




Nam Ngiep 1 Hydropower Project

Environmental Management Monthly Monitoring Report

January 2016

A	24 Feb 2016	 Viengkeo Phetnavongxay	 Peter G. Jensen	 Prapard PanAram	
REV	DATE	AUTHOR	CHECKED	APPROVED	MODIFICATION DETAILS
<u>Accessibility</u>		<p>Document No.</p> <p>NNP1-C-J0904-RP-013-A</p>			
<input checked="" type="checkbox"/>	Public				
<input type="checkbox"/>	Internal				
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BBREVIATIONS / ACRONYMS

ADB	Asian Development Bank
BBS	Biodiversity Baseline Survey
BOD	Biochemical Oxygen Demand
BOF	Biodiversity Offset Framework
BODM	Board of Directors Meeting
BRP	Biomass Removal Plan
CA	Concession Agreement between the NNP1PC and GOL,
CAP	Corrective Action Plan
COD	Commercial Operation Date
CVC	Conventional Concrete
CWC	Civil Works Contract
DAS	Document Approval Sheet
DCC	District Coordination Committees
DEQP	Department of Environmental Quality Promotion, MONRE
DESIA	Department of Environmental and Social Impact Assessment, MONRE
DFRM	Department of Forest Resources Management, MONRE
ECZ	Elephant Conservation Zone
EdL	Electricite du Laos
EIA	Environmental Impact Assessment
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 of Chulalongkhorn University
ERM	Environmental Resource Management
ESD	Environmental and Social Division of NNP1PC
ESMMP	Environmental and Social Monitoring and Management Plan
GOL	Government of Lao PDR
GIS	Geographic Information Systems
IEE	Initial Environmental Examination

IMA	Independent Monitoring Agency
INRMP	Integrated Natural Resources Management Plan
ISP	Integrated Spatial Planning
LTA	Lender's Technical Advisor
MoM	Minutes of Meeting
MoNRE	Ministry of Natural Resource and Environment, Lao PDR
NCR	Non-Compliance Report
NNP1PC	Nam Ngiep 1 Power Company Limited
NPF	National Protection Forest
NTFP	Non-Timber Forest Products
NTP	Notice to Proceed (under each construction contract)
NVDI	Normalised Difference Vegetation Index
OC	Obayashi Corporation
ONC	Observation of Non-Compliances
PONRE	Provincial Department of Natural Resource and Environment, MONRE
PRLRC	Provincial Resettlement and Livelihood Restoration Committee
PvPA	Provincial Protection Area
RCC	Roller Compacted Concrete
ROW	Right of Way
SLBMP	Salvage Logging Biomass Management Plan
SMO	Social Management Office of ESD within NNP1PC
SS-ESMMP	Site Specific Environmental and Social Monitoring and Management Plan
TL	Transmission Line(s)
TLWC	Transmission Line Works Contract
ToR	Terms of Reference
TSS	Total Suspended Solids
USD	US Dollar
UXO	Unexploded Ordinance
WMC	Watershed Management Committee
WMF	Watershed Management Fund
WMP	Watershed Management Plan
WWTS	Waste Water Treatment System

EXECUTIVE SUMMARY

Actual overall cumulative work progress until the end of January 2016 was 32.1%¹ (compared to planned progress of 36.9%), based on achieved Interim Milestone Payments for all Contracts excluding the value of Advance Payments. The cumulative work progress of the Civil Works until the end of January 2016 was 41.2% (compared to planned progress of 41.0%) calculated in the same manner as described above for the value of achieved Interim Milestone Payments excluding advance payment. While the diversion tunnel was completed and the Nam Ngiep River diverted on 31 October 2015 about a month ahead of schedule, progress of critical work such as the re-regulation dam structure and the main dam and powerhouse excavation continue to be the same or better than planned. These activities are progressing to schedule despite increased quantities of dam excavation and slope stabilisation and the Civil Works overall can be considered to be on schedule.

Regarding the compliance and environmental monitoring related activities, during January 2016, a total of 18 new Observations of Non-Compliances (ONCs) and 1 Non-Compliance Report (NCR) were issued to the Contractor, a decrease of 6 ONCs compared to December 2015. With a carrying over from the previous month, a total of 22 ONCs and 1 NCR were active in January.

The Houay Soup Resettlement Village's landfill will be located at Spoil Area Number 6 together with the NNP1PC landfill. A contractor was being selected by NNP1PC to carry out earthworks for site preparations. The EMO also carried out a random household survey between 19 – 20 January 2016 at Ban Hat Gniun, Ban Thaheua and Ban Hatsaykham to quantify the amount of domestic waste generated from the households so as to calculate the volume of waste and size of the Houay Soup Resettlement Village's Landfill. In January 2016, the Waste Water Treatment Systems at priority camps namely V&K, RT and Song Da worker camps are being upgraded.

The Camp's effluent discharge remain to be an outstanding issue during January 2016. Most of the camps' effluence discharges were found to contain significantly high total and faecal coliforms of 160,000 MPN/100 ml. Upgrades of these other camps' WWTS need to be addressed. The level of dust emissions at the aggregate crushing plant was reduced to below the National Standard after the application of additional sprinklers. However, the level of noise emission remained to be slightly higher than the National Standard during between 22:00-06:00 at the Songda Camp number 2, Sino Hydro Camp, aggregate crushing plant and RCC plant. The EMO planned to visit these sites in February to observe and identify key sources of the noise pollution during 22:00-06:00.

A coordination meeting was held from 14-15 January 2016 between NNP1PC EMO and the Watershed Management Committee represented by MoNRE's Department of Forest Resource Management and the secretariat office (WMO) of Xaysomboun and Bolikhamxay provinces to discuss and agree on the way forward and concerns/issues related to watershed, biodiversity and biomass programmes. During this meeting, new deadlines for NNP1 watershed programme were discussed and agreed between NNP1PC and ADB, i.e. a Draft Watershed Management Plan and a Final Watershed Management Plan to be submitted on 31 July 2016 and 31 October 2016 respectively.

The first disbursement of the Watershed Management Fund (WMF) was settled on 7 January 2016 and the official notification letter was issued to the relevant stakeholders including MoNRE, National Treasury (Ministry of Finance), Department of Energy and Business (Ministry of Energy and Mine), NNP1 Project Steering Committee, WMC, and WMO of Xaysomboun and Bolikhamxay. A recent rapid survey in Bolikhamxay and Xaysomboun Provinces that the candidate sites were not suitable as the offset site. Bolikhamxay Province later agreed to reconsider Nam Mounae Watershed Area as a candidate and allowed

¹ The progress to-date is calculated as (Cumulative Amount of Achieved Interim Milestone Payments) / (Total Agreed Price of Construction Contracts) and expressed as a percentage

the Company to conduct a survey as an attempt to conclude the offset site selection. The meeting also agreed that the biomass clearance should be undertaken only within the priority biomass removal areas as described in NNP1 Biomass Removal Plan (BRP). The target within this year is to complete the clearance work at the lower and central part of the reservoir area.

During 12-14 January 2016, the EMU representatives from Bolikhamxay province visited the NNP1 Project site. This mission was a follow up on the previous environmental concerns raised during the November mission. The EMU also visited a downstream village of Ban Somseun where some villagers were invited by the NNP1PC TD to visit the main dam area. The EMO will continue to address key concerns raised by the EMU and report back in February.

1 INTRODUCTION

1.1 Project Overview

The Nam Ngiep originates in the mountains of Xieng Khouang Province, flowing through Khoum 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).

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 2016. The EMMR was prepared by the Project's Environmental Management Office (EMO). It has been internally reviewed and cleared by EMO senior technical staff and management prior to submitting the report to the Government of Lao PDR (GoL) related agencies.

The EMMR and other related reports including related construction Site Specific Environmental and Social Monitoring and Management Plans (SS-ESMMPs) are 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.

1.2 Work Progress of Principal Contractor

Construction Works for the Project are being carried out through four separate main construction contracts. These are the Civil Works, the Electrical and Mechanical Works, the Hydraulic Metal Works and the 230 kV Transmission Line Works. Actual overall cumulative work progress until the end of January 2016 was 32.1%²

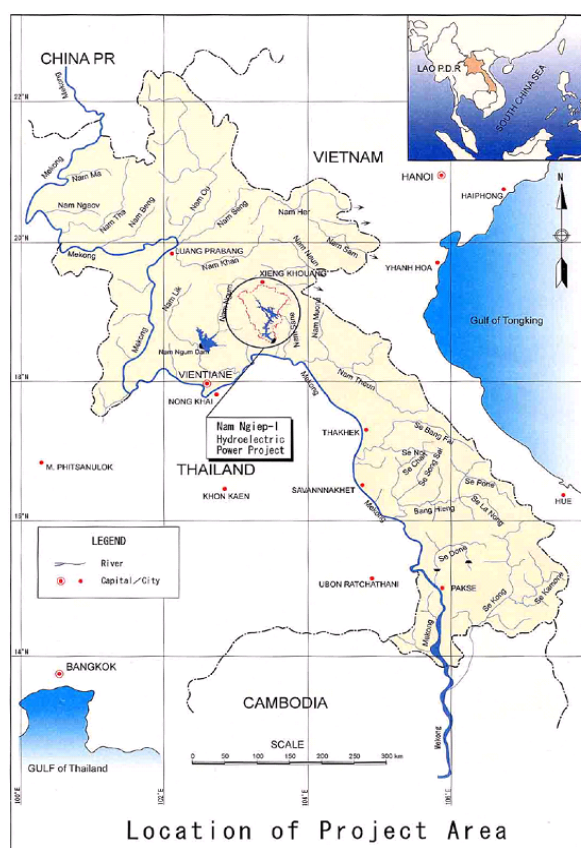


FIG. 1: LOCATION MAP

² The progress to-date is calculated as (Cumulative Amount of Achieved Interim Milestone Payments) / (Total Agreed Price of Construction Contracts) and expressed as a percentage

(compared to planned progress of 36.9%), based on achieved Interim Milestone Payments for all Contracts excluding the value of Advance Payments. In terms of the value of actual work done the percentage is slightly understated since work completed, but not paid, is not included.

The overall construction schedule and progress curve (by achieved Milestone Payments) are shown in Fig. 2 and 3 below

FIG. 2: OVERALL CONSTRUCTION SCHEDULE

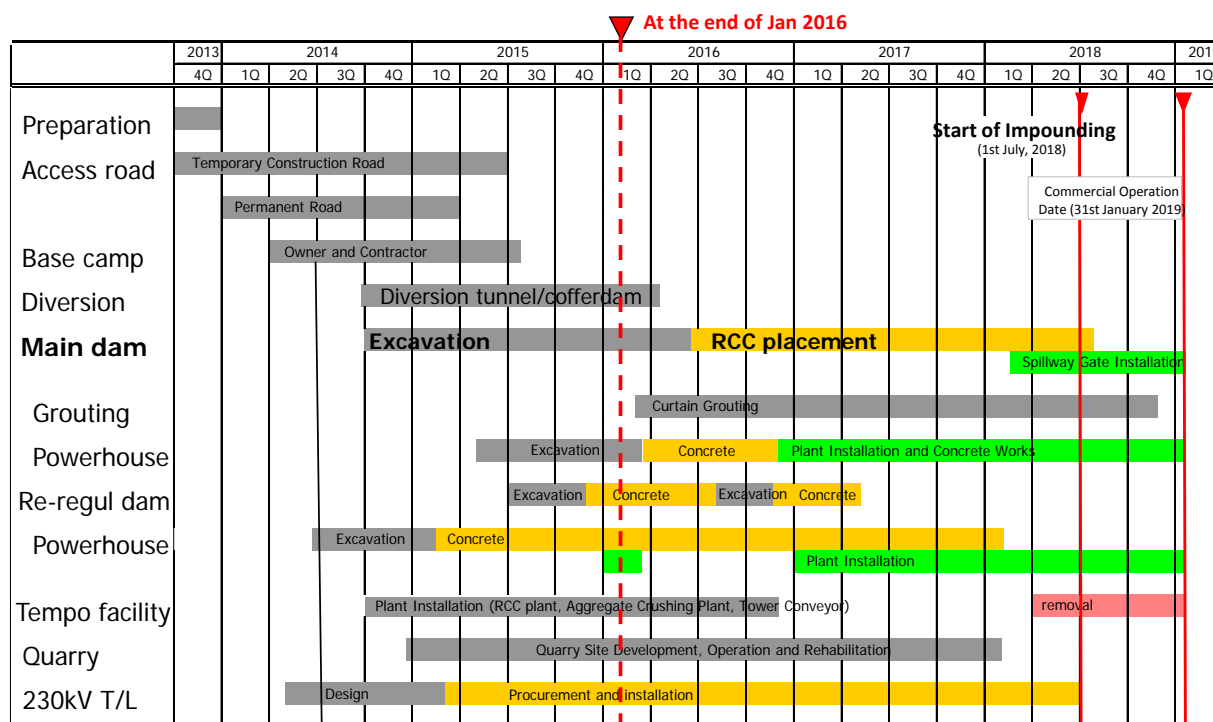
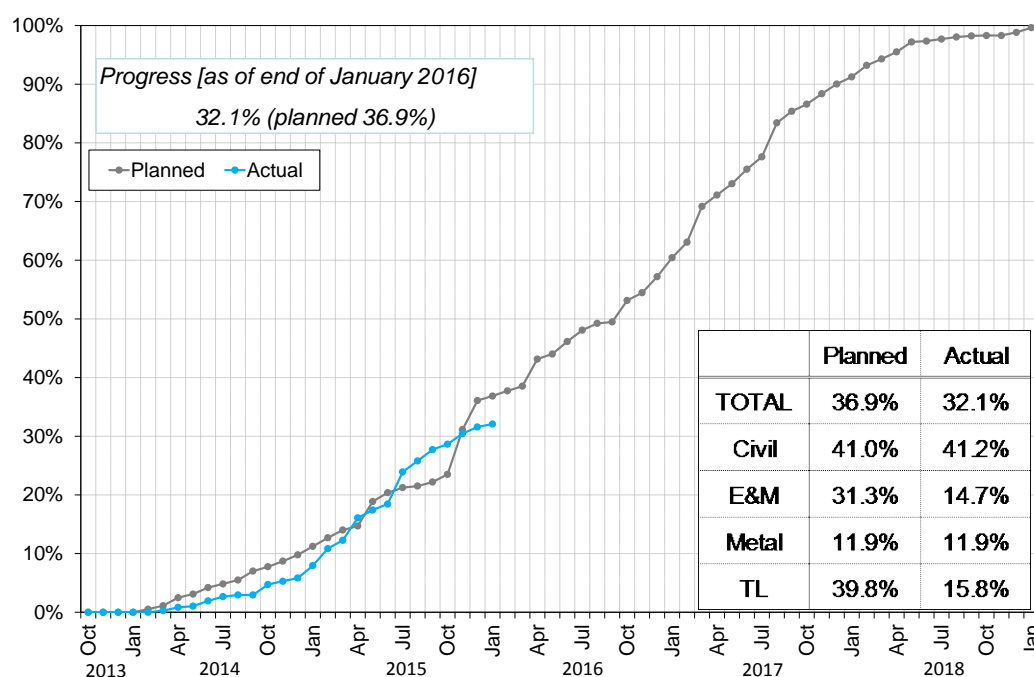


FIG. 3: PROGRESS CURVE (ALL CONSTRUCTION WORKS)



1.2.1 Civil Work

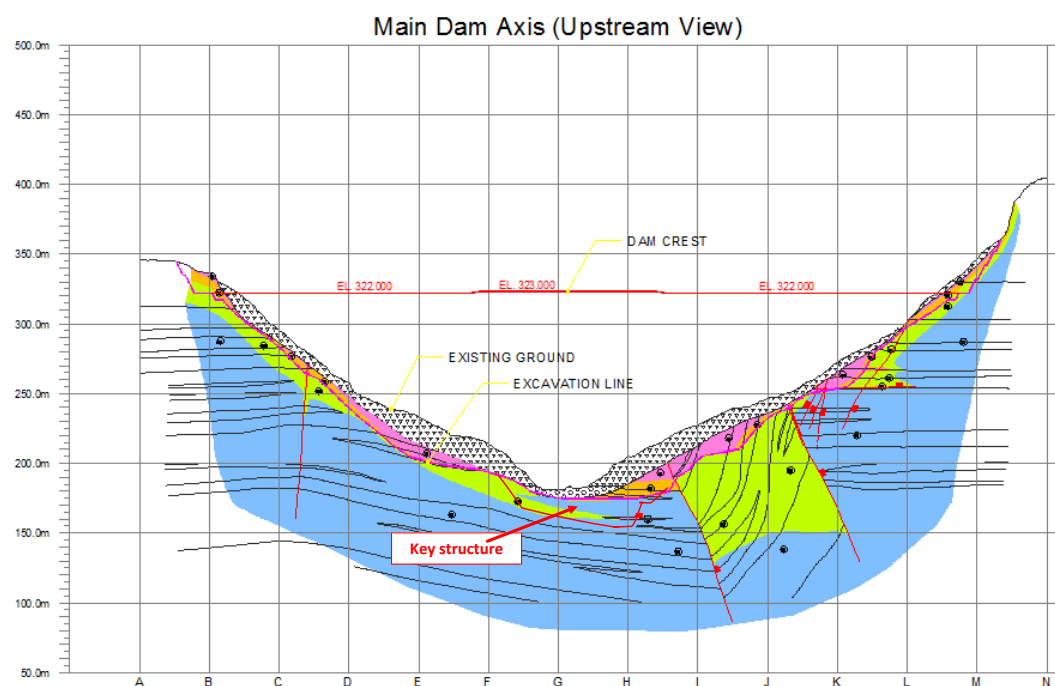
The CWC was executed between Obayashi Corporation and the Nam Ngiep 1 Power Company on 30 September 2013 and the NTP was issued on 03 October 2014. The cumulative work progress of the Civil Works until the end of December 2015 was 41.2% (compared to planned progress of 41%) calculated in the same manner as above for the value of achieved Interim Milestone Payments excluding advance payment.

1.2.1.1 MAIN DAM AND POWER HOUSE

After starting the main dam excavation works in October 2014 on the left bank, both left and right banks were excavated down to El. 175 m by the end of December 2015. As shown in Fig.4, excavation below this level continues together with the necessary slope protection works, revisiting some areas where damage to the dam foundation was sustained during the wet season.

The dam excavation works were well advanced in the river bed after diversion of the Nam Ngiep was achieved at the end of October 2015. However, excavated volumes are now known to be about 20% greater than expected and part of this is needed to construct a 'key' structure due to the weak layers of rock being encountered in the dam foundation as shown in Fig.4. The additional excavation work was commenced in January 2016.

FIG. 4: PROGRESS DRAWING OF THE MAIN DAM EXCAVATION



1.2.1.2 RE-REGULATING DAM AND POWER HOUSE

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

Structural concrete works were commenced in March 2015, in coordination with installation of the grounding system. Structural concrete works were commenced in March 2015, in coordination with installation of the grounding system. The progress of structural concrete works is shown in Table 1 below.

TABLE 1: PROGRESS OF RE-REGULATION DAM STRUCTURAL CONCRETE WORKS

	Concrete (m ³) placed as at the end of January 2016					
Structure	Intake	Powerhouse	Tailrace	Spillway	Left Bank RCC	Total
Completed Qty.	10,638	6,039	1,676	3,271	10,109	31,733
Progress		76%		14%	78%	52%

The concrete volume placed already for both powerhouse and dam is 31,733m³ being 52% of the revised total estimate of 60,447m³ for both structures. The powerhouse concreting has advanced well and the formal handing-over of the appropriate working area from Civil Contractor to E&M Contractor for the installation of the draft tube liner was carried out at Site on 30 November 2015 in accordance with the appropriate Interface Milestone Date. The area will be handed back on time to the Civil Contractor in mid-February 2016 for secondary concrete embedment of the draft tube liner.

The shaping of the excavation of the re-regulating dam at the right bank was started in May 2015, and completed in the period ahead of the last wet season. The excavation works at the left bank for the labyrinth dam portion and the left bank structure were started and finished in October 2015. The left bank dam structure was redesigned to be constructed of roller compacted concrete (RCC) and concrete placement works were started in November 2015 and completed in December 2015 and handed over to the Electrical and Mechanical Works Contractor.

The Dyke (saddle dam) embankment works on the right bank near the Houay Soup Resettlement Area were also started in November 2015 and continue satisfactorily as shown in Table 2 below.

TABLE 2: PROGRESS OF DIKE EMBANKMENT WORK

Description	Unit	Quantity Completed	Total Quantity	Progress
Earth material	m ³	289,500	482,000	60%
Filter material	m ³	18,600	143,000	13%
Rip-rap	m ³	23,700	70,000	34%

1.2.2 Temporary Work Facility

1.2.2.1 DIVERSION TUNNEL INLET AND OUTLET

The diversion tunnel excavation and its slope protection works around the inlet and outlet were commenced in October 2014. Due to the worse than expected geological conditions at the outlet portal, additional open excavation works were carried out, and tunnel excavation works were actually commenced in early January 2015 after constructing the outlet portal.

At the end of June 2015 the top-heading of tunnel excavation was completed, and the bench excavation was completed in August 2015. The invert lining concrete works were started in May 2015 and completed in September 2015. The arch lining concrete works were constructed by mobile sliding form having been started at the end of June 2015 and completed in late September 2015. The river diversion took place on 31

October 2015 together with construction of a cofferdam at the inlet and removal of the cofferdam at the outlet.

1.2.2.2 SECONDARY UPSTREAM COFFER DAM

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 were completed ahead of construction schedule in February 2016.

1.2.2.3 TEMPORARY BRIDGE

The temporary bridge works for the main river crossing were completed and the bridge opened for traffic from 16 January 2015.

1.2.2.4 PLANT YARD

These comprise the Aggregate Crushing Plant, the CVC Batching Plant and the RCC Batching Plant.

All the excavation and embankment works were completed by the end of 2014. The installation of equipment for the RCC Batching Plant was completed in November 2015. Foundation works for the Aggregate Crushing Plant were completed in July 2015 and final installation of superstructure and equipment were also substantially completed in September 2015.

Construction of the laboratory at the RCC plant and installation of testing equipment was completed before RCC trial mixing on site was started in August 2015. The RCC trial embankment was successfully completed shortly afterwards and RCC placement in the permanent structure at the re-regulation dam followed on, starting in November 2015 and finishing during the next month. The belt conveyor system from the RCC plant to the main dam is under construction (73% complete) and will be completed in May 2016.

1.2.2.5 QUARRY

The removal of overburden is complete for now and the excavation of raw materials were started in July 2015. The nature and type of the rock being exploited is variable and good quarry management is considered necessary.

1.2.3 Electrical and Mechanical Works

The cumulative work progress of the Electrical and Mechanical Works progress until the end of January 2016 was 14.1% (compared to planned progress of 31.3%). This delay is due to change of the schedule of receipt of runner material for the first Unit at the Electrical and Mechanical Works Contractor's factory from December 2015 to March 2016. However, the runner will be shipped from the factory to the site on schedule by coordination of the manufacturing schedule in their factory. Accordingly, it has no impact on the overall schedule.

a) The main activities carried out during this month are described below:

- For the main power station, calculation documents of mechanical strength of upper guide bearing and lower guide bearing, site specific environmental and social monitoring and management plan, and shop inspection and test procedure for guide vane;
- For the re-regulation power station, construction drawings of the 115 kV capacitive voltage transformer.

b) All of the six sections of the draft tube liner have been joined by welding in-situ at the end of January 2016;

- c) The installation works of the grounding system in the lowest area of the main powerhouse substructure was completed at the end of January 2016;
- d) The installation works of the grounding system in the re-regulation powerhouse was completed below EL. 160 m and its grounding conductor was extended up to EL 166 m on the river side at the outlet area at the end of October 2015 in coordination with the Civil Works Contractor.

FIG. 5: PROGRESS OF INSTALLATION OF DRAFT TUBE LINER AT THE RE-REGULATION POWERHOUSE



1.2.4 Hydraulic Metal Work

The HMWC was executed between IHI Infrastructure Systems and NNP1PC on 18 April 2014 and the NTP was issued to the Contractor on 03 October 2014. The cumulative work progress of the Hydraulic Metal Works until the end of January 2016 was 11.9% (compared to planned progress of 11.9%).

