



NAM NGIEP 1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Environmental Management Monthly Monitoring Report

November 2017

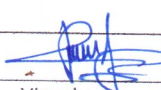
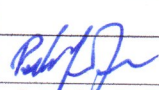
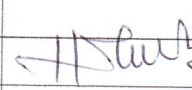
A	20 December 2017	 Viengkeo Phetnavongxay	 Peter Glenssen	 Vilayhak Somsoulivong	
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BBREVIATIONS / ACRONYMS

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
EC OCD	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 November 2017, 10 Site Specific Environmental and Social Management and Monitoring Plans (SS-ESMMP) and one annex of a Detail Work Programme (DWP) were active for EMO review. Out of these, eight SS-ESMMPs and one annex of a Detail Work Programme were cleared, two SS-ESMMPs were carried over to November 2017.

On 29 November 2017, the Environmental Management Unit (EMU) of Bolikhamxay Province visited to the main construction sites, camps and Phouhomxay (the resettlement village, previously called Houay Soup Resettlement Area). The EMU will submit a mission report to EMO review by early December 2017.

The camps' effluents were monitored fortnightly, the result for November 2017 indicated significant improvement for key parameters (BOD, total coliform and faecal coliform), all of which complied with the relevant effluent 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 Phoukham Chanvong (PKC Co., Ltd) was awarded a one-year contract for operating Houay Soup Landfill including waste collection and transportation from Phouhomxay, Thahuea, Hat Gniun villages to Houay Soup Landfill. On 22 – 23 November 2017, a community consultation for solid waste management was carried out with authorities of Phouhomxay, Thahuea, Hat Gniun villages to introduce the scope of waste collection by the local waste collector. The operation of Houay Soup Landfill by the PKC contractor started on 01 December 2017.

The technical workshop for NNP1 Watershed Management Plan with relevant GOL counterparts was conducted on 26-27 September 2017. The results from technical workshop were discussed with IAP and ADB mission on 13 November 2017 and it was recommended that NNP1 should incorporate the comments from the September workshop and move ahead with the plan approval.

The draft proposal of NNP1 “No Net Loss Forecast” was discussed during the IAP and ADB mission on 13 and 18 November 2017. NNP1 and ADB will have further detailed discussions on technical matters and budget prior to approval by NNP1 Shareholders in December 2017.

As of 30 November 2017, out of the total biomass clearance area of 1640 ha, 459 ha have been fully cleared and vegetation cutting has been completed in another 907 ha making the area ready for burning of the cut biomass.

The fishery monitoring programme has continued as planned. The data from the daily fish catch logbook indicates that the mean daily fish catch in Nam Ngiep River was 1.6 kg/household/day in October 2017. The estimated total fish catch in Nam Ngiep basin for October 2017 is 39,500 kg. Around 33 % of the catch was sold, 58% was consumed fresh, 6% processed and approximately 3% was used for other purposes.

1. INTRODUCTION

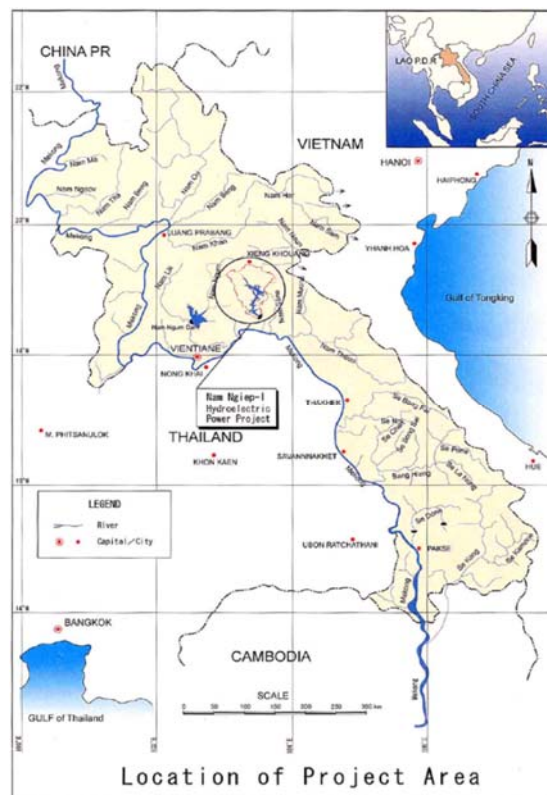
The Nam Ngiep originates in the mountains of Xieng Khouang Province, flowing through Khoun District into Thathom District of Xaysomboun Province, through Hom District and into Bolikham District of Bolikhamxay Province. The Nam Ngiep meets the Mekong River just upstream from Pakxan in Bolikhamxay Province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



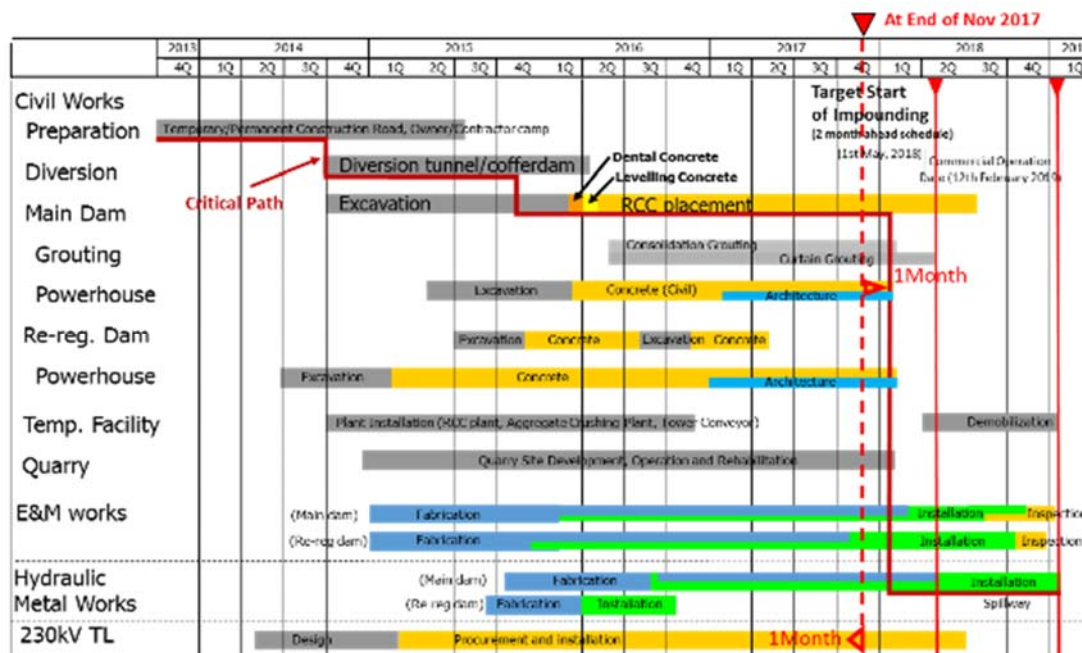
2. WORK PROGRESS OF PRINCIPAL CONTRACTORS

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 November 2017 was 88.7 %¹ (compared to planned progress of 88.4 %), 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 November 2017 was 90.0 % (compared to planned progress of 82.2 %) 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 95 % by achievement of total anticipated drilled length as of the end of November 2017 as a proportion of the total expected drilling

Table 2-1: Progress of consolidation and curtain drilling for grouting at the end of October 2017

Item	Description	Total Drilling (m)	Completed (m)	Progress (%)
Consolidation Grouting	Anticipated Quantity	17,769	16,978	95
Curtain Grouting	Original Design Quantity	27,945	28,420	102
	Anticipated Final Quantity	58,400	28,420	48

*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. Overhead travelling crane runway beam was installed in December 2016. Progress of the powerhouse concreting works is still proceeding well and is shown in **Error! Reference source not found.** below

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

Location	Total Anticipated Volume (m ³)	Completed (m ³)	Progress (%)
Main Powerhouse	32,600	31,870	97
Penstock Embedment	10,257	8,571	83
Spillway	37,650	10,861	29



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 30 November 2017

Status Of Construction Progress		2016				2017			
		1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Powerhouse (Substructure)		Planned (85%)				2 nd Stage Concrete (100%)			
Powerhouse (Building)		Structural				Architectural			

Powerhouse Building Works	Concrete Second Phase (m ³)	Painting Inside and Outside (m ²)	Lighting Fixture (nos)	Electrical Conduit and Wire (m)	Handrail (m)	Duct Work (m)	Fire Alarm System (Conduit) (m)	Epoxy Coating (Dust and Acid) (m ²)
Designed	3,496	6,135	311	2,510	460	345	1,208	1,476
Completed	3,496	5,024	296	2,460	414	345	1,208	875
Progress	100 %	82 %	95 %	98 %	90 %	100 %	100%	59%



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 November 2017 was 91.6 % (compared to planned progress of 95.1 %).

Figure 2-4: Preparation for installation of stay ring OHTC for unit 1 at the main powerhouse



Figure 2-5: Preparation for Installation of Stay Cone at the re-regulation powerhouse



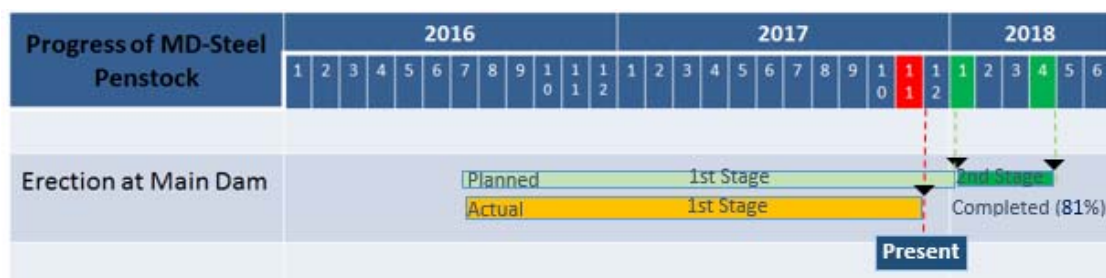
2.3 Hydro-Mechanical Works

The HMWC was executed between IHI Infrastructure Systems (IIS) and NNP1PC on 18 April 2014 and the NTP was issued to the Contractor on 03 October 2014. The actual cumulative work progress of the Hydro-Mechanical Works until the end of November 2017 was 56.5 % (compared to planned progress of 56.5 %).

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 2-6 below:

Figure 2-6: Progress of the penstock pipe fabrication at the IHI field shop as at the end of November 2017



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 2017 was 98.1 % (compared to planned progress of 98.3 %).

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 2-7** below)

Figure 2-7: Cumulative Work Progress of Tower Foundation (Original Planned and Actual)

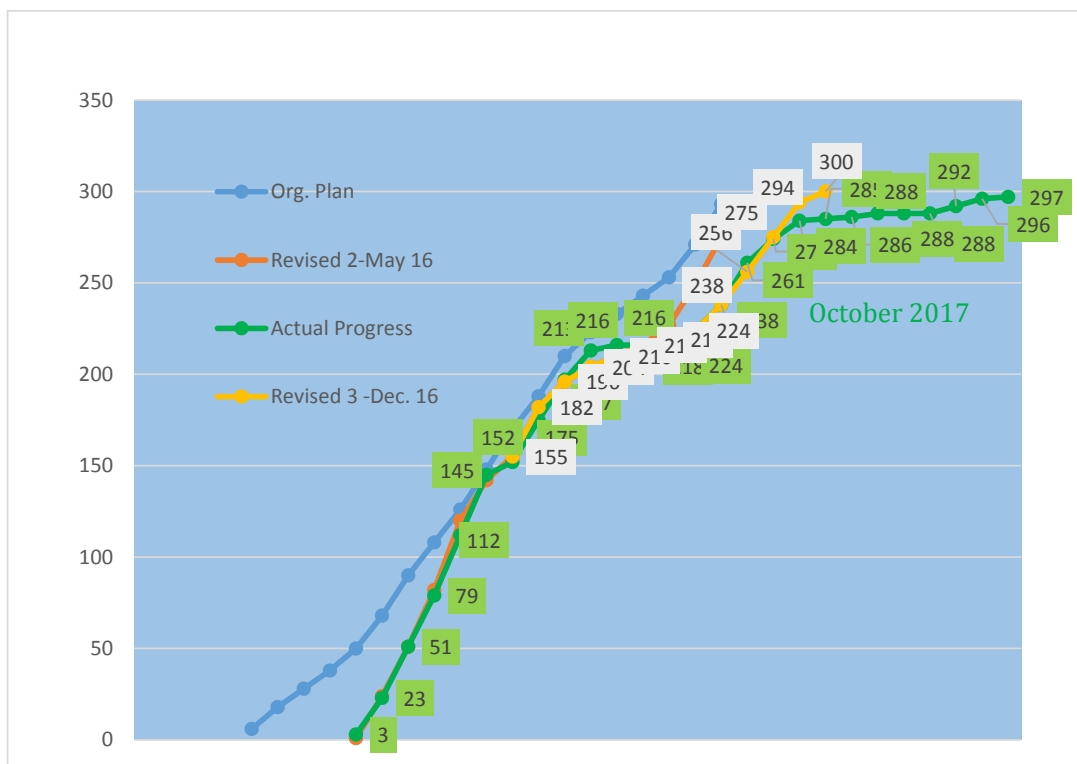


Figure 2-8: Cumulative Works Progress of tower foundation (Revised Planned & Actual)

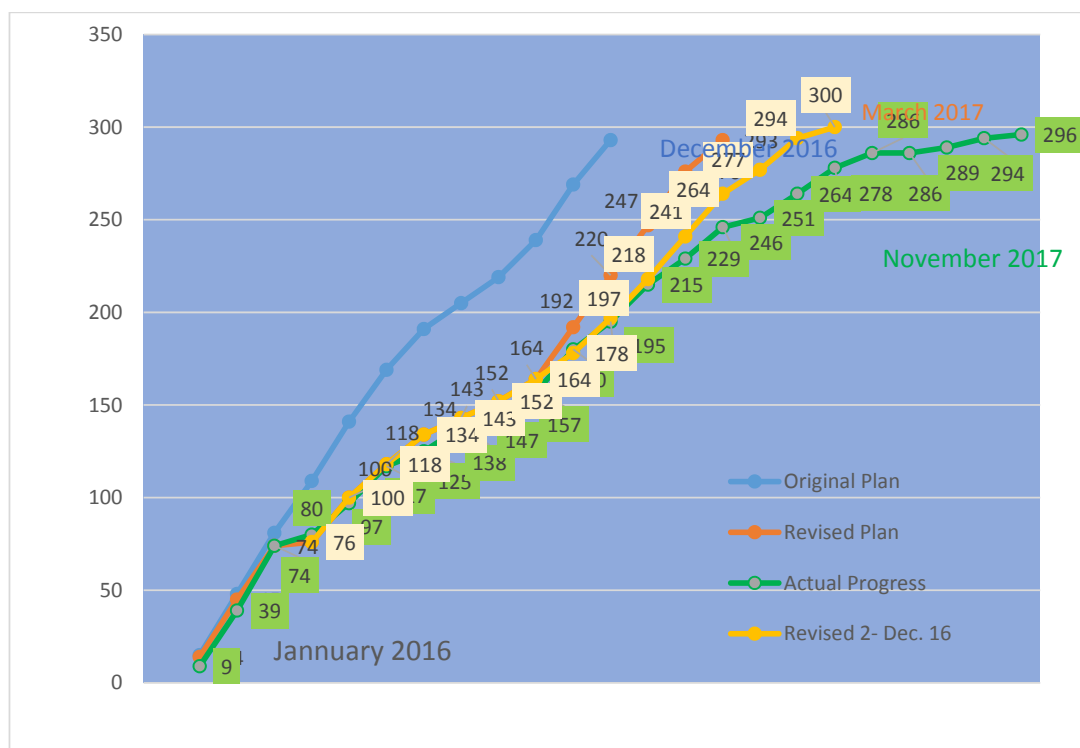


Figure 2-9: Revised Cumulative Works Progress of Tower Erection (Planned & Actual)

3. ENVIRONMENTAL MANAGEMENT MONITORING

3.1 Compliance Management

3.1.1 Site Specific Environmental and Social Management and Monitoring Plans

During November 2017, 10 Site Specific Environmental and Social Management and Monitoring Plans (SS-ESMMP) and one annex of a Detail Work Programme (DWP) were active for EMO review. Out of these, eight SS-ESMMPs and one annex of a Detail Work Programme were cleared, two SS-ESMMPs were carried over to December 2017.

