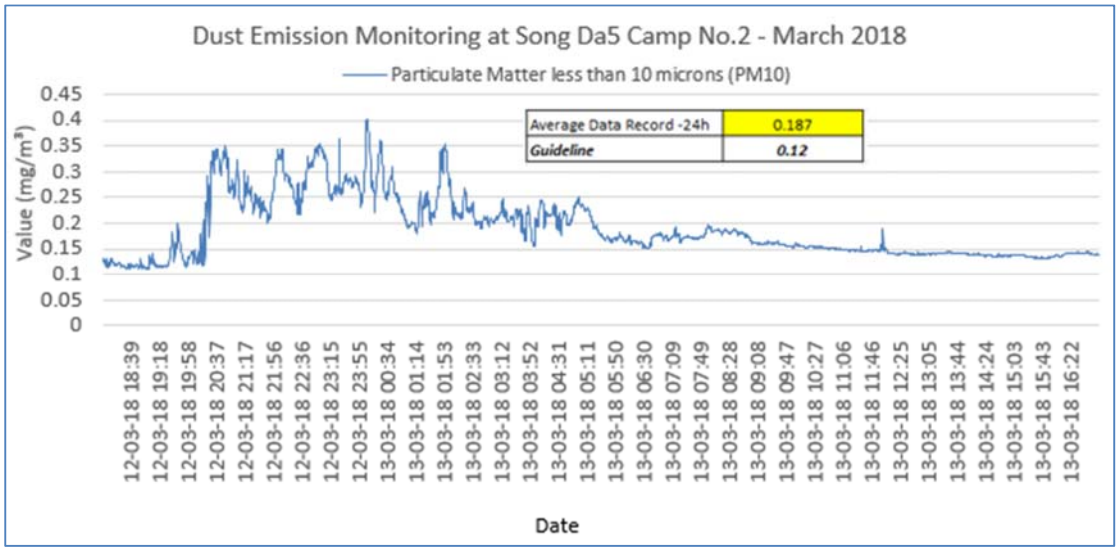


Figure B- 6: Dust Monitoring Results at Main Dam (Top View Left Bank) in March 2018