The main activities carried out during this month are described below:

- Design for the main dam facilities was on-going. For the penstock, cutting and bending of lower and inclined penstock were started and upper penstock are under procurement.
- Fabrication for the facilities of the re-regulation dam is on-going.

1.2.5 Transmission Line

The TLW Contract was executed between Loxley-Sri Consortium and NNP1PC on 11 July 2014 and the NTP was issued to the 230kV TL Contractor on 03 October 2014. The cumulative work progress of the Transmission Line Works until the end of January 2016 was 15.8% (compared to planned progress of 39.8%). The difference is chiefly as a result of delay to commencement of construction works by approximately 7 months while awaiting compensation matters to be resolved by NNP1PC. The Contractor has been instructed to accelerate its Works and has implemented this by already mobilising significant additional resources for right of way clearing, foundation construction and tower erection. Current planning is to be back on the original schedule by May 2016 and to continue using the supplemental resources to complete the whole works early. During the 2015 rainy season there were ongoing delays to compensation, but nearly full access to most sections of alignment was possible in October 2015.

2 ENVIRONMENTAL MANAGEMENT MONITORING

2.1 Compliance and Environmental Monitoring

2.1.1 SS-ESMMP Review and Approval

In January 2016, a total of five (05) SS-ESMMPs were approved by the NNP1PC EMO as below:

- SS-ESMMP for Grouting Works at Secondary Cofferdam;
- SS-ESMMP for Construction of Main Powerhouse;
- SS-ESMMP for Enhancement Works of the Road Conditions at Houay Soup Resettlement area;
- SS-ESMMP for the Installation of the Draft Tube Liner; and
- SS-ESMMP for the Installation, Operation, and Dismantling of Tower Crane.

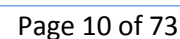
Apart from these, a SS-ESMMP of Levelling (Cutting & Filling) for the construction of the school for the Hatsaykham resettlers at Houay Soup Resettlement Area was approved with comments and a SS-ESMMP for the development of 38 ha paddy field for HSRA was objected. The SS-ESMMP of Civil Work Construction of the NNP1 Project Landfill submitted by the Main Contractor was reviewed by the EMO. However, it is understood that a new Contractor will be selected to prepare the landfill site. Thus, a new SS-ESMMP for the landfill site preparation (earthworks) shall be prepared after awarding a contract to a selected contractor in February 2016.

A full list of all SS-ESMMP documents reviewed and approved to date can be found in the Annex A.

2.1.2 Compliance Report

During January 2016, the EMO conducted inspections of 12 construction sites that potentially have high environmental risks in accordance to the approved SS-ESMMPs and EMMP-CP. These include upstream/downstream cofferdams, camps (HM workers' camp, SECC camp), SECC workshop and Industrial area, Houay Soup Bridge construction and the 230 kV Transmission Line.

FIG. 6: DAM AND COMMON FACILITIES CONSTRUCTION AREA



Key issues found during site inspections are described below:

- **Waste Water Treatment Systems (WWTS):** the upgrade of the WWTS at three priority worker camps (i.e. RT, V&K, and Song Da) is in progress. The EMO continues to monitor the discharge from the worker camps (refer to the section 1.2.3 Effluent Discharge Monitoring) and the upgrade of these WWTSs according to the design suggested by the independent consultant.
- **Dust Management:** Based on the site observations, the dust emission from the aggregate plant yard during this reporting period was significantly reduced. The EMO continues to monitor and test the dust emission monthly in order to ensure minimum workers' health impacts.

TABLE 3: SUMMARY OF ONCs AND NCRs IN JANUARY 2016

Reporting period	ONC	NCR Level 1	NCR Level 2
New issues in January 2016	18	1	0
Carried over from the December 2015	10	0	0
Total issues in January 2016	28	1	0
Resolved during January 2016	9	1	0
Unresolved, carried over into February 2016	19	0	0

As shown in Table 3 above, One Non-Compliance Report (NCR) was issued in January as a result of the aggregate crushing plant's slurry disposal offsite at a sediment pond located below Spoil Disposal Area #7. The slurry percolated through the rock/soil profile of the pond and entered into the Nam Ngiep below the Construction Bridge. The implementation of a corrective action plan will be followed up in February 2016.

FIG. 8: TRENDS OF ONCs/NCRs IN JANUARY 2016

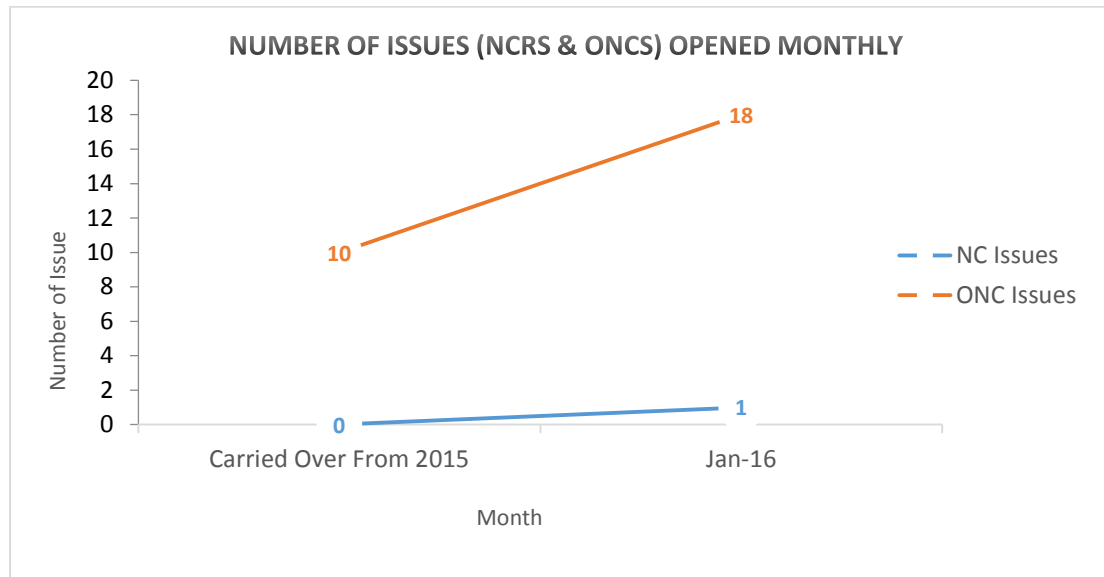


Table 4 below summarizes the types of environmental compliance issues raised with the Contractor during January 2016. It is observed that the water pollution and hazardous waste management remained the key issues experienced on site. The induction of the waste management has been requested in the camp site by the Contractor, the following up on this progress shall be monitored in February 2016.

TABLE 4: SUMMARY OF NEW NON-COMPLIANCES ISSUED IN JANUARY 2016

Non-Compliance Category	ONC	NCR1	NCR2	NCR3
Water Pollution (site)	10	1		
Hazardous Waste Management including minor oil spills at workshops, material storage and handling	07			
General waste management	02			
TOTAL	19	1	0	0

Photograph 1: Inspection at HM Camp*Photograph 2: Inspection at the Aggregate Crushing Plant**Photograph 3: A New Turbid Water Treatment System at the Main Dam**Photograph 4: Houay Soup Bridge Construction*

2.1.3 Environmental Monitoring

A budget was approved in December 2015 to construct a small water quality laboratory at the Owners' Site Office and Village. The location to build this lab has been determined. The EMO is in the process of working with the NNP1PC Technical Department to prepare a detailed design and obtain quotations for purchasing equipment to carry out bacteria, BOD and TSS analysis.

Water quality monitoring continued to be monitored on a monthly basis for surface water quality of Nam Ngiep and its main tributaries, ground water, effluent and construction area discharges as described in details below. Water quality continued to be monitored on a monthly basis for surface water quality of Nam Ngiep and its main tributaries, ground water, effluent and construction area discharges as described below.

2.1.3.1 SURFACE (AMBIENT) WATER QUALITY MONITORING

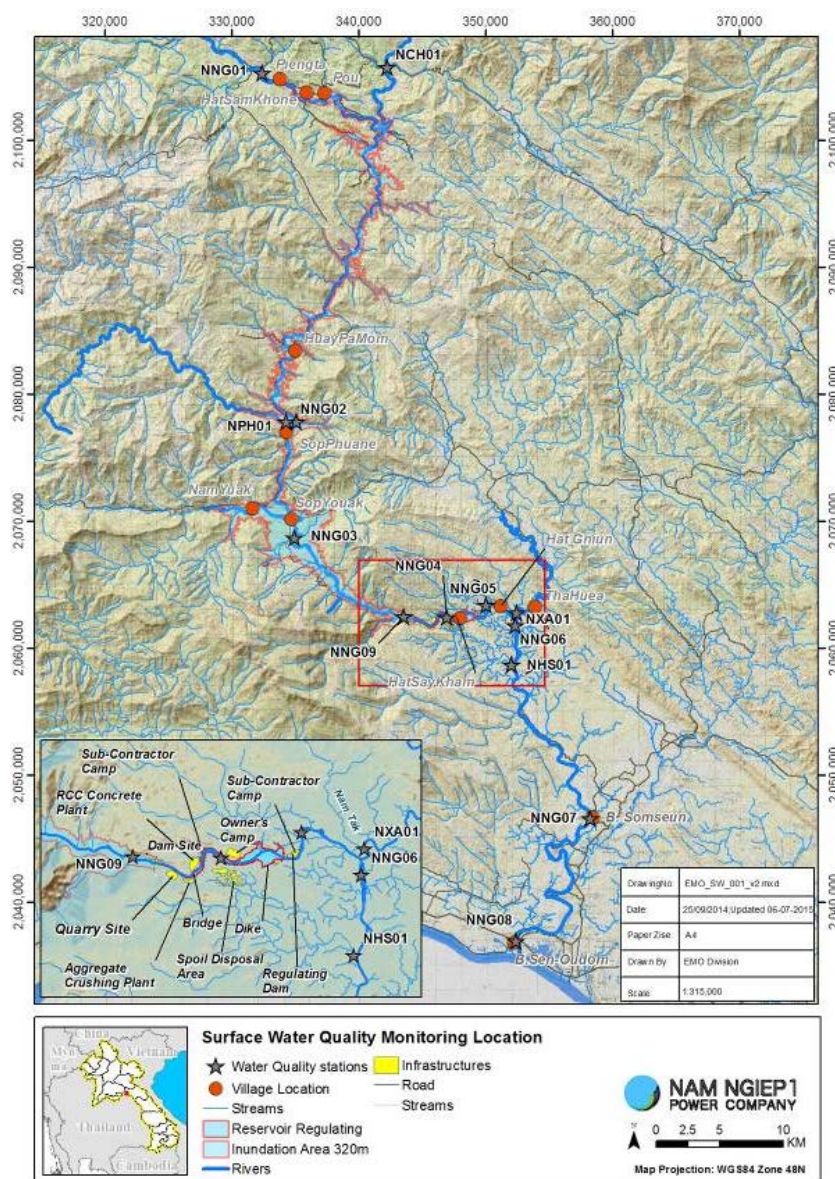
Surface water samples are regularly collected and analysed twice a month³ from 9 stations in Nam Ngiep and 4 stations in the main tributaries including the lower Nam Chian, Nam Phouane, Nam Xao and Houay Soup (total 13 stations, see Figure 9). However in January 2016, surface water sampling in two out of 13 stations (i.e. Nam Ngiep upstream Nam Phouan confluence [NNG02] and Nam Phouan upstream of Nam Ngiep confluence [NPH01]) were canceled due to slippery site access caused by a rain event occurred on 27 January 2016.

TABLE 5: SURFACE WATER QUALITY MONITORING LOCATIONS

	Site Code	Monitoring Location
1	NNG01	Nam Ngiep Upstream of Ban Phiengta
2	NNG02	Nam Ngiep Upstream of Nam Phouan Confluence
3	NNG03	Nam Ngiep Downstream of Ban Sop-Yuak
4	NNG09	Nam Ngiep Upstream Main Dam
5	NNG04	Nam Ngiep Downstream RT Camp
6	NNG05	Nam Ngiep Upstream of Ban Hat Gniun
7	NNG06	Nam Ngiep Downstream of Nam Xao Confluence
8	NNG07	Nam Ngiep at Ban Somsuen
9	NNG08	Nam Ngiep at the Bridge of Road 13
10	NCH01	Nam Chiane at the Bridge of Road 1D
11	NPH01	Nam Phouan Upstream of Nam Ngiep Confluence
12	NXA01	Nam Xao Upstream of Nam Ngiep Confluence
13	NHS01	Nam Houay Soup Upstream of Nam Ngiep Confluence

³ Monthly for chemical parameters and fortnightly for physical parameters

FIG. 9: MAP OF SURFACE WATER QUALITY MONITORING STATIONS



Key findings for surface water quality monitoring in January 2015 are shown in Table 6, 7, 8, 9 and summarised as follow:

- Nam Ngiep

Biochemical Oxygen Demand (BOD5) for the stations of Nam Ngiep Downstream of Ban Sop Yuak (NNG03) and Nam Ngiep downstream of RT Camp (NNG04) were slightly higher than the National Surface Water Quality Standard (less than 1.5 mg/l) with values recorded as 2.3 mg/l and 1.8 mg/l respectively. However, these were not related to NNP1 activities as BOD5 in the Effluent Discharged of the RT Camp (EF05) was only 6.0 mg/l (with a discharge volume of 50 m³/day). The Chemical Oxygen Demand (COD) exceeded the National Surface Water Quality Standard (<5 mg/l) for the station of Nam Ngiep upstream Main Dam (NNG09) to the lowest Nam Ngiep station (NNG08) and Nam Houay Soup (NHS01). In addition, faecal coliform contamination exceeded the National Standard for the stations of Nam Ngiep upstream Main Dam (NNG09), Nam Ngiep downstream of RT Camp (NNG04), Nam Ngiep upstream Ban Hat Gniun (NNG05), Nam

Ngiep downstream of Nam Xao confluence (NNG06) and Nam Ngiep at Ban Somsuen (NNG07) with values recorded of 4,900 MPN/100 ml, 3,300 MPN/100 ml, 3,300 MPN/100 ml, 1,700 MPN/100 ml, and 2,600 MPN/100 ml respectively. The faecal coliform peak occurred in the upstream main dam station, and decreased in the downstream stations. Thus, these surpluses are not related to the project activities.

All other parameters were below the National Surface Water Quality Standard.

TABLE 6: PHYSICAL AND CHEMICAL PARAMETERS OF NAM NGIEP SURFACE WATER QUALITY MONITORING IN DECEMBER 2015

Site Name		Nam Ngiep								
Station Code		NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08
Date		25/01/16		26/01/16	27/01/16	27/01/16	27/01/16	27/01/16	27/01/16	27/01/16
Parameters (Unit)	Guideline									
pH	5.0 – 9.0	6.51	No sampling due to site access limitation	6.52	7	6.88	6.73	7.81	7.17	7.95
DO (%)		96.5		102.3	100.6	103	105	102.3	102.8	102.7
DO (mg/L)	>6.0	9.91		10.25	10.44	10.79	10.6	10.35	10.04	10.2
Conductivity (µs/cm)		126.6		93.4	79.2	81.3	87.4	87.3	88.4	94.8
TDS (mg/l)		63		46	39	40	43	43	44	47.4
Temperature (°C)		13.2		14.1	13.1	12.6	14.3	13.5	15.7	15.9
Turbidity (NTU)		22.1		12.3	62.9	64.4	61	52.3	40	21.9
TSS (mg/l)		34.6		21.0	183	155	152	160	93.3	55.2
NO ₃ -N (mg/l)	<5.0	0.09		0.24	0.17	0.17	0.17	0.15	0.14	0.12
NH ₃ -N (mg/l)	<0.2	ND ¹²		ND ¹²	ND ¹²	ND ¹²	ND ¹²	ND ¹²	ND ¹²	ND ¹²
Total Iron (mg/l)		1.92		0.519	7.52	6.70	6.43	6.48	4.44	2.12
COD (mg/l)	<5.0	ND ¹⁶		ND ¹⁶	12.4	10.6	9.6	8.4	6.4	9.6
BOD (mg/l)	<1.5	ND ¹³		2.3	1.2	1.8	ND ¹³	ND ¹³	1.0	ND ¹³
Manganese (mg/l)	<1	0.060		0.030	0.225	0.227	0.204	0.228	0.114	0.069
Total coliform (MPN/100ml)	<5,000	240		790	4,900	3,300	3,300	1,700	3,300	2,400
Fecal coliform (MPN/100ml)	<1,000	7.8		220	4,900	3,300	3,300	1,700	2,600	490

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

TABLE 7: PHYSICAL PARAMETER RESULTS OF NAM NGIEP SURFACE WATER QUALITY (FORTNIGHTLY MEASURED) IN JANUARY 2016

	Site Name	Nam Ngiep River								
	Station code	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08
	Date	12/01/16		13/01/16	14/01/16	14/01/16	14/01/16	14/01/16	14/01/16	14/01/16
Parameters (Unit)	Guideline									
pH	5.0 - 9.0	6.78	No Sample	6.5	6.69	7.39	6.72	7.92	6.75	7.21
DO (%)		102.8		105.1	106.2	107.2	111.4	112.5	105.5	104
DO (mg/L)	>6.0	8.8		9.34	8.95	9.24	9.38	9.5	8.74	8.82
Conductivity(μs/cm)		102.8		99.6	120.6	100.5	93.8	92.5	90.9	94.5
TDS (mg/L)		51		49	60	50	46	46	45	47.2
Temperature (°C)		20.9		20.1	22.5	21.5	22.6	22.6	23.6	22.5
Turbidity (NTU)		24.6		15	19.2	20.7	19.4	18.6	19.1	19.7

- **Nam Chiane (NCH01)**

The Nam Chian of the NNP1PC Project construction site about 66 km. All parameters monitored for Nam Chian at the bridge station (NCH01) complied with the National Surface Water Quality Standard.

- **Nam Phouan (NPH01)**

The Nam Phouan upstream of NNP1PC Project construction site about 24 km. All parameters monitored at the Nam Phouan station, NPH01 complied with the National Surface Water Quality Standard.

- **Nam Xao (NXA01)**

No samples were taken during January 2016 due to the site access limitation.

- **Nam Houay Soup (NHS01)**

Nam Houay Soup has a confluence with Nam Ngiep River downstream of NNP1 construction footprint. All parameters monitored for Nam Houay Soup (station NHS01) were within the National Surface Water Quality Standard, except Biochemical Oxygen Demand (BOD₅) which was slightly above the National Surface Water Quality Standard (less than 1.5 mg/l) with a value recorded as 1.6 mg/l. There is no construction activity at Houay Soup resettlement area located upstream of the monitoring point during this period. Therefore, the water quality of this site presents the ambient conditions.

TABLE 8: RESULTS OF PHYSICAL AND CHEMICAL PARAMETERS OF NAM CHIAN, NAM PHOUAN, NAM XAO AND NAM HOUAY SOUP IN JANUARY 2016

Site Name	Nam Chain	Nam Phouan	Nam Xao	Nam Houaysoup
Station Code		NPH01	NXA01	NHS01
Date	25/01/16		27/01/16	27/01/16
Parameters (Unit)	Guideline	No Sample		
pH	5.0 - 9.0		7.4	8.01
DO (%)			100.4	92.6
DO (mg/L)	>6.0		9.37	9.18
Conductivity(μs/cm)			134.6	51.1
TDS (mg/L)			67	25
Temperature (°C)			14.2	15.3
Turbidity (NTU)			7.96	2.72
TSS (mg/L)			5.3	ND ¹⁶
NO ₃ -N (mg/L)	<5.0		0.08	0.16
NH ₃ -N (mg/L)	<0.2		ND ¹²	ND ¹²
Total Iron (mg/L)			0.544	0.521
COD (mg/L)	<5.0		ND ¹⁶	7.2
BOD (mg/L)	<1.5		ND ¹³	ND ¹³
Manganese (mg/L)	<1		0.030	ND ⁴
Total coliform (MPN/100mL)	<5,000		330	390
Fecal coliform (MPN/100mL)	<1,000		330	170

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

TABLE 9: PHYSICAL PARAMETERS RESULTS OF NAM NGIEP SURFACE WATER QUALITY (MEASURED FORTNIGHTLY) IN JANUARY 2016

Site Name	Nam Chain	Nam Phouan	Nam Xao	Nam Houaysoup
Station Code	NCH01	NPH01	NXA01	NHS01
Date	12/01/16		14/01/16	14/01/16
Parameters (Unit)	Guideline	No sample		
pH	5.0 - 9.0		7.74	7.71
DO (%)			98.6	110.7
DO (mg/L)	>6.0		8.07	9.22
Conductivity (μs/cm)			136.6	61
TDS (mg/L)			68	30
Temperature (°C)			24.2	23.3
Turbidity (NTU)			3.2	3.03

- Nam Chian (NCH01)

The Nam Chian is about 66 km upstream of the NNP1PC Project construction site. All parameters monitored for Nam Chian at the bridge station (NCH01) complied with the National Surface Water Quality Standard.

- Nam Phouan (NPH01)

The Nam Phouan is about 24 km upstream of NNP1PC Project construction site. All parameters monitored at the Nam Phouan station, NPH01 complied with the National Surface Water Quality Standard.

- Nam Xao (NXA01)

All parameters monitored at the Nam Xao station met the National Surface Water Quality Standard.

- Nam Houay Soup

Nam Houay Soup has a confluence with Nam Ngiep River downstream of NNP1 construction footprint. All parameters monitored for Nam Houay Soup (station NHS01) were within the National Surface Water Quality Standard. There is no construction activity at Houay Soup resettlement area located upstream of the monitoring point during this period. Therefore, the water quality of this site presents the ambient conditions.

TABLE 10: RESULTS FOR PHYSICAL AND CHEMICAL PARAMETERS OF NAM CHIAN, NAM PHOUAN, NAM XAO AND NAM HOUAY SOUP IN JANUARY 2016

	Site Name	Nam Chain	Nam Phouan	Nam Xao	Nam Houaysoup
	Station Code		NPH01	NXA01	NHS01
	Date	25/01/16		27/01/16	27/01/16
Parameters (Unit)	Guideline		No Sample		
pH	5.0 - 9.0	7.52		7.4	8.01
DO (%)		102.3		100.4	92.6
DO (mg/L)	>6.0	11.19		9.37	9.18
Conductivity(μs/cm)		40		134.6	51.1
TDS (mg/L)		20		67	25
Temperature (°C)		10.2		14.2	15.3
Turbidity (NTU)		16		7.96	2.72
TSS (mg/L)		48.6		5.3	ND ¹⁶
NO ₃ -N (mg/L)	<5.0	0.09		0.08	0.16
NH ₃ -N (mg/L)	<0.2	ND ¹²		ND ¹²	ND ¹²
Total Iron (mg/L)		1.22		0.544	0.521
COD (mg/L)	<5.0	ND ¹⁶		ND ¹⁶	7.2
BOD (mg/L)	<1.5	1.0		ND ¹³	ND ¹³
Manganese (mg/L)	<1	0.056		0.030	ND ⁴
Total coliform (MPN/100mL)	<5,000	2,400		330	390
Fecal coliform (MPN/100mL)	<1,000	1,700		330	170

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

TABLE 11: PHYSICAL PARAMETERS RESULTS OF SURFACE WATER QUALITY – NAM CHIAN, NAM PHOUAN, NAM XAO AND NAM HOUAY SOUP (MEASURED FORTNIGHTLY) FOR JANUARY 2016

Site Name	Nam Chian	Nam Phouan	Nam Xao	Nam Houaysoup
Station Code	NCH01	NPH01	NXA01	NH501
Date	12/01/16		14/01/16	14/01/16
Parameters (Unit)	Guideline			
pH	5.0 - 9.0	7.78	No sample	7.74
DO (%)		106.2		98.6
DO (mg/L)	>6.0	9.42		8.07
Conductivity (µs/cm)		37.8		136.6
TDS (mg/L)		18		68
Temperature (°C)		19.3		24.2
Turbidity (NTU)		11.2		3.2
				7.71
				110.7
				9.22
				61
				30
				23.3
				3.03

2.1.3.2 GROUNDWATER QUALITY MONITORING

In January 2016, groundwater quality was tested in three boreholes at Ban Hatsaykham (Fig.10). The assessment found that the pH levels for one of three boreholes (GHSK02) was 6.37, slightly lower than the National Standard range of between 6.50 and 9.2. The instance of low pH will continue to be monitored. However, the levels of those recorded do not pose risks to health.