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

Title	Date Received	Status
DWP & Appendix for Aggregate Crushing Plant	05 July 2017 (5 th submission)	No objection with comments on 16 November 2017
SS-ESMMP for Houay Soup Landfill Operation	08 October 2017 (1 st submission)	No objection with comments on 14 November 2017
SS-ESMMP for Construction of Internal Road 3.1 km in HSRA	25 October 2017 (2 nd submission)	No objection with no further comments on 15 November 2017
	07 November 2017 (1 st submission)	Returned with comments on 14 November 2017

Title	Date Received	Status
SS-ESMMP for Construction of Access Road No.1 & No. 2 to Agricultural Land at Zone 2UR	14 November 2017 (2 nd submission)	No objection with no further comments on 16 November 2017
SS-ESMMP for Construction of Internal Road 1.73 km in HSRA	22 November 2017 (1 st submission)	No objection with no further comments on 27 November 2017
SS-ESMMP for Electrical Work for Re-regulation Power Station	04 November 2017 (1 st submission)	No objection with no further comments on 27 November 2017
SS-ESMMP for Electrical Work for Main Power Station	15 November 2017 (1 st submission)	No objection with no further comments on 27 November 2017
SS-ESMMP for Construction of Tractor Road 2.7km at HSRA.	27 November 2017 (3 rd submission)	No objection with no further comments on 31 November 2017
SS-ESMMP for Water Supply Installation for three villages (zone4) downstream of NNP1 Project.	27 November 2017 (1 st submission)	No objection with no further comments on 31 November 2017
SS-ESMMP for Assembly of Stator in Re-Reg Power Station.	24 November 2017 (1 st submission)	Under review
SS-ESMMP for Assembly and Installation of Distributor for in Re-Reg Power Station.	29 November 2017 (1 st submission)	Under review

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 October 2017	7	0	2	0
Newly Opened in November 2017	8	0	0	0

Total in November 2017	15	0	2	0
Resolved in November 2017	3	0	1	0
Carried over into December 2017	12	0	1	0
Unsolved Exceeding Deadlines	6	0	1	0

Figure 3-1: Summary of ONC and NCR

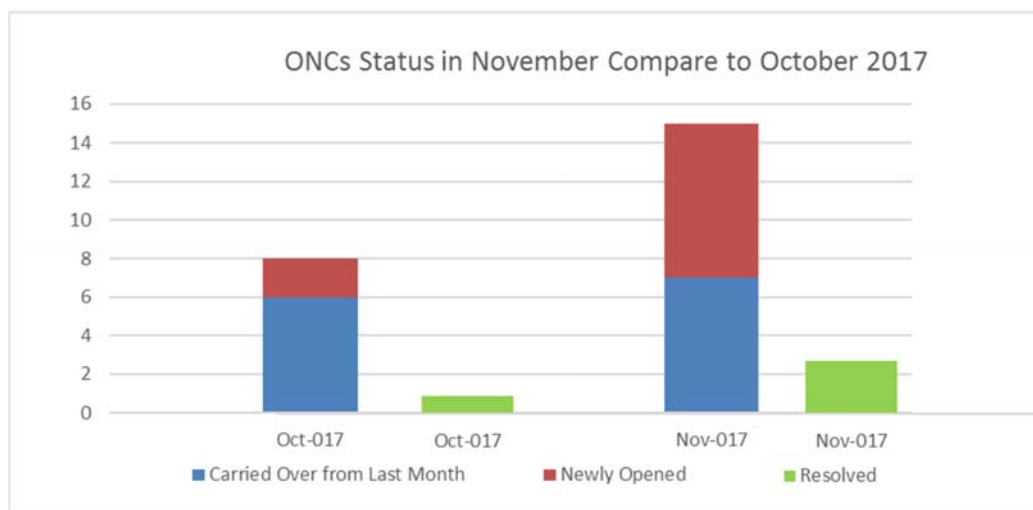


Table 3-3: Carried-Over ONC and NCR from November 2017 into December 2017

Site ID	Issues	Reporting	Actions
Re-Regulation Dam (Borrow Pit Area at Corner of P1 & P1A Road)	<p>The borrow pit was operated without adequate environmental management actions:</p> <ul style="list-style-type: none"> - The slope of the cut had no berm and cut-off drains; - Lack of closure plan for the borrow pit <p>First inspection: 30 August 2016 Latest inspection: 22 November 2017</p>	ONC (Closure Pending)	<p>The contractor was instructed to submit a closure plan for the borrow pit by end of November 2017.</p> <p>A submission of a closure plan will be followed up and reported in December 2017.</p>
Main Dam WWTS No. 1	<p>Turbid water with high pH was discharged from a sediment pond next to the Main Dam Powerhouse into the Nam Ngiep (NCR_OC-0020).</p> <p>First inspection: 18 July 2017 Latest inspection: 22 November 2017</p>	NCR2 (Closure pending)	<ul style="list-style-type: none"> - The Contractor has been carrying out proper operation and maintenance of the Main Dam's WWTS which resulted in a constant compliance of effluent water quality from October to November 2017. - A closure letter of this NCR2 was submitted for management review and will be sent to the contractor by the first week of December 2017.
Building Concept Construction SOLE (HSRA)	<p>Leakage of black water from the septic tank into a grey water pond was observed. There is a risk of bacterial rich wastewater overflowing or seeping into the outside environment. (ON_BC-0001).</p> <p>First inspection: 07 September 2017 Latest inspection: 28 November 2017</p>	ONC (Closure pending)	The decommissioning of workers' camp and facilities are in progress following the submitted Site Decommissioning Plan.
Temporary Accommodation for 44 HH from 2LR at HSRA	The decommissioning of a temporary accommodation at HSRA was not completed. The bamboo building structure, toilet septic tanks and waste water ponds were	ONC (Closure pending)	The temporary accommodation will be decommissioned by the end of December 2017 as stated in the SS-ESMMP.

Site ID	Issues	Reporting	Actions
	not removed and sanitised (ON_INFRA-0001). First inspection: 07 September 2017 Latest inspection: 28 November 2017		
Vieng Oudom Sup Construction Co., Ltd (HSRA)	The Contractor will finish all construction activities at the middle of October 2017, however, the submission of a revised DWP & SS-ESMMP and Site Decommissioning Plan for EMO review and clearance is pending (ON_VDC-0002). First inspection: 19 September 2017 Latest inspection: 28 November 2017	ONC (Closure pending)	The contractor was instructed to revise and resubmit the DWP & SS-ESMMP to include the Site Decommissioning Plan at least 07 days before final Inspection.
Vannavong Construction Co., Ltd (HSRA)	The Contractor will finish all construction activities by the end of September 2017, the existing DWP & SS-ESMMP was pending revision. (ON_VNV-0002). First inspection: 19 September 2017 Latest inspection: 28 November 2017	ONC (Closure pending)	The Contractor was recommended to revise and submit a DWP & SS-ESMMP to include the Site Decommissioning Plan and submitted at least 07 days prior to Final Inspection.
Kenber –Main Dam	An electricity generation was operated without any measures for oil spill as a result, oil continued to seep through the generator causing oil film and soil contamination. (ONC_OC-0268) First inspection: 07 November 2017 Latest inspection: 21 November 2017	ONC (New)	The contractor is required to clean up the oil contaminated soil and store it in a secure facility for proper elimination, provide an oil protective tray, absorbent pads and dry sand on site.
Songda5 Camp No:1	A total of 80 paint drums were placed together with other construction materials	ONC (New)	The contractor is required to remove all paint drums to a proper hazardous material storage with

Site ID	Issues	Reporting	Actions
	on the ground without a protective bund and floor. (ONC_OC-0269) First inspection: 21 November 2017 Latest inspection: Not available		concrete floor and bund with caution signboard.
SXN Camp	<ul style="list-style-type: none"> - Unsecure camp and facilities. Plastic sheet was used as the camp roofing and wall material; - Grey water from cooking area was discharged directly to Nam Ngiep river; - No waste collection which resulted in disposing of waste around camp areas (ONC_SXN-0001) First inspection: 10 November 2017 Latest inspection: Not available	ONC (New)	<p>The contractor was instructed to:</p> <ul style="list-style-type: none"> - Collect and segregate the waste properly by following the waste management sub-plan as proposed in the contractor SS-ESMMP; - Improve the camp and facilities as per proposed Appendix 4 of the contractor DWP & SSESMP; and - Move cooking and washing areas at least 30m away from the Nam Ngiep River bank, all waste water from cooking and washing needs to be drained to the waste water pond for treatment.
KCP Camp	Improper management of hazardous material. Five oil drums of 250 litre capacity were stored on the ground due to insufficient space in the existing hazardous storage. (ONC_KCP-0002) First inspection: 28 November 2017 Latest inspection: Not available	ONC (New)	The contractor was instructed to provide oil spill protective tray for a temporary storage of oil drums and improve the existing hazardous storage facility to properly handle hazardous material by 12 December 2017.
VSP Camp	Poor housekeeping was observed. Solid waste was disposed around camp (ONC_VSP-0006) First inspection: 28 November 2017	ONC (New)	The contractor was instructed to improve the camp hygiene and sanitation by the next joint site inspection on 12 December 2017 including the following corrective action:

Site ID	Issues	Reporting	Actions
	Latest inspection: Not available		<ul style="list-style-type: none"> - Clean up the camp premises on daily basis; and - Dispose general waste at Houay Soup Landfill on regular basis to avoid waste accumulation and vector attraction.
Pyramid's Sub-contractor	Pyramid's sub-contractors set up two seeping huts at the construction site within Phouhomxay village without a management plan, no waste bins, toilet and other appropriate camp facilities provided at the camp; (ONC_PRMC-0001) First inspection: 28 November 2017 Latest inspection: Not available	ONC (New)	<p>The Pyramid contractor was instructed to:</p> <ul style="list-style-type: none"> - Provide a secure camp and proper camp facilities for their sub-contractor including waste bins, toilet, cooking and washing areas; and - Submit the camp operation and management as well as decommissioning plan for EMO's review and approval by 12 December 2017.
Vannavong's Sub-contractor	Vanavong's sub-contractors set up a sleeping hut at the construction site within Phouhomxay village without a management plan, no waste bins, toilet and other appropriate camp facilities provided at the camp; (ONC_VNV-0002) First inspection: 28 November 2017 Latest inspection: Not available	ONC (New)	<p>The Vannavong contractor was instructed to:</p> <ul style="list-style-type: none"> - Provide a secure camp and proper camp facilities for their sub-contractor including waste bins, toilet, cooking and washing areas; - Submit the camp operation and management as well as decommissioning plan for EMO's review and approval by 12 December 2017.

Figure 3-2: Site Inspection Locations

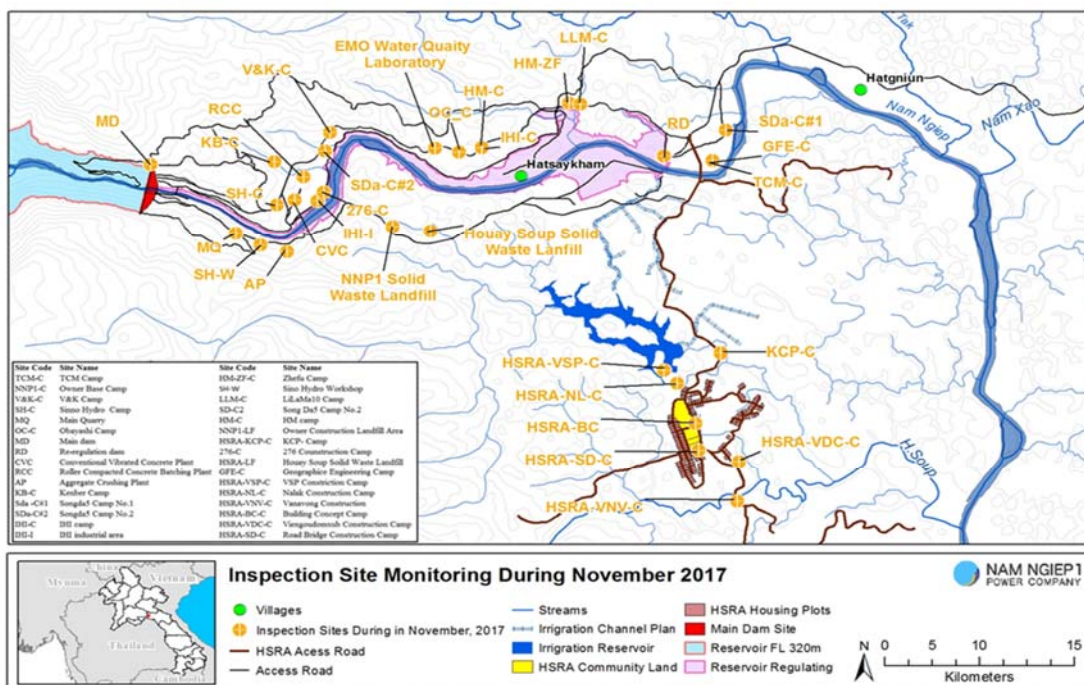
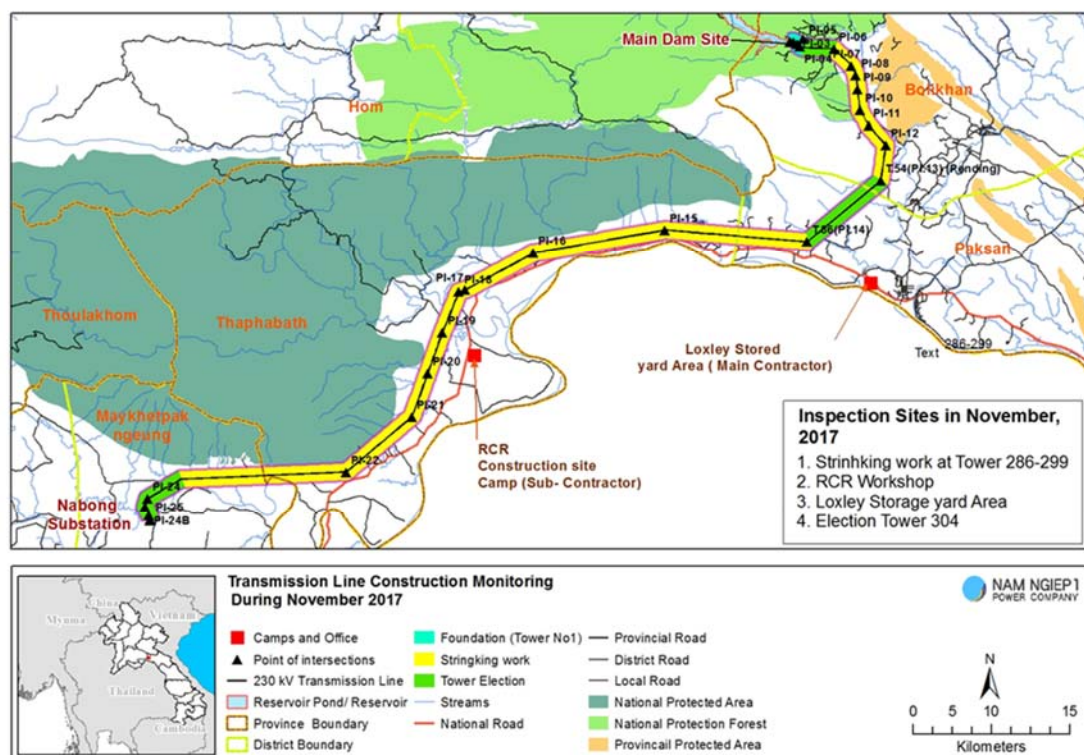


Figure 3-3: 230 kV Transmission Line Construction Monitoring



3.1.3 Inspection by Environment Management Unit

The Environmental Management Unit (EMU) of Bolikhamxay Province visited NNP1 on 29 November 2017, and the following findings were discussed in the filed with EMO, OC and the civil sub-contractors.