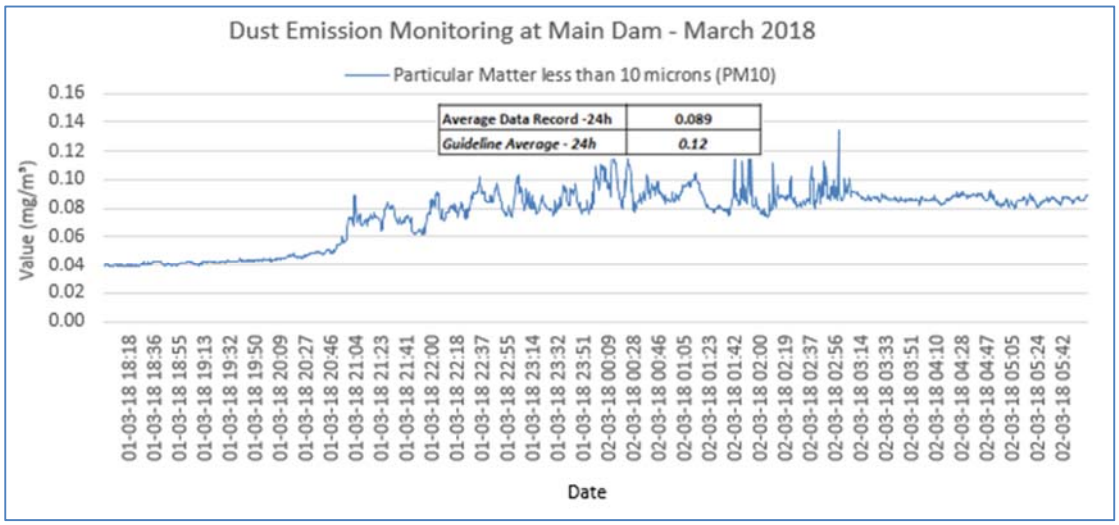


Figure B- 7: Dust Monitoring Results at the Lilama10 Camp in March 2018

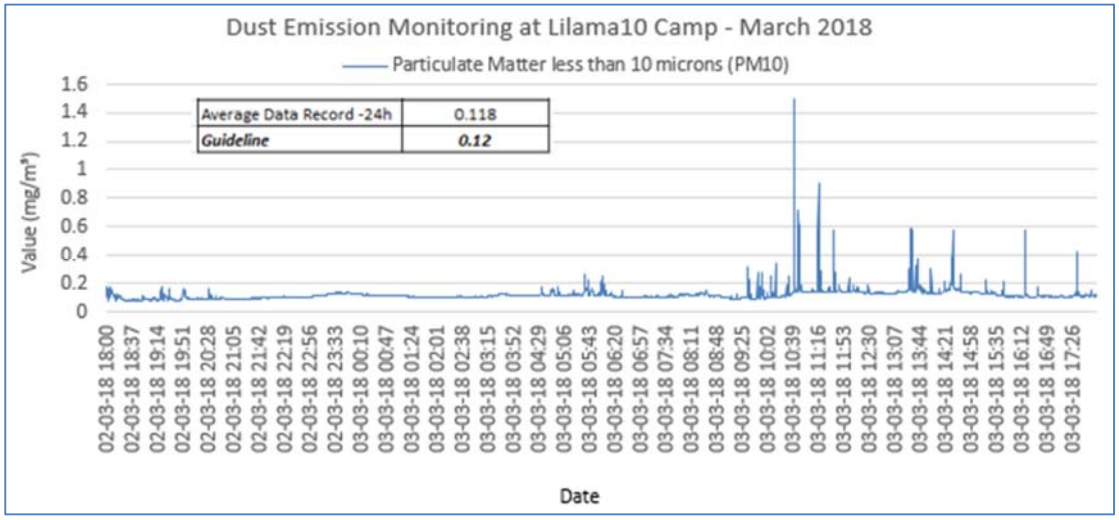
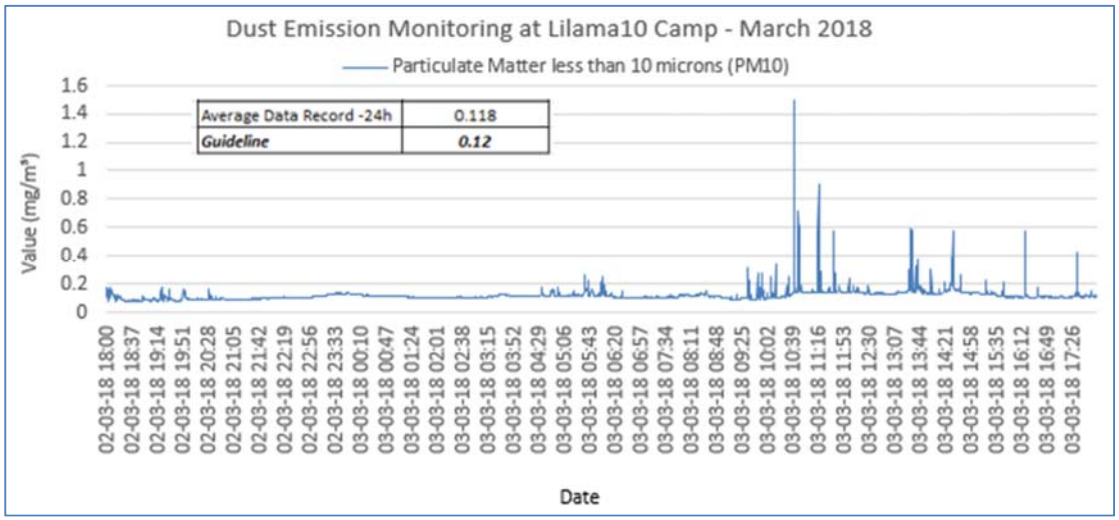