FIG. 10: MAP OF GROUNDWATER SAMPLING SITE AT BAN HATSAYKHAM

TABLE 12: GROUNDWATER QUALITY MONITORING RESULTS IN JANUARY 2016

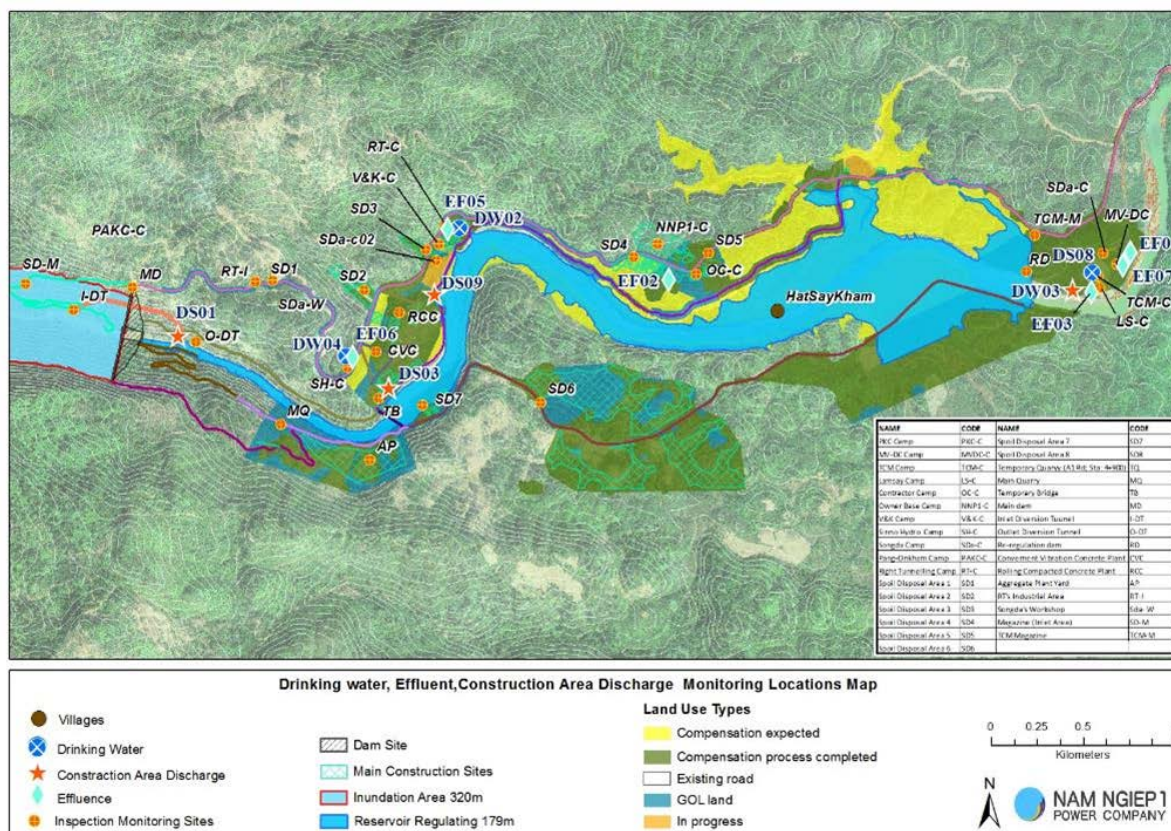
	Site Name		Ban Hatsaykham	
	Station Code	GHSK01	GHSK02	GHSK03
	Date	29/01/16	29/01/16	29/01/16
	Guideline			
Parameter (Unit)				
pH	6.5-9.2	6.63	6.37	6.5
Sat. DO (%)		45.2	53.6	45.7
DO (mg/L)		3.6	4.23	3.77
Conductivity (µs/cm)		82.7	61.4	78.5
TDS (mg/L)	<1,200	41	30	38
Temperature (°C)		26.1	26.5	25.2
Turbidity (NTU)	<20	0.05	0.03	0.21
Fecal coliform (MPN/100ml)	0	0	0	0
Ecoli Bacteria (MPN/100mL)	0	0	0	0

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

2.1.3.3 EFFLUENT DICHARGE

The effluents from all Camps were monitored during January 2016. The camps include Owner Site Office and Village, Obayashi Corporation (OC) Camp, TCM Camp, Right Tunnelling (RT) Camp, Sino Hydro Camp, Songda5 Camp#1, Songda 5 Camp#2 and HM Camp. During the mission, the effluent was discharged from Owner's Site Office and Village, RT Camp and HM Camp. A map of monitoring locations is demonstrated in Fig. 11 below:

FIG. 11: MAP OF EFFLUENT MONITORING LOCATIONS



All parameters were assessed in accordance to the Effluent Guideline specified in the Project's Concession Agreement Annex C. Key assessment results are shown in Table 13 and summarised below.

- Owner's Site Office and Village (NNP1PC) [EF01]:** All parameters monitored were within the Guideline. Discharge from the Owner's Site Office and Village was approximately 50 m³/day.
- OC Camp [EF02]:** The COD, BOD₅ and NH₃-N exceeded the Guideline at 136 mg/l, 69.6 mg/l and 35 mg/l respectively. The amount of total and faecal coliforms were found to be more than 160,000 MPN/100 ml which were much higher than the Guideline. The discussion for wastewater treatment system improvement will be initiated.
- TCM Camp [EF03]:** All parameters monitored were within the Guideline specified in the Guideline, except faecal coliforms that exceeded with a value recorded as 700 MPN/100 ml.
- Right Tunneling Camp (RT Camp) [EF05]:**
 - Total Suspended Solids (TSS) was 26.7 mg/l below the Standard.
 - The amount of faecal coliforms have substantially increased from a recorded values of 540 MPN/100 ml in December 2015 to 1,700 MPN/100 ml in January 2016 as a result of more effluent being discharged and stored at the WWTS. A discharge from the RT camp was approximately 50 m³/day.

- **Sino Hydro Camp [EF06]:**

- The COD, BOD₅ and NH₃-N exceeded the Guideline at 124 mg/l, 33.8 mg/l and 13 mg/l respectively. Specifically, the amount of total and faecal coliforms were both found to be 160,000 MPN/100 ml which was significantly higher than the Standard.

- **Songda5 Camp#1 [EF07]:** The COD, BOD₅ and NH₃-N exceeded the Standards at 162 mg/l, 82.6 mg/l and 11 mg/l respectively. The total and faecal coliforms were also high at this camp with values of more than 160,000 MPN/100 ml.

- **Songda5 Camp#2 [EF08]:** The TSS, COD, BOD₅, NH₃-N and faecal coliforms exceeded the Guidelines with measured values of 79.2 mg/l, 202 mg/l, 69.9 mg/l and 29 mg/l respectively.

- **HM Camp [EF09]:** The TSS and BOD₅ exceeded the Guidelines at 528 mg/l and 51.3 mg/l respectively. Specifically, it was found that the level of total and faecal coliforms were significantly above the Guideline at 160,000 MPN/100 ml. The discharge from the HM camp was approximately 100 m³/day.

The rain event occurred on 27 January of about 15 mm in 12 hours (a day before the sampling was taken) contributed to the high TSS level in many of these mentioned camps. The camp's sediment control measures will be reviewed and inspected in preparation for the coming wet season. All camp's WWTS is subjected to the upgrade in accordance to the technical design provided by the independent consultant. The upgrade is in progress in 3 priority camps namely V&K, RT and Song Da worker camps since December 2015.

TABLE 13: EFFLUENT DISCHARGE MONITORING RESULTS IN JANUARY 2016

	Site Name	Owner site office and village	OC Camp	TCM Camp	RT Camp	Sino Hydro Camp	Songda5 Camp#1	Songda5 Camp#2	HM Camp
	Station code	EF01	EF02	EF03	EF05	EF06	EF07	EF08	EF09
	Date	28/01/16	28/01/16	28/01/16	28/01/16	28/01/16	28/01/16	28/01/16	28/01/16
Parameters (Unit)	Guideline in the CA								
pH	6.0 - 9.0	7.34	7.62	8.57	7.96	7.45	8.06	8.39	8.31
Sat. DO (%)		32.4	9.8	85.9	94.2	7.2	15.7	12.6	82.9
DO (mg/L)		2.85	0.84	7.84	8.6	0.66	1.43	1.18	7.43
Conductivity (µs/cm)		395	912	129.8	225	577	662	742	186.8
TDS (mg/L)		197	456	64	112	288	331	371	143
Temperature (°C)		20.6	21.5	18.9	18.8	18.3	19	17.7	19.8
Turbidity (NTU)		5.68	32.8	63.1	55.3	69.8	21.1	47.6	1,726
TSS (mg/L)	<50	ND ¹⁶	34.8	29.6	26.7	124	30.5	79.2	528
COD (mg/L)	<125	9.4	136	19.9	17.9	84.0	162	202	84.0
BOD ₅ (mg/L)	<30	ND ¹³	69.6	ND ¹³	6.0	33.8	82.6	69.9	51.3
NH ₃ -N (mg/L)	<10	5	35	ND ¹²	3	13	11	29	8
Oil & Grease (mg/L)	<10	ND ¹³	5	ND ¹³	ND ¹³	1	3	2	ND ¹³
Total coliform (MPN/100ml)	<400	>160,000	>160,000	35,000	160,000	>160,000	>160,000	>160,000	>160,000
Fecal Coliform (MPN/100ml)		130	>160,000	700	1,700	160,000	160,000	160,000	>160,000
Estimate Discharge (m ³ /day)		50	0	0	50	0	0	0	100

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

2.1.3.4 CONSTRUCTION AREA DISCHARGE

During January 2016, the discharges from the Aggregate Crushing Plant (DS02), CVC plant (DS03), Regulating Dam (DS08), RCC plant (DS09), and Main Dam (DS01) were monitored.

A rain event occurred on 27 January (a day before the sampling was taken) for about 15 mm in 12 hours. This caused a high level of sediment load in most of the construction sites monitored as well as the pH level in the RCC and CVC plants. Details on the assessment results for construction area discharge are shown in Table 12 and summarised as the following:

- **Aggregate Crushing Plant (DS02):**

The Total Suspended Solids (TSS) was above the Guideline set at less than 50 mg/l with values recorded as 708 mg/l. This site discharged water at a rate of 500 m³/day.

- **Main Dam Construction Area (DS01):**

The Total Suspended Solids (TSS) was above the Guideline set at less than 50 mg/l with values recorded as 100 mg/l in late January 2016. Although, this has decreased substantially from the December 2015 where it was recorded at 5,864 mg/l. The turbid water treatment system installation was completed since mid-January 2016. This site discharged water at a rate of 300 m³/day. All other parameters complied with the National Effluent Discharge Standard.

- **Re-regulating Dam (DS08):**

The Total Suspended Solids (TSS) was higher than the Guideline set at less than 50 mg/l with values recorded as 5,400 mg/l. This site discharged water at a rate of 5,000 m³/day.

- **RCC Plant Site (DS09):**

The pH was higher than the Guideline range (6.0-9.0) with a value recorded of 10.00. The TSS was above the CA Annex C Effluent Discharge Standard set at less than 50 mg/l with values recorded as 703 mg/l in late January 2016. These have tripled from December 2015 where they were recorded at 252 mg/l only. The site discharged water at a rate of 500 m³/day. All other parameters complied with the National Effluent Discharge Standard.

The sediment pond system was repaired but there was still a leakage at the bottom of the pond which proofed its in-effectiveness. This issue will be followed up in February inspection.

- **CVC Plant Site (DS03):**

The pH was higher than the Standard range (6.0-9.0) with a value recorded of 11.33. Total Suspended Solids (TSS) was above the CA Annex C Effluent Discharge Standard set at less than 50 mg/l with values recorded as 1,828 mg/l in late January 2016. The site discharged water at a rate of 300 m³/day. All other parameters complied with the National Effluent Discharge Standard.

The existing sediment pond system is now subject to improved design and repair as there is a leakage at the bottom of the pond and inadequate effectiveness. This is expected to be completed in January 2016.

TABLE 14: RESULTS OF CONSTRUCTION AREA DISCHARGE IN DECEMBER 2015

	Site Name	Main Dam		CVC Plant Site	Regulating Dam		RCC Plant	
	Station Code	DS11		DS03	DS08		DS09	
	Date	01/12/15	17/12/15	No sampling due to no discharge	01/12/15	17/12/15	01/12/15	17/12/15
Parameter	Guideline		No sampling due to no discharge					
pH	6.0 - 9.0	6.71			7.11	6.60	8.32	7.09
Sat. DO (%)	-	90.2			103.3	109.0	97.8	108.8
DO (mg/l)	-	7.20			7.75	9.35	7.41	9.24
Conductivity (µs/cm)	-	169.8			214.5	233	257	324
TDS (mg/L)	-	84.9			107.25	116.5	128.5	162
Temperature (°C)	-	25.7			29.1	22.4	28.7	22.8
Turbidity (NTU)	-	7,980			29.0	9.58	141	158
TSS (mg/L)	<50	5,864			34.6	11.3	134	252
Oil & Grease (mg/L)	<10	ND ¹³			ND ¹³	ND ¹³	ND ¹³	ND ¹³
ND ¹ (<0.0005 mg/L)	ND ² (<0.0003 mg/L)	ND ³ (<0.0002 mg/L)		ND ⁴ (<0.005 mg/L)	ND ⁵ (<0.003 mg/L)	ND ⁶ (<0.09 mg/L)	ND ⁷ (<0.07 mg/L)	ND ⁸ (<0.04 mg/L)
ND ⁹ (<0.02 mg/L)	ND ¹⁰ (<0.01 mg/L)	ND ¹¹ (<0.3 mg/L)	ND ¹² (<0.2 mg/L)	ND ¹³ (<1.0 mg/L)	ND ¹⁴ (<1.5 mg/L)	ND ¹⁵ (<4.0 mg/L)	ND ¹⁶ (<5.0 mg/L)	

2.1.3.5 GRAVITY FED WATER SUPPLY (GFWS) QUALITY MONITORING

Water quality monitoring for GFWS system was conducted on a monthly basis to monitor and provide some necessary recommendations to the Social Management Office (SMO) during the operation phase for village bathing and washing. During January 2016, the water sampling was conducted from water taps at Ban Hat Gniun and Ban Thaheua.

Results of the assessment for GFWS of Ban Hat Gniun and Ban Thaheua are shown in Table 15 and summarised as the following:

- **Ban Thahuea (WTHH02):** All parameters complied with the National Drinking Water Standard, except faecal coliforms and E.coli bacteria parameters which were above the National Standards (0 MPN/100ml) both at 23 MPN/100ml.
- **Ban Hat Gniun (WHGN02):** All parameters complied with National Drinking Water Standard, except faecal coliform and E.coli bacteria parameters which were both 12 MPN/100ml, above the National Standards of 0 MPN/100ml.

These levels of bacterial contamination would not have significant impacts for bathing and washing purposes, but unsuitable as drinking water.

TABLE 15: RESULTS OF THE GRAVITY FED WATER SUPPLY QUALITY MONITORING IN JANUARY 2016

	Site Name	Ban Thaheua	Ban HatGnuin
	Station	WTHH02	WHGN02
	Date	17/12/15	17/12/15
Parameter (Unit)	Guideline		
pH	6.5-8.5	7.03	6.95
Sat. DO (%)	-	102.3	106.9
DO (mg/L)	-	8.64	8.79
Conductivity (µs/cm)	<1,000	154.9	87.6
TDS (mg/L)	<600	77.9	43.8
Temperature (°C)	<35	23.2	24.7
Turbidity (NTU)	<10	2.64	1.43
Color (Pt-Co)	<5	ND ¹⁶	ND ¹⁶
Arsenic (mg/L)	<0.05	0.0004	0.0006
Cadmium (mg/L)	<0.003	ND ⁵	ND ⁵
Total iron (mg/L)	<1	0.014	0.014
Lead (mg/L)	<0.01	ND ¹⁰	ND ¹⁰
Magnesium (mg/L)	-	1.46	2.12
Manganese (mg/L)	<0.5	ND ⁴	ND ⁴
Mercury (mg/L)	<0.001	0.0004	ND ³
Selenium	<0.01	ND ¹	ND ¹
Fluoride (mg/L)	<1.5	0.10	0.13
Nitrate -N (mg/L)	<50	0.08	0.06
Nitrite -N (mg/L)	<3	ND ⁹	ND ⁹
Total Hardness (mg/L)	<300	27.2	40.2
Fecal coliform (MPN/100ml)	0	70	79
Ecoli Bacteria (MPN/100mL)	0	70	79

2.1.3.6 DUST EMISSION MONITORING

The method for dust emission monitoring is to start from 11:45 a.m and continue for 72 consecutive hours in targeted villages of Thahuea, HatGnuin and Hatxaykham. Monitoring starts on a non-working day for villagers (Sunday) to obtain a record of at least 20 hours of ambient conditions.

During January 2016, dust emission monitoring was conducted in Ban Hat Gnuin, Ban Hatsaykham and Ban Thaheua. In addition, dust emission monitoring was also conducted for 24 consecutive hours for the Aggregate Crushing Plant, RCC Plant, Sino Hydro Camp and Songda Camp#2 to assess possible worker safety impacts (Figure 12). It was found that the dust emission levels (maximum average) at Ban Hat Gnuin, Ban Hatsaykham (closer to the construction site) and Ban Thahuea were within the National Standard. These are shown in Table 16, 17 and 18; Figure 13, 14 and 15 below:

FIG. 12: NOISE AND DUST EMISSION MONITORING LOCATIONS

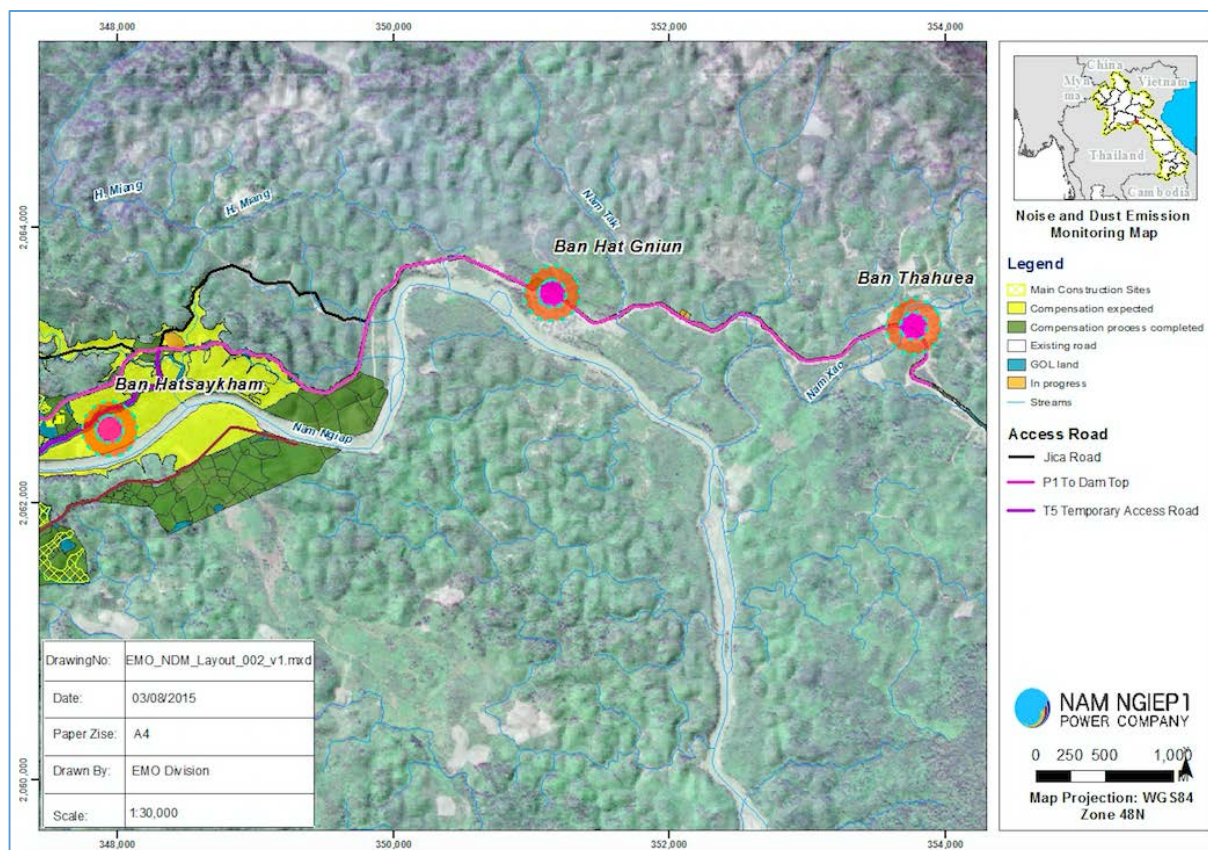


TABLE 16: AVERAGE DUST EMISSION LEVELS MEASURED IN 24 HOURS AT BAN HAT GNIUN

Ban Hat Gniun - Average Dust Emission Levels in 24 Hours			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	17/01/2016 13:12	18/01/2016 13:12	19/01/2016 13:12
End Time	18/01/2016 13:12	19/01/2016 13:12	20/01/2016 08:50
Average Data Recorded in 24h (mg/m ³)	0.071	0.052	0.062
Guideline Average in 24h (mg/m³)	0.12	0.12	0.12

FIG. 13: DUST MONITORING RESULTS AT BAN HAT GNUIN IN JANUARY 2016

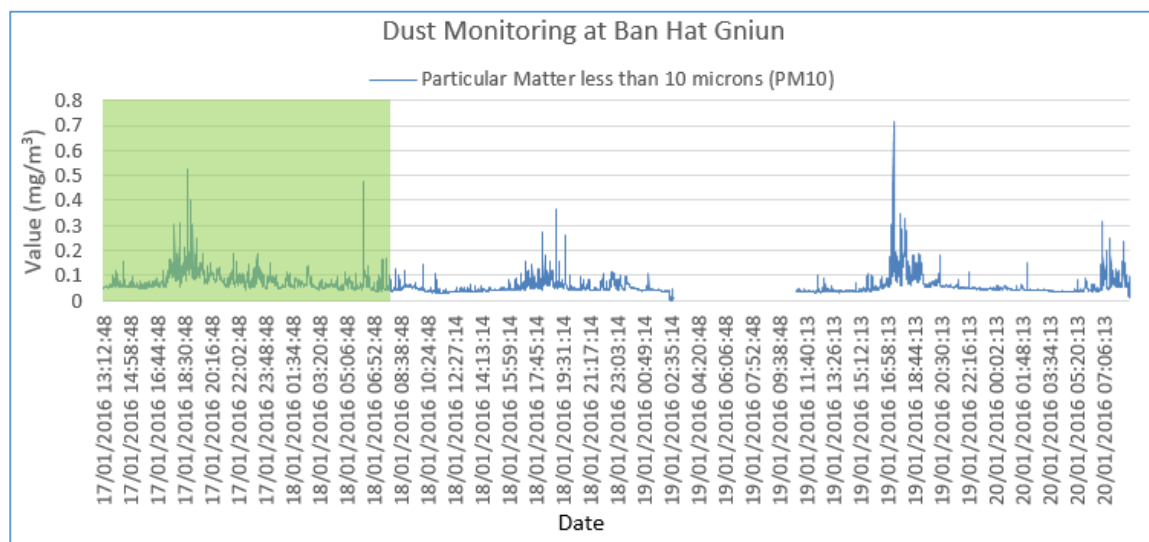


TABLE 17: AVERAGE DUST EMISSION MEASURED IN 24 HOURS AT BAN HATSAYKHAM

Ban Hatsaykham - Dust Emission Average in 24 Hours			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	10/01/2016 16:11	11/01/2016 16:11	12/01/2016 16:11
End Time	11/01/2016 16:11	12/01/2016 16:11	13/01/2016 16:11
Average Data Recorded in 24h (mg/m ³)	0.069	0.068	0.052
Guideline Average in 24h (mg/m³)	0.12	0.12	0.12