- To improve maintenance and operation of WWTS at Song Da 5 Camp No.2;
- To properly manage grey water at the main dam's temporary toilet;
- Erosion control plan for the Main Dam outlet portal to be provided; and
- The EMU's warning letter dated 31 July 2017 will be closed upon receiving a report from NNP1. EMO is preparing the report.

The EMU will submit a mission report to EMO for review by early December 2017.

NNP1PC is working with the contractors to address these findings and recommendations and an official response with progress report addressing the recommendations of the EMU will be submitted to the EMU by the middle of December 2017.

3.2 Environmental Quality Monitoring

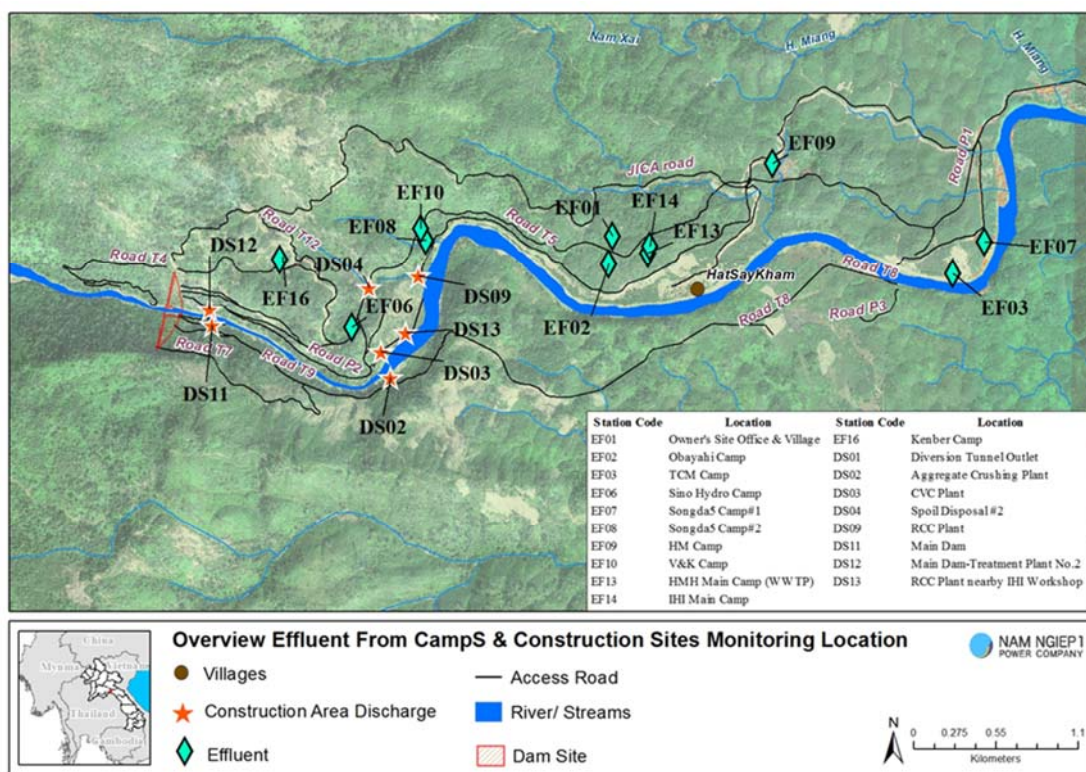
The analyses of Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD5), faecal coliform, E. Coli bacteria and total coliform have been carried out by NNP1PC Environmental Laboratory since August 2017.

All data are reported to the Ministry of Natural Resources and Environment (MONRE) on a monthly basis and quarterly to the ADB. The reports are also published on the Company's website.

3.2.1 Effluent Discharge from Camps and Construction Sites

During November 2017, 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.*, and the monitoring locations are displayed

Figure 3-4 below.

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 November 2017 indicate that all key parameters (BOD₅, total coliform and faecal coliform) are in compliance with the relevant effluent standards.

The sediment control at the Aggregate Crushing Plant and RCC Plant continues to improve by application of a coagulant (Ammonium aluminium sulfate). Only a minor exceedance of the TSS standard was measured at the RCC Plant discharge (DS09) on 16 November 2017.

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-compliances for total nitrogen.	No corrective action is required.
Obayashi Corporation Camp	EF02	Non-compliances for TSS, ammonia nitrogen (NH ₃ -N), total nitrogen.	The effluent monitoring result is being shared with Contractor to improve the operation of the WWTS.
Sino Hydro Camp	EF06	Non-compliances for ammonia nitrogen (NH ₃ -N), total nitrogen, total phosphorus	As above.
Song Da5 Camp No. 1	EF07	Non-compliances for ammonia nitrogen (NH ₃ -N) and total nitrogen.	As above.
Song Da5 Camp No. 2	EF08	Non-compliance for COD, ammonia nitrogen and total nitrogen.	As above.
Zhefu Camp (Subcontractor of Hitachi-Mitsubishi Hydro)	EF09	No sampling due to no discharged.	
V&K Camp	EF10	Full compliance	
H-MH Main Camp (WWTS)	EF13	Non-compliance for COD, NH ₃ -N, total nitrogen and oil & grease.	As above.
IHI Main Camp	EF14	Non-compliance for COD, NH ₃ -N, total nitrogen.	As above.
Kenber Camp	EF16	Full compliance	
Main Dam Construction Area (Waste Water Treatment Plant No.1)	DS11	Full compliance	
Main Dam Construction Area (Waste Water Treatment Plant No.2)	DS12	No discharge during the missions	
Spoil Disposal Area No.2 (Song Da5 Workshop)	DS04	Non-compliance for TSS	As above.

Site	Sampling ID	Status	Corrective Actions
CVC Plant	DS03	No discharge during the missions.	
RCC Plant (discharge point at the weirs)	DS09	All monitored parameters (except minor exceedance for TSS on 16 November 2017) complied with the Standard.	As above.
RCC Plant (Discharged nearby IHI Workshop)	DS13	No sampling at this point. The DS13 was joined with DS09.	
Aggregate Crushing Plant	DS02	All monitored parameters complied with the Standard.	

3.2.2 Ambient Surface Water Quality Monitoring

The surface water quality monitoring programme comprises 14 monitoring stations. The November 2017 programme is summarized 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 ($\mu\text{S}/\text{cm}$), TDS (mg/l), Temperature ($^{\circ}\text{C}$), Turbidity (NTU), TSS (mg/l), BOD5 (mg/l), Faecal coliform (MPN/100 ml) and Total coliform (MPN/100 ml)	<ul style="list-style-type: none"> - 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 ($\mu\text{S}/\text{cm}$), TDS (mg/l), Temperature ($^{\circ}\text{C}$), Turbidity (NTU)	All 14 stations
Monthly	TSS (mg/l), BOD5 (mg/l), COD (mg/l), NH3-N (mg/l), NO3-N (mg/l), total coliform (MPN/100 ml), faecal coliform (MPN/100 ml)	All 14 stations

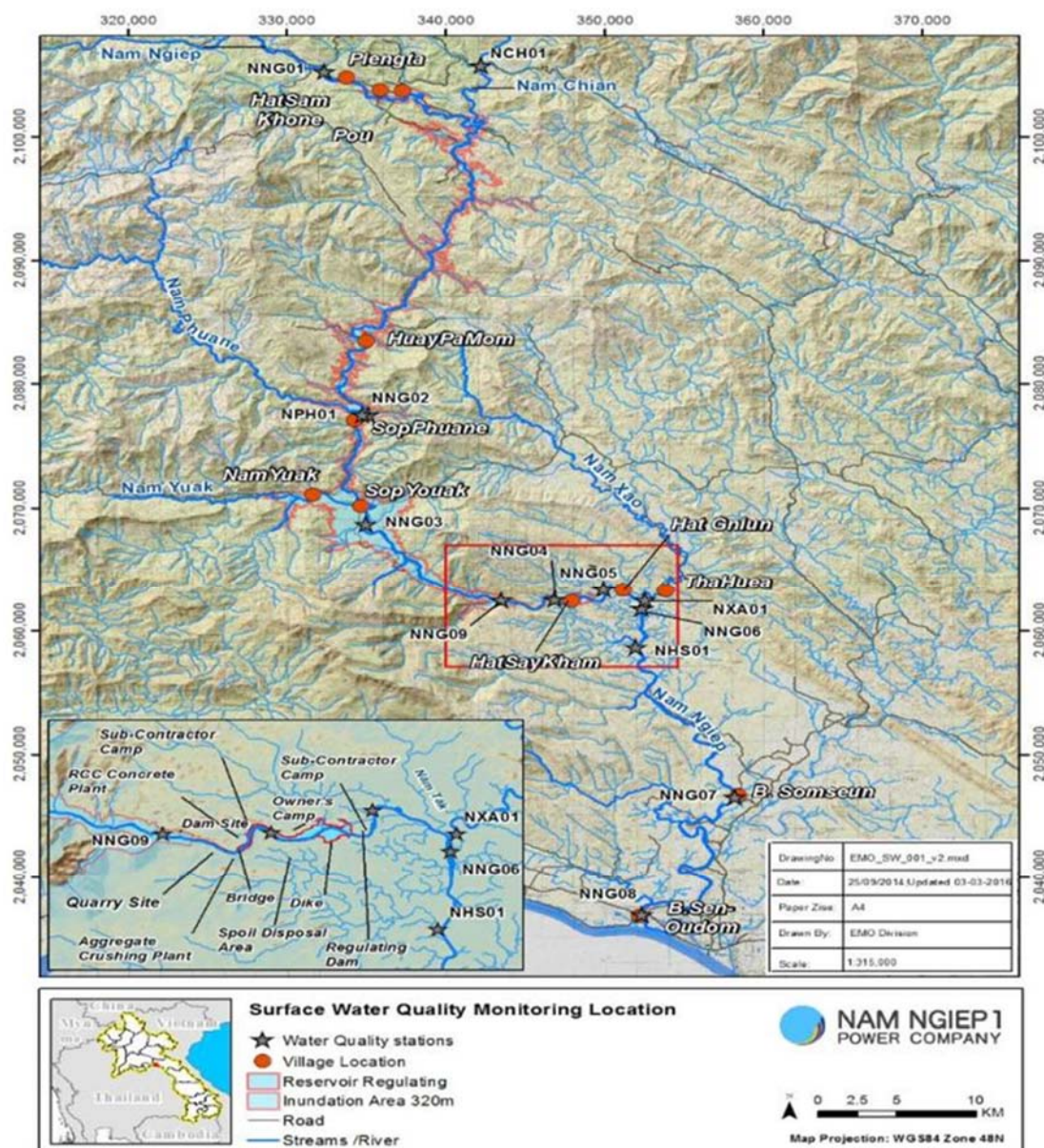
Figure 3-5 below.

During the period from 02-10 November 2017, NNP1PC carried out a controlled sediment flushing of the re-regulation reservoir in order to remove sediments that had accumulated as a result of the Nam Ao dam break on 11 September 2017. During the flushing operation, NNP1PC undertook intensive (hourly/daily) water quality monitoring in 9 stations immediately upstream and downstream the Construction Area, in the re-regulation reservoir and in Nam Xao, and Houay Soup. The flushing operation and the monitoring data will be presented in a separate report.

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

Frequency of Monitoring	Parameters (Unit)	Monitoring Sites
Weekly	pH, DO (%), DO (mg/l), Conductivity ($\mu\text{S}/\text{cm}$), TDS (mg/l), Temperature ($^{\circ}\text{C}$), Turbidity (NTU), TSS (mg/l), BOD ₅ (mg/l), Faecal coliform (MPN/100 ml) and Total coliform (MPN/100 ml)	<ul style="list-style-type: none"> - 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 ($\mu\text{S}/\text{cm}$), TDS (mg/l), Temperature ($^{\circ}\text{C}$), 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

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



Key findings for surface and re-regulation reservoir water quality monitoring in November 2017 are shown in **Table 3-6** to Error! Reference source not found. below.

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

River Name	Nam Ngiep									
Zone	Location Refer to Construction Sites									
	Upstream				Within / Re-regulation Reservoir		Downstream			
Station Code	NNG01	NNG02	NNG03	NNG09	NNG04 / R6	R7	NNG05	NNG06	NNG07	NNG08

Final- 20 December 2017

	Date	16-Nov-17	16-Nov-17	16-Nov-17	16-Nov-17	16-Nov-17	16-Nov-17	16-Nov-17	16-Nov-17	16-Nov-17	16-Nov-17
Parameters (Unit)	Guideline										
pH	5.0 - 9.0	8.04	7.83	7.88	7.93	7.06	7.67	7.8	7.96	7.72	7.73
Sat. DO (%)		99.2	100.9	103.5	102.2	100.4	100.2	103.9	103.4	104.6	102
DO (mg/l)	>6.0	8.41	7.67	7.97	8.05	8.24	8.26	8.19	8.05	8.01	7.95
Conductivity (µs/cm)		74.3	83.5	66.7	69.3	106	99	68	69.7	71.7	70.6
TDS (mg/l)		37	41	33	34.5	53	49	34	34.85	35.8	35.3
Temperature (°C)		21.6	27.8	27.2	25.1	24.29	25.49	26.4	27	28	26.7
Turbidity (NTU)		16.1	17.4	14	11.8	7.95	8.39	15.54	16.14	11.2	16.6
TSS (mg/l)		26.83	39.02	34.84	26.64	13.9	8.01	19.38	24.74	27.18	48.08
BOD ₅ (mg/l)	<1.5	1.08	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
COD (mg/l)	<5	<5	6.1	<5	5.9	5.7	6.9	<5	8.5	5.9	6.7
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	0.08	0.08	0.09	0.09	0.09	0.06	0.09	0.05	0.09	0.09
Faecal coliform (MPN/100ml)	<1,000	1,600	220	280	220	280	220	350	350	280	280
Total Coliform (MPN/100ml)	<5,000	1,700	920	1,600	280	350	280	350	350	280	350

Table 3-7: Results of Nam Ngiep Surface Water Quality Monitoring on 02, 9, 23 and 28 November 2017

	River Name	Nam Ngiep							
	Zone	Location Refer to Construction Sites							
		Upstream	Within / Re-regulation Reservoir		Downstream				
	Station Code	NNG09	NNG04 / R6	R7	NNG05	NNG06	NNG07	NNG08	
	Date	2-Nov-17	2-Nov-17	2-Nov-17	2-Nov-17	2-Nov-17	2-Nov-17	2-Nov-17	
Parameters (Unit)	Guideline								
pH	5.0 - 9.0	7.45	6.9	6.72	8.08	8.15	7.13	7.11	
Sat. DO (%)		104.1	101	91.7	103.7	102.7	95.9	94.4	
DO (mg/l)	>6.0	8.61	8.53	7.77	8.71	8.59	8.13	7.9	
Conductivity (µs/cm)									
TDS (mg/l)									
Temperature (°C)		23.41	22.4	22.47	23.1	23	23	23.6	
Turbidity (NTU)		47.7	36.4	40.58	38.5	36.6	57.73	34.85	
TSS (mg/l)		92.5	84	42.08	44.61	50	56.04	37.14	
BOD ₅ (mg/l)	<1.5	1.18	1.07	1.08	1.26				
Faecal coliform (MPN/100ml)	<1,000	1,600	1,600	1,600	1,600				

