Environmental and Social Monitoring Report

Project Number: 41924-014
23 February 2016

Nam Ngiep 1 Hydropower Project
(Lao People's Democratic Republic)

Quarterly Monitoring Report 2015 – Q3 Environmental

Prepared by Nam Ngiep 1 Power Company Limited for the Asian Development Bank

NAM NGIEP1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Third Quarterly Monitoring Report

(3rd QMR)

Environment

July to September 2015

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A	23 Feb 2016				
A2	25 Jan 2016				Addressing ADB's Comments
A1	3 Dec 2015				Addressing LTA's Comments
A0	Aug 2015	Viengkeo PHITNAVONGXAY	Peter Gaensen	Prapard PANARAM	

Accessibility	
☑	Public
☐	Internal
☐	Confidential

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ABBREVIATIONS / ACRONYMS

ADB	Asian Development Bank
BAC	Biodiversity Advisory Committee
BMSP	Biodiversity Management Sub-Plan
BOD	Biochemical Oxygen Demand
BRP	Biomass Removal Plan
CA	Concession Agreement between the NNP1PC and GOL
CBI	Community and Biodiversity Investment
COD	Chemical Oxygen Demand
DEQP	Department of Environmental Quality Promotion
DESIA	Department of Environmental and Social Impact Assessment, MONRE
DFRM	Department of Forest Resources Management, MONRE
DO	Dissolved Oxygen
ECZ	Elephant Conservation Zone
EGAT	Electricity Generating Authority of Thailand
EIA	Environmental Impact Assessment
EMO	Environmental Management Office
EMU	Environmental Monitoring Unit
EPF	Environmental Protection Fund
GOL	Government of Lao PDR
IEE	Initial Environmental Examination
IFMP	Integrated Fishery Management Plan
IMA	Independent Monitoring Agency
ISP	Integrated Spatial Planning
km	kilometre
LTA	Lender's Technical Advisor
LTI	Lost Time Incident
m	metre
MONRE	Ministry of Natural Resource and Environment, Lao PDR
MVI	Motor Vehicle Incident
NCI	Non-Compliance Issue
NCR	Non-Compliance Report
NNP1PC	Nam Ngiep 1 Power Company Limited
NPA	Non-Profit Association
NPF	National Protection Forest
NTP	Notice to Proceed (under each construction contract)
OC	Obayashi Corporation
ONC	Observation of Non-Compliance
PAP	Project Affected People
PCDP	Public Consultation Disclosure Plan
PONRE	Provincial Department of Natural Resource and Environment, MONRE

PPA	Provincial Protected Area
QMR	Quarterly Monitoring Report
RI	Recordable Injury
ROW	Right of Way
SMO	Social Management Office
SS-ESMMP	Site Specific Environmental and Social Monitoring and Management Plan
TD	Technical Division
TOR	Terms of Reference
TSS	Total Suspended Solids
UXO	Unexploded Ordinance
WMC	Watershed Management Committee
WMP	Watershed Management Plan
WWTS	Waste water treatment systems

EXECUTIVE SUMMARY

By the end of the Third Quarter of 2015, actual overall cumulative work progress for the Project until the end of September 2015 was 27.7% compared to planned progress of 22.2%. For the Civil Works, the difference between the actual progress and the planned progress is largely due to the advanced progress of mobilisation and installation of the RCC belt conveyor. The main dam excavation works have been completed down to El. 180m on both the left and the right banks by the end of September 2015.

The NNP1PC Environmental Management Office (EMO) has achieved a number of key environmental management activities. A working draft of the IEE report was provided to the NNP1PC on 28 August 2015. The draft Integrated Natural Resources Management Plan (INRMP) was submitted to the NNP1PC on 12 August 2015. In addition, by the close of August 2015, all consultations with Project Affected People (PAP) and Government of Lao PDR (GOL) counterparts about the IEE had been concluded and summarized in a Public Consultation Disclosure Plan (PCDP). The final draft Houay Soup IEE and INRMP will be submitted to ADB in October 2015.

A total of 62 new non-compliances including one Non-Compliance Report, were issued to the sub-contractors for environmental performance. Most significant issues found are related to poor hazardous waste management and waste water treatment systems. These waste water treatment systems' designs have been subject to a review by external consultants since June 2015.