FIG. 14: DUST MONITORING RESULTS AT BAN HATSAYKHAM IN JANUARY 2016

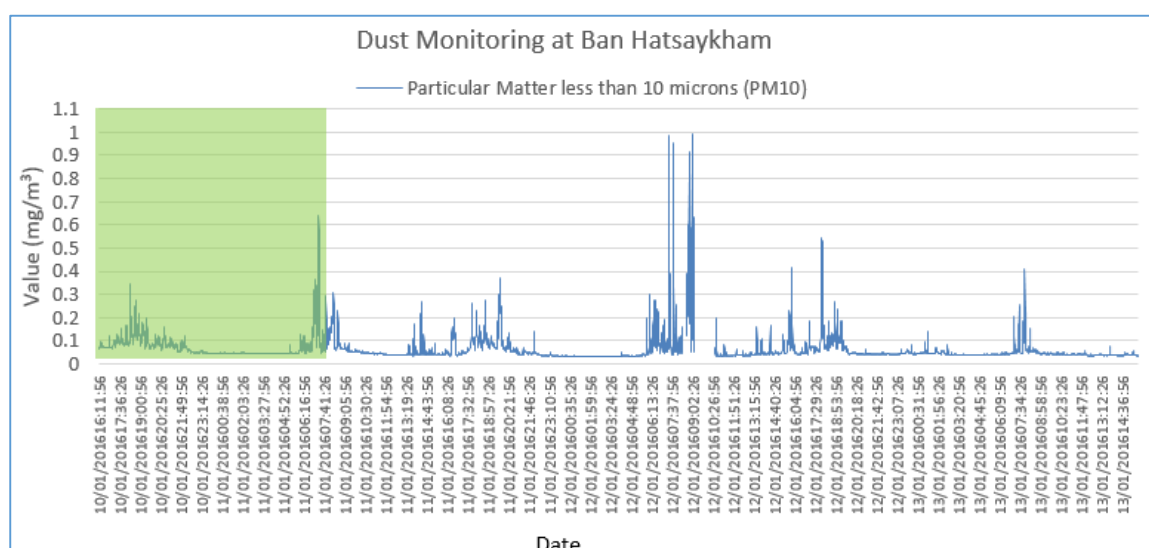
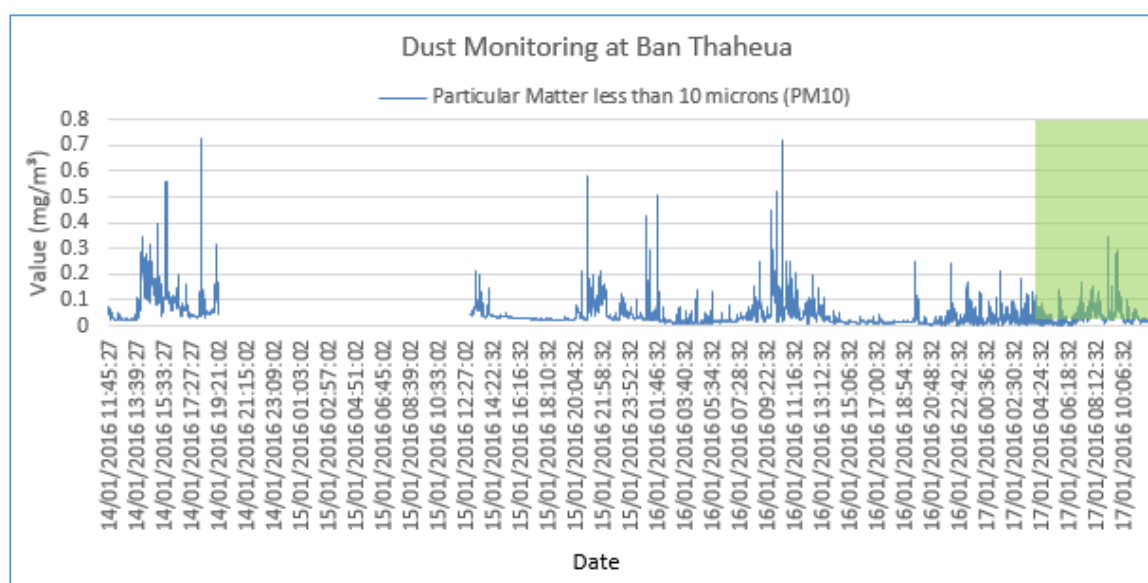


TABLE 18: AVERAGE DUST EMISSION MEASURED IN 24 HOURS AT BAN THAHUEA

Ban Thahuea - Dust Emission Average in 24 Hours			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	14/01/2016 11:45	15/01/2016 11:45	16/01/2016 11:45
End Time	15/01/2016 11:45	16/01/2016 11:45	17/01/2016 08:59
Average Data Recorded in 24h (mg/m ³)	0.087	0.043	0.029
Guideline Average in 24h (mg/m³)	0.12	0.12	0.12

FIG. 15: DUST EMISSION MONITORING RESULTS AT BAN THAHUEA IN JANUARY 2016



- **Aggregate Crushing Plant:** The average dust emission level on the monitored dates complied with the National Environmental Standard (0.12 mg/m³) with an average value of 0.028 mg/m³ (Fig. 16). It maybe resulted from the shower rain and only few crushing machines were operated during the monitoring period. Mitigation measures were also undertaken by the contractor, such as the installation of sprinkler systems to compress the dust generated from the aggregate crushing plant.
- **RCC Plant:** The average dust emission results at the RCC plant was 0.042 mg/m³ (Fig. 17), thus it is considered to be in compliant with the National Environmental Standard (0.12 mg/m³);
- **Songda Camp#2:** The average dust emission results at the Songda camp#2 was 0.049 mg/m³ (Fig. 18) thus it is considered complying with the National Environmental Standard (0.12 mg/m³);
- **Sino Hydro Camp:** The average dust emission results was 0.042 mg/m³ (Fig. 19), it is considered complying with the National Environmental Standard (0.12 mg/m³).

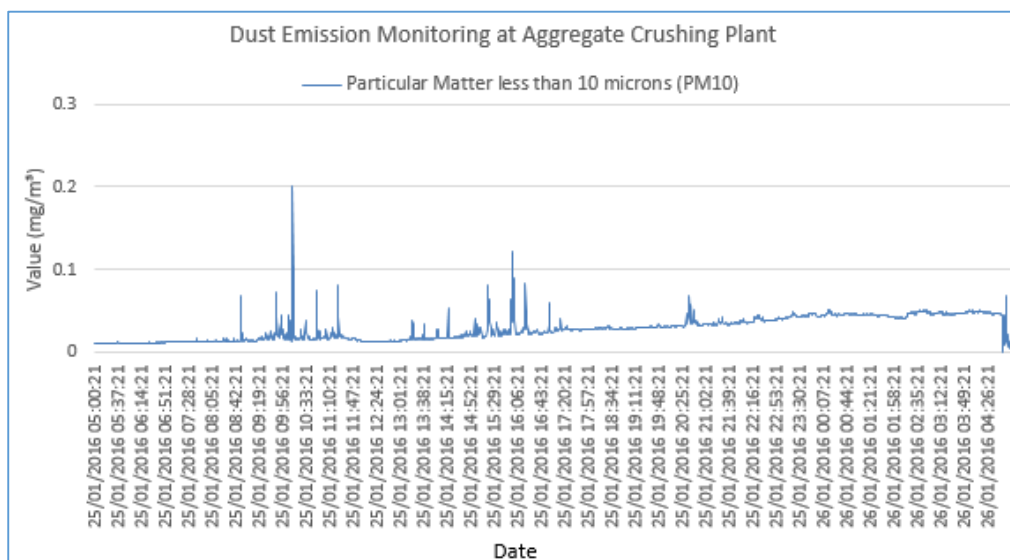
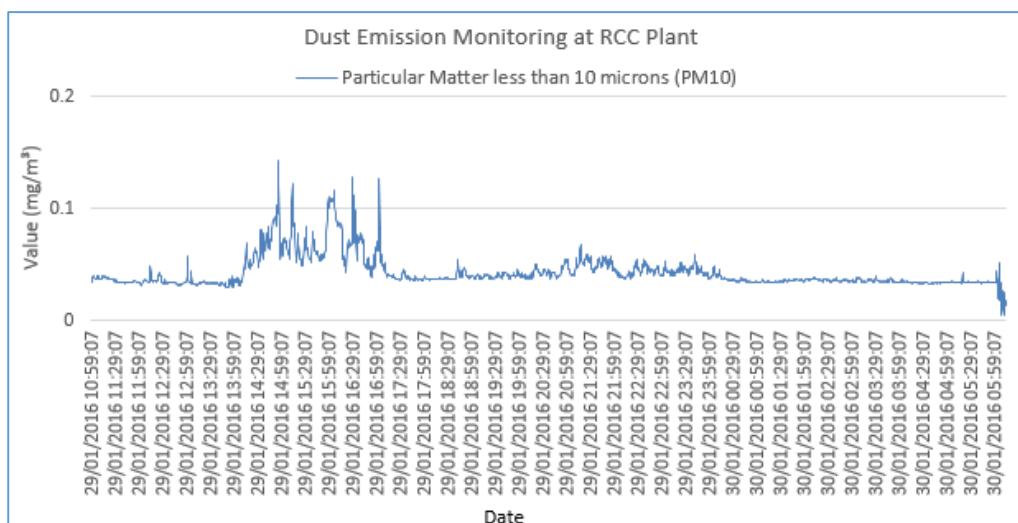
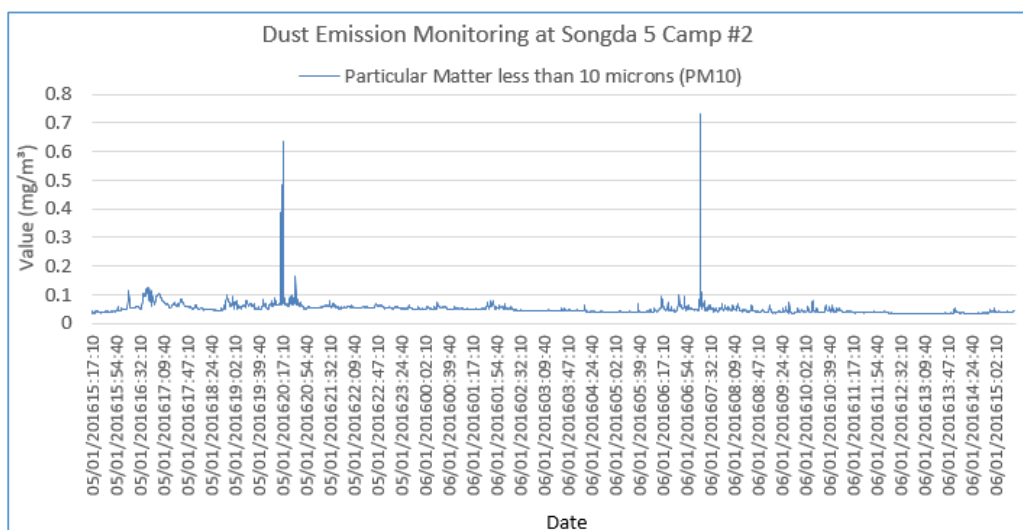
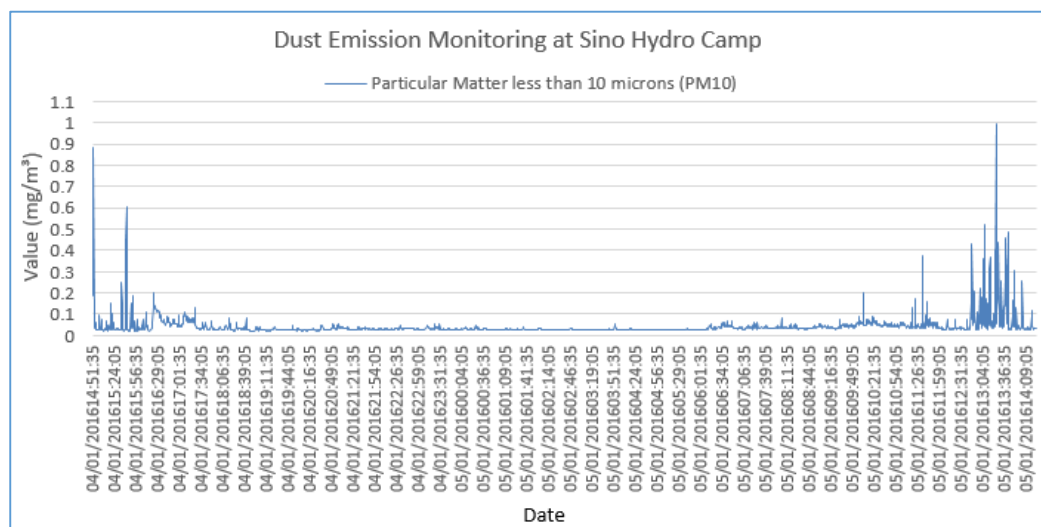
FIG. 16: DUST MONITORING RESULTS AT AGGREGATE CRUSHING PLANT IN JANUARY 2016**FIG. 17: DUST MONITORING RESULTS AT RCC PLANT IN JANUARY 2016****FIG. 18: DUST MONITORING RESULTS AT SONG DA 5 CAMP #2 IN JANUARY 2016**

FIG. 19: DUST EMISSION MONITORING RESULTS AT SINO HYDRO CAMP IN JANUARY 2016



2.1.3.7 NOISE MONITORING

During January 2016, noise monitoring was conducted in Ban Hatsaykham, Ban Hat Gnuin for at least 72 consecutive hours in each village. However, data records were incompletely captured at Ban Hatsaykham due to noise meter failure. Noise monitoring was also conducted at the Aggregate Crushing Plant, RCC Plant, Sino Hydro Camp and Songda Camp#2 for 24 consecutive hours.

Results of the noise monitoring for January 2016 are summarized below:

- **Ban Hat Gnuin:** The maximum noise level recorded was 84.6 dB(A) from 06:01-18:00 which complied with the maximum National Noise Level Standard of 115 dB(A). However, the 24 hour average noise levels were recorded as 59.76 dB (A) during 18:01-22:00 and 66.52 dB (A) during 22:01-6:00 which were greater than the National Standard.
- **Ban Hatsaykham:** The maximum noise level recorded was 81.6 dB(A) which was below the prescribed Standard (115dB(A)). The 24 hour average noise level recorded was 46.04 dB(A) which was complied with the National Standard (55dB(A)).
- **Ban Thaheua:** The recorded maximum noise level was 80.3 dB(A) which complied with the National Standard. However, average noise level results measured between 22:01 and 6:00 from 14-17 January 2016 were slightly above the National Noise Level Standard at 46.44, 45.06 and 52.81 dB(A) respectively.
- **Aggregate Crushing Plant:** The maximum noise level recorded was 85.5 dB(A) which was below the maximum Standard of 115 dB(A) in 24 hours whilst the maximum average noise level was recorded as 52.89 dB(A) which was higher than the National Standard of 50dB(A) for the period of 22:01-6:00. According to the Project's approved ESMMP-CP, the aggregate plants are required to be located at least 500 m from sensitive receptors (villages, schools, temples, etc.). The NNP1PC existing aggregate plant is located 3 km from the nearest village. In addition, the ESMMP-CP requires that all workers have adequate PPE for sites where maximum noise levels are greater than 80 dB(A) and use ear plugs or ear defenders whilst working on the site. This PPE is provided to all workers. Workers without necessary PPE are not allowed on site.
- **RCC Plant:** The maximum noise level recorded was 85.8 dB(A) which was below the maximum Standard of 115 dB(A) in 24 hours. The average noise level during 22:01-6:00 was recorded as 58.64

dB(A) which was higher than the National Standard of 50dB(A) and the Projects ESMMP-CP requirements (refer to Aggregate Crusher Plant above).

- **Songda Camp#2:** The maximum noise level recorded was 77.9 dB(A) which was below the maximum Standard of 115 dB(A) in 24 hours. The average noise level during 22:01-6:00 was recorded as 50.30 dB(A) which was slightly higher than the National Standard of 50dB(A).
- **Sino Hydro Camp:** The maximum noise level recorded was 76.9 dB(A) which was below the maximum Standard of 115 dB(A) in 24 hours. The average noise level during 22:01-6:00 was recorded as 53.48 dB(A) which was higher than the National Standard of 50dB(A).

A night time observation around the villages and construction sites will be undertaken by the EMO to identify the sources of high noise level. The findings will be reported in February 2016.

TABLE 19: AVERAGE RESULTS OF NOISE MONITORING AT BAN HAT GNUIN IN JANUARY 2016

Noise Level (dB)	21-22/01/2016			22-23/01/2016			23-24/01/2016			24/01/2016
	10:05 – 18:00	18:01 – 22:00	22:01 – 06:00	06:01 – 18:00	18:01 – 22:00	22:01 – 06:00	06:01 – 18:00	18:01 – 22:00	22:01 – 06:00	06:00-11:44
Data Record Max	72.80	77.20	81.70	79.00	76.10	75.50	84.60	68.50	76.30	74.30
Guideline Max	115	115	115	115	115	115	115	115	115	115
Data Record Average	46.62	59.76	66.52	49.66	58.19	58.04	50.51	51.25	49.37	49.72
Guideline Averaged	55	55	45	55	55	45	55	55	45	55

FIG. 20: RESULTS OF NOISE LEVEL MONITORING AT BAN HAT GNUIN IN JANUARY 2016

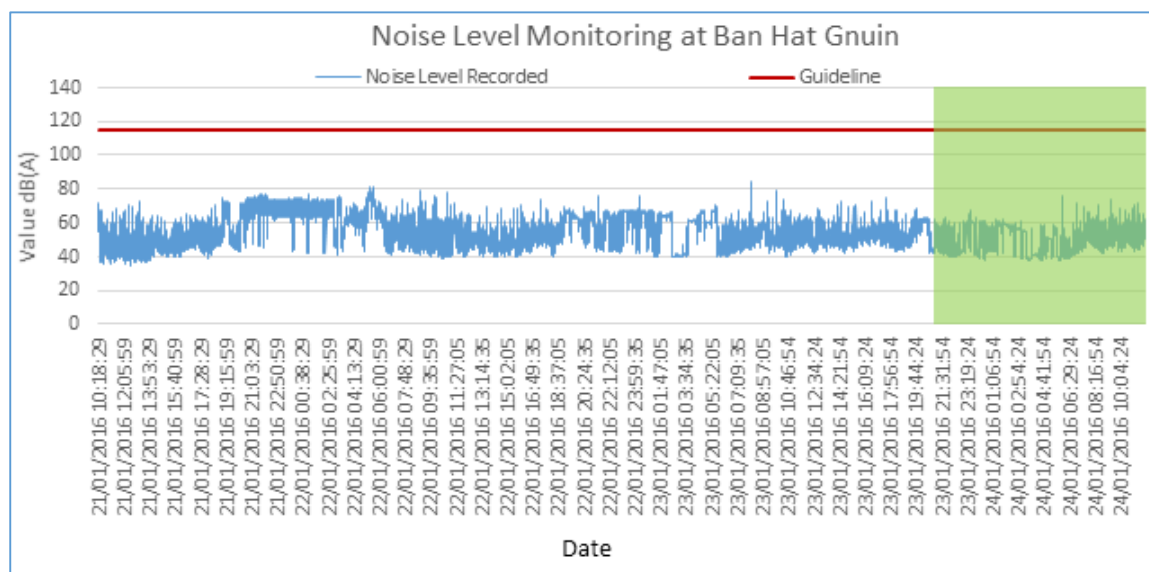
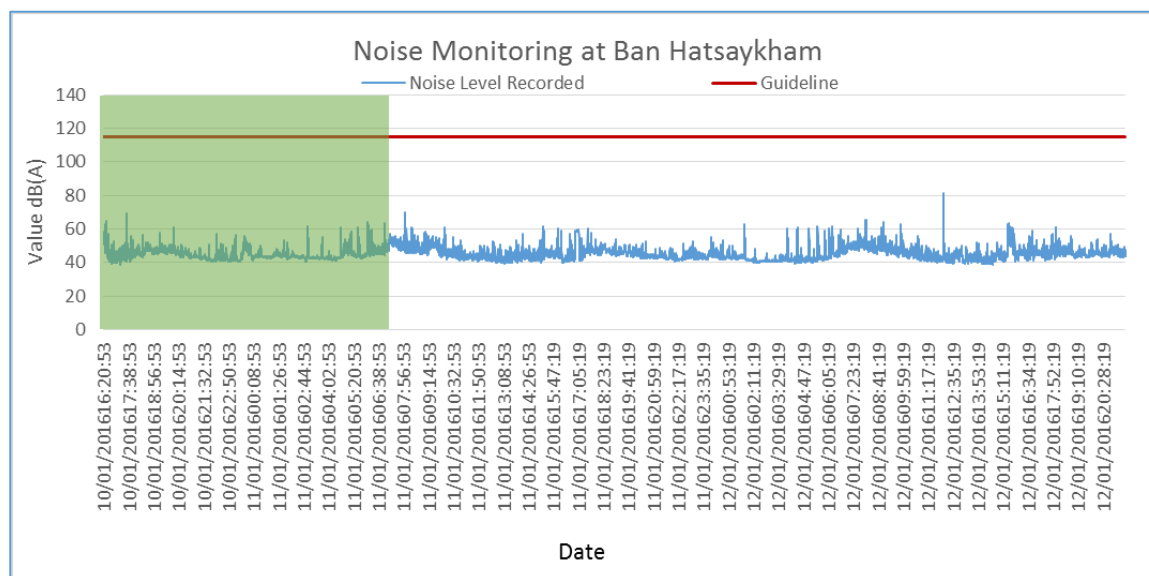


TABLE 20: NOISE MONITORING AVERAGE RESULTS AT BAN HATSAYKHAM (PERIODICALLY) IN JANUARY 2016

Noise Level (dB)	10-11/01/2016			11-12/01/2016			12-13/01/2016			13/01/2016
	16:20-18:00	18:01 – 22:00	22:01 – 06:00	06:01 – 18:00	18:01 – 22:00	22:01 – 06:00	06:01 – 18:00	18:01 – 22:00	22:01 – 06:00	06:01 – 16:20
Data Record Max	69.4	60.7	61.3	69.7	54.1	63	81.6	56.9	61.1	76.4
Guideline Max	115	115	115	115	115	115	115	115	115	115
Data Record Average	45.29	45.49	44.19	46.08	45.28	43.00	45.83	46.05	43.44	45.49
Guideline Averaged	55	55	45	55	55	45	55	55	45	55

FIG. 21: RESULTS OF NOISE LEVEL MONITORING AT BAN HATSAYKHAM IN JANUARY 2016**TABLE 21: AVERAGE NOISE MONITORING RESULTS AT BAN THA HEUA (PERIODICALLY) IN JANUARY 2016**

Noise Level (dB)	14-15/01/2016			15-16/01/2016			16-17/01/2016			17/01/2016
	12:00-18:00	18:01-22:00	22:01-06:00	06:01-18:00	18:01-22:00	22:01-06:00	06:01-18:00	18:01-22:00	22:01-06:00	06:00-09:10
Data Record Max	75.7	71	80.3	79.2	69.4	75.7	78.6	70.2	69.1	71.8
Guideline Max	115	115	115	115	115	115	115	115	115	115
Data Record Average	47.79	48.05	46.44	51.51	48.71	45.06	50.31	48.38	52.81	50.34
Guideline Averaged	55	55	45	55	55	45	55	55	45	55