	River Name	Nam Ngiep						
	Zone	Location Refer to Construction Sites						
		Upstream	Within / Re-regulation Reservoir		Downstream			
	Station Code	NNG09	NNG04 / R6	R7	NNG05	NNG06	NNG07	NNG08
Date	2-Nov-17	2-Nov-17	2-Nov-17	2-Nov-17	2-Nov-17	2-Nov-17	2-Nov-17	2-Nov-17
Parameters (Unit)	Guideline							
Total Coliform (MPN/100ml)	<5,000	1,600	1,600	1,600	1,600			

	River Name	Nam Ngiep						
	Zone	Location Refer to Construction Sites						
		Upstream	Within / Re-regulation Reservoir		Downstream			
	Station Code	NNG09	NNG04 / R6	R7	NNG05	NNG06	NNG07	NNG08
Date	9-Nov-17	9-Nov-17	9-Nov-17	9-Nov-17	9-Nov-17	9-Nov-17	9-Nov-17	9-Nov-17
Parameters (Unit)	Guideline							
pH	5.0 - 9.0	7.42	7.19	7.9	7.97	7.93	6.91	6.87
Sat. DO (%)		98.9	100	98.8	105.1	102.2	97.6	93.6
DO (mg/l)	>6.0	8.25	8.34	8.11	8.73	8.46	8.2	7.57
Conductivity (µs/cm)								
TDS (mg/l)								
Temperature (°C)		23.12	23.02	24.05	23.7	23.8	23.2	25.1
Turbidity (NTU)		13.5	12.54	10.4	7.04	8.06	37.27	62.75
TSS (mg/l)		29	18.88	15.05	26.13	24.3		
BOD ₅ (mg/l)	<1.5	<1.0	<1.0	<1.0	<1.0			
Faecal coliform (MPN/100ml)	<1,000	920	280	170	220			
Total Coliform (MPN/100ml)	<5,000	920	280	280	280			

	River Name	Nam Ngiep			
	Zone	Location Refer to Construction Sites			
		Upstream	Within / Re-regulation Reservoir		Downstream
	Station Code	NNG09	NNG04 / R6	R7	NNG05
Date		23-Nov-17	23-Nov-17	23-Nov-17	23-Nov-17
Parameters (Unit)	Guideline				
pH	5.0 - 9.0	7.58	7.5	7.65	7.45
Sat. DO (%)		98.6	89.3	92.8	100.2
DO (mg/l)	>6.0	8.16	7.3	7.27	8.62
Conductivity (µs/cm)		118	120	120	120
TDS (mg/l)		59	60	60	60
Temperature (°C)		24.13	24.2	26.77	24.5
Turbidity (NTU)		19.32	16.25	9.19	13.64
TSS (mg/l)		11.8	15.4	<5	<5
BOD ₅ (mg/l)	<1.5	<1.0	<1.0	<1.0	<1.0
Faecal coliform (MPN/100ml)	<1,000	170	79	130	110
Total Coliform (MPN/100ml)	<5,000	220	79	170	110

	River Name	Nam Ngiep									
	Zone	Location Refer to Construction Sites									
		Upstream				Within / Re-regulation Reservoir		Downstream			
	Station Code	NNG01	NNG02	NNG03	NNG09	NNG04 / R6	R7	NNG05	NNG06	NNG07	NNG08
Date		29-Nov-17	29-Nov-17	29-Nov-17	29-Nov-17	29-Nov-17	29-Nov-17	29-Nov-17	29-Nov-17	29-Nov-17	29-Nov-17
Parameters (Unit)	Guideline										
pH	5.0 - 9.0	8.06	8.13	8.1	8.08	7.3	7.55	8.11	7.95	7.94	7.94
Sat. DO (%)		102	102.1	101.6	100.8	91	89.6	101.2	99.2	102.5	99.1
DO (mg/l)	>6.0	8.17	8.49	8.46	8.53	7.75	7.19	8.32	8	8.3	8.15
Conductivity (µs/cm)		71.3	68.6	67.2	74.4	108	98	70.4	72.2	72.6	77.1
TDS (mg/l)		35.5	34.3	33.5	37.2	54	49	35.2	36.1	36.3	38.5
Temperature (°C)		24.7	23.6	23.9	22.5	22.14	23.75	24.3	25.2	24.8	24
Turbidity (NTU)		17.3	19.3	16.8	13.5	17.78	13.11	14.7	11.3	11.6	25.5
TSS (mg/l)					36.43	10.96	21.33	22.95			

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

	River Name	Nam Chain	Nam Phouane	Nam Xao	Nam Houay Soup
	Zone	Location Refer to Construction Sites			
		Tributaries Upstream		Tributaries Downstream	
	Station Code	NCH01	NPH01	NXA01	NHS01
	Date	16-Nov-17	16-Nov-17	16-Nov-17	16-Nov-17
Parameters (Unit)	Guideline				
pH	5.0 - 9.0	7.82	7.74	7.95	7.95
Sat. DO (%)		100.6	103.8	92.1	86.5
DO (mg/l)	>6.0	8.49	8.38	7.16	6.86
Conductivity (µs/cm)		32.1	57.8	99.6	34.5
TDS (mg/l)		16	29	49.8	17
Temperature (°C)		21.5	24.5	27.1	27.5
Turbidity (NTU)		4.24	1.76	2.43	5.39
TSS (mg/l)		4.15	2.05	1.69	1.35
BOD ₅ (mg/l)	<1.5	1.01	<1.0	<1.0	<1.0
COD (mg/l)	<5	7.9	<5	<5	11.2
NH ₃ -N (mg/l)	<0.2	<0.2	<0.2	<0.2	<0.2
NO ₃ -N (mg/l)	<5	0.11	0.1	0.06	0.1
Faecal coliform (MPN/100ml)	<1,000	920	110	170	280
Total Coliform (MPN/100ml)	<5,000	920	170	170	280

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

	River Name	Nam Chain	Nam Phouane	Nam Xao	Nam Houay Soup
Zone	Location Refer to Construction Sites				
	Tributaries Upstream		Tributaries Downstream		
Station Code	NCH01	NPH01	NXA01	NHS01	
Date	29-No-17	29-No-17	29-No-17	29-No-17	
Parameters (Unit)	Guideline				
pH	5.0 - 9.0	8.25	8.06	8.34	8.13
Sat. DO (%)		102.4	103.5	91.5	85.7
DO (mg/l)	>6.0	8.48	8.5	7.33	7.03
Conductivity (µs/cm)		40.4	59.4	103.9	41.7
TDS (mg/l)		20.2	29.2	51.95	20.85
Temperature (°C)		22.3	21.4	25.6	24.4
Turbidity (NTU)		2.9	1.69	2.21	3.78

3.2.3 Groundwater Quality Monitoring

During November 2017, groundwater quality was monitored at the six boreholes built for Phouhomxay. The results were informed to the villagers and local health centre as part of the public health programme. All parameters at the six boreholes complied with the groundwater quality standards for water supply purposes.

Figure 3-6: Groundwater Quality Monitoring Locations

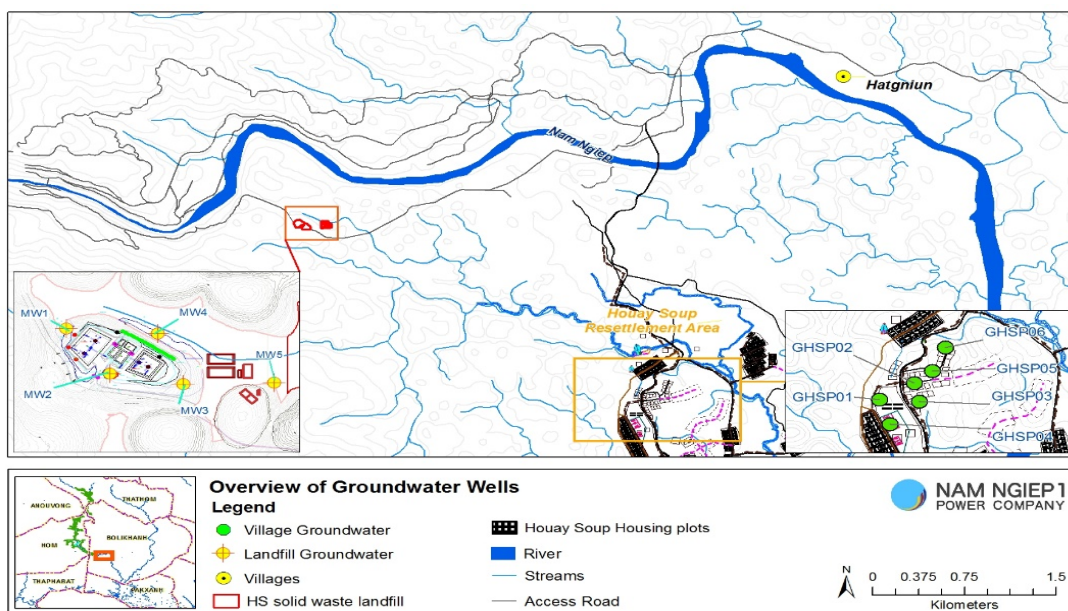


Table 3-10: Groundwater Quality Monitoring Results for Houay Soup Resettlement Area

	Site Name	Houay Soup Resettlement Area					
	Station Code	GHSP01	GHSP02	GHSP03	GHSP04	GHSP05	GHSP06
	Date	21-Nov-17	21-Nov-17	21-Nov-17	21-Nov-17	21-Nov-17	21-Nov-17
Parameter (Unit)	Guideline						
pH	6.5-9.2	7.09	6.8	6.98	7.19	6.89	7.0
DO (%)		98.5	68.3	6.98	6.29	77.3	83
DO (mg/l)		7.66	6.82	6.03	6.29	6.15	6.64
Conductivity (µs/cm)	<1,200	395	304	323	410	302	382
TDS (mg/l)		192	152	161	205	151	191
Temperature (°C)		26.5	26.1	25.3	27.9	25.9	26.5
Turbidity (NTU)	<20	0.66	0.48	0.85	0.48	0.48	0.42
Faecal coliform (MPN/100 ml)	0	0	0	0	0	0	0
E. Coli Bacteria (MPN/100 ml)	0	0	0	0	0	0	0

3.2.4 Gravity Fed Water Supply (GFWS) Quality Monitoring

During November 2017, water samples were taken from the taps at Thahuea and Hat Gniun Villages.

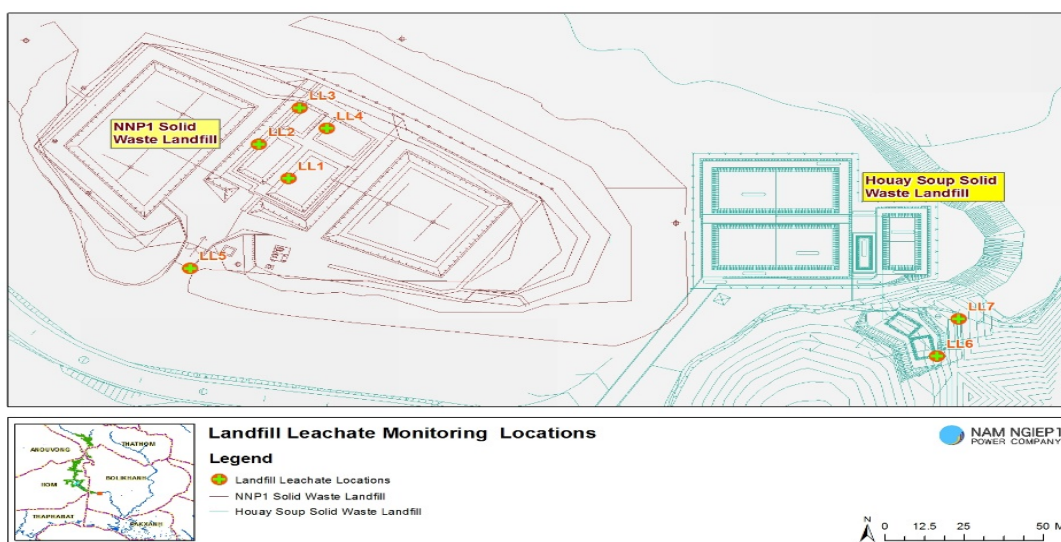
All parameters complied with the National Drinking Water Standards for both Thahuea and Hat Gniun Villages except for faecal coliforms and E.Coli. Presence of E.Coli in the GFWS system is a normal situation, however, local villagers were informed about the results and encouraged to boil the water before drinking.

Table 3-11: Result Gravity Fed Water Supply (GFWS) Quality Monitoring

	Site Name	Thaheua Village	Hat Gnuin Village
	Station Code	WTHH02	WHGN02
	Date	21-Nov-17	21-Nov-17
	Guideline		
pH	6.5-9.2	7.67	7.94
DO (%)		97.5	100.4
DO (mg/l)		7.69	8.02
Conductivity (µs/cm)	<1,200	45.6	65.7
TDS (mg/l)		23	33
Temperature (°C)		26.4	25.7
Turbidity (NTU)	<20	0.58	0.86
Faecal coliform (MPN/100 ml)	0	49	7.8
Ecoli Bacteria (MPN/100 ml)	0	49	7.8

3.2.5 Landfill Groundwater Monitoring

During November 2017, no discharge of treated leachate from neither the NNP1 Project Landfill nor the Houay Soup Landfill has been observed, and water samples were therefore taken from the NNP1 Project Landfill's final leachate pond (LL4), and from the Houay Soup Landfill's final leachate pond (LL6). All results indicated compliance with the relevant standards at all final ponds of both Landfills.

Figure 3-7 Landfill Leachate Monitoring Location**Table 3-12 Landfill Leachate Monitoring Results**

Parameter (Unit)	Site Name	NNP1 Project Landfill Leachate		Houay Soup Landfill	
	Location	Pond No.04	Discharge Point	Last pond	Discharged Point
	Station	LL4	LL5	LL6	LL7
	Date	13-Nov-17	13-Nov-17	13-Nov-17	13-Nov-17
	Guideline				
pH	6.0-9.0	8.13	No Discharge	8.93	No Discharge
Sat. DO (%)		124.5		103.9	
DO (mg/l)		9.41		7.62	
Conductivity (μS/cm)		295		15.14	
TDS (mg/l)		147		7	
Temperature (°C)		28.1		29.8	
Turbidity (NTU)		5.44		1.31	
TSS (mg/l)	<50	14.95		<5	
BOD ₅ (mg/l)	<30	30.54		8.85	
COD (mg/l)	<125	60.3		<25	
Faecal Coliform (MPN/100ml)		13		0	
Total Coliform (MPN/100ml)	<400	23		0	

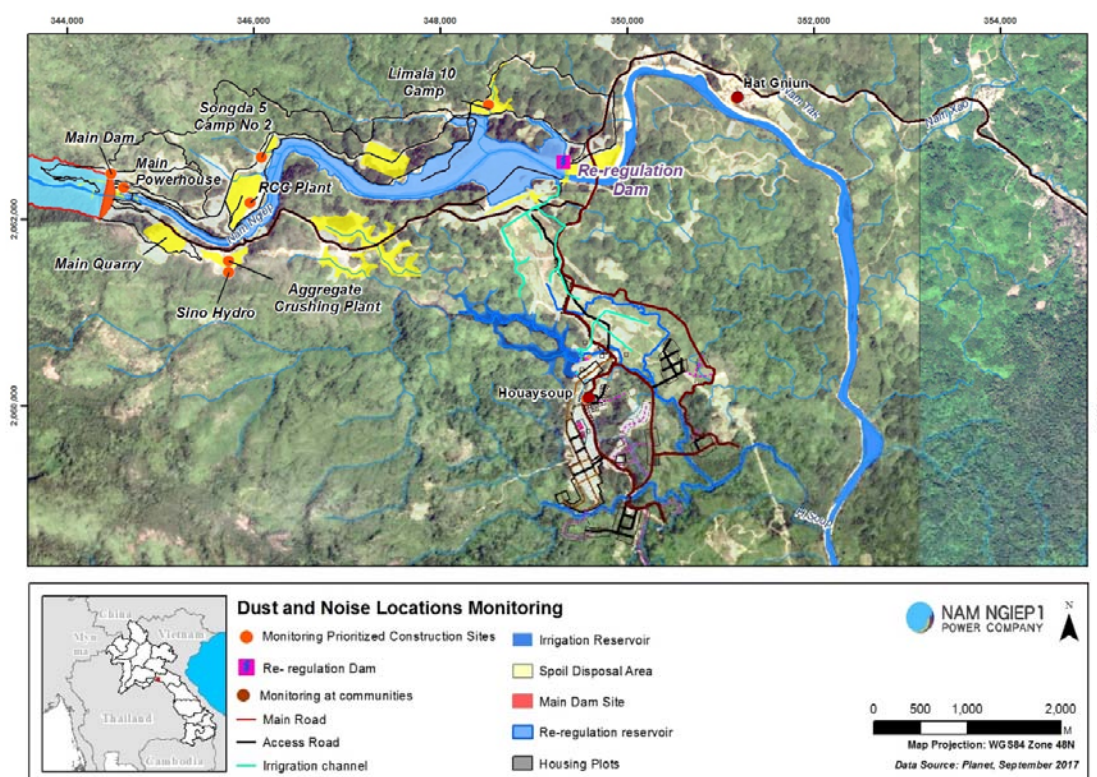
3.2.6 Dust Monitoring

The monitoring points are indicated on the map in **Figure 3-8**. The results indicate compliance with the National Standard, except at the Aggregate Crushing Plant and at the Main Powerhouse. All staff were advised to wear dust masks while working in these areas. The results are presented in **Annex 2**.