On 30 July 2015 at 7.00 a.m., prolonged heavy rain triggered slope collapse (100m^3) which damaged some part of the Turbid Water Treatment Plant and pipes that connect chemical tanks to the filtration system at the Outlet Diversion Tunnel site. The broken pipes and unsafe access in the first few hours triggered an uncontrolled leakage of 150 litres of sulphuric acid (H_2SO_4) at 25% dilution (i.e. 75% water), polymer and hydrocarbon (diesel) into the surrounding environment, including the treatment plant site and the river diversion tunnel which was flooded at the time. . No injuries were recorded, the pH level was normal and no fish kills occurred. The Contractor has continued to use the sediment ponds to remove excessive sediment, and manually add sulphuric acid to bring pH levels of the effluent water into an acceptable range prior to discharge. The Contractor also reported daily to the EMO on the pH and turbidity levels of effluent discharged. The volume of sulphuric acid applied and the total discharge volumes are also reported.

On 22 June 2015, the NNP1PC commissioned the services of two external consultants to review the current designs of the camps' WWTS, and the Project landfill. A final landfill design was submitted by these consultants in July 2015 with a construction expected to commence in the Fourth Quarter of 2015. Latest, it was informed that the Contractor would submit a final landfill design for quotations in October 2015 to construction the landfill.

The Community Recyclable Bank Program was officially launched at Ban Hat Gnuin on 24 July 2015. About 122 members have transferred their recyclables to the Bank, including 86 villagers and 36 students from the elementary school in Ban Hat Gnuin.

During the Third Quarter of 2015, most of Chemical Oxygen Demand (COD) results for the entire sampling sites were higher than the National Surface Water Quality Standard set at less

than 5.0 mg/l. The highest COD level is 41.8 mg/l for the site of Nam Ngiep at Ban Somsuen (NNG07) in July 2015. This high COD may be related to the local activities especially the run-off from livestock farms and discharges from construction and camp sites.

For the Third Quarter, it was found that the Fecal and Total Coliforms exceeded the National Standard at the RT (sub-contractor) and Obayashi (Contractor)'s camps at more than 1600,000 MPN/100 ml (Total Coliforms). The monthly site inspection at the RT camp found that seepage from the system continues to be a problem and additional improvements to the system have been requested to the sub-contractor. Thus, all camps' WWTS were assessed by an independent consultant- Pacific Aquatech Pty. Ltd., a Thai based environmental engineering company experienced in WWTS design. In September 2015, a final report on the recommended design changes for the camps was provided to NNP1PC. A joint internal review of these recommendations will be carried out in October to agree on the next steps.

The Gravity Fed Water System (GFWS)'s surface water monitoring was carried out in July 2015. This was aimed to collect the baseline information on streams that will be used to supply water to the Project affected villages of Hat Gniun, Thaheau and Houay Soup using the GFWS. Results indicated that Fecal Coliforms were found to be more than 23 MPN/100ml which exceeded the Lao Drinking Water Standards of 0 MPN/100ml. However, the primary purpose of this water supply is for secondary uses such as washing, bathing and laundry which would not cause major health concerns.

Regarding the Biodiversity Management Program, in July 2015, the EMO conducted key informant interview targeting relevant decision makers in the watershed areas. This information will be incorporated in designing management arrangements, strategies, and resource counterparting mechanisms in the WMP. In September 2015, NNP1PC EMO and Consultant team as well as the ADB Consultant organised in-house workshops/consultative meeting regarding the results of site visits within the watershed area. The initial draft Integrated Fishery Management Plan (IFMP) will be completed in October 2015.

In compliance with the NNP1PC Project milestones, the Biodiversity Advisory Committee (BAC) and ADB have acknowledged the submission of the first draft Biodiversity Baseline Survey Report on 1 August 2015 whilst additional review and comments are being provided. In addition, the NNP1PC is achieving good progress on the offset site selection process. This Report will be referred to as a key document for the development of a Biodiversity Management Sub-Plan (BMSP) attached to the NNP1PC WMP.

The concept of biodiversity offset and the information on proposed offset sites within the Provincial administrative area was discussed amongst the NNP1PC, ADB Biodiversity Consultant, and BAC members. It was recommended by BAC members that the ground truth survey is commenced as an initial assessment of biodiversity values within the proposed sites. This ground truth survey is expected to start in October 2015 for around 2 months. The outcomes will serve as a key reference for making decisions on the offset site selection through a consensus building workshop planned in January 2016.

In July 2015, NNP1PC finalized the development of a Biomass Removal Plan (BRP) which incorporates a modeling scenario using a MONRE's tool called BioREM. The final BRP was approved by MONRE on 29 July 2015 and was later submitted to the ADB on 31 July 2015,

meeting the milestone date of BRP submission. It also progressed with the procurement of a Biomass Clearance Contractor; a Consultant to develop ESMMP/SS-ESMMP for biomass clearance work and; a UXO survey and clearance Contractor. The contract was signed with the Biomass Clearance Contractor on 29 September 2015. The remaining contracts are being finalized and expected to be signed by early October 2015.