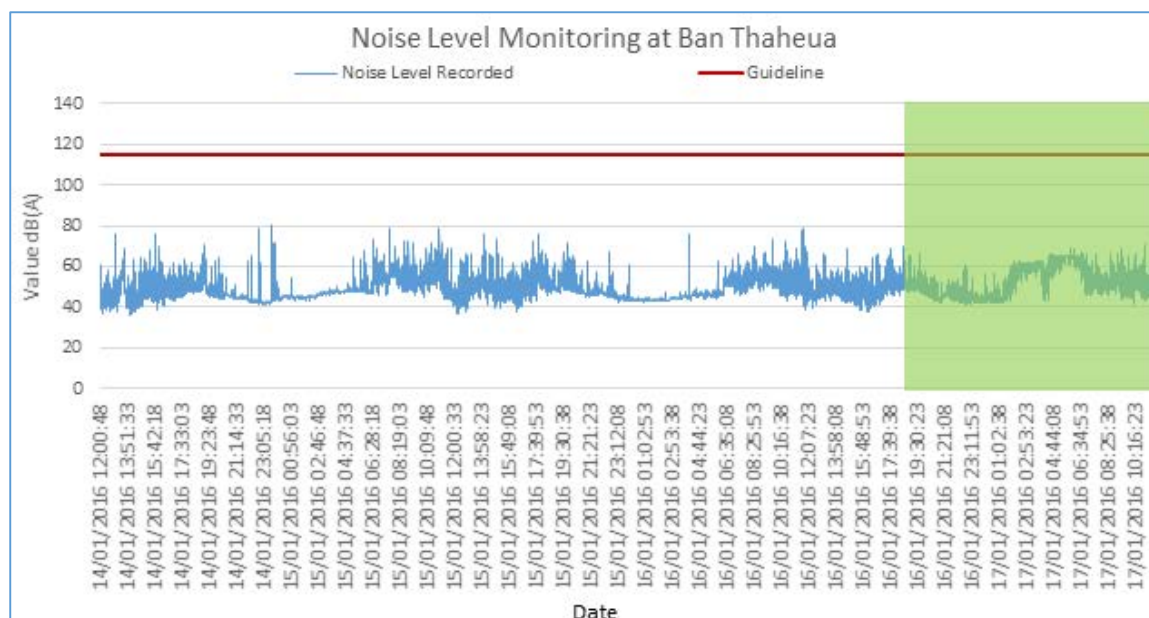
FIG. 22: RESULTS OF NOISE LEVEL MONITORING AT BAN THAHEUA IN JANUARY 2016

TABLE 22: AVERAGE RESULTS OF NOISE MONITORING AT AGGREGATE CRUSHING PLANT AND RCC PLANT IN JANUARY 2016**Aggregate Crushing Plant**

Noise Level (dB)	25-26/01/2016	
	06:00 – 22:00	22:01 – 06:00
Data Record Max	85.5	70.9
Guideline Max	115	115
Data Record Average	52.64	52.90
Guideline Averaged	70	50

RCC Plant

Noise Level (dB)	29-30/01/2016		30/01/2016
	11:24 – 22:00	22:01 – 06:00	06:00-11:10
Data Record Max	85.8	73.6	84.3
Guideline Max	115	115	115
Data Record Average	55.93	58.64	65.70
Guideline Averaged	70	50	70

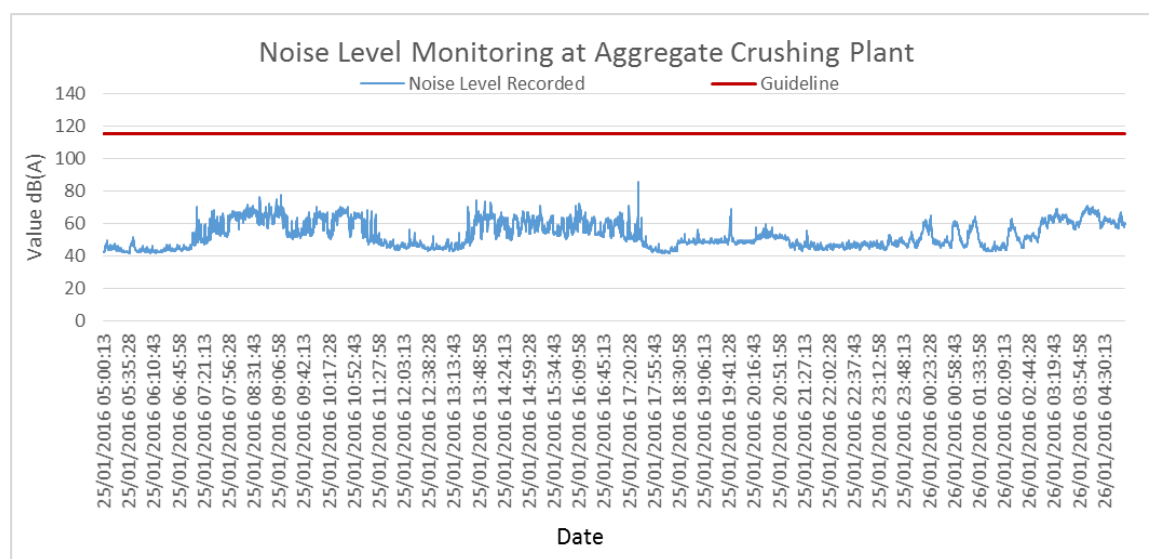
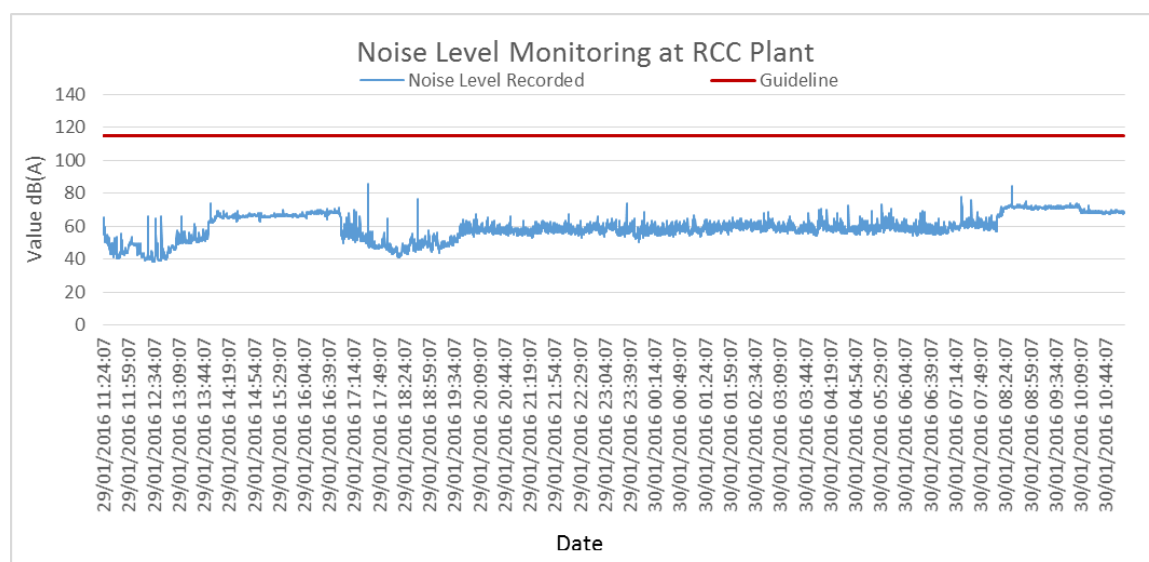
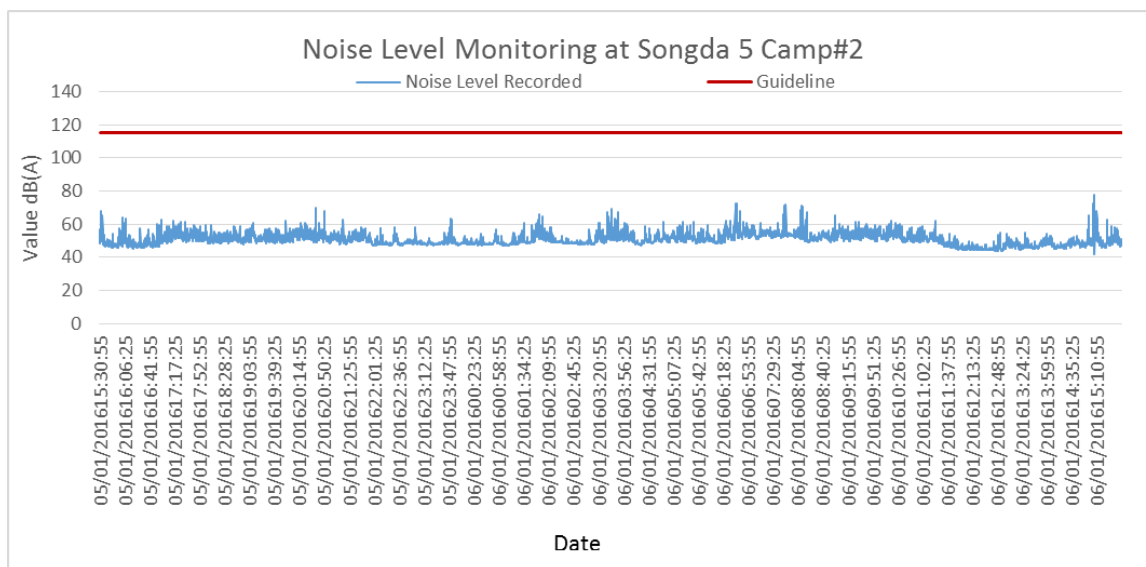
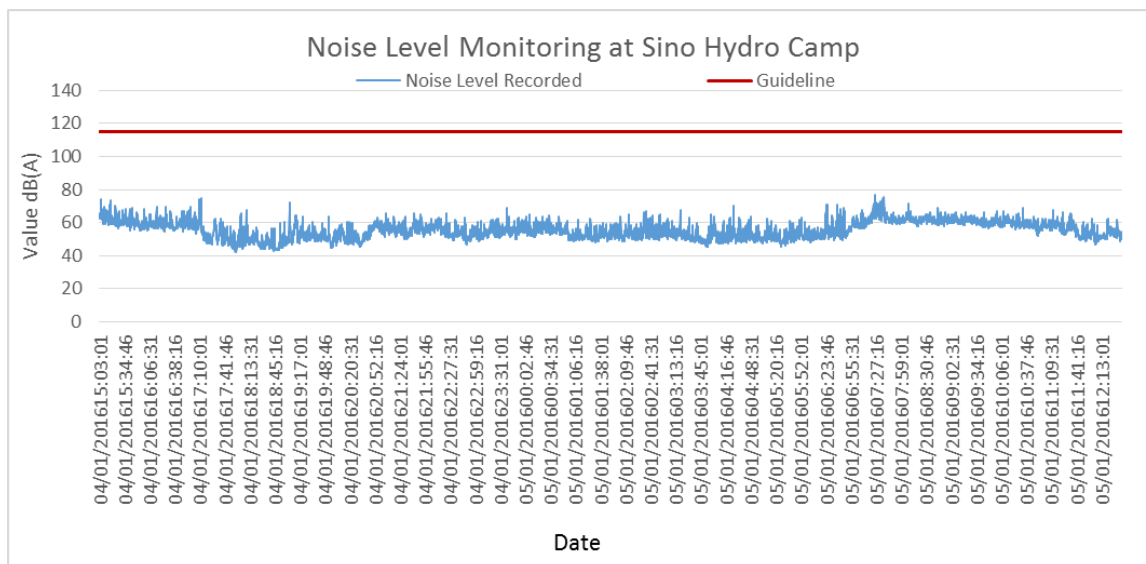
FIG. 23: RESULTS OF NOISE LEVEL MONITORING AT AGGREGATE CRUSHING PLANT IN JANUARY 2016**FIG. 24: RESULTS OF NOISE LEVEL MONITORING AT RCC PLANT IN JANUARY 2016**

TABLE 23 AND TABLE 24: AVERAGE RESULTS OF NOISE MONITORING AT SONGDA CAMP#2 AND SINO HYDRO CAMP IN JANUARY 2016**Songda Camp#2**

Noise Level (dB)	25-26/12/2015		26/12/2015
	17:06 – 22:00	22:01 – 06:00	06:00-15:56
Data Record Max	80.8	62.4	77.3
Guideline Max	115	115	115
Data Record Average	52.03	51.80	51.42
Guideline Averaged	70	50	70

Sino Hydro Camp

Noise Level (dB)	29-30/12/2015		30/12/2015
	16:34 – 22:00	22:01 – 06:00	06:00-16:09
Data Record Max	69.3	66.1	73.9
Guideline Max	115	115	115
Data Record Average	54.86	49.69	55.33
Guideline Averaged	70	50	70

FIG. 25: RESULTS OF NOISE LEVEL MONITORING AT SONGDA CAMP#2 IN JANUARY 2016**FIG. 26: RESULTS OF NOISE LEVEL MONITORING AT SINO HYDRO CAMP IN JANUARY 2016**

2.1.4 Waste Management

2.1.4.1 SOLID WASTE MANAGEMENT

Since November 2015, it was agreed by the NNP1PC management that the Owner will operate a permanent landfill and a Houay Soup Resettlement Village landfill (900 m³) which would be located at Spoil Area Number 6. The NNP1PC Technical Department (TD) is seeking an external contractor to carry out earthworks (excavation and levelling) for site preparation. Uncompressed waste is being temporarily stored at the temporary pits until the permanent landfill is constructed. A total of 6 temporary waste pits have been excavated at Spoil Area Number 6. Four out of six pits have already been closed and back-filled and one pit is still in use. Once the permanent landfill is completed, all the material in the temporary pits will be moved to the permanent landfill.

2.1.4.2 HAZARDOUS MATERIALS AND WASTE INVENTORY

On 14 January 2016, a hazardous waste inventory was jointly undertaken at the main construction sites and sub-contractor camps. Hazardous materials and waste were recorded at nine sites including the PKC Camp, TCM Camps 1 and 2, Song Da 5 Camp, Right Tunneling Workshop, Song Da 5 Workshop, V&K Camp, CVC Plant, Sino-hydro Camp and Song Da 5 CVC Plant.

2.1.4.3 HAZARDOUS MATERIAL MANAGEMENT AUDIT

A hazardous material management audit was also conducted on 14 January 2016. It was observed that the conditions for the hazardous material management were not satisfactory in terms of facility condition and waste management. These sites included RT Workshop, Song Da 5 workshop and Song Da 5 CVC Plant. The Compliance and Monitoring Team issued Observations of Non-Compliances (ONCs) to three Sub-Contractors (RT Workshop, Songda 5 Workshop and Songda 5 CVC Plant) requiring each workshop to improve their standards. During January 2016, the workshop camps were not improved and the ONCs were not resolved. The EMO will follow up again during the Hazardous Material Management Audit scheduled on 11 February.

2.1.4.4 SELLING OF WASTES

During January 2016, several types of waste generated from construction activities were sold to Khunmixay Factory for further processing as summarised below.

TABLE 25: AMOUNT OF WASTE SOLD IN JANUARY 2016

No.	Date	Types of Waste	Unit	Site Name		Total
				RT Camp	TCM Camp	
1	14/01/2016	Used tyres	u	-	40	40
2		Empty used chemical containers	sd	-	528	528
3		Empty contaminated bitumen drums/containers	d	-	80	80
4		Plastic bottles	Kg	10	3	13
5		Aluminium tin/cans	Kg	-	5	5
6		Paper/ cardboard	Kg	-	15	15
7		Scrap metal	Kg	-	700	700
8		Glass bottles	Kg	-	30	30

Note:

d = drum (contain 200 l/unit),

sd = small drum (contain 20 l/unit)

co = container (contain 1-10 l/unit)

ca = can (contain 1-5 l/unit)

b = bag

bo = bottle (contain 1-5 l/unit)

u = unit

2.1.4.5 COMMUNITY WASTE MANAGEMENT

2.1.4.5.1 COMMUNITY RECYCLE BANK PROGRAMME

The EMO continued to provide administrative and management supports to villagers on the operations of Community Recycle Bank at Ban Hat Gnuin. During the period of 24 July to 31 January 2016 (6 months), a total of 5,189 kg of recyclables have been sold and stored at the Community Recycle Bank. In addition, the number of villagers participating in this programme has increased constantly. By the end of January 2016, a total of 163 people (118 villagers and 45 students) 116 households held accounts at the Recycle Bank. The percentage of participation in the programme for each village are: Ban Hat Gniun 79%, Ban Hatsaykham 62% and Ban Thahuea 60% in just six months of operation.

Table 21 below summarizes the total amount of waste traded at the Recycle Bank from July to January 2016.

TABLE 26: RECYCLABLES TRADED FROM JULY TO JANUARY 2016

No.	Types of Waste	Unit	Total Quantity
1	Glass	Kg	1,658
2	Scrap metal	Kg	1,487.5
3	Plastic bottles	Kg	959
4	Paper/cardboard	Kg	910
5	Aluminium/tin cans	Kg	345.5
6	Hydraulic/oil containers	Kg	11.5
7	Used batteries	Am	9

On 16 January 2016, a total of 164 kg of plastic bottles and 1,400 kg of scrap metal were sold to the Khunmixay Factory for processing (See photos below). A long term contract signing for selling recyclables has also been discussed. The Khunmixay Factory agreed to purchase and transport all recyclables from the Community Recycle Bank and the NNP1PC in 2016 on a regular basis.

The EMO carried out a random household survey between 19 – 20 January 2016 at Ban Hat Gniun, Ban Thahuea and Ban Hatsaykham to quantify the amount of domestic waste generated from the households so as to calculate the volume of waste and size of the Hoauy Soup Resettlement Village's Landfill. The surveyed households⁴ represented 10% of the total households in each village.

The results of the survey are as below:

1. The average amount of domestic waste generated per day from each household was 0.5 kg of recyclables, 1.1 kg of food waste and 1.0 kg of general waste.

⁴ These are equivalent to 7 households at Ban Thahuea; 9 households, 2 restaurants and 2 general stores at Ban Hat Gniun and; 4 households at Ban Hatsaykham. In addition, 1 hotel, 1 restaurant and 1 general store within the camp follow area need to be surveyed.

2. Some villagers did not participate the Community Recycle Bank Programme because they do not have enough recyclables to sell or they do not have a vehicle to transport their recyclables, especially the villagers at Ban Thaheua and Ban Hatsaykham.

These results have been provided to the NNP1PC TD and incorporated in the design of the HS Landfill.

The extension of a storage area for the recycling pressing machine was completed. The machine was installed and instructions were provided for its use. The machine will be used by NNP1PC (Owner's Site Office and Village) and Hat Gniun village to press plastics and cans to improve values of their sale price. The machine will be operational when all safety measures have been approved by NNP1PC TD. It was also agreed that the pressing machine will operate only on Saturday and Sunday for a trial period of 6 months and will be relocated to the Owner's Site Office and Village until a permanent location is identified (see below photo).



Photograph 5: Installing a Recyclable Pressing Machine

2.2 Watershed and Biodiversity Management

2.2.1 Watershed Management

2.2.1.1 WATERSHED MANAGEMENT PLAN (WMP)

A coordination meeting was held from 14-15 January 2016 between NNP1PC EMO and the Watershed Management Committee represented by MoNRE's Department of Forest Resource Management and the secretariat office (WMO) of Xaysomboun and Bolikhamxay provinces to discuss and agree on the way forward and concerns/issues related to watershed, biodiversity and biomass programmes. Some discussions related to the watershed management programme are below:

- It is very important to complete Integrated Spatial Planning (ISP) in Xaysomboun province to avoid further delay in developing a Watershed Management Plan (WMP). NNP1 EMO requested a support from WMC and Xaysomboun WMO to assist MoNRE DEQP and Xaysomboun ISP technical team to commence the planning exercise particularly in three districts within NNP1 watershed (Hom, Anouvong and Thathom).

- The new deadlines for NNP1 watershed programme have been discussed and agreed between NNP1PC and ADB during these meetings: 1) on 31 July 2016 for the Draft Watershed Management Plan and; 2) on 31 October 2016 for the Final Watershed Management Plan. It is also understood that several activities which will be commenced under priority watershed action plan will contribute to the WMP development.
- It is important to have a practical WMP prepared for the GOL with their strong ownership during the planning process. It was therefore agreed that the GOL should take a lead in the development of WMP through WMC and its technical consultant in close association with the EMO watershed team. The WMC also requested that the EMO watershed team organises a more intensive discussion for further continuation of WMP development particularly to result in adequate quality of formulated plan accepted by relevant stakeholders including NNP1 lenders/reviewers.
- The final TOR of the WMC and WMO was officially been issued by NNP1 WMC through an official notification letter (No. 24/WMC-NNP1. XSB, dated 13/01/2016), signed by the Vice Governor of Xaysomboun Province as the Chair of WMC. The final TOR contains 10 articles that detail the roles and responsibilities of NNP1 WMC including other members at the Central level (DFRM) and the Provincial level (WMOs in each Province).
- National Level WMC which was established in 2015 have initiated the discussion with Project developers in the upper Nam Ngiep 1 watershed such as Nam Ngiep Power 2 and Nam Xan to fully responsible on their Project catchment area and provide a contribution toward the overall protection of Nam Ngiep watershed.

2.2.1.2 WATERSHED WORKING PLAN

The coordination meeting on 14-15 January 2016 also discussed some details on the implantation of priority watershed working plan. Some key discussion points are summarized below:

- The NNP1PC confirmed that the first disbursement of the Watershed Management Fund (WMF) was settled on 7 January 2016 and the official notification letter was issued to the relevant stakeholders including MoNRE, National Treasury (Ministry of Finance), Department of Energy and Business (Ministry of Energy and Mine), NNP1 Project Steering Committee, WMC, and WMO of Xaysomboun and Bolikhamxay.
- It was explained to NNPPC EMO that the fund flow from the MoF should follow certain mechanisms as agreed between MoF and WMC:
 - WMC parties (MoNRE DFRM, WMO Xaysomboun Province and WMO Bolikhamxay Province) should create an official bank account for a fund transfer from MoF.
 - Each WMC parties should submit a detailed proposal (activity and required budget) to the National Treasury of MoF with an attachment of an official notification of fund disbursement by NNP1PC. For the next fund request, the report of activities should accompany the proposal.
 - The fund will only be transferred upon an acceptance of the proposals by the National Treasury, MoF.
- It was discussed and agreed that WMC parties should provide progress reports regularly to NNP1PC, MoNRE and MoF as part of the monitoring mechanism. The timeline of reporting will be in weekly, monthly, quarterly and annually basis. The report form will refer to the standard reporting of GOL with modifications based on the inputs / comments from NNP1PC.
- It was discussed and agreed that certain activities are necessary to support the WMP development. Some arrangements were agreed as below:

- The GOL consultant should be on board as soon as possible to continue with the WMP development. The ToR will be designed by DFRM with NNP1PC assistance and the advertisement is expected to start in early February.
- The watershed demarcation is urgently needed at the sensitive villages along the watershed boundary before the shifting cultivation period. These local practices may pose serious risks to the watershed in terms of forest destruction and wild fire. The activity will then be followed by land use zoning activity and awareness raising in order to allocate the land for different uses together with consultations with local villagers. It is expected that the activity will start from February 2016.
- Some GOL junior staff will undergo on the job training as part of the capacity building programme regarding the use of GIS tools (GPS reading, tracking, mapping, etc.).

In following up after the coordination meeting, NNP1 has been informed that the official bank account from each WMC party has been created and the proposal which refers to priority activity of the Watershed Working Plan has been submitted to the National Treasury of MoF. NNP1PC EMO has also shared the flow chart of activities including the related milestones and deadlines to make sure that overall progress are in track of its schedule particularly for the WMP development. NNP1PC EMO has further discussed and shared the view to MoNRE DFRM related to ToR for GOL consultant which will be further finalized and proceeded with the selection process in February 2016.