3.2.7 Noise Monitoring

During November 2017, noise monitoring was conducted for 72 consecutive hours at Hat Gniun and Houay Soup Resettlement villages; and 24 consecutive hours at the Aggregate Crushing Plant, RCC Plant, Sino Hydro Temporary Worker Camp, Main Dam, Lilama10 Camp, and Main Powerhouse. Unfortunately, the noise monitoring equipment malfunctioned during monitoring at Phouhomxay.

Figure 3-8: Noise and Dust Emission Monitoring Locations



The results at all stations (except Hat Gniun Village and Main Powerhouse) indicated compliance with National Standard for the period of 06:01-22:00. The noise levels during the period of 22:01-18:00 were higher than the Standard at the Main Powerhouse.

3.3 PROJECT WASTE MANAGEMENT

3.3.1 Solid Waste Management

In November 2017, an approximately 160.5 m³ of solid waste was disposed of at the NNP1 Project Landfill, an increase of 12.3 m³ compared to October 2017. Spot checks of waste bags were conducted on a daily basis before disposal of the waste.

A total of 2,377 kg of recyclable waste was sold to Khounmixay Processing Factory by the Contractors as shown **Table 3-13**.

Table 3-13: Amounts of Recyclable Waste Sold

Source and Type of Recycled Waste	Unit	Sold	Cumulative Total by November 2017
Construction activity			

Source and Type of Recycled Waste		Unit	Sold	Cumulative Total by November 2017
1	Scrap metal	kg	2,222	29, 252
Sub-Total 1		kg	2,222	29,252
Operation camp				
2	Glass bottles	kg	7	855
3	Plastic bottles	kg	34.5	256
4	Paper/Cardboard	kg	53.5	215
5	Aluminium can	kg	60	29
Sub-Total 2		kg	155	1,355
Grand Total 1+2		kg	2,377	30,607

A total of 6,718 kg food waste was collected in November 2017 from the selected camps by Hatsaykham Villagers for use as animal feed - an increase of 21 kg compared to October 2017.

Table 3-14 Amounts of Food Waste Collected by Villagers

NO.	SITE NAME	UNIT	TOTAL
1	SongDa5 Camp No. 2	kg	2,612
2	SongDa5 Camp No. 1	kg	2,184
3	Obayashi Corporation Camp	kg	1,094
4	Owner's Village and Site Office (OSOV)	kg	568
5	LILAMA 10 Camp	kg	150
6	Kenber Camp	kg	110
Total		kg	6,718

3.3.2 Hazardous Materials and Waste Management

The amount of hazardous waste collected and transported for offsite treatment and final disposal at Khounmixay Processing Factory in November 2017.

Table 3-15: Results of Hazardous Material Inventory

No.	Hazardous Waste Type	Unit	Total in November 2017 (A)	Disposal by Selling (B)	Remainder (A - B)
1	Used hydraulic and engine oil	litre (l)	11,040	1,430	9,610
2	Contaminated soil, sawdust and concrete	kg	1,105	10	1,095
3	Empty used chemical drum/container	Drum (20 litre)	800	458	342
4	Used oil filters	No.	624	143	481
5	Used tyre	No.	417	3	414
6	Empty paint and spray cans	can	378	76	302
7	Cement bag	bag	300	0	300
8	Empty used oil drum/container	drum (20 l)	163	16	147

No.	Hazardous Waste Type	Unit	Total in November 2017 (A)	Disposal by Selling (B)	Remainder (A - B)
9	Ink cartridge	No.	139	0	139
10	Contaminated textile and material	kg	133	65	68
11	Empty used oil drum/container	drum (200 l)	121	6	115
12	Halogen/fluorescent bulbs	No.	67	0	67
13	Empty used chemical drum/container	drum (200 l)	41	5	36
14	Lead acid batteries	No.	22	0	22
15	Acid and caustic cleaners	bottle	20	0	20
16	Clinical waste	kg	18	16	4
17	Lithium-ion batteries	No.	7	0	7
18	Empty contaminated bitumen drum/container	drum (200 l)	6	0	6
19	Used oil mixed with water	liter (l)	0	0	0

A total of 16 kg of clinical waste from OC contractor and Song Da 5 sub-contractors was incinerated at the Vientiane landfill.

3.4 Community Waste Management

3.4.1 Community Recycling Programme

In November 2017, a total of 253 kg of recyclable waste was recorded at the Community's Waste Bank, an increasing of 74 kg compared to October 2017.

Table 3-16: Types and amounts of waste traded

Types of Waste	Unit	Remaining in October 2017	Additions in November 2017	Sold	Remaining in November 2017
Scrap metal	Kg	311	99	0	410
Glass bottles	Kg	1,224	79	0	1,303
Paper/cardboard	Kg	150	23	0	173
Aluminium cans	Kg	129	18	0	147
Plastic bottles	Kg	418	34	0	452
Total	Kg	2,232	253	0	2,485

3.4.2 Houay Soup Resettlement Area Waste Management

The Phoukham Chanvong (PKC Co., Ltd) was awarded a one-year contract for operating Houay Soup Landfill including waste collection and transportation from Phouhomxay, Thahuea, Hat Gniun villages to Houay Soup Landfill. On 22 – 23 November 2017, a

community consultation for solid waste management was carried out with local authorities of Phouhomxay, Thahuea, Hat Gniun villages to introduce the scope of waste collection by the local waste collector. The operation of Houay Soup Landfill by the PKC contractor started on 01 December 2017.

During November 2017, an approximate of 1.5 m3 of solid waste from the local contractors and residents at Phouhomxay was disposed at the Houay Soup Landfill.

3.4.3 Waste Clean-up in Four Villages at 2LR

On 28 November 2017, NNP1 and GOL counterparts (RMU & EMU of Hom District and Xaysomboun Province) organized a consultation on waste clean-up in the 4 villages of Zone 2LR that are being resettled, namely Ban Houaypamom, Sopphoune, Sopyouk (Nong) and Ban Namyouk at the 2 LR, Hom District, Xaysomboun Province. The purpose of the waste clean-up is to remove and safely dispose waste that remains after relocation of the households before start of reservoir impounding. The waste clean-up activities started on 01 December 2017 at Houaypamom village.

3.5 Watershed and Biodiversity Management

3.5.1 Watershed Management

3.5.1.1 PREPARATION OF THE WATERSHED MANAGEMENT PLAN

The technical workshop for NNP1 Watershed Management Plan with relevant GOL counterparts was conducted on 26-27 September 2017. There was general agreement among the participants about the proposed activity packages, and some minor suggestions and recommendations were received. The Lao version was reviewed by relevant GOL counterparts in October 2017 and comments were sent to NNP1 for consolidation in the document.

The results from the technical workshop were discussed with IAP and ADB mission on 13 November 2017. NNP1PC continues with the plan approval process after incorporating the comments from GOL. Next meeting with GOL for final approval is planned to take place in December 2017.

3.5.1.2 PREPARATION OF PROVINCIAL REGULATION FOR THE WATERSHED MANAGEMENT

Xaysomboun and Bolikhamxay WRPO in coordination with NNP1PC EMO have completed the consultations about the provincial regulation at the end of November 2017. The consultations involved 15 villages and 3 districts in Xaysomboun Province and 8 villages and 1 district in Bolikhamxay Province. The submission to Xaysomboun Provincial Assembly and Provincial Justice Department is expected in December 2017.

3.5.2 Biodiversity Offset Management

3.5.2.1 PREPARATION OF BIODIVERSITY OFFSET MANAGEMENT PLAN

A draft of "No Net Loss Forecast" was discussed during the IAP and ADB mission on 13 and 18 November 2017. The proposal provides a clear road map for mitigation activities in NNP1 watershed focussing on two proposed Total Protection Zones and the activities in Nam Chouane- Nam Xang to offset the residual impacts focussing on riverine habitat and fauna. NNP1 and ADB will have further detailed discussions on technical matters and budget prior to submission of the proposal for approval by NNP1 Board of Directors in

December 2017. IAP strongly recommended that the BOMP should be ready by March 2018.

3.5.2.2 IMPLEMENTATION OF PRE-BIODIVERSITY OFFSET MANAGEMENT PLAN

Bolikhambxay Province has been implementing the pre-Biodiversity Offset Management Plan for 2017 (pre-BOMP) in Nam Chouane-Nam Xang offset site has been implemented since March 2017. During October 2017, two patrolling teams have completed their first month of field work at Xaychamphone and Viengthong Districts. The overall patrolling work were evaluated and the findings were discussed with NNP1 at the end of October 2017 and the outcome was satisfactory. The overall results of pre-BOMP were also discussed with IAP Mission on 14-15 November 2017 and the mission noted for the impressive collaboration between GOL and NNP1.

As the development of BOMP is expected to be further delayed, the BOMC together with NNP1PC initiated the development of a second pre-BOMP proposal for 2018. The plan will focus on continuing the activities under the first pre-BOMP, such as, awareness program, community outreach, capacity building, and patrolling. The proposal was also discussed with IAP Mission on 14-15 November 2017 and the mission recommended to continue the pre-BOMP activities in 2018. The pre-BOMP format will serve later on as a format for annual BOMP.

3.5.3 Biomass Clearance

The biomass clearance work has continued in November 2017 by 1 Company and 4 Local Contractors. As of 30 November 2017, out of the total biomass clearance area of 1640 ha, 459 ha have been fully cleared and vegetation cutting has been completed in another 907-ha making the area ready for burning of the cut biomass.

Table 3-17 Biomass Clearance Progress in Each Priority Area as of 30 November 2017.

Target area		Progress in Ha as of 30 November 2017	
Block	Total area to be cleared in Ha	Total area in progress in Ha	100% completed area (within the total area in progress) in Ha
B1	109.24	54.06	0.37
B2	158.63	153.61	58.69
B3	80.35	80.20	40.42
B4	163.74	157.48	155.35
B5	340.14	205.95	79.47
B6	31.92	13.74	0.22
B7	39.65	39.65	7.37
B8	37.61	42.03	1.19
B9	52.75	52.75	13.42
B10	269.1	209.16	9.34
B11	89.98	89.98	
B12	64.11	64.11	
B13	101.24	101.24	
B14	43.33	43.34	38.21
B15	43.73	43.74	43.74
B16	3.32	3.32	3.32
B17	7.96	7.96	7.96
B18	3.95	3.95	
Total	1,640.75	1,366.28	459.07

4. FISHERY MONITORING

The fishery monitoring programme is progressing in November 2017 as planned, only the daily catch logbook was conducted this month with addition to fish and water quality monitoring during flushing operation of re-regulation reservoir. 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 October 2017. The estimated total fish catch in Nam Ngiep basin for October 2017 is 39,500 kg. Around 33 % of the catch was sold, 58% was consumed fresh, 6% processed and approximately 3% was used for other purposes.

ANNEXES

ANNEX A: RESULTS OF EFFLUENT ANALYSES

Table A- 1: Results of Camp Effluents in November 2017

Parameters (Unit)	Site Name	Owner's Site Office and Village		Obayashi Camp		Sino Hydro Camp	
	Station Code	EF01		EF02		EF06	
	Date	01-Nov-17	13-Nov-17	01-Nov-17	13-Nov-17	01-Nov-17	13-Nov-17
	Effluent Guideline in the CA						
pH	6.0 - 9.0	7.13	6.19	6.47	7.3	7.37	7.4
Sat. DO (%)		45.4	65	79.7	88.4	73.8	89.4
DO (mg/l)		3.45	4.88	6.2	6.36	5.9	6.42
Conductivity (µs/cm)		414	400	618	677	633	629
TDS (mg/l)		207	200	309	338.5	316	314.5
Temperature (°C)		28.2	28.4	26.9	30.9	25.3	30
Turbidity (NTU)		0.9	0.18	45	18.2	12.7	11.9
TSS (mg/l)	<50	<5	<5	341.17	12.86	6.4	<5
BOD (mg/l)	<30	<6	25.4	<6	<6	<6	<6
COD (mg/l)	<125	<25.0	<25.0	138	66.2	51.8	38.4
NH ₃ -N (mg/l)	<10.0	<0.2	7	5	20	38	33
Total Nitrogen (mg/l)	<10	8.76	15.8	8.58	24.3	39.3	35.2
Total Phosphorus (mg/l)	<2	0.68	1.17	0.03	1.1	1.66	1.25
Oil & Grease (mg/l)	<10.0	<1		3		<1	
Total coliform (MPN/100 ml)	<400	170	27	0	0	0	0
Fecal Coliform (MPN/100 ml)		170	7.8	0	0	0	0
Effluent Discharge Volume (l/mn)		15	15	8	30	15	12
Chlorination Dosing Rate (ml/mn)				710	170	165	250
Residual Chlorine (mg/l)				0.26	1.4	0.21	1.04

Parameters (Unit)	Site Name	Song Da5 Camp No.1		Song Da5 Camp No.2		Zhefu Camp	
	Station Code	EF07		EF08		EF09	
	Date	01-Nov-17	13-Nov-17	01-Nov-17	13-Nov-17		
	Effluent Guideline in the CA						
pH	6.0 - 9.0	7.4	7.17	7.5	7.31		
Sat. DO (%)		85	79.1	60	62.9		
DO (mg/l)		6.35	5.83	4.85	4.51		
Conductivity (µs/cm)		1244	1,378	718	797	No samples due to no water	
TDS (mg/l)		622	689	359	398.5		
Temperature (°C)		29.3	29.8	24.6	31.1		
Turbidity (NTU)		13.9	14.9	40.7	33.6		
TSS (mg/l)	<50	17.7	28.57	27.32	24.6		
BOD (mg/l)	<30	<6	25.89	<6	<6		

Parameters (Unit)	Site Name	Song Da5 Camp No.1		Song Da5 Camp No.2		Zhefu Camp	
	Station Code	EF07		EF08		EF09	
	Date	01-Nov-17	13-Nov-17	01-Nov-17	13-Nov-17		
	Effluent Guideline in the CA						
COD (mg/l)	<125	75.1	77.9	130	152		
NH ₃ -N (mg/l)	<10.0	27	27	29	45		
Total Nitrogen (mg/l)	<10	30.6	30.4	31.7	45.3		
Total Phosphorus (mg/l)	<2	1.23	1.18	1.4	1.26		
Oil & Grease (mg/l)	<10.0	1		<1			
Total coliform (MPN/100 ml)	<400	4.5	0	0	0		
Fecal Coliform (MPN/100 ml)		0	0	0	0		
Effluent Discharge Volume (l/mn)		30	12	30	60		
Chlorination Dosing Rate (ml/mn)		140	140	540	160		
Residual Chlorine (mg/l)		0.13	0.21	0.38	1.45		