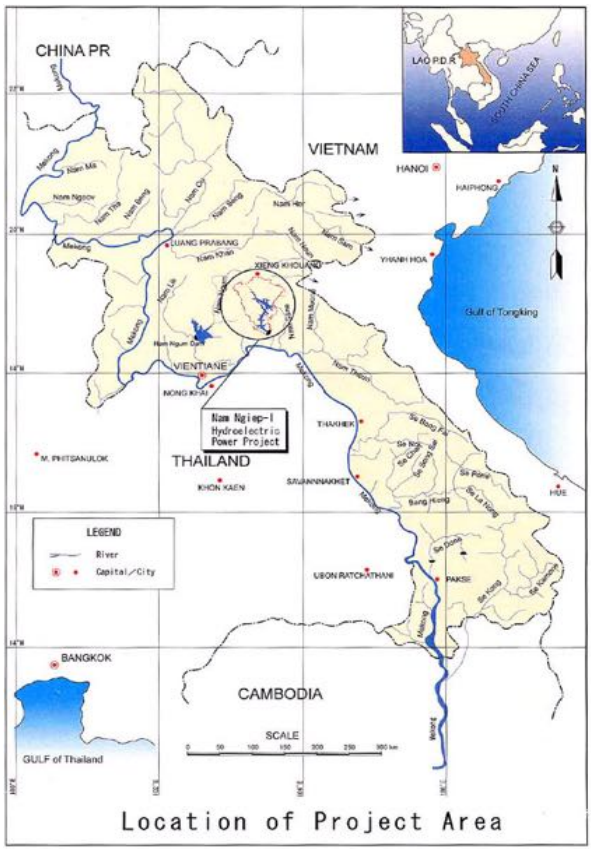
A meeting was held between the NNP1PC, PONRE Bolikhamxay and Environmental Protection Fund (EPF) on 23 July 2015 regarding the use of the EPF's resource which was affirmed by the province to support the management of Houay Ngua Provincial Protected Area (PPA). It was later that the NNP1PC first payment of USD 180,000 is possible to be allocated for biodiversity related protection and conservation management activities in Xaysomboun and Bolikhamxay provinces in the amount of USD 50,000 and USD 80,000 respectively. Bolikhamxay province has proposed to utilize the EPF's resource to support the management of Houay Ngua Provincial Protected Area (PPA) whilst the Xaysomboun provincial plan will be discussed later on with the EPF.

1. INTRODUCTION

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

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

Fig. 1: Project Location



This Quarterly Monitoring Report (QMR) provides a summary of environmental monitoring activities from 1 June to 30 September, 2015. The QMR 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 Lenders' Technical Assistance (LTA) and ADB.

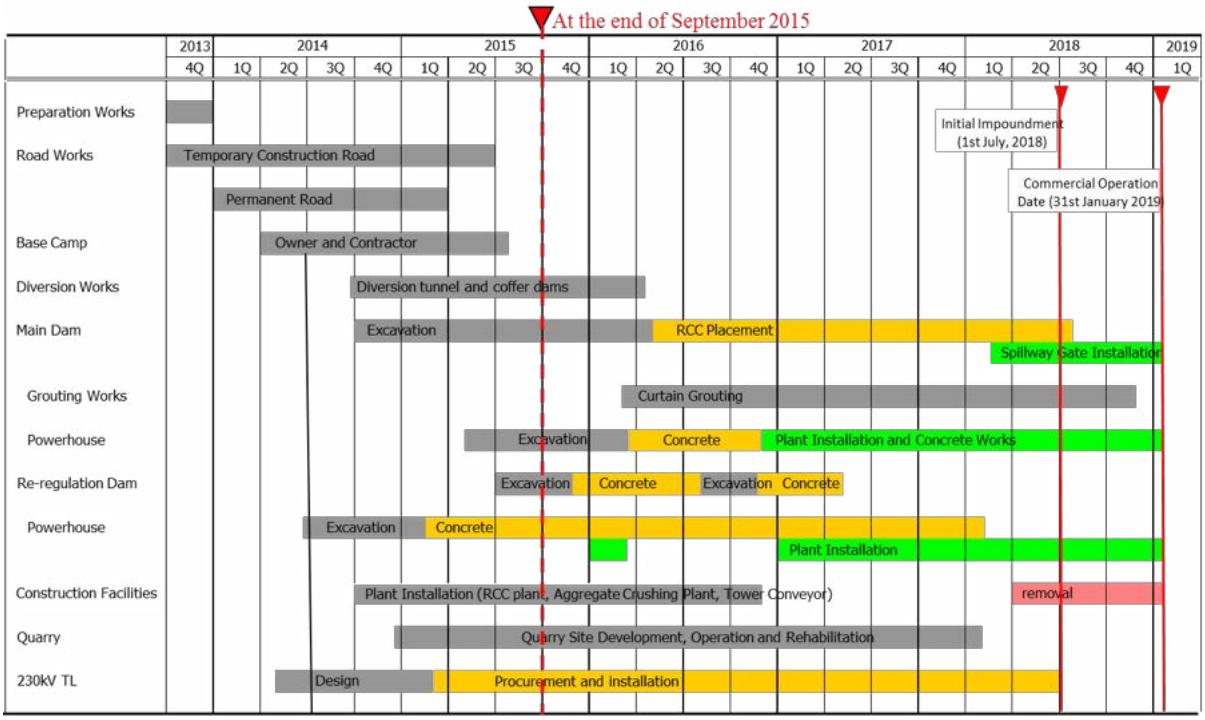
The QMRs and other related reports, including the Site Specific Environmental and Social Monitoring and Management Plans (SS-ESMMPs), are publically disclosed on the Project