2.2.2 Biodiversity Management

2.2.2.1 BIODIVERSITY OFFSET MANAGEMENT PLAN

The coordination meeting held on 14-15 January 2016 also discussed the progress on offset site selection and relevant biodiversity management program with the highlight note as follow:

- It is understood from the recent rapid survey in Bolikhamxay and Xaysomboun Provinces that the candidate sites are not suitable as the offset site. Bolikhamxay Province has later agreed to reconsider Nam Mounae Watershed Area as a candidate and allowed the Company to conduct a survey as an attempt to conclude the offset site selection. Several recommendation raised by the GOL include the following:
 - The EMO team needs to initiate a coordination meeting with Bolikhamxay Province and relevant village authorities in two districts of Viengthong and Xaychamphone to explain the survey objectives, overall activities and timeframe, as well as the assistance required from the villagers and district military on the field work. This coordination work should be completed before the survey team accessing the area in order to avoid any unexpected or sensitive issues that will further delay the work.
 - Bolikhamxay Province confirmed that they would play a key role in coordinating with relevant local authorities with technical and financial supports from the NNP1PC.
 - Bolikhamxay Province understands the approach of using a combination of specialists for the field walk and camera trapping as well as potentially a combination of both local and international experts. However, due to the recent unprecedented situation before the National Celebration Day on December 2015 as well as the issues in nearby provinces in which foreigners disturbed the local custom then it is quite sensitive for the locals to accept distinguished foreign national to access the remote area. It is recommended for the current survey to be managed by local experts especially in accessing very remote and sensitive area. If it is deemed necessary, than the profile of

international specialist needs to be communicated at central level including with Ministry of Foreign Affairs related to the working permission.

- The meeting also discussed the concerns on the way to move forward with the offset site selection. The survey in Nam Mouane Watershed of Bolikhamxay Province should be prioritized before deciding to go ahead with other options including the survey in other Provinces. If Nam Mouane was found to be suitable then the area will be declared as an “offset site” of NNP1. In the event that the area is not suitable as an offset site then there should be further discussion and agreement between NNP1PC, MoNRE DFRM, Bolikhamxay and Xaysomboun Provinces as well as at the level of NNP1 Project Steering Committee.
- Xaysomboun Province also addressed some concerns regarding the partial completion of rapid survey in Phou Hae and Phou Sod due to the security issues during November to December 2015. The province requested the company to complete the field observation before concluding the offset site selection. If it is fully confirmed that these sites are not suitable then the Province would like the Company to consider forested area in Thathom District outside NNP1 watershed. In any worst case scenario where none of the suitable sites were confirmed in both provinces then further serious discussions would be needed on whether the offset program is feasible for the Project. Another option proposed by DFRM was that the unsuitable offset sites in Xaysomboun as “endangered species conservation area” as future biodiversity conservation in Xaysomboun Province outside NNP1 watershed area.

In following up the progress on offset site selection particularly the preparation of rapid survey in Nam Mouane Watershed, NNP1PC has requested the Biodiversity Consultant to provide the proposal that details the approaches to be taken with its cost estimation. The proposal is being reviewed internally with assistance of NNP1 BAC particularly on clarification and justification of combination approach of spatial assessment for habitat status, village interview, direct field observation as well as camera trap. It is understood that the more camera traps to be deployed then the more comprehensive information could be obtained which the Consultant should provide more elaboration on priority survey area based on their initial assessment using satellite imagery in addition to their knowledge on the survey area. The proposal is expected to be finalized within end of January after several reviews from NNP1 and BAC and the contract could be settled in the early of February 2016.

2.2.3 Biomass Clearance

A coordination meeting held from 14-15 January 2016 also discussed the preparation phase of a biomass clearance work with the highlight notes as the following:

- The biomass clearance will be commenced only within the priority biomass removal area as described in NNP1 Biomass Removal Plan (BRP). The target within this year is to complete the clearance work at the lower and central part of the reservoir area.
- It was discussed and agreed that the Contractor's Work Plan must be approved first by Xaysomboun Province (at least at the Vice Governor level) prior to commencing any field activity. In this regard, it was requested by the province that another technical meeting in which the Biomass Contractor could present in detail the working plan of each priority clearance area. This meeting will also discuss further on how to deal with options of utilizing biomass waste or lesser valued biomass for the local communities as Xaysomboun Province does not have much experience to deal with the matter. One of the key issues that will be discussed is the mechanism (administrative and arrangement) to deal with remaining commercial valued timber if found throughout the clearance work.

- It was also discussed and agreed that a technical Working Group (including representatives from relevant sectors) under the WMC will be established for coordination, monitoring and reporting. The progress report of the biomass clearance work will be directly submitted to WMC and to DESIA upon request.

In following up after the meeting, the EMO planned to have a technical discussion at the end of January but the bad weather and unavailability of the provincial governor and relevant authorities resulted in the postponement of the activity to early of February. Upon the approval of contractor's working plan the Biomass Contractor could mobilize their clearance workers into the area. In parallel, NNP1PC will ensure a good collaboration with NNP1PC SMO and TD related to the compliance to SS-ESMMP.

3 OTHER OBLIGATIONS

3.1 Environmental Protection Fund (EPF)

The EMO continued to support Bolikhamxay and Xaysomboun PONREs on the development of their proposals for EPF funding. The Bolikhamxay PONRE would mobilise funding to support Houay Ngoua Provincial Protected Area and Xaysomboun PONRE focused their proposal on one of the high value tree species called Longleng (*Cunninghamia sinensis*) protected forest management in order to strengthen their capacity in protected forest management and coordination mechanism.

3.2 A Houay Soup Resettlement Area IEE

The Houay Soup Initial Environment Examination was approved by ADB in November 2015. The associated Integrated Natural Resources Management Plan for Houay Soup was approved by the ADB in December 2015. Both documents have been disclosed to the public via NNP1PC's website.

3.3 A Nabong Substation Upgrade Due Diligence Assessment

The Draft Due Diligence Assessment was submitted to the ADB on 20 October 2015. The assessment found that the current IEE for the upgrade works (EDL, 2007) is compliant with the ADB Safeguards Policy Statement, June 2009.

On 30 October 2015, the NNP1PC made a presentation and a request to Department of Energy Business (Ministry of Energy and Mines) and EDL to facilitate the passage of the DDA (Nabong Upgrade and 115kV) through MONRE. Minutes of the meeting has not been received by NNP1PC.

3.4 A 115kV Transmission Line IEE Due Diligence Assessment

On 30 October 2015, NNP1PC presented the DDA requirements to the Department of Energy Business, EDL. At that meeting, the EDL provided a tentative approval to assist the NNP1PC achieve the project responsibility on the DDAs. The minutes from that meeting have not yet been provided by EDL.

3.5 Independent Monitoring Agency (IMA) TOR and Procurement

MoNRE promised to finalize the IMA recruitment by the end of January 2016. However, there was no update by the time of issuing this report. The EMO will continue to follow up with MoNRE.

3.6 EMU Mission

In January 2016, the EMU representatives from Bolikhamxay province visited the NNP1 Project site during 12-14 January 2016. This mission was a follow up on the previous environmental concerns raised during the November mission where most of them have been resolved including: (i) recycle waste management at the

PK's camp; (ii) drainage systems at the RT's camp; (iii) fencing at the camp site; (iv) cleaning up the oil spill at the fuel station and storage area; (v) providing the PPE to the workers and (vi) To regular dispose the concrete waste. Details on the corrective actions in response to the EMU's concerns will be reported in the Monthly Environmental Monitoring Report.

Photograph 6-9: Sites Inspection and the down stream village(Ban Xom Xeun) Visit by the EMU Bolikhamxay Province During 12-14 January 2016



During January mission, the main environmental concerns raised by the EMU are below:

- Turbid water from the aggregate crushing plant yard and bridge construction;
- Untreated water at the sediment pond of the RT camp, SongDA camp#2 and V&K camp;
- Temporary waste pits at the spoil area number 6;
- Drainage system at the workshop area for the bridge construction work;
- Potential turbid water of NamNgiep river to the XomXeun village (downstream village).

During the consultation with the downstream villagers at Ban XomXeun, NNP1PC acknowledged the villagers's concerns on the water quality of Nam Ngiep during October to November 2015. It clarified that the turbid water was mainly caused by upstream activities of the NNP1 project area according to the surface water quality monitoring results during this period. After the EMO's information presentation, the Technical Department of NNP1PC invited the villagers to visit the site on 20 January 2016 to enhance their understanding on the current construction activities in the main dam (see above photos).

The EMO will continue to monitor the issues that are of the EMU's concerns and will report the progress in February 2016 report.

3.7 Other Support Programs

3.7.1 Integrated Spatial Planning Programme

NNP1PC has further followed up with MoNRE DEQP on the ISP district planning exercises in Hom, Anouvong and Thathom districts. It is understood that these exercises will comprise of:

- Collection and revision of existing environment and social related information at the district level;
Discussion on the potential and future development plan;
- Rapid environmental and social assessment;
- Participatory mapping that will be further documented into the GIS dataset with DEQP support;
- Final ISP report with DEQP support.

The workshop was planned to be held on 25 January 2016 but was further postponed to early February 2016. The EMO has internally discussed and agreed to provide direct assistance to district authorities for activity 1-4 under the supervision of representative DEQP technical team. The workshop could be commenced at the level where the overall information has been compiled and ready for ISP drafting.

ANNEXES

Annex A: Compliance Report

Construction SS-ESMMP Status By Site

No	Site name	List of ESMMP and SSESMP	Sub-Contractor	Approval Status by EMO/NNP1 (date)	Detail Site Information	Monthly Construction & Operation Status
Electrical and Mechanical Works						
1	Main dam and re-regulation dam	SS-ESMMP for Installation of the draft tube liner	IHI	Approved with no comment on 13 January 2015	To install the draft tube liner	On going
Associated Construction Facilities						
Construction Sites						
2	Main dam Cofferdam	SS-ESMMP for Main Powerhouse Construction	Song Da 5, TCM	Approved with no comments on 13 January 2016	To construct the powerhouse at the main dam and re-regulating dam	
		SS-ESMMP for Installation, Operation, and Dismantling of Tower Crane	Song Da 5,	Approved with no comments on 13 January 2016	To install the tower crane	On going
3	Cofferdam	SS-ESMMP for Grouting Works at Secondary Cofferdam		Approved with no comment on 13 January 2016	To construct the grouting for the secondary cofferdam	On going
Houay Soup Residential Area (Resettlement Site)						
4	Enhancement Works on Road Conditions	SS-ESMMP of HouySoup access road	Chalern Savan., Ltd	Approved with no comment on 19 Jan 2016	To improve the existing access road through the resettlement site	Works have not commenced

5	Houy Soup school construction	SS-ESMMP of Land levelling (Cutting & Filling) for construct the school of Hatsaykham Resettlement Villagers	Chalern Savan Road and Bridge Construction Co., Ltd.	Approved with comments on 28 January 2016	To construct the school at Houy Soup resettlement site	Work commences
6	Paddy Field Development for 38 households	SS-ESMMP of Paddy Field Development for 38 households	Phatthiya Co., Ltd.	Objection with Comments on 27 January 2016	To develop the paddy field at Houy Soup resettlement site	Works have not commenced

New Observations of Non-Compliances (ONCs) Issued in January 2016

No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
01	RT Camp	17.02.2015	ON_OC-0028	The temporary current sediment pond / retention ponds which collect the camp's grey water and storm run-off, currently accumulates and increase the wastewater quantity in the pond has been leaking to the environment / natural water. The result of the water discharge testing in December 2014 and January 2015 indicated continuously contaminated with high bacteria and has trended of bacteria increasing. 01/12/2014, detected 9200 MPN/100ml, total Coliform.	As agreement, TD had assigned an external specialist to provide the guideline and specific recommendation to all the wastewater treatment system at worker's camp. The final guideline and recommendation had been provided through TD and Contractors for following the external specialist guideline on November 2015(Final guideline is available at Owner Base Camp of NNP1). So, EMO had acknowledged to follow the design and guideline of the external specialist since December 2015 to the present.	30.3.16		Open	Improving the system under the specialist guideline (TD cooperation)

No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
				And 01/01/2015, detected >160,000 MPN/100ml, total Coliform and 160,000 MPN/100ml fecal-coliform.	EMO is waiting for the final Request Inspection from Contractor through TD; While the regular inspection shall be conducted by EMO, which the direct discharging is prohibited and NCR could be issued then.				
02	Songda5 Camp N#2	02.06.2015	ON_OC-0085	The wastewater treatment system does not follow the proposed design.	As agreement, TD had assigned an external specialist to provide the guideline and specific recommendation to all the wastewater treatment system at worker's camp. The final guideline and recommendation had been provided through TD and Contractors for following the external specialist guideline on November 2015(Final guideline is available at Owner Base Camp of NNP1). So, EMO had acknowledged to follow the design and guideline of the external specialist since December 2015 to the present. EMO is waiting for the final Request Inspection from Contractor through TD; While the regular inspection shall be conducted by EMO, which the	31.03.16	26.01.16	Open	

No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
					direct discharging is prohibited and NCR could be issued then.				
03	V&K Camp	02.06.2015	ON_OC-0087	The camp has insufficient facilities for the long-term operation. There is an evidence of grey water has been released from the septic tank to the open ditch. This is observed to be non-compliance to the project's environmental guideline.	As agreement, TD had assigned an external specialist to provide the guideline and specific recommendation to all the wastewater treatment system at worker's camp. The final guideline and recommendation had been provided through TD and Contractors for following the external specialist guideline on November 2015(Final guideline is available at Owner Base Camp of NNP1). So, EMO had acknowledged to follow the design and guideline of the external specialist since December 2015 to the present. EMO is waiting for the final Request Inspection from Contractor through TD; While the regular inspection shall be conducted by EMO, which the direct discharging is prohibited and NCR could be issued then.	31.03.16	26.01.16	Open	
04	RT Camp	29.12.2015	ON_OC-0192	A part of grey water pipe line (inflow) was lower than the new grey water treatment system,	The contractor needs to re-install the grey water pipe line to allow grey water flow into the new grey	12.01.16	26.01.16	Open	Delayed, Subject to a follow up

No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
				and the grey water cannot flow into the new treatment system, resulted in grey water leaked and stagnant in the open ditch.	water treatment system and ensure any leakage is stopped.				during the next inspection, if no potential improvement, a NCR shall be issued.
05	SECC Camp	04.01.2016	ON_SE CC-0001	A PVC pipe is connected from underground septic tanks to a wastewater retaining pond. This indicates that black water will be discharge when the septic tanks are full, causing untreated effluent to be discharged directly to the environment	<p>Close/block the connected PVC pipe. Septic waste is to be treated and disposed of in accordance with the Owners' environmental and social management requirement.</p> <p>The Contractor is to provide detail on the WWTS internal system treatment processes, and then also seek advice from the Owner regarding disposal methods and treatment process when the systems approaches 60%-80% full. Disposal of effluent from full waste water treatment systems is not permitted without Owner approval.</p>	19.01.16	26.01.16	Open	Delayed, Subject to discuss on next inspection, if no potential improvement, NCR shall be issued.
06	SECC Camp	04.01.2016	ON_SE CC-0002	1. Insufficient concreted area provided at the wash and bathing area. This has resulted	The Contractor has to: 1. Increase a concrete pad of the bathing area and install bunding.	19.01.16	26.01.16	Open	Delayed, Subject to discuss on

No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
				<p>in wash-water spreading out to the local environment. This has the potential to cause disease vectors, unpleasant odors and local waterlogged soils.</p> <p>2. Inappropriate drainage (ditches) from the wash-down area generally, and its connection to the sediment pond. This has resulted in stagnant water accumulating in the ditches causing waterlogged soils to form and potential vector for disease and bad odor.</p> <p>3. The worker bathing area is being operated without a privacy screen. On the expose area without.</p>	<p>2. Provide proper ditches around the washing / bathing area to drain / allow the grey water flow freely into the wastewater retaining pond provided.</p> <p>3. Provide appropriate partition around the worker's washing/ bathing area to hide from public view and facilitate privacy.</p>				<p>next inspection, if no potential improvement, NCR shall be issued.</p>
07	SECC Camp	04.01.2016	ON_SE CC-0003	<p>Unprocessed grey water from kitchen area is drained directly to an open ditch intended only for surface water. NNP1 is concerned that mixing of kitchen waste with surface water that the idea incorporating both grey water and storm water into the storm water sediment pond will</p>	<p>The site drainage system between domestic wastewater and storm run-off need to be separated accordingly.</p>	30.01.16	26.01.16	Open	<p>In deadline</p>

No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
				facilitate rapid filling and overflow, causing localized waterlogged and contaminated areas.					
08	SECC Workshop and Industrial Area	04.01.2016	ON_SE CC-0004	The workshop was started operating without the benefit of spillage protection facilities. This has a potential risk of creating contaminated ground by the heavy machine maintenance activities.	The Contractor has to: 1. Construct a concrete floor and bunding at the workshop as well as an oil waste separator system. 2. The immediate area surrounding the workshop requires appropriate drainage to avoid or minimize surface water from entering the site. 3. Ensure that the site has oil spill clean-up kit.	19.01.16	26.01.16	Open	Delayed, Subject to discuss on next inspection, if no potential improvement, NCR shall be issued.
09	SECC Workshop and Industrial Area	04.01.2016	ON_SE CC-0005	There is no an appropriate hazardous material storage facility provided. A number of fuel drums and oily equipment are stored directly on the ground without spill protection measures. NNP1 is concerned that without appropriate mitigation measures, the current practice can create contaminated soil at the site.	The Contractor has to: 1. Install a proper / designated hazardous material storage facility with bund, roof cover and side protection; 2. Relocate fuel drums and oily equipment into a designated hazardous material storage area.	19.01.16	26.01.16	Open	Delayed, Subject to discuss on next inspection, if no potential improvement, NCR shall be issued.
10	PC Bridge	04.01.2016	ON_SE CC-0006	1. During the time of inspection it was observed that sediment pond volume at the site	The Contractor has to: 1. Increase the size of the sedimentation pond according to	19.01.16	26.01.16	Resolved	Delayed, Subject to discuss on

No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
				<p>compared to the volume of effluent discharged was inadequate. The pond system was insufficient to allow of the adequate effluent retention time. Untreated effluent was being discharged directly into the NamNgiep. The pond settling system is for the most part ineffective.</p> <p>2. The water from the site emptying into the pond system is creating turbulence which impacts on the settling process.</p>	<p>the volume of water pumped from the construction site.</p> <p>2. The crest of the final pond outlet needs to be increased to increase retention time and facilitate sediment settling.</p> <p>3. Provide an alternative method to drop effluent water into the pond system to prevent / minimize pond turbulence.</p>				<p>next inspection, if no potential improvement, NCR shall be issued.</p>
11	Aggregate Plant Yard	12.01.2016	NC_OC-0011	<p>Cement laden effluent washed water (slurry) from Aggregate Plant is being released to the environment and river without processing.</p> <p>Effluent water from the aggregate plant is being directed offsite to a sediment pond below Spoil Disposal Area #7. The effluent is then percolating through the rock-soil profile of the pond and entering into the NamNgiep river below the Construction</p>	<p>The Contractor has to:</p> <p>1. Immediately suspend any further slurry effluent from leaving the site without separation of the residual cement from the natural sediments. Establishment of a treatment facility is requested. This can be in the form of separated bays or bermed area at the Aggregate Plant to separate the material.</p> <p>2. All wash down and work areas that produce cement slurry are to be directed towards the treatment facility.</p>	15.01.16	26.01.16	Open	<p>Delayed, Subject to discuss on next inspection, if no potential improvement, NCR Level 2 shall be issued.</p>

No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
				<p>Bridge (Refer to photos.)</p> <p>Slurry cement waste is highly alkaline. It reduces water quality and is toxic to fish and other aquatic organisms (fauna and flora). Slurry sediment coats the poor spaces of the stream/river bed and destroys habitat.</p>	<p>3. Do not dilute the runoff that is within the drainage system and or pond as this will exacerbate the pollution contamination. The cement slurry is to be removed and disposed of at an approved Spoil Disposal Area.</p> <p>4. The condition of the sediment pond wall below near Spoil Area #7 is required to increase its sediment trapping capacity.</p> <ul style="list-style-type: none"> • Note: failure to correct as requested will result in an elevated NCR (2 or 3) being issued. 				
12	Sino Hydro Camp	12.01.2016	ON_OC-0195	<p>Cooking oil was directly poured into the grease trap. This potentially has high risk of cause to treatment system operational failed and drainage pipe being blocked that causes the water will overflow in shortly period.</p>	<p>The Contractor has to:</p> <ol style="list-style-type: none"> 1. Completely collected the oil in the grease traps and store properly in drum(s)/container to reduce food waste in the recently oil trap near the canteen; 2. Install/connect the PVC 90° elbow to blocked food waste and to be filter only water. 3. The oil traps needs to be cleaned up regularly at least twice /week, to minimized food waste, oil and foam decomposed in the waste water, which lead to bad 	26.01.16	26.01.16	Resolved	

No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
					water quality and/or un-pleasance odor.				
13	TL 230 kV	14.01.2016	ON_LS-0007	There was improper concrete waste management on site at the tower No. 182. It can potentially be discharged into the water course and also indirectly impact the river quality and aquatic animals.	The Contractor has to: 1. Clean up the concrete waste after finishing work and dispose at the designated area.	28.02.16	28.01.16	Resolved	
14	TL 230 kV	14.01.2016	ON_LS-0008	That is no temporary toilet facilities had been provided for temporary worker camp on field site at the Tower No.236-239. There is lack of proper hygienic and sanitation facilities for the cooking and toilet area.	The contractor shall install the temporary toilet or mobile toilet for environmental health management.	28.01.16	28.01.16	Open	Delayed, Subject to a discussion during the next inspection, if no potential improvement, NCR will be issued.
15	SECC Workshop and Industrial Area	19.01.2016	ON_SE CC-0007	The contractor has undertaken heavy machine maintenance works outside the workshop facility without the use of a spill kit, resulting in oil spills and soil contamination. The site also requires a general tidy up for improved safety	The contractor has to: 1. provide oil drip trays / containers for any maintenance and hazardous material handling activities outside the workshop. If the drip trays are not provided maintenance works can only occur in the workshop facility. 2. Ensure that the site has is provided with an oil spill cleanup	02.02.16	26.01.16	Open	In deadline

No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
					kit 3. All spilled oils and contaminated soil will be cleaned, stored in a proper manner and disposed according to NNP1 requirements for hazardous material				
16	SECC Workshop and Industrial Area	19.01.2016	ON_SE CC-0008	The contractor was requested to provide a proper / designated hazardous material storage at the site. So far, no action been under taken on this request: (i), used oil and chemical drums, as well as spent oil filters and oily rags were discarded on the ground (ii), along with scattered general solid and construction waste.	The Contractor is required to: 1. A proper/designated hazardous waste storage facility with floor bunding, roof cover and side protection as required; 2. The contractor shall immediately relocate fuel drums and oily equipment into designated storage area. 3. Clean up the spills and the area, generally. Note: The contractor needs to take an appropriate corrective action within specified deadline. Otherwise NCR will be issued accordingly.	26.01.16	26.01.16	Open	Delayed, Subject to discuss on next inspection, if no potential improvement, NCR shall be issued.
17	SECC Batching Plant Yard	19.01.2016	ON_SE CC-0009	Accordingly to the status of site operational development. So far, the batching plant has been operating with inadequate environmental mitigation measures. 1. Inadequate site ditch/drain diverting the	1. Improve the site ditch/drainage system between the batching plant facilitate and increase the sedimentation ponds capacity .100%. 2. Improve the land surface and cover with gravel or similar	29.02.16		Open	In deadline