Parameters (Unit)	Site Name	V&K Camp		HM Hydro Camp		IHI Camp	
	Station Code	EF10		EF13		EF14	
	Date	01-Nov-17	13-Nov-17	01-Nov-17	13-Nov-17	01-Nov-17	13-Nov-17
	Effluent Guideline in the CA						
pH	6.0 - 9.0	6.16	6.25	7.31	7.34	6.46	7.03
Sat. DO (%)		74.6	84.7	89.6	83.1	47.3	84.6
DO (mg/l)		5.92	6.1	6.98	6.24	3.61	6.28
Conductivity (µs/cm)		340	343	1097	843	1097	1,627
TDS (mg/l)		170	171.5	547	421.5	547	813.5
Temperature (°C)		25.9	30.9	26.7	28.4	27.8	29.1
Turbidity (NTU)		6.06	2.98	49.9	41.8	55	50.6
TSS (mg/l)	<50	<5	<5	24.8	19.15	23.07	23.81
BOD (mg/l)	<30	<6	<6	<6	<6	<6	<6
COD (mg/l)	<125	<25.0	<25.0	226	190	198	229
NH ₃ -N (mg/l)	<10.0	<0.2	<0.2	22	24	14	9
Total Nitrogen (mg/l)	<10	3.55	2.85	27.8	24.7	17	14.8
Total Phosphorus (mg/l)	<2	0.48	0.41	1.61	1.24	1.1	0.88
Oil & Grease (mg/l)	<10.0	<1		11		4	
Total coliform (MPN/100 ml)	<400	0	0	0	0	0	0
Fecal Coliform (MPN/100 ml)		0	0	0	0	0	0
Effluent Discharge Volume (l/mn)		10	3	4.2	4.2	12	3

Parameters (Unit)	Site Name	V&K Camp		HM Hydro Camp		IHI Camp	
	Station Code	EF10		EF13		EF14	
	Date	01-Nov-17	13-Nov-17	01-Nov-17	13-Nov-17	01-Nov-17	13-Nov-17
	Effluent Guideline in the CA						
Chlorination Dosing Rate (ml/mn)		99	160	3.1	3.1	10	7
Residual Chlorine (mg/l)		0.11	0	0.4	0.98	0.32	1.17

Parameters (Unit)	Site Name	Kenber Camp	
	Station Code	EF16	
	Date	01-Nov-17	13-Nov-17
	Effluent Guideline in the CA		
pH	6.0 - 9.0	7.95	6.85
Sat. DO (%)		81.9	95.8
DO (mg/l)		6.75	7.04
Conductivity (µs/cm)		395	300
TDS (mg/l)		198	150
Temperature (°C)		23.7	28.7
Turbidity (NTU)		7.71	6.31
TSS (mg/l)	<50	7.6	8.27
BOD (mg/l)	<30	<6	<6
COD (mg/l)	<125	<25.0	<25.0
NH ₃ -N (mg/l)	<10.0	<0.2	<0.2
Total Nitrogen (mg/l)	<10	3.02	2.66
Total Phosphorus (mg/l)	<2	0.31	0.67
Oil & Grease (mg/l)	<10.0	<1	
Total coliform (MPN/100 ml)	<400	0	0
Fecal Coliform (MPN/100 ml)		0	0
Effluent Discharge Volume (L/mn)		0	4
Chlorination Dosing Rate (ml/mn)		175	15
Residual Chlorine (mg/l)		0.01	0.01

Table A- 2: Results of the Construction Area Discharge in November 2017

	Site Name	Aggregate Crushing Plant				
	Station Code	DS02				
	Date	02-Nov-17	09-Nov-17	16-Nov-17	23-Nov-17	30-Nov-17
	Guideline					
Parameter (Unit)						
pH	6.0 - 9.0	6.11	7.01	8.15	7.79	7.85
Sat. DO (%)		66.7	89.6	103.6	102.4	101.2
DO (mg/l)		5.1	6.48	7.85	7.96	7.6
Conductivity (µs/cm)		291	190	138.2	116.5	170.8
TDS (mg/l)		145	95	69	58	85.4
Temperature (°C)		27.45	30.7	28.2	26.9	28.8
Turbidity (NTU)		25.17	26	3.8	2.55	1.9
TSS (mg/l)	<50	29.9	30	7.51	3.3	3.19
Oil & Grease (mg/l)	<10	6.11	7.01	8.15	7.79	7.85

	Site Name	Spoil Disposal No.2				
	Station Code	DS04				
	Date	02-Nov-17	09-Nov-17	16-Nov-17	23-Nov-17	30-Nov-17
	Guideline					
Parameter (Unit)						
pH	6.0 - 9.0	5.4	6.64	6.8	6.97	7.13
Sat. DO (%)		35.1	79.6	60.7	72.4	41.6
DO (mg/l)		2.76	5.86	4.79	5.22	3.3
Conductivity (µs/cm)		64	16	21.37	24.2	20.06
TDS (mg/l)		32	8	10	12	10
Temperature (°C)		25.61	28.3	25.8	26.7	25.6
Turbidity (NTU)		6.73	15.27	2.61	2.05	2.2
TSS (mg/l)	<50	5.6	10.81	1.74	2.05	2.06
Oil & Grease (mg/l)	<10		<1.0			

		Site Name	RCC Plant Discharge at lower ponds				
		Station Code	DS09				
		Date	02-Nov-17	09-Nov-17	16-Nov-17	23-Nov-17	30-Nov-17
Parameter (Unit)	Guideline						
pH	6.0 - 9.0		7.28	7.9	8.77	7.97	7.51
Sat. DO (%)			49.4	97	91.4	93.7	84.1
DO (mg/l)			3.79	7.14	6.74	7.41	6.31
Conductivity (µs/cm)			527	145	441	281	294
TDS (mg/l)			264	72	220	140	147
Temperature (°C)			27.85	28	29.7	26	28.8
Turbidity (NTU)			25.7	18.0	31.0	16.4	9.7
TSS (mg/l)	<50		36.04	20	56.25	12.06	16.49
Oil & Grease (mg/l)	<10		7.28	7.9	8.77	7.97	7.51

		Site Name	Main Dam's Waste Water Treatment Plant No.1					Main Dam's Waste Water Treatment Plant No.2
		Station Code	DS11					DS12
		Date	02-Nov-17	09-Nov-17	16-Nov-17	23-Nov-17	30-Nov-17	
Parameter (Unit)	Guideline							
pH	6.0 - 9.0		6.73	7.81	7.26	7.25	7.52	No Discharged
Sat. DO (%)			58.4	97.2	101.1	100.1	99.5	
DO (mg/l)			4.5	7.67	7.66	7.74	7.42	
Conductivity (µs/cm)			520	721	565	596	782	
TDS (mg/l)			259	360	282	293	361	
Temperature (°C)			27.52	26.1	27.9	27.1	29.1	
Turbidity (NTU)			9.37	15	7.74	3.07	2.66	

	Site Name	Main Dam's Waste Water Treatment Plant No.1					Main Dam's Waste Water Treatment Plant No.2
	Station Code	DS11					DS12
	Date	02-Nov-17	09-Nov-17	16-Nov-17	23-Nov-17	30-Nov-17	
Parameter (Unit)	Guideline						
TSS (mg/l)	<50	13.59	19	11.34	12.3	5.66	
Oil & Grease (mg/l)	<10	6.73	7.81	7.26	7.25	7.52	

Table A- 3: Temperature and Dissolved Oxygen Depth Profile Results of the Re-regulation Reservoir Monitoring in November 2017

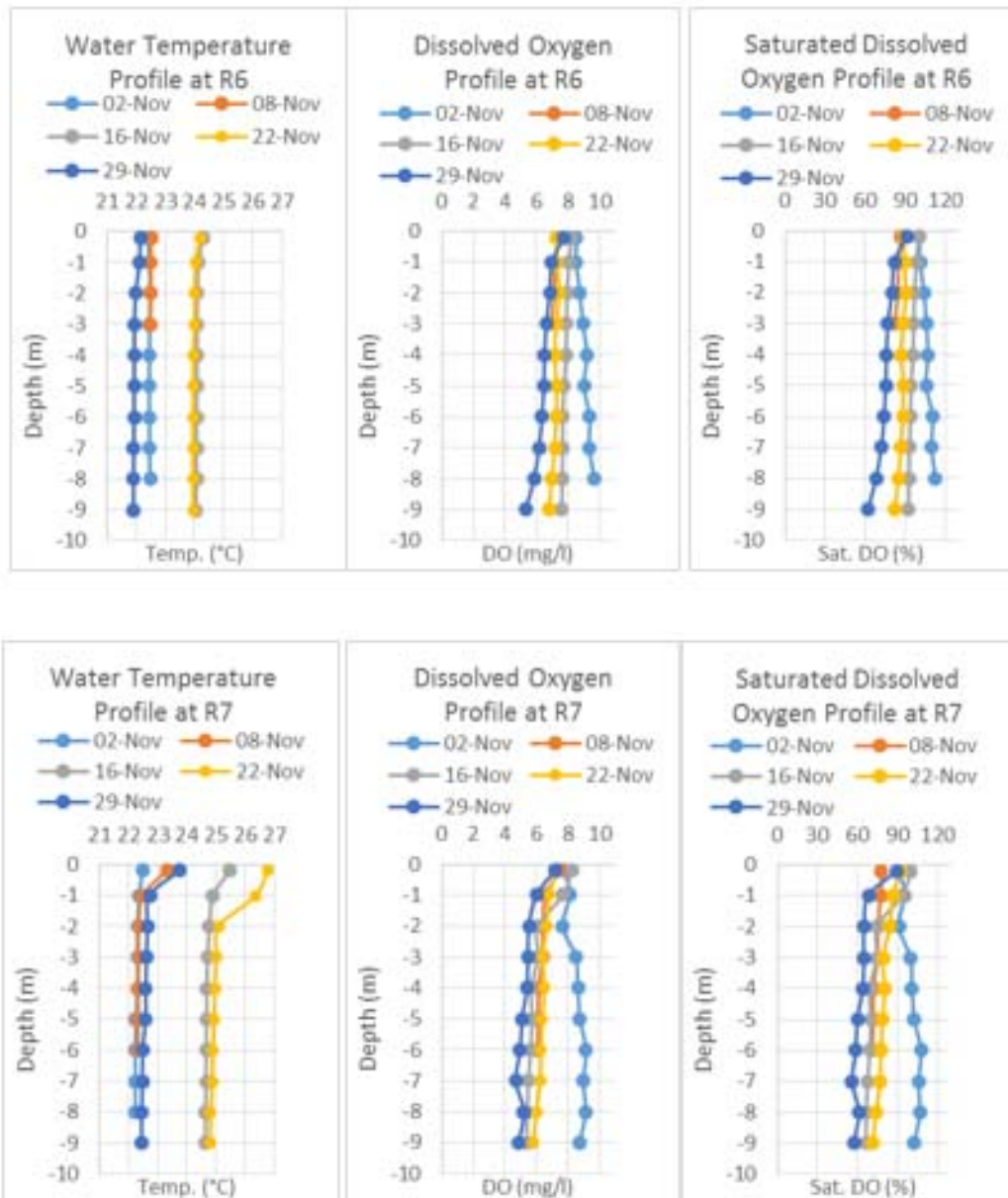
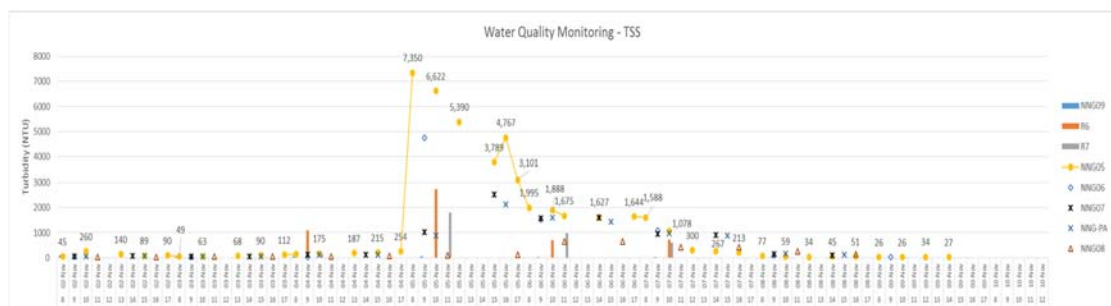
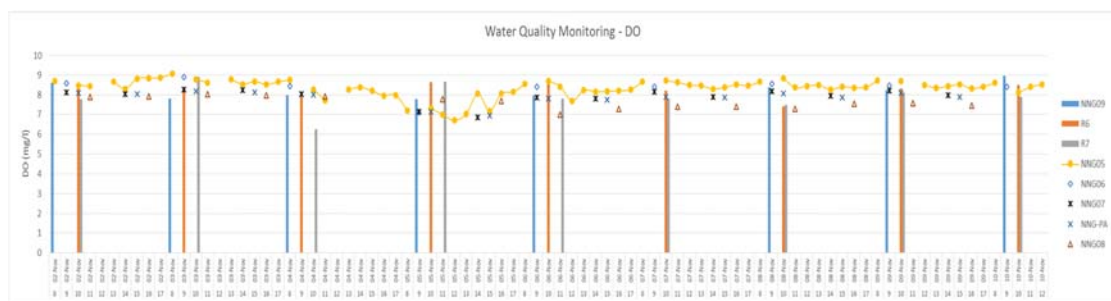
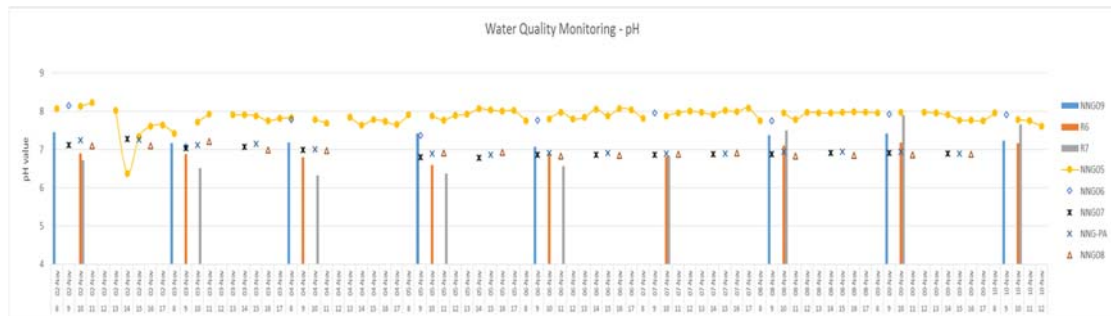


Table A-4: Water Quality Monitoring Results for Nam Ngiep, Re-regulation Reservoir, Nam Xao and Nam Houay Soup between 2-10 November 2017 (Re-regulation Reservoir Sediment Flushing)



ANNEX B: AMBIENT DUST QUALITY

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

Hat Gnuin Village - 24 Hours Average Particulate Matter (PM10) Concentration			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	13/Nov/17 17:54	14/Nov/17 17:55	15/Nov/17 17:56
End Time	14/Nov/17 17:55	15/Nov/17 17:55	16/Nov/17 18:00
Average Data Record in 24h (mg/m ³)	0.029	0.030	0.024
Guideline Average in 24h (mg/m ³)	0.12	0.12	0.12