Figure B-8: Dust Monitoring Results at the Sino Hydro Camp in March 2018



ANNEX C: AMBIENT NOISE DATA

Table C- 1: Average Results of Noise Monitoring at Ban Hat Gniun in March 2018

Noise Level (dB)	05-06/March/18			06-07/March/18			07-08/March/18		
	18:00-22:00	22:01 – 06:00	06:01 – 18:00	18:00-22:00	22:01 – 06:00	06:01 – 18:00	18:00-22:00	22:01 – 06:00	06:01 – 18:00
Maximum Value Recorded	54.40	54.20	66.60	56.20	64.80	64.80	65.20	58.90	62.60
Guideline Max	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***
Average Data Recorded	40.04	39.27	42.81	42.37	38.44	41.92	43.80	37.40	46.92
Guideline Averaged	***55***	***45***	***55***	***55***	***45***	***55***	***55***	***45***	***55***

Figure C- 1: Result of Noise Level Monitoring at Ban Hat Gniun in March 2018

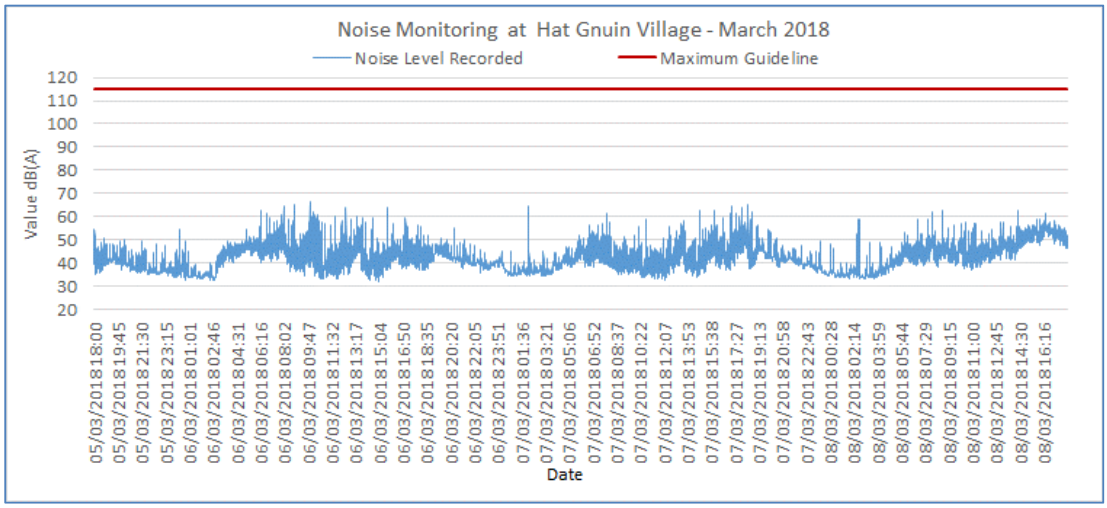


Table C- 2 Average Results of Noise Monitoring at Phouhomxay Village in March 2018

Noise Level (dB)	20-21/March/18			21-22/March/18			22-23/March/18		
	18:00-22:00	22:01 – 06:00	06:01 – 18:00	18:00-22:00	22:01 – 06:00	06:01 – 18:00	18:00-22:00	22:01 – 06:00	06:01 – 18:00
Maximum Value Recorded	66.50	52.80	68.00	66.50	56.40	73.70	63.60	68.30	75.70
Guideline Max	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***
Average Data Recorded	40.66	38.50	41.35	40.18	37.02	41.41	45.76	43.09	43.03
Guideline Averaged	***55***	***45***	***55***	***55***	***45***	***55***	***55***	***45***	***55***

Figure C- 2: Result of Noise Level Monitoring at Phouhomxay Village in March 2018