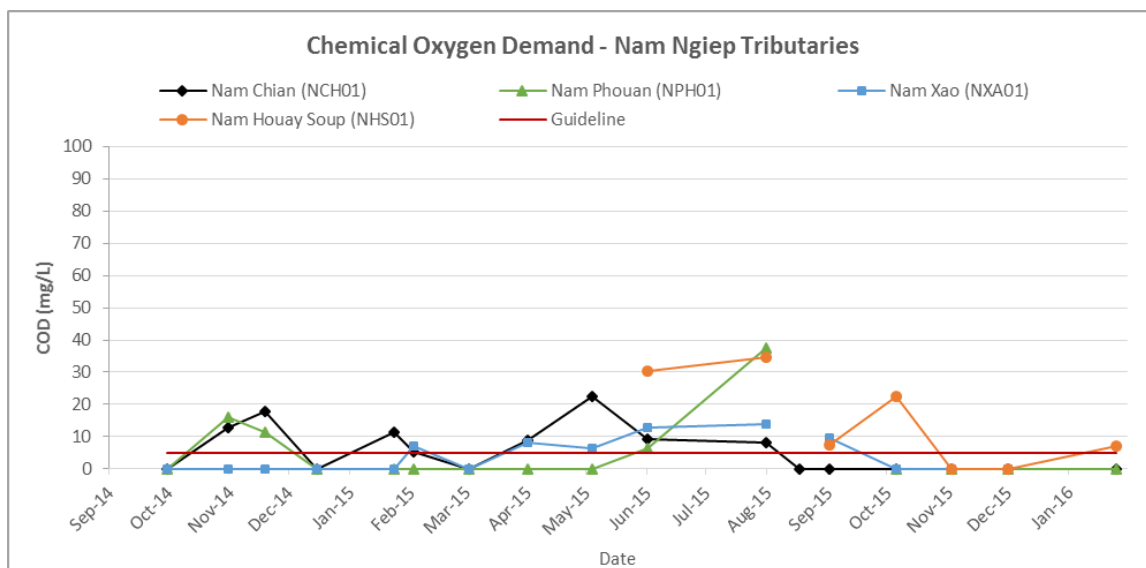
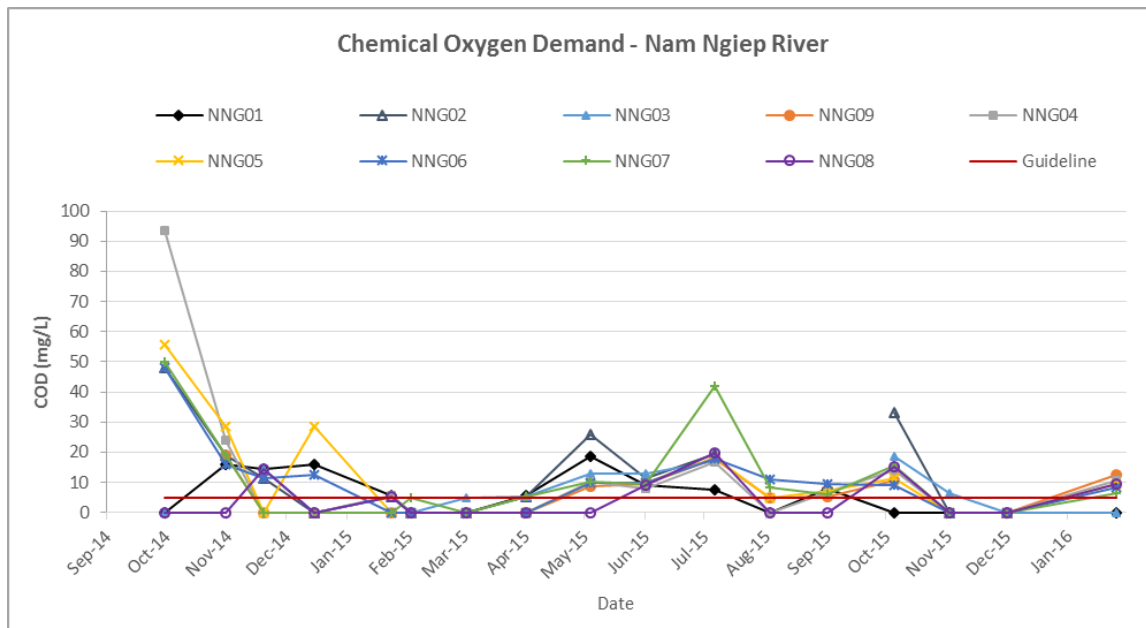
No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
				<p>cement water from the batching plant to the sedimentation ponds. Cement water is being released to the environment without processing as observed by EMU representatives (ref; EMU Mission Summary January2016)</p> <p>2. Improper landscaping, surfacing and drainage at the site generally, to prevent or minimize muddy surfaces and high turbid water being generated at the site during operations.</p> <p>3. Site sediment pond system capacity is too small to process all the waste water generated from the site, with the potential to pollute the nearby NamNgiep.</p>	<p>surfacing type to avoid muddy and high turbid water being generating at the site during operation activities.</p> <p>3. Provide/extend earth bund and/or cut-off drain surrounding the batching plant area to stop storm run-off from leaving the operational areas.</p> <p>4. Inform EMO/NNP1 whenever pumping / emptying from the sediment pond is required.</p> <p>5. Effluent from the pond is to be disposed in a designated Spoil Area.</p>				
18	SECC Batching Plant Yard	19.01.2016	ON_SE CC-0010	<p>1. There is contaminated soil from the generator storage facility was discarded.</p> <p>2. A 200 liter drum of hydrocarbon / fuel connected to the generator (store nearby the NamNgiep River bank) has</p>	<p>The contractor has to:</p> <p>1. Collect all contaminated soil and store in a designated hazardous storage facility area for disposal, as advised by NNP1. Contaminated soil is to be treated off site by an authorized</p>	02.02.16		Open	In deadline

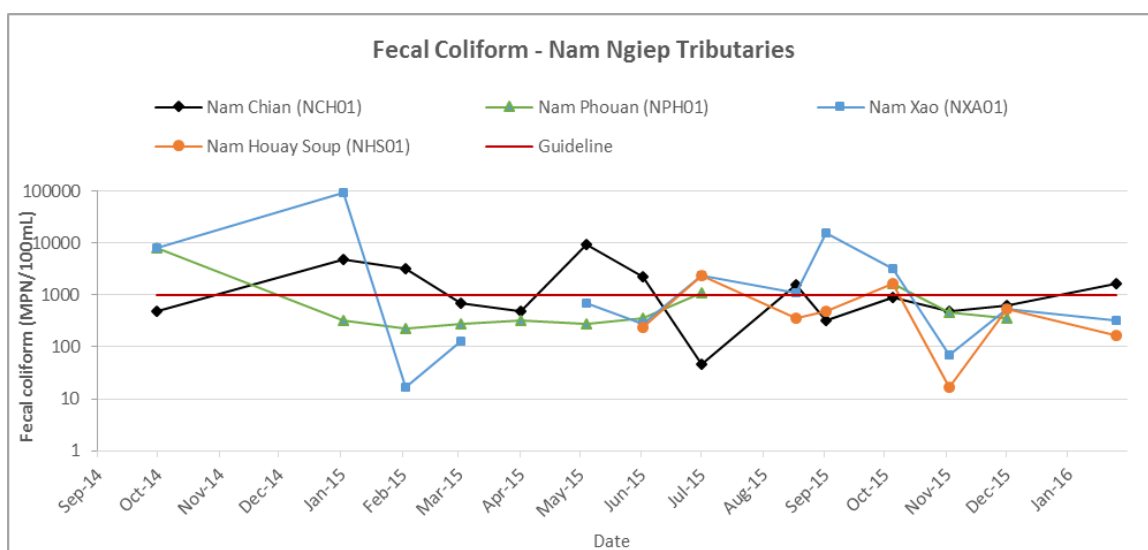
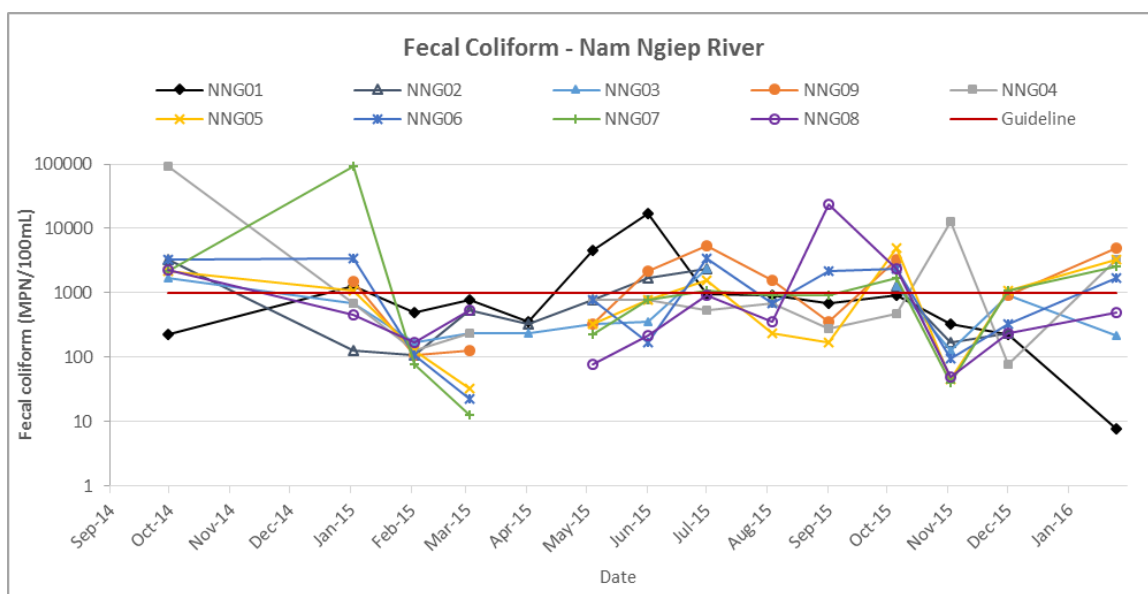
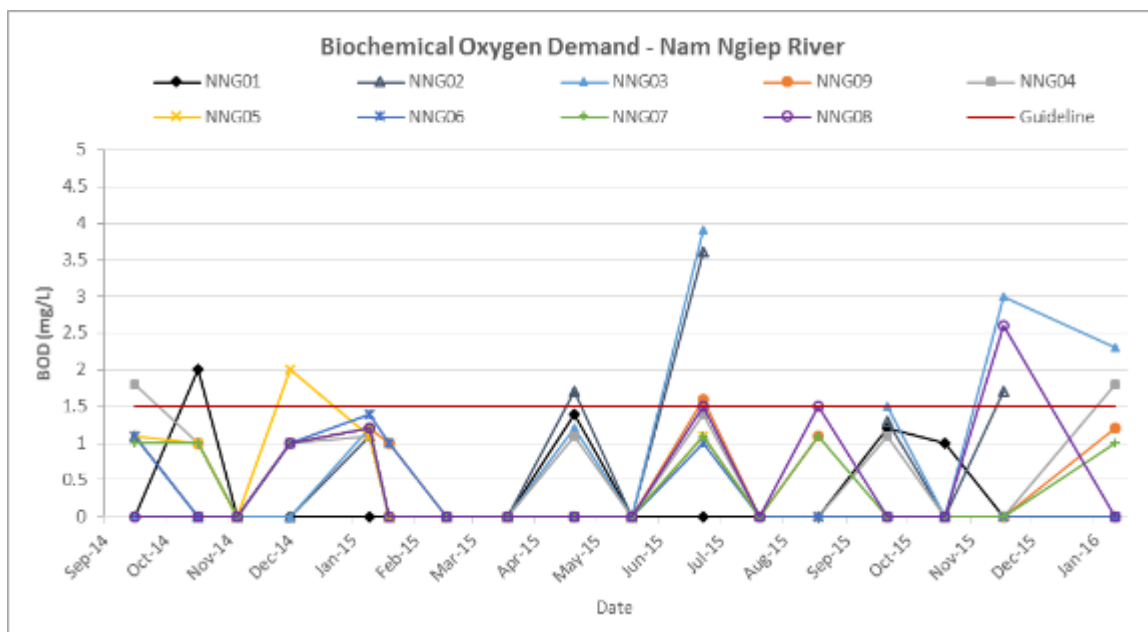
No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
				been placed on a table that lacks proper support. There is risk of spillage and contamination caused by table collapse.	processor. Install a proper supporter for fuel drums that will prevent collapse / falling. Otherwise, re-locate the generator away from river bank. (Ref; project's ESMMP defined 30-50 m from stream / channel)				
19	PC Bridge	19.01.2016	ON_SE CC-0011	Disconnect all wastewater effluent pipes that direct effluent between the pier foundations pits to the Nam Ngiep. No direct discharge is permitted.	<ul style="list-style-type: none"> - All effluent waste from the pier foundation pits and construction areas generally, will be directed to and processed by the site sediment pond system. - All the wastewater from the site shall be tested prior to pumping to the environment. Test results shall be shared with EMO, and - Pumping is only to occur with NNP1 approval. <p>Note: The issues listed shall not be repeat. Otherwise, NCR will be issued immediately.</p>	02.02.16		Open	In deadline
20	HM Worker Camp	20.01.2016	ON_H M-0001	There was improper waste management at worker camp. Construction waste and domestic solid waste littered the camp ground, and there was no waste bins provided.	<p>The Contractor shall:</p> <ol style="list-style-type: none"> 1. Clean up all waste and segregate into recyclables, hazardous and solid waste for disposal. 2. Provide: a) at least four waste 	04.02.16		Open	In deadline

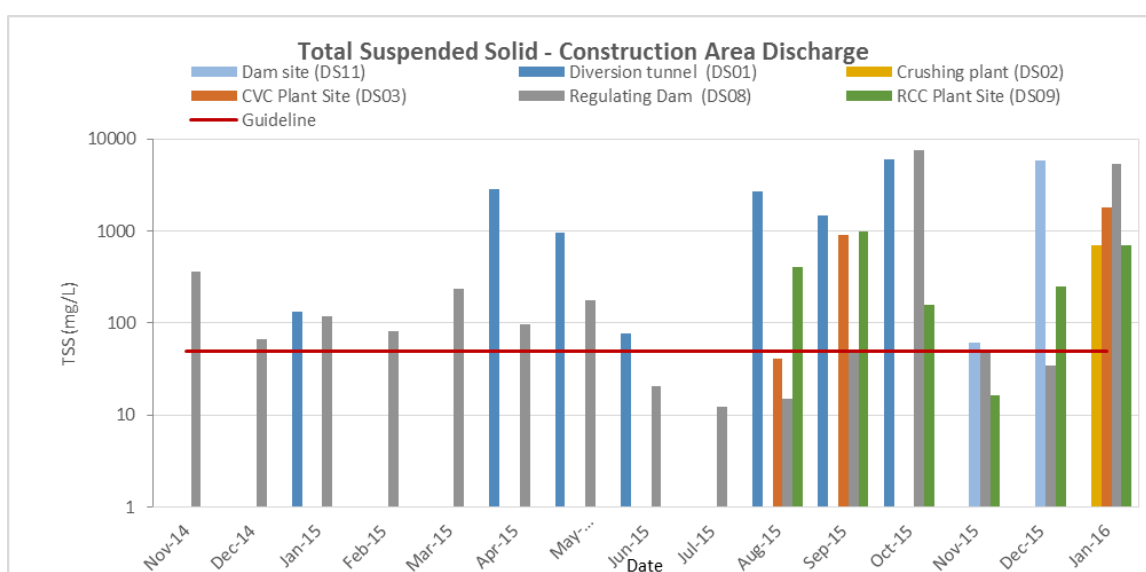
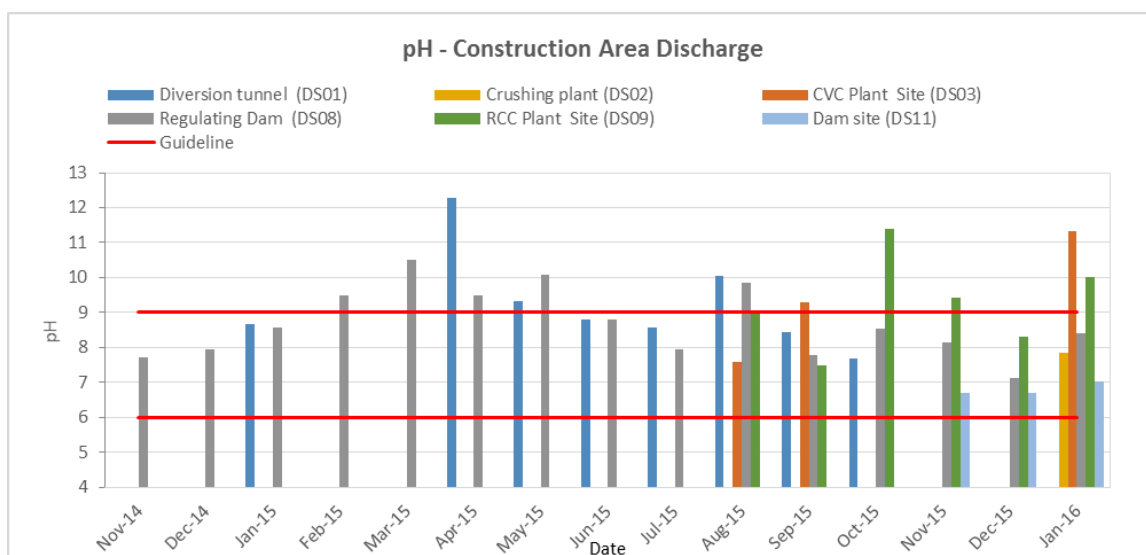
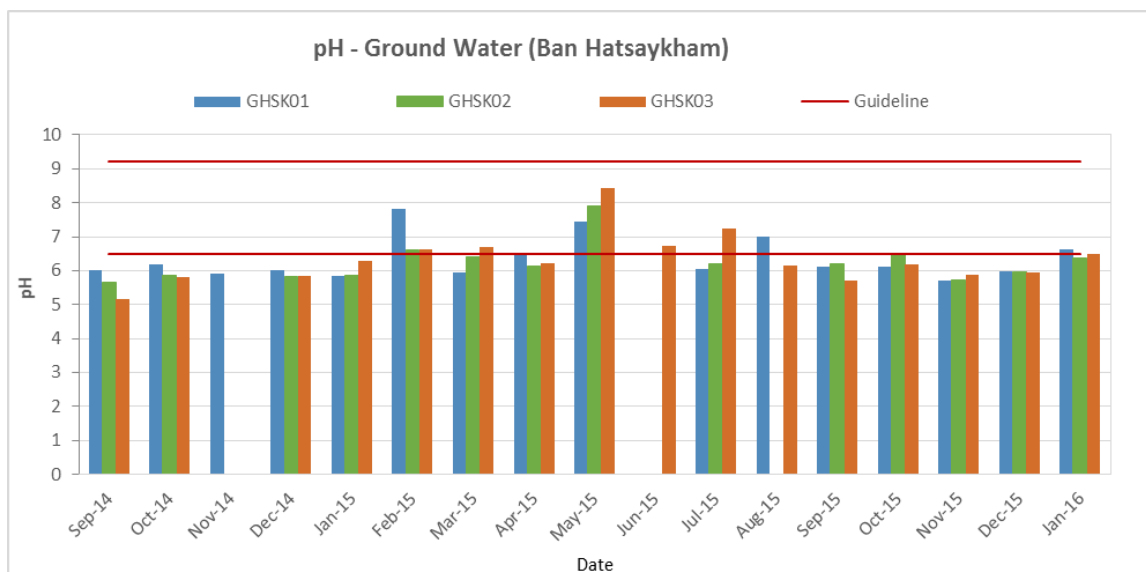
No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
					bins such as food waste, general waste, recycle waste, and hazardous waste at worker camp; and b) two waste bins such as general waste and recycle waste bins at the construction site.				
21	HM Worker Camp	20.01.2016	ON_H M-0002	Cement waste dumped nearby to the camp.	The Contractor shall clean up and disposed the waste on designated disposal area.	27.01.16		Open	In deadline
22	Main Dam	26.01.2016	ON-OC-0196	Evidence of construction related turbid water continuing to be discharged directly to the Nam Ngiep without processing. The pond is full and is likely to spill, given existing rain conditions. At earlier inspection it was agreed between OC and NNP1 that i) turbid water from the upstream coffer dam is to be treated at the treatment plant located at on the right bank downstream of the main dam construction area, ii) discharged water from the treatment plant is to be tested for pH and turbidity levels. This information / results is to be circulated daily with NNP1.	The Contractor needs to take an appropriate action and ensure that the contaminated water is being reduced prior discharge to minimize the accumulative impact on Nam Ngiep at downstream. EMO recommend the following options: (i). Divert the turbid water to downstream part (powerhouse platform area) for the wastewater to be treated by installed wastewater treatment plant. (ii) Increase the volumetric capacity of the existing of the sediment ponds to allow for longer settling period. (iii). Prior to discharge (except emergency case), the turbid water	05.02.16		Open	In deadline

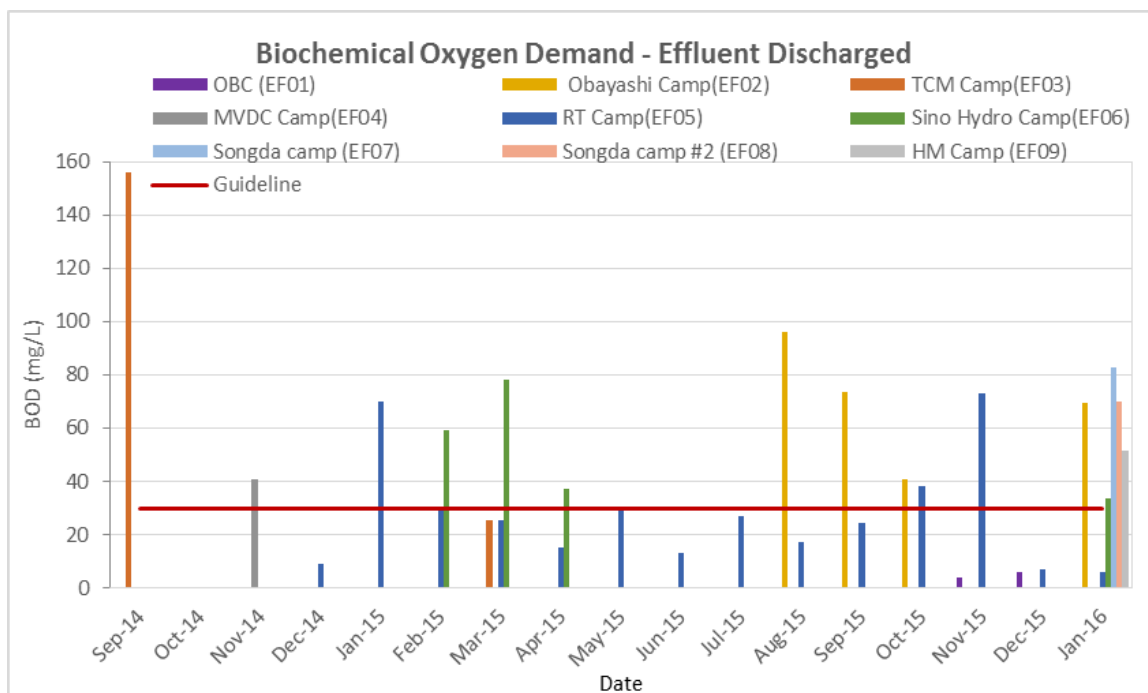
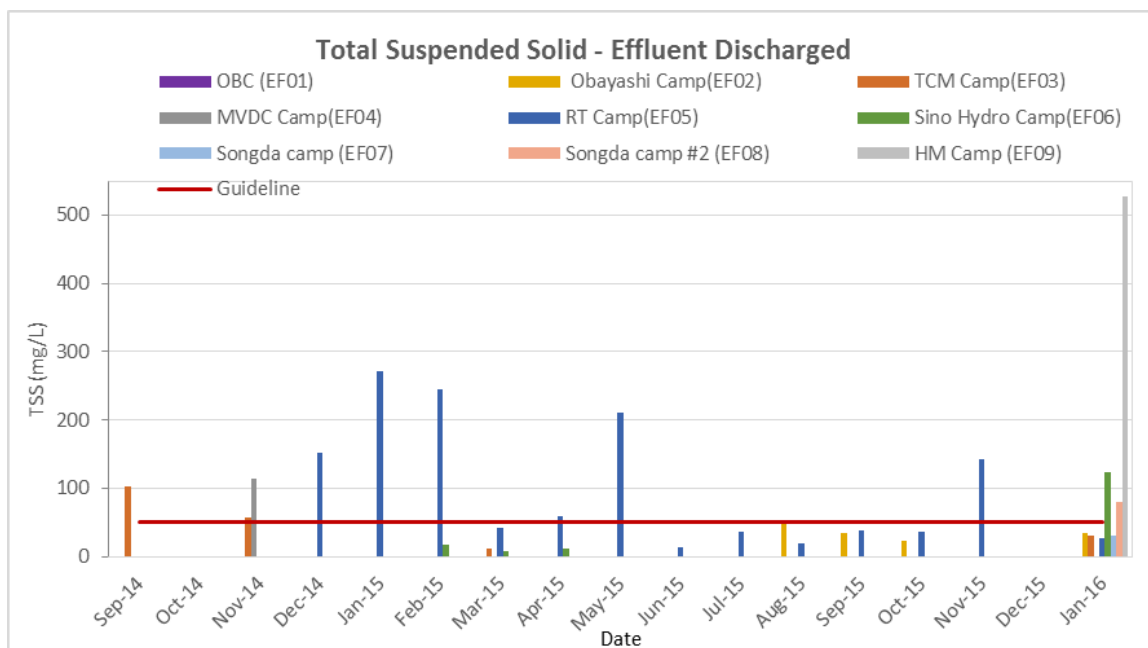
No	Site Name	Inspection Date	Issue ID	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up	Status	Remark
				Effluent discharge can only occur on the approval of NNP1. To date the diversion of effluent water from the upstream coffer dam area continues to be disposed in the sediment pond without monitoring.	shall be tested (ensure pH and Turbidity is complied with standard guideline), and inform EMO accordingly. Note: If the wastewater is being continue discharged with a highly turbid and / or sensitive of impaction without testing and informing NNP1-EMO is observed, NCR will be immediately issued.				
23	TL 230 kV	28.01.2016	ON_LS-0009	There are oil drums, oil filters and hydraulic pipes stored at the backyard without appropriate hazardous material storage. Some oil spill is not cleaned up properly. This has a potential impact on the environment during a rain event.	The Contractor has to: 1. Provide the hazardous material storage with concrete platform and bunding; and store all hazardous materials and waste inside the designated area; 2. Segregate the hazardous material waste from activities properly and labeling it; Clean up the oil spillage and store properly in designated hazardous waste storage area.	11.02.16		Open	In deadline