Figure B- 1: Dust Monitoring Results at Ban Hat Gniun in November 2017

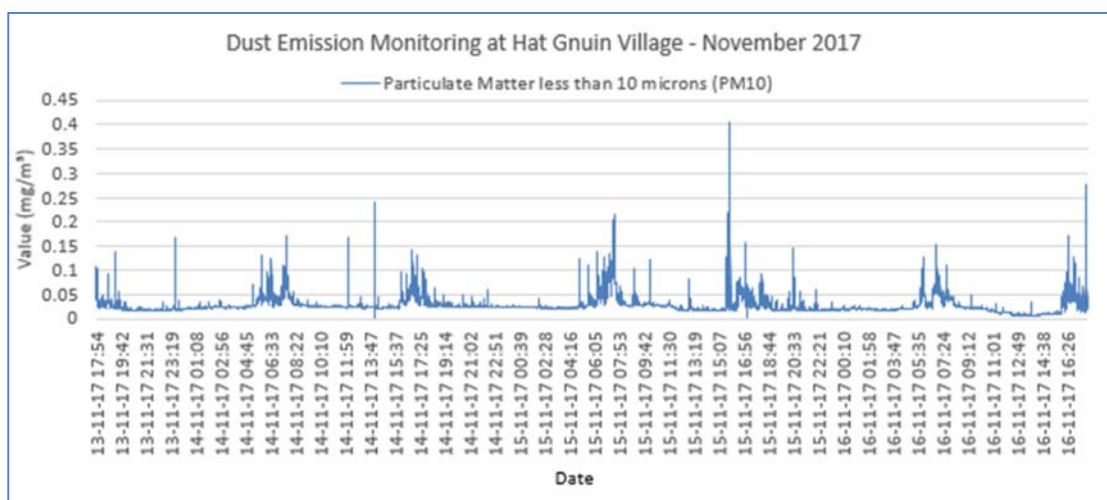


Figure B- 2: Dust Monitoring Results at the Aggregate Crushing Plant in November 2017

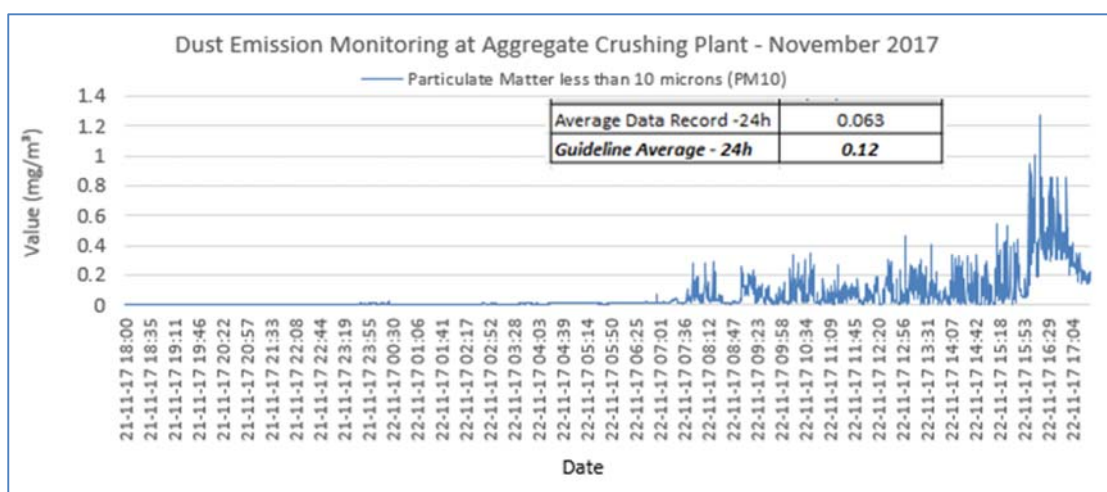


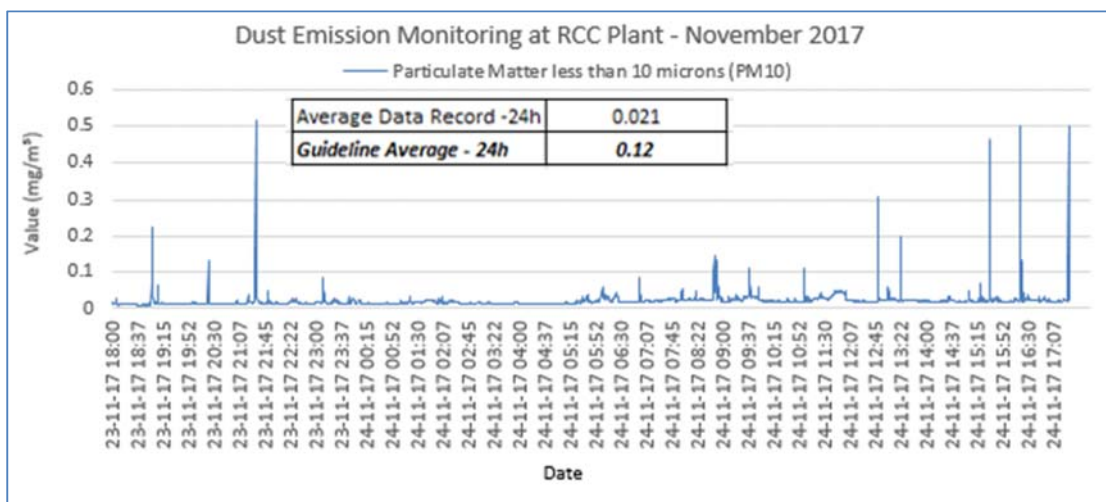
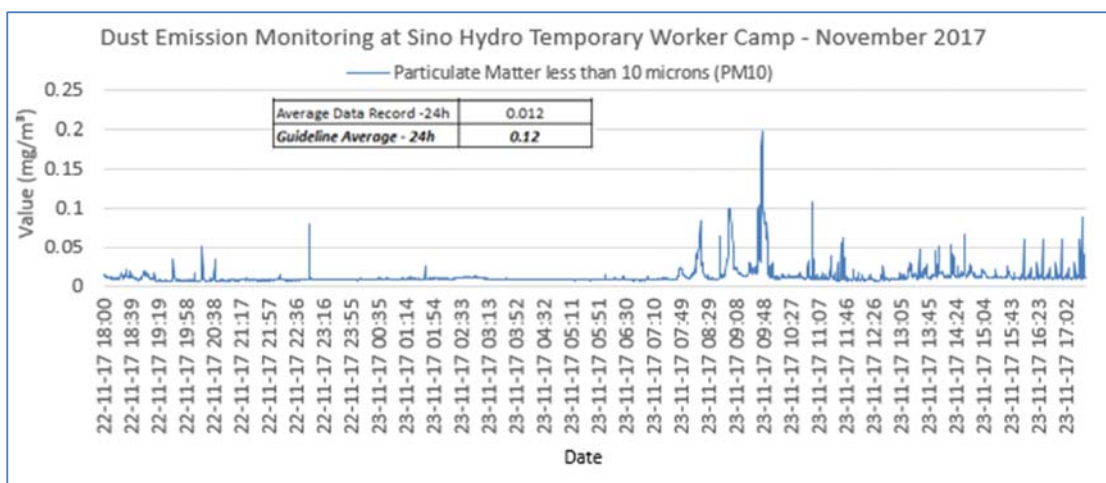
Figure B- 3: Dust Monitoring Results at the RCC Plant in November 2017**Figure B- 4: Dust Monitoring Results at the Sino Hydro Temporary Camp in November 2017**

Figure B- 5: Dust Monitoring Results at the SongDa5 No.2 Camp in November 2017

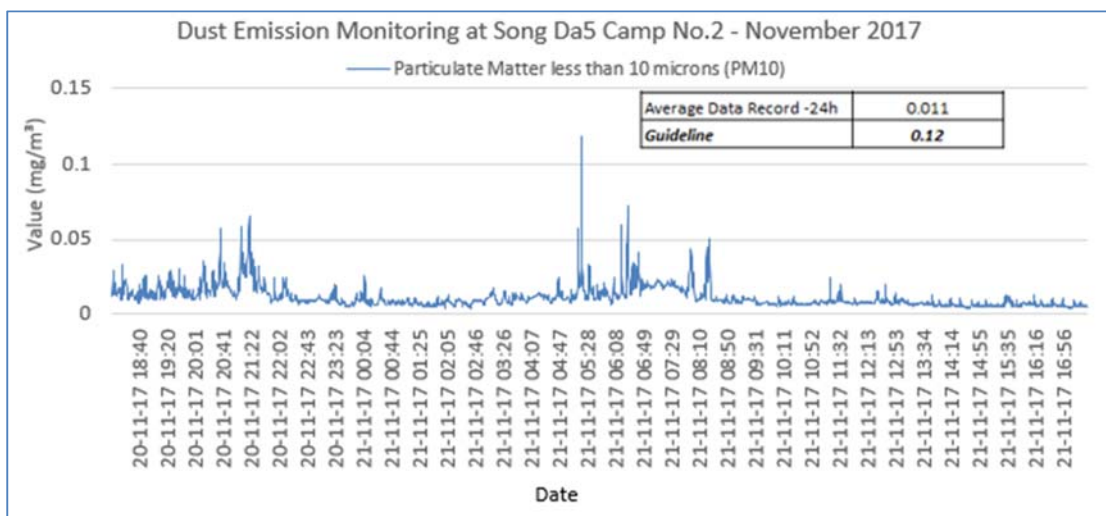


Figure B- 6: Dust Monitoring Results at Main Dam (Top View Left Bank) in November 2017

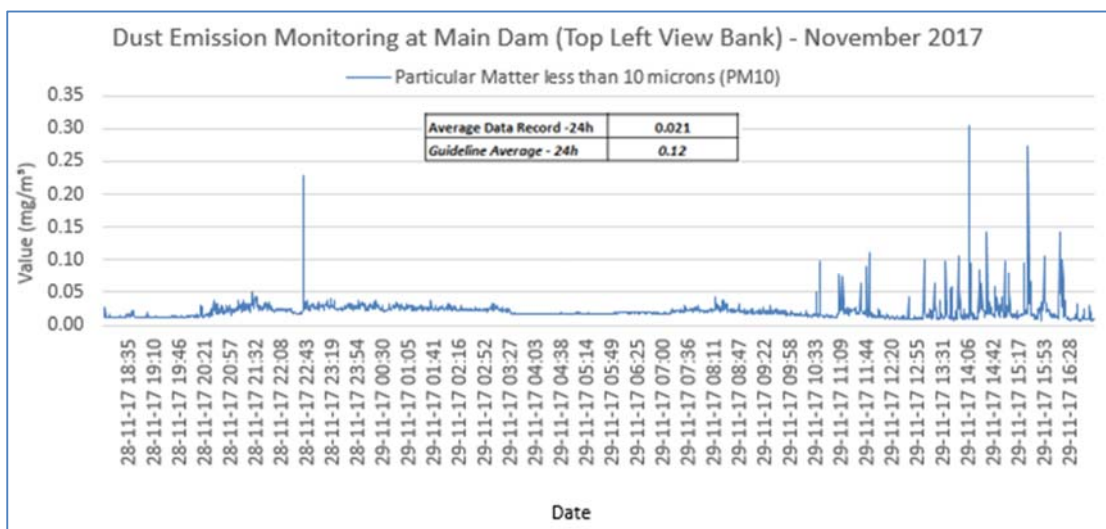
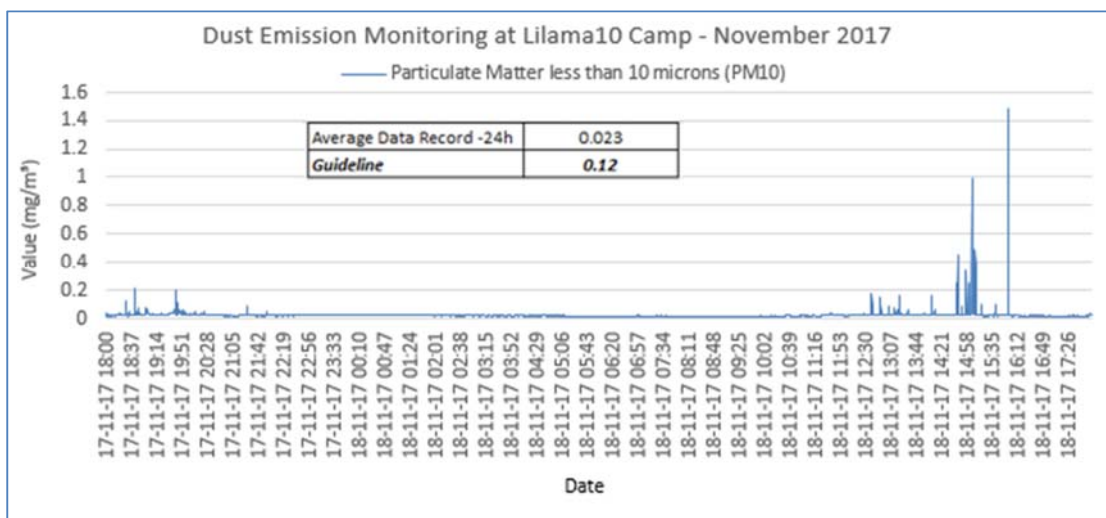
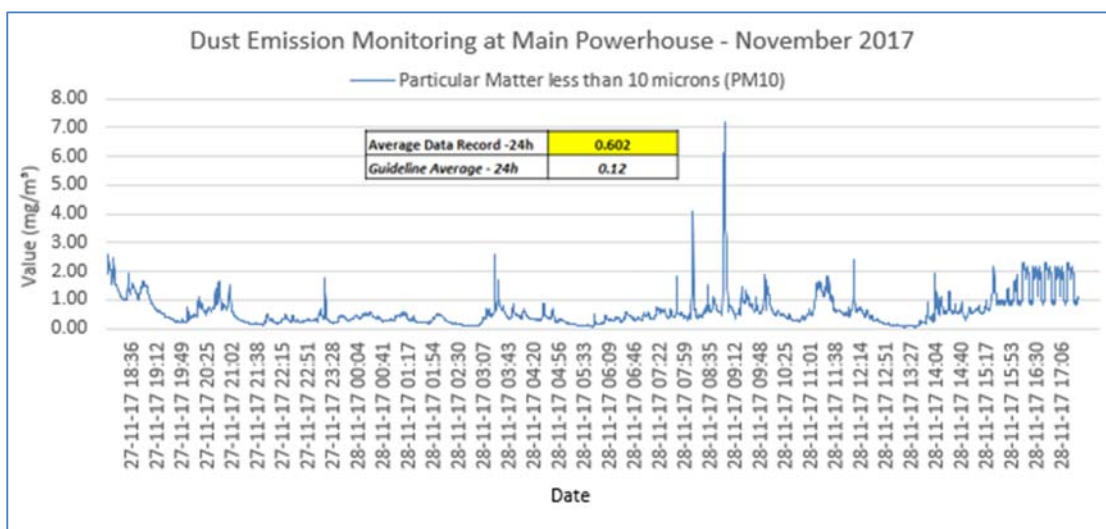


Figure B- 7: Dust Monitoring Results at the Lilama10 Camp in November 2017**Figure B- 8: Dust Monitoring Results at the Main Powerhouse in November 2017**

ANNEX C: AMBIENT NOISE DATA

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

Noise Level (dB)	13-14/November/17			14-15/November/17			15-15/November/17		
	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	64.80	63.20	68.70	62.20	60.30	70.40	71.70	61.00	68.70
Guideline Max	115	115	115	115	115	115	115	115	115
Average Data Recorded	50.47	47.11	43.51	44.09	44.79	46.66	50.19	45.24	46.79
Guideline Averaged	55	45	55	55	45	55	55	45	55