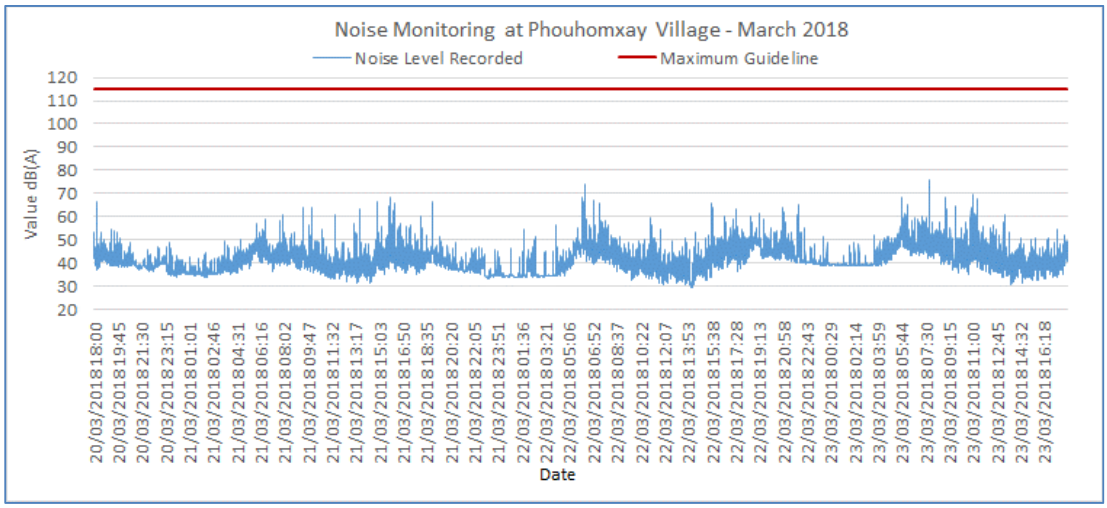


Table C-3 and Table C-4: Average Results of Noise Monitoring at Aggregate Crushing Plant and RCC Plant in March 2018

Aggregate Crushing Plant ***RCC Plant***

Noise Level (dB)	19-20/March/18		20/March/18
	18:00 – 22:00	22:01 – 06:00	06:01-18:0
Maximum Value Recorded	51.1	61.8	77
Guideline Max	*115*	*115*	*11*
Average Data Recorded	39.08	42.51	59.4
Guideline Averaged	*70*	*70*	*7*

Noise Level (dB)	16-17/March/18		17/March/1
	18:00 – 22:00	22:01 – 06:00	06:01-18:0
Maximum Value Recorded	55.4	58.2	65.
Guideline Max	*115*	*115*	*11*
Average Data Recorded	49.89	46.77	55.6
Guideline Averaged	*70*	*70*	*7*

Figure C-*3*: Results of Noise Level Monitoring at the Aggregate Crushing Plant in March 2018