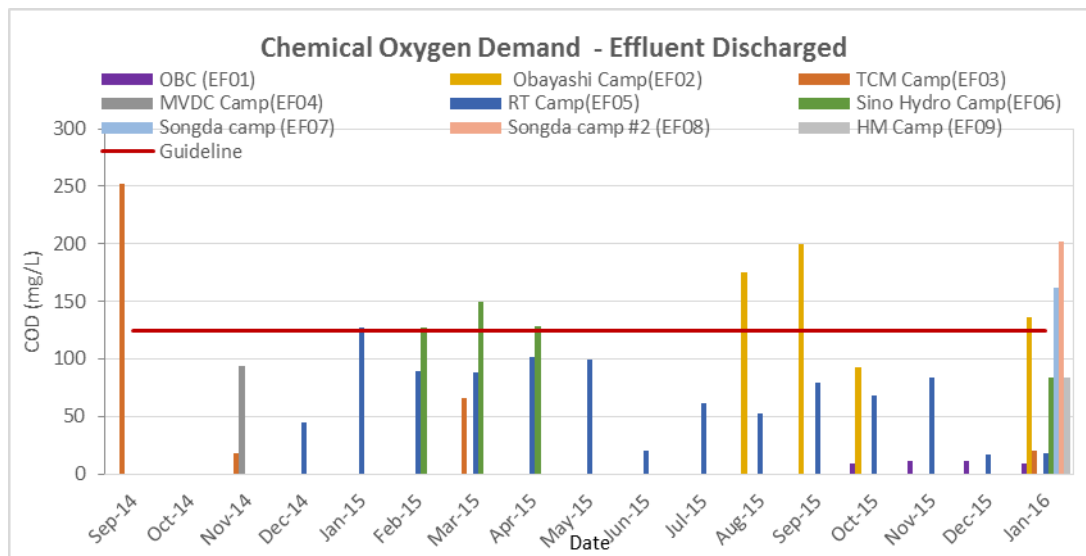
Annex B: Trend of Water Quality Monitoring Results From September 2014 – January 2016











Annex C: Hazardous Material Audit June through To January 2016

Site		PKC Fuel station and storage			Songda Camp			TCM fuel station and HazMat storage			RT work shop			V&K Camp			Songda Work shop			Sino hydro camp			Sino hydro fuel station			Songda CVC Plant			
Month			1			1			1			1			1			1			1			1			1		
Storage area																													
1	Floor of storage area is	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
2	Fully bunded with capacity >120% of combined container	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
3	Bunds in adequate condition	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X
4	Closed storage protected from rainfall and flood level	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
5	Storage area is well ventilated	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
6	Oil trap linked to the storage area	√	√	√	√	√	√	√	√	√	X	X	X	√	√	√	N A	N A	N A	√	√	√	√	√	√	√	N A	N A	N A
7	Located not close to camp, office and watercourse	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
8	Storage has the fence and lock	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X
9	Incompatible hazardous materials and chemicals stored	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
10	Explosives stored in underground facilities or in	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	
11	Explosive storage facilities are locked and access is restricted	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	N A	
Containers																													
12	Containers leak-proof and in good condition	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
13	Metallic (Iron) containers without corrosion (rust)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	

Site		PKC Fuel station and storage			Songda Camp			TCM fuel station and HazMat storage			RT work shop			V&K Camp			Songda Work shop			Sino hydro camp			Sino hydro fuel station			Songda CVC Plant		
Month			1			1			1			1			1			1			1			1			1	
14	Container chemically compatible with material stored	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
15	Container closed unless material added or used	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
16	Refuelling equipment without leakages observed	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Labels																												
17	Restricted access signs outside facility	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X	√	√	√	√	√	√	√	√	X	X
18	Display of labels with words “Hazardous product/waste”	√	√	√	√	√	√	-	-	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X
19	Label describes hazards for users	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X
20	PPE request sign posted within premises	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
21	Procedures for HazMat handling posted within premises	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X
22	Procedures for emergency response posted within premises	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	N	N	N	√	√	√	√	√	X	X
Safety																												
23	Fire fighting equipment available and controlled	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X
24	Fire fighting equipment is sited appropriately for ease of access	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X
25	Staff wear PPE on site	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
26	Staff trained for HazMat handling and spill response	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Site		PKC Fuel station and storage			Songda Camp			TCM fuel station and HazMat storage			RT work shop			V&K Camp			Songda Work shop			Sino hydro camp			Sino hydro fuel station			Songda CVC Plant		
Month			1			1			1			1			1			1			1			1			1	
Spill response																												
27	Spill response kits readily available with adequate supply	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	N R	N R	N R	√	√	√	X	X	X
28	Safe storage is provided for contaminated materials after spill response	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X
29	Plan is in place for removal and final disposal of contaminated materials	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X
Documentation																												
30	HazMat Register in place	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
31	HazMat Register up-to-date	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
32	MSDS sheets readily accessible	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X

Annex D: Hazardous Material Inventory January 2016

No.	Site	PKC Camp	TCM 1&2 Camp	Songda camp	RT camp	Songda workshop	V&K camp	CVC Plant	Sino hydro fuel station	Songda cvc plant	Total
1	Used oil/ hydraulic fluids	25d	11co	0	3d	1d	1d	0	3sd	1d	31d,3sd,11
2	Used oil mixed with water	0	0	0	1d	0	0	0	0	0	1d
3	Other petroleum residues	0	0	0	0	0	0	0	0	0	0
4	Empty used oil drum/container	7d	8sd	1d	2d	2d,6sd	4d	6sd	9d,3sd	3d	28d,23sd
5	Used oil filters	55u	0	0	5u	0	9u	0	0	0	69u
6	Contaminated soil, sawdust and	9b	0	0	10b	2b	1b	0	0	0	23b
7	Contaminated textile and material	4b	0	0	1b	2b	1b	0	0	0	8b
8	Contaminated used rubber (hydraulic) hose	2d	0	0	2d	0	0	0	0	0	4d
9	Contaminated grease	1d	0	0	0	0	0	0	0	0	1d
10	Empty contaminated	2d	0	0	0	0	0	0	0	0	2d
11	Empty contaminated bitumen drum/container	0	80d	0	0	0	0	0	0	0	80d
12	Used tire	162u	40u	0	6u	30u	12u	0	9u	9u	268u
13	Chemical mixed with water and chemical waste	0	0	0	0	0	0	0	0	0	0
14	Empty used chemical	0	528sd	0	0	0	38d	2d	0	0	568d
15	Solvent residues and containers	0	0	0	0	0	0	0	0	0	0
16	Acid and caustic cleaners	90bo	0	0	270bo	0	0	0	0	0	360bo
17	Empty paint and spray cans	0	4ca	0	0	0	0	0	0	0	4ca
18	Used battery	10u	11u	0	0	0	0	0	0	0	21u

1. PKC camp

Item	Type of Hazardous Materials	Quantity
------	-----------------------------	----------

		November 2015		December 2015		January 2016	
Diesel	Diesel	6,500 litres		8,200 litres		8,000 litres	
Gasoline	Gasoline	0		0		0	
Delo Silver MC SAE 15W-40	Engine oil	4	sd	4	sd	3	sd
Delo Silver SAE 30	Engine oil	2	sd	3	sd	2	sd
Hydraulic Fluid Rando HD 68	Hydraulic oil	1	d	1	d	1	d
Thuban GL5 EP SAE 80W-90	Gear oil	7	sd	5	sd	5	sd
Thuban GL5 EP SAE 85W140	Gear oil	3	sd	2	sd	3	sd
CATEX Multifak EP 2 Automotive & Grease	Grease	-	-	-	-	-	-
Connix SP4	Chemical	4	d	3	d	2	d

2. TCM 1 & 2 camp

Item	Type of Hazardous Materials	Quantity					
		November 2015		December 2015		January 2016	
Diesel	Diesel	19,500 l		16,000 l		14,000 l	
Gasoline	Gasoline	0		0		20 l	
GL-5 PTT SAE 140 (20 l)	Gear oil	-	-	1	sd	-	-
CAT Hydraulic oil advanced 30 (20 l)	Hydraulic oil	3	sd	2	sd	-	-
Shell RIMULA SAE 40-50 (6 l)	Engine oil	-	-	1	sd	2	sd
PTT GL-5 SAE 90 (6 l)	Gear oil	-	-	-	-	-	-
Color Spray	Paint	4	ca	5	ca	5	ca
Jotun	Paint	4	co	4	co	5	co
U90	Paint	1	co	2	co	4	co
Hydraulic oil AW 68	Hydraulic oil	2	sd	2	sd	5	sd
Motor oil CF-4, 10W-30	Engine oil	-	-	-	-	-	-
Acidic acid	Acidic acid	-	-	-	-	-	-
TIPCO Asphalt (AC 80-100)	Asphalt	-	-	-	-	-	-
TIPCO Asphalt (MC 70)	Asphalt	-	-	-	-	-	-
Oil machine RIMULA 40	Engine oil	1	sd	3	sd	2	sd
Hydraulic SAE 10W-30	Hydraulic oil	2	sd	3	sd	4	sd
Shell Advance (1L Black) for M	Break oil	-	-	-	-	-	-
Crease shell HT	Grease	3	sd	2	sd	1	sd
Paint M111	Paint	2	co	2	co	-	-
Paint ATM	Paint	26	sd	20	sd	25	sd

3. Songda camp

Item	Type of Hazardous Materials	Quantity					
		November 2015		December 2015		January 2016	
Diesel	Diesel	16,000 litres		32,000 litres		34,000 litres	
Gasoline	Gasoline	0		0		0	
AZOLLA ZS 68	Hydraulic oil	18	d	15	d	14	d
MOBUBE HD 85W-140	Gear oil	1	d	8	d	2	d
MOBILUX EP3 Mobil	Grease	7	d	-	-	-	-
ARUS 424 ISO VG32	Compress oil	3	d	2	d	2	d

Mobil Brake Fluid POT4	Break oil	46	co	24	co	18	co
Mobil DTE 26 ISO VG 68 (20 litres)	Hydraulic oil	-	-	-	-	-	-
Mobil Delvac Super 1300 15 W-40 (20 litres)	Engine oil	14	d	-	-	8	d
Sika Plast 257	Chemical	-	-	-	-	-	-
Total grease (EP HV 2)	Grease	-	-	3	d	3	d
Azolla ZS 46	Hydraulic oil	2	d	1	d	3	d
Cater EP 220	Engine oil	15	d	5	d	5	d
Shell S2 FR-A	Gear oil	-	-	-	-	-	-
Total ALTIS	Grease	-	-	-	-	-	-
Air compress 3G	Compress oil	2	sd	2	sd	2	sd
Air compress 5G	Compress oil	40	sd	20	sd	20	sd

4. Right Tunnel camp (RT camp)

Item	Type of Hazardous Materials	Quantity					
		November 2015		December 2015		January 2016	
Diesel	Diesel	30,000 litres		11,416 litres		594 litres	
Gasoline	Gasoline	0		0		0	
Shell Rimula R3+30 (209 l)	Engine oil	1	d	1	d	2	d
Shell Rimula R3+40 (209 l)	Engine oil	2	d	2	d	1	d
Shell Rimula R4+15w-40 (209 l)	Engine oil	-	-	-	-	1	d
Shell Spirax S2 ATF D2 (209 l)	Transmission oil	2	d	2	d	2	d
Petronas, ATF MD3 (200 l)	Transmission oil	-	-	1	d	1	d
Shell Spirax S4 CX50 (209 l)	Transmission oil	4	d	3	d	4	d
Shell Air Tool Oil S2 A320 (209 l)	Gear oil	2	d	1	d	-	-
Shell , Gadus S2V220 (180 kg)	Grease	3	d	3	d	2	d
Caltex Delo Silver MG 15W-40 200LM ML2 (200 l)	Engine oil	2	d	1	d	5	sd
Caltex Thuban GL4 90 (200 l)	Gear oil	4	sd	2	d	1	d
Caltex Thuban GL4 140	Gear oil	2	d	2	d	2	d
Caltex Hydraulic Oil AW68 (200 l)	Hydraulic oil	6	d	5	d	2	d
Tellus Oil S2M46 (209 l)	Hydraulic oil	4	d	-	-	-	-
Glycerine oil	Transmission oil	1	co	-	-	1	co
Mobil Brake Fluid POT4	Break oil	27	co	9	co	26	co
Thinner AAA		1	sd	-	-	-	-
Grease Trane	Grease	-	-	-	-	2	d
Distilled water		59	ca	27	ca	20	ca
acid		267	ca	219	ca	267	ca
Paint KOBE	Paint	6	ca	6	ca	6	ca
Paint white	Paint	4	ca	4	ca	4	ca
Paint TOA	Paint	19	ca	18	ca	18	ca
Paint spray KOBE#900	Paint	4	ca	4	ca	1	ca
Paint spray KOBE#911	Paint	-	-	38	ca	18	ca
Paint spray KOBE#914	Paint	1	ca	-	-	-	-
Paint spray KOBE#920	Paint	-	-	2	ca	-	-
Paint spray (Red)	Paint	55	ca	4	ca	-	-
AERESEAL	Paint	-	-	-	-	-	-

Emulsion 25mm x 200 mm	Explosive material	42	kg	42	kg	-	-
Emulsion 35 mm x 400 mm	Explosive material	-	-	-	-	-	-
Ammonium Nitrate 25mm x 200 mm	Explosive material	2960	kg	2960	kg	2,960	kg
Electric Detonator Milli second Delay No. 6	Explosive material	-	-	-	-	-	-
Electric Detonator Milli second Delay No. 8	Explosive material	633	u	633	u	-	-
Electric Detonator Milli second Delay No. 10	Explosive material	199	u	199	u	-	-
Non-Electric Detonator Half Second Delay No.1	Explosive material	1332	u	1332	u	-	-
Non-Electric Detonator Half Second Delay No.2	Explosive material	577	u	577	u	-	-
Non-Electric Detonator Half Second Delay No.3	Explosive material	1350	u	1350	u	-	-
Non-Electric Detonator Half Second Delay No.4	Explosive material	782	u	782	u	-	-
Non-Electric Detonator Half Second Delay No.5	Explosive material	532	u	532	u	-	-
Non-Electric Detonator Half Second Delay No.6	Explosive material	3015	u	3015	u	-	-
Non-Electric Detonator Half Second Delay No.7	Explosive material	3823	u	3823	u	-	-
Non-Electric Detonator Half Second Delay No.8	Explosive material	4690	u	4690	u	-	-
Non-Electric Detonator Half Second Delay No.9	Explosive material	3730	u	3730	u	-	-
Non-Electric Detonator Half Second Delay No.10	Explosive material	2815	u	2815	u	-	-
Resin Capsules 600x30mm (Fast set)	Explosive material	559	pc	-	-	-	-
Sika- Sika Aer	Chemical	50	l	50	l	-	-
Sika Antisol-S 200 lit/dr	Chemical	1000	l	1000	l	-	-
Sika Separol 200 lit/dr	Chemical	420	l	420		-	-
Cormix Congrout A	Chemical	990	kg	870	kg	810	kg
Cormix Congrout AFL	Chemical	4600	l	1000	l	-	-
Sika-Swell S-2	Chemical	-	-	-	-	-	-
Sika Waterplug 102	Chemical	108	kg	-	-	-	-
Sika Proof membrane		60	kg	60	kg	-	-
Lime 1kg/unit		-	-	21	u	21	u
Lime Non-Shrink lanko 701		-	-	-	-	250	kg
Cement 50 kg		-	-	-	-	3,200	kg

5. Songda workshop

Item	Type of Hazardous Materials	Quantity		
		November 2015	December 2015	January 2016
Diesel	Diesel	0	0	0
Gasoline	Gasoline	0	0	0

Grease	Grease	1	d	1	sd	-	-
6400 15W-40 Rubiatia	Engine oil	-	-	-	-	1	d
SELFILL 2020RS	Chemical	1	d	2	sd	-	-
DTE 26 ISO VG 68 AZOLLA ZS 68	Hydraulic oil	2	d	1	d	1	d
Total Transmission TM85W-140	Transmission oil	1	d	-	-	2	d
Dynamic SAE 15W-40	Engine oil	5	d	2	d	1	d
Mobil DTE 25	Hydraulic oil	-	-	-	-	1	d
AZOLLA ZS 46	Hydraulic oil	-	-	1	d	2	d

6. V&K camp

Item	Type of Hazardous Materials	Quantity					
		November 2015		December 2015		January 2016	
Diesel	Diesel	2,500 litres		7,500 litres		0	
Gasoline	Gasoline	0		0		0	
Sika 257	Chemical	-	-	-	-	-	-
Zic SD 5000 CH 15W-40	Engine oil	-	-	-	-	1	d
PTT Hydraulic	Hydraulic oil	-	-	-	-	4	sd
Grease	Grease	-	-	-	-	3	sd
Zic Hydraulic	Hydraulic oil	-	-	-	-	5	sd

7. CVC Plant

Item	Type of Hazardous Materials	Quantity					
		November 2015		December 2015		January 2016	
Sika 257	Chemical	12,700 litres		5,000 litres		13,000 litres	
Sika Air	Air Compressor	30	d	33	d	51	d
Grease	Grease	-	-	-	-	-	-

8. Songda CVC Plant

Item	Type of Hazardous Materials	Quantity					
		November 2015		December 2015		January 2016	
6400 15W-40 Rubiatia	Engine oil	1	d	1	d	1	d
MOBUBE HD 85W-140	Gear oil	3	d	2	d	3	d
Cat TDTO 30	Transmission oil	2	d	1	d	1	d
SELFILL 2020RS	Chemical	6	d	-	-	2	d
AZOLLA ZS 68	Hydraulic oil	1	d	1	d	1	d

9. Sinohydro Camp

Item	Type of Hazardous Materials	Quantity					
		November 2015		December 2015		January 2016	
Emulsion Explosive RJ,90X2500g	Explosive material	492.5	kg	13,317	kg	2855	kg
Emulsion Explosive RJ,65X1500g	Explosive material	-	-	-	-	-	-
Emulsion Explosive RJ,32X200g	Explosive material	88	kg	894	kg	100	kg

Prill Ammonium Nitrate ZBG 21007-90	Explosive material	-	-	13,000	kg	5020	kg
MS Delay Detonator (No.1),5m long	Explosive material	343	pcs	163	pcs	40	pcs
MS Delay Detonator (No.3),5m long	Explosive material	388	pcs	588	pcs	302	pcs
MS Delay Detonator (No.5),5m long	Explosive material	575	pcs	575	pcs	260	pcs
MS Delay Detonator (No.7),5m long	Explosive material	580	pcs	580	pcs	240	pcs
MS Delay Detonator (No.9),5m long	Explosive material	740	pcs	740	pcs	390	pcs
MS Delay Detonator (No.11),5m long	Explosive material	450	pcs	710	pcs	383	pcs
MS Delay Detonator (No.13),5m long	Explosive material	570	pcs	1070	pcs	784	pcs
MS Delay Detonator (No.15),5m long	Explosive material	-	-	600	pcs	275	pcs
MS Delay Detonator (No.3),10m long	Explosive material	200	pcs	1650	pcs	1700	pcs
MS Delay Detonator (No.5),10m long	Explosive material	420	pcs	1710	pcs	1620	pcs
MS Delay Detonator (No.7),10m long	Explosive material	390	pcs	1590	pcs	1590	pcs
MS Delay Detonator (No.9),10m long	Explosive material	350	pcs	1550	pcs	1430	pcs
MS Delay Detonator (No.11),10m long	Explosive material	730	pcs	1780	pcs	1504	pcs
MS Delay Detonator (No.13),10m long	Explosive material	840	pcs	1740	pcs	1404	pcs
MS Delay Detonator (No.15),10m long	Explosive material	650	pcs	1700	pcs	1450	pcs
MS Delay Detonator (No.1),12m long	Explosive material	180	pcs	180	pcs	80	pcs
MS Delay Detonator (No.3),12m long	Explosive material	200	pcs	200	pcs	52	pcs
MS Delay Detonator (No.5),12m long	Explosive material	210	pcs	210	pcs	40	pcs
MS Delay Detonator (No.7),12m long	Explosive material	230	pcs	230	pcs	-	-
MS Delay Detonator (No.9),12m long	Explosive material	120	pcs	120	pcs	-	-
Electric Detonator 3m long	Explosive material	-	-	-	-	9292	pcs
Detonating cord	Explosive material	690	m	11205	m	1060	m
XIN DA	Explosive material	31	d	30	d	29	d
Zhonghua	Chemical	7	d	4	d	2	d
PTT	Lubricating oil	11	d	11	d	10	d
DELO	Lubricating oil	1	d	1	d	1	d
Mobil	Lubricating oil	2	d	3	d	25	d
JADLON	Lubricating oil	59	d	60	d	59	d
ATLANTIC	Lubricating oil	1	d	1	d	1	d
SPIRAX	Lubricating oil	1	d	1	d	1	d
GESTIE	Lubricating oil	4	d	7	d	12	d
MOBILUX	Lubricating oil	42	d	19	d	10	d
U-90	Lubricating oil	3	d	-	-	-	-
REMULA	Lubricating oil	4	d	-	-	-	-
GENUINE	Lubricating oil	3	d	-	-	-	-
Emulsion Explosive RJ,90X2500g	Explosive material	492.5	kg	13,317	kg	2855	kg
Emulsion Explosive RJ,65X1500g	Explosive material	-	-	-	-	-	-
Emulsion Explosive RJ,32X200g	Explosive material	88	kg	894	kg	100	kg
Prill Ammonium Nitrate ZBG 21007-90	Explosive material	-	-	13,000	kg	5020	kg
MS Delay Detonator (No.1),5m long	Explosive material	343	pcs	163	pcs	40	pcs
MS Delay Detonator (No.3),5m long	Explosive material	388	pcs	588	pcs	302	pcs
MS Delay Detonator (No.5),5m long	Explosive material	575	pcs	575	pcs	260	pcs
MS Delay Detonator (No.7),5m long	Explosive material	580	pcs	580	pcs	240	pcs

Note: d = drum (contain 200 l/unit)

l = litres

sd = small drum (contain 20 l/unit)

co = container (contain 1-10 l/unit)

b = bag

u = unit

ca = can (contain 1-5 l/unit)

bo = bottle (contain 1-5 l/unit)