Figure C- 1: Result of Noise Level Monitoring at Ban Hat Gnuin in November 2017

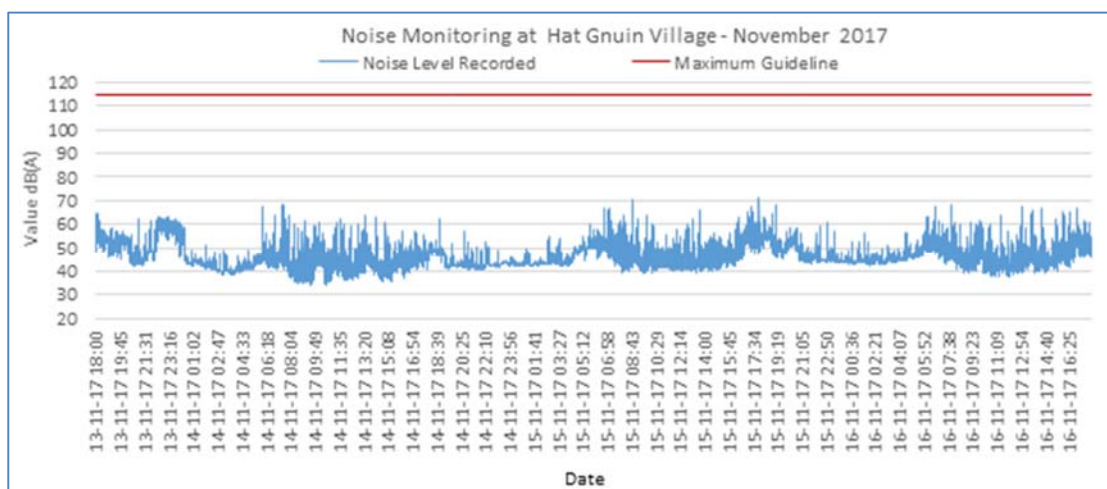


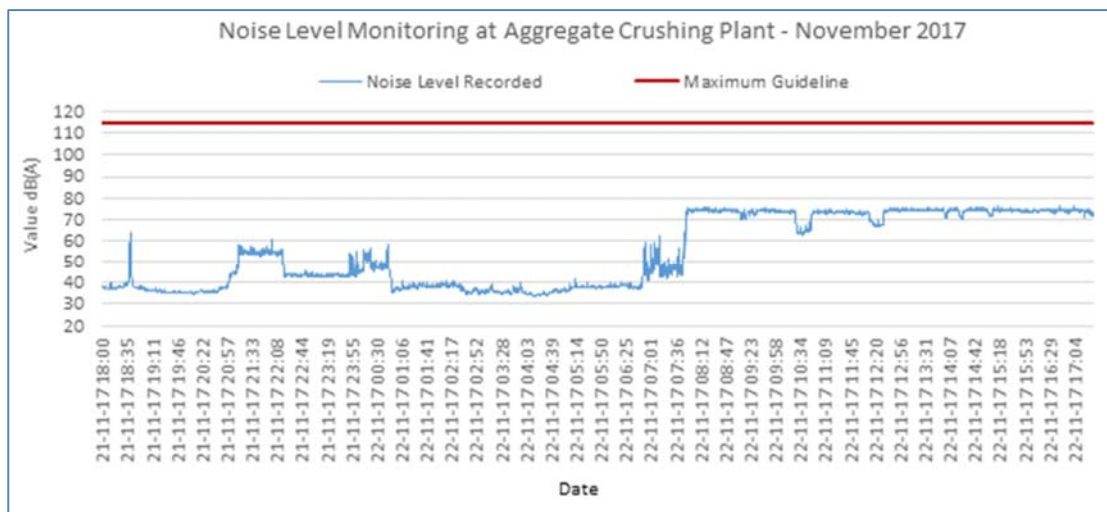
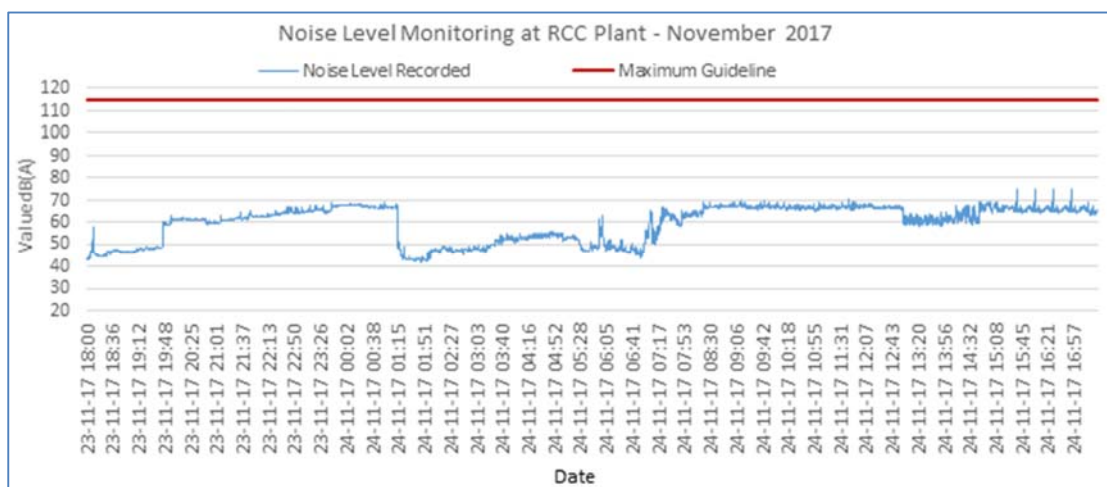
Table C- 2 and Table C-3: Average Results of Noise Monitoring at Aggregate Crushing Plant and RCC Plant in November 2017

Aggregate Crushing Plant

Noise Level (dB)	21-22/November/17		22/November/17
	18:00-22:00	22:01-06:00	06:01-17:30
Maximum Value Recorded	64	60.6	76.5
Guideline Max	115	115	115
Average Data Recorded	40.75	40.23	68.58
Guideline Averaged	70	70	70

RCC Plant

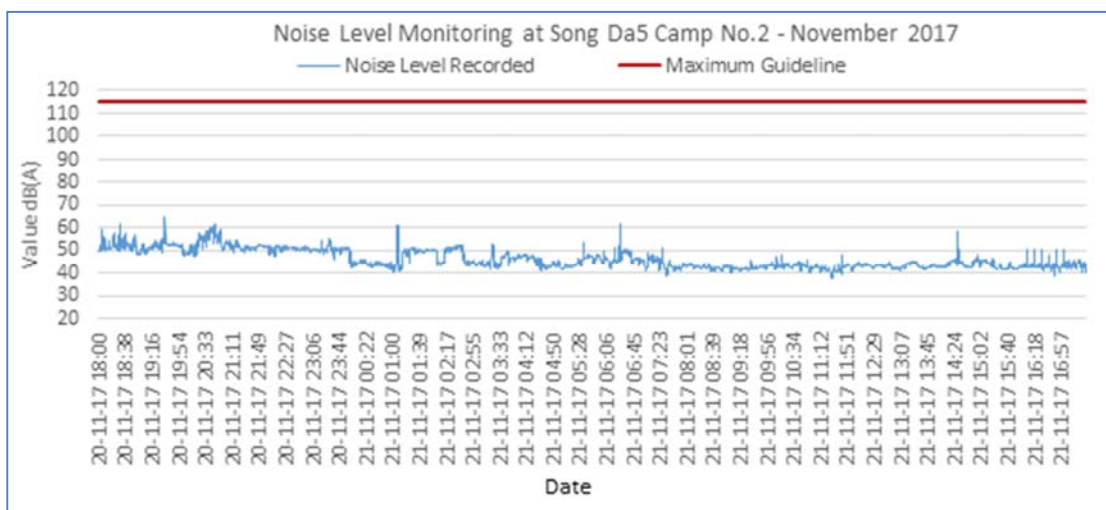
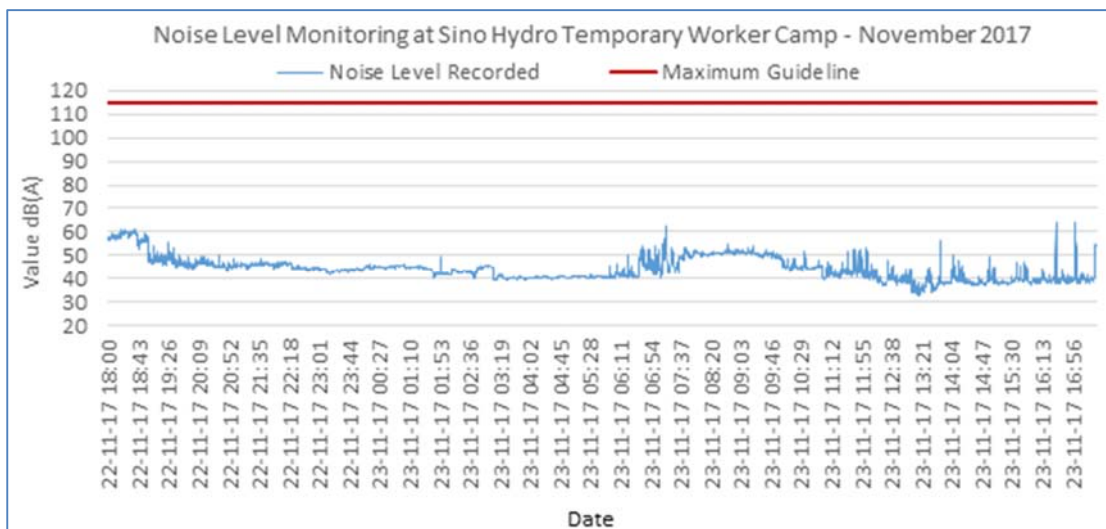
Noise Level (dB)	23-24/November/17		24/November/17
	18:00-22:00	22:01-06:00	06:01-17:30
Maximum Value Recorded	65.1	69.1	74.7
Guideline Max	115	115	115
Average Data Recorded	54.75	56.16	63.49
Guideline Averaged	70	70	70

Figure C- 2: Results of Noise Level Monitoring at the Aggregate Crushing Plant in November 2017**Figure C- 3: Results of Noise Level Monitoring at the RCC Plant in November 2017****Table C- 4 and Table C- 5: Average Results of Noise Monitoring at SongDa Camp#2 and Sino Hydro Camp in November 2017****Song Da5 Camp No.2**

Noise Level (dB)	20-21/November/17		21/November/17
	18:00 – 22:00	22:01 – 06:00	06:01-17:30
Maximum Value Recorded	65.4	60.9	62.1
Guideline Max	115	115	115
Average Data Recorded	52.30	47.24	43.38
Guideline Averaged	70	70	70

Sino Hydro Temporary Worker Camp

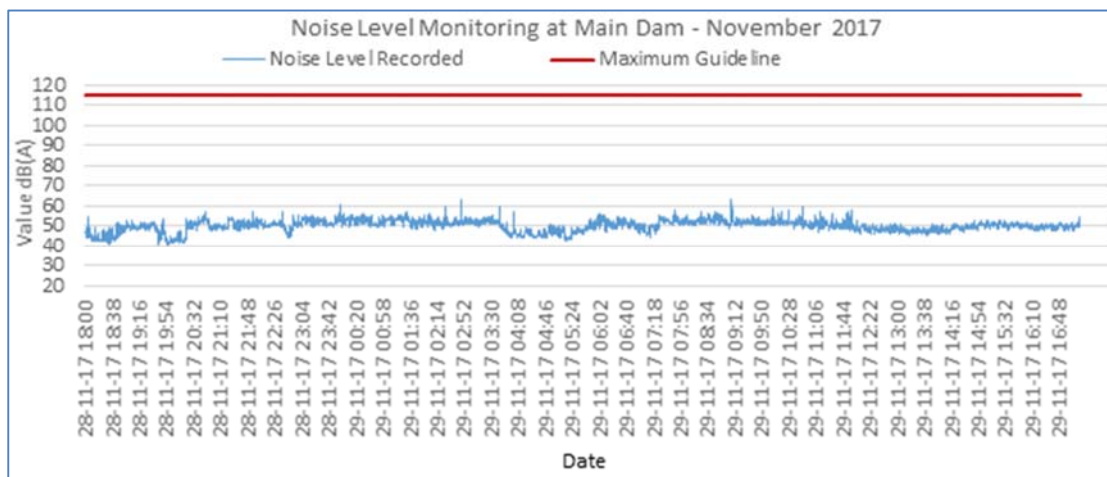
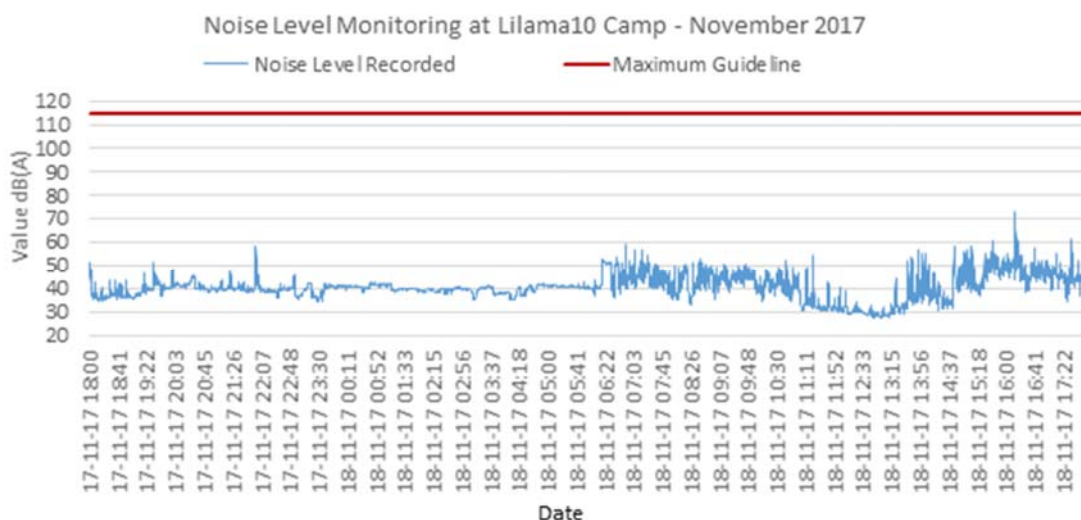
Noise Level (dB)	22-23/November/17		23/November/17
	18:00 – 22:00	22:01 – 06:00	06:01-17:30
Maximum Value Recorded	61.2	49.7	64.4
Guideline Max	115	115	115
Average Data Recorded	49.26	42.91	43.37
Guideline Averaged	70	70	70

Figure C- 4: Results of Noise Level Monitoring at SongDa5 Camp#2 in November 2017**Figure C- 5: Results of Noise Level Monitoring at Sino Hydro Temporary Worker Camp in November 2017****Table C- 7 and Table C- 8: Average Results of Noise Monitoring at Main Dam, and Lilama 10 Camp in November 2017****Main Dam**

Noise Level (dB)	28-29/November/17		29/November/17
	18:00 – 22:00	22:01 – 06:00	06:01-17:17
Data Record Max	57.3	63.2	63
Guideline Max	115	115	115
Data Record Average	48.26	50.55	50.38
Guideline Averaged	70	70	70

Lilama 10 Camp

Noise Level (dB)	17-18/November/17		18/November/17
	18:00 – 22:00	22:01 – 06:00	06:00-18:00
Maximum Value Recorded	58.8	46.3	73.7
Guideline Max	115	115	115
Average Data Recorded	40.09	40.09	41.62
Guideline Averaged	70	70	70

Figure C-6: Results of Noise Level Monitoring at Main Dam in November 2017**Figure C- 7: Results of Noise Level Monitoring at Lilama10 Camp in November 2017****Table C- 8: Average Results of Noise Monitoring at Main Powerhouse in November 2017****Main Powerhouse**

Noise Level (dB)	27-28/November/17		28/November/17
	16:00 – 22:00	22:01 – 06:00	06:01-17:30
Data Record Max	79.9	83.5	84.7
Guideline Max	115	115	115
Data Record Average	72.88	73.20	74.03
Guideline Averaged	70	70	70

Figure C- 8: Results of Noise Level Monitoring at Main Powerhouse in November 2017