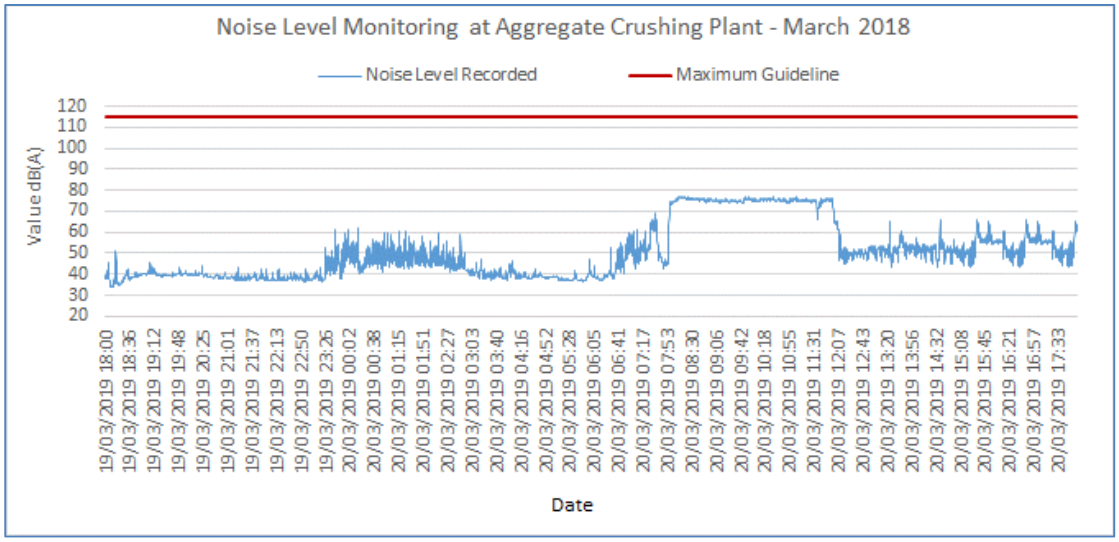


Figure C-*4*: Results of Noise Level Monitoring at the RCC Plant in FebruaryMarch 2018

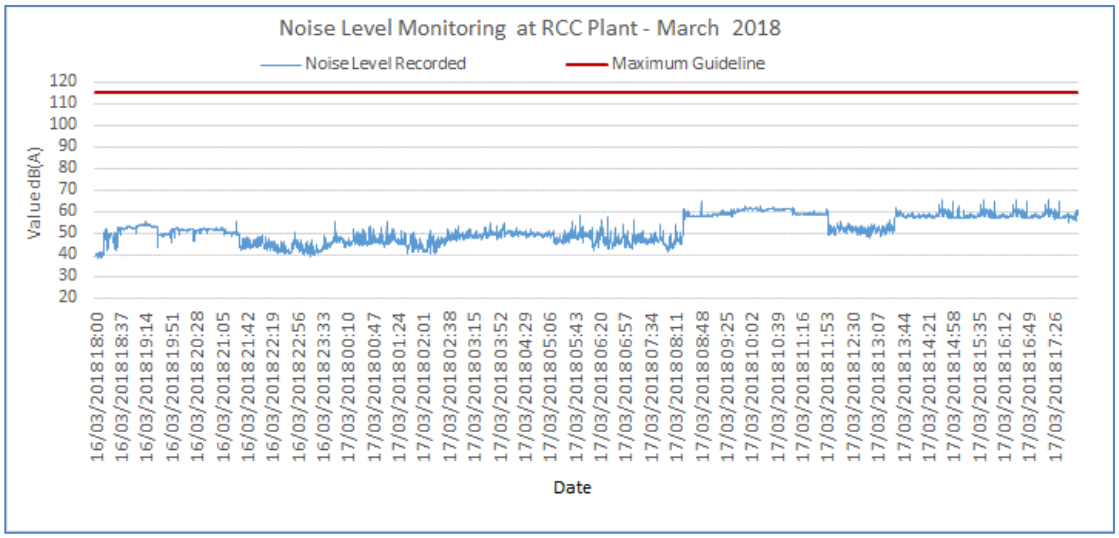


Table C- 5 and Table C- 6: Average Results of Noise Monitoring at Song Da5 Camp No. 2 and Sino Hydro Camp in March 2018

Song Da5 Camp No.2 ***Sino Hydro Temporary Worker Camp***

Noise Level (dB)	12-13/March/18		13/March/18	Noise Level (dB)	27-28/March/18		28/March/18
	18:30 – 22:00	22:01 – 06:00	06:01-18:0		18:00 – 22:00	22:01 – 06:00	06:01-18:00
Maximum Value Recorded	65.5	60	76.	Maximum Value Recorded	71.2	46.6	62.
Guideline Max	*115*	*115*	*11*	*Guideline Max*	*115*	*115*	*11*
Average Data Recorded	53.53	47.69	45.9	Average Data Recorded	42.99	38.57	49.6
Guideline Averaged	*70*	*50*	*7*	*Guideline Averaged*	*70*	*50*	*7*

Figure C- 5: Results of Noise Level Monitoring at Song Da5 Camp No.2 in March 2018

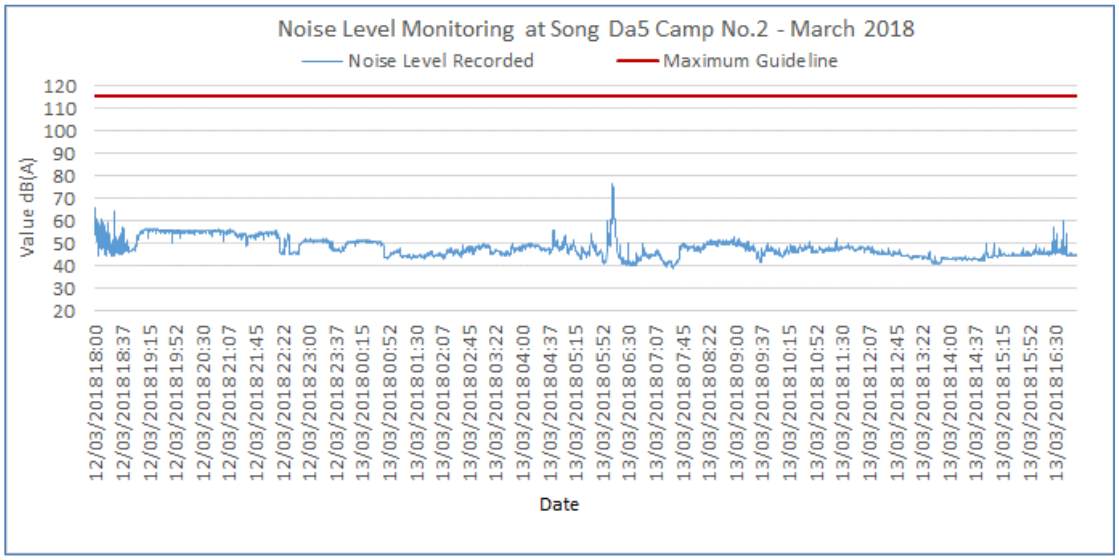


Figure C- 6: Results of Noise Level Monitoring at Sino Hydro Temporary Worker Camp in March 2018

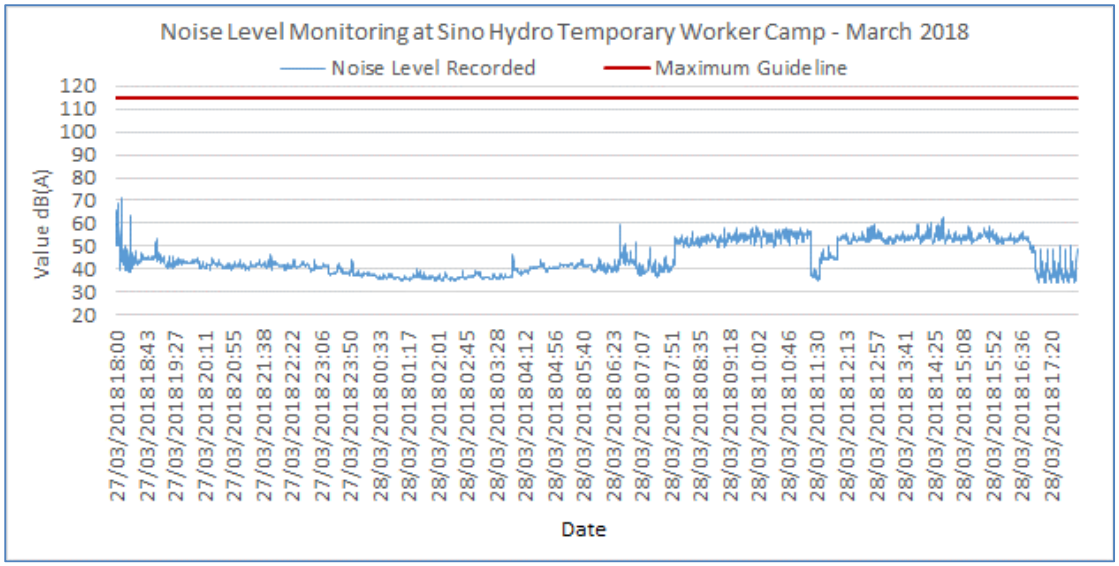


Table C- 8 and Table C- *9: Average Results of Noise Monitoring at Main Dam, and Lilama 10 Camp in March 2018*

Main Dam ***Lilama 10 Camp***

Noise Level (dB)	01-02/March/18		02/March/18	Noise Level (dB)	02-03/March/2018		03/March/2018
	18:00 – 22:00	22:01 – 06:00	06:01-17:		18:00 – 22:00	22:01 – 06:00	06:00-18:
Data Record Max	66.5	61.6	65	Maximum Value Recorded	71.3	52.9	71
Guideline Max	***115***	***115***	***1***	***Guideline Max***	***115***	***115***	***1***
Data Record Average	52.59	53.06	51.	Average Data Recorded	46.28	37.26	44.
Guideline Averaged	***70***	***70***		***Guideline Averaged***	***70***	***50***	

Figure C-7: Results of Noise Level Monitoring at Main Dam (Top View Left Bank) in March 2018

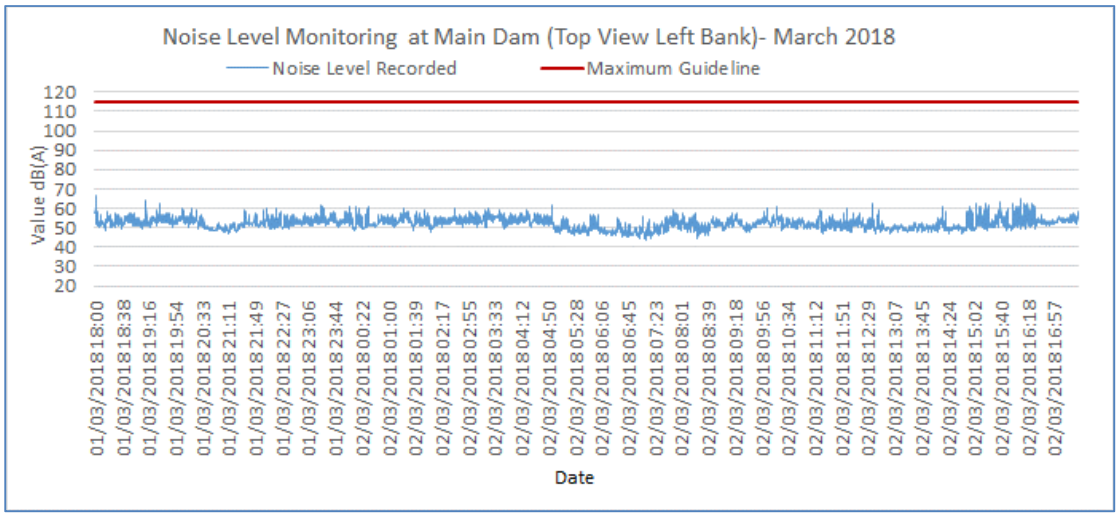


Figure C- 8: Results of Noise Level Monitoring at Lilama10 Camp* in *Febuary 2018

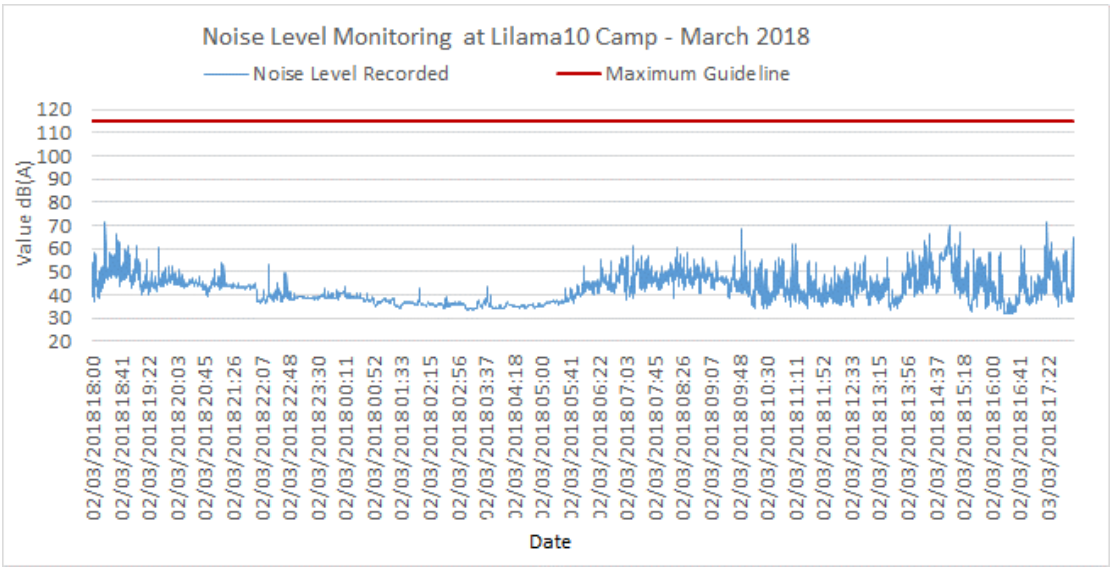


Table C-9 and Table C-10: Average Results of Noise Monitoring at Main Powerhouse, and Sino Hydro Camp in March 2018

Main Powerhouse ***Sino Hydro Camp***

Noise Level (dB)	28-29/March/18		29/March/18	Noise Level (dB)	15-16/March/18		16/March/18
	18:00 – 22:00	22:01 – 06:00	06:01-18:0		18:00 – 22:00	22:01 – 06:00	06:01-17:30
Data Record Max	82.7	62.8	86.(	Maximum Value Recorded	57.9	75.7	64.3
Guideline Max	***115***	***115***	***11***	***Guideline Max***	***115***	***115***	***115***
Data Record Average	55.21	46.83	64.4	Average Data Recorded	47.12	49.32	50.83
Guideline Averaged	***70***	***70***	***7(***	***Guideline Averaged***	***70***	***50***	***70***

Figure C- 9: Results of Noise Level Monitoring at Main Powerhouse in March 2018

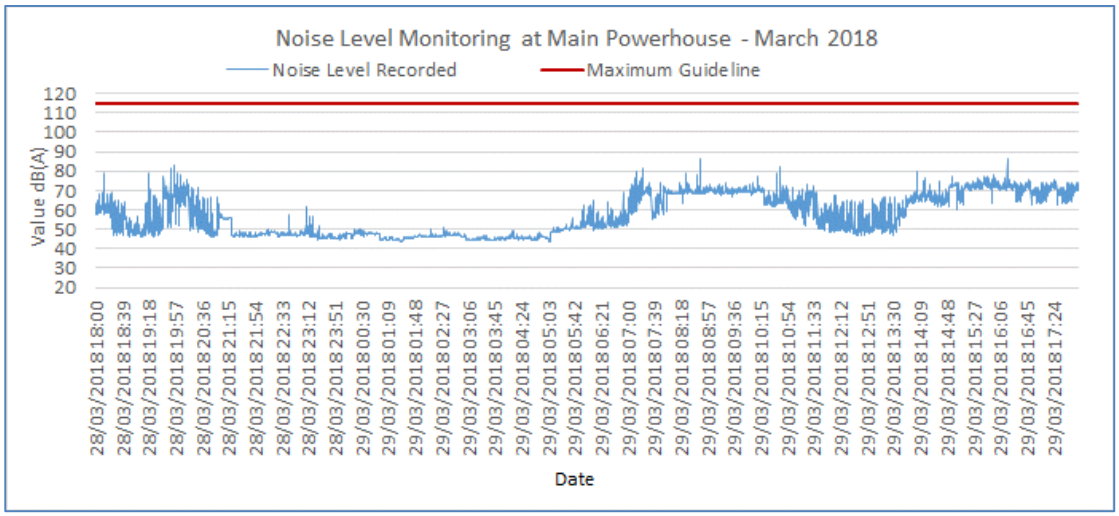


Figure C-10: Results of Noise Level Monitoring at Sino Hydro Camp in March 2018