website[1] in line with the ADB Public Communications Policy. Hard copies of these reports will also be available upon requests at the Project's main office in Vientiane Capital and field office in Pakxan, Bolikhamxay province.

2. CONSTRUCTION PROGRESS DURING THE REPORTING PERIOD

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 230kV Transmission Line Works. Actual overall cumulative work progress until the end of September 2015 was 27.7%[2] compared to planned progress of 22.2%. Main construction activities and respective progresses made during the period of July to September 2015 are shown in Fig. 2 and 3 below:

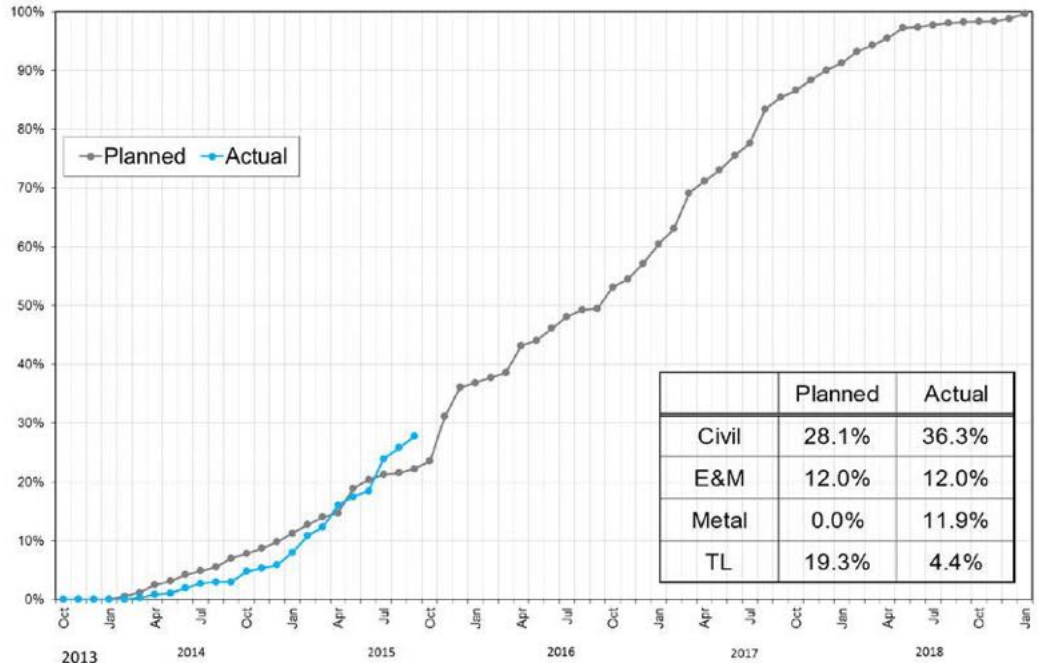
Fig. 2: Overall Construction Progress up to June September 2015



[1] Available at: http://namngiep1.com/resources/environmental-reports/. Vientiane Office address: 236/16 Ban Phonsinuan, P.O Box 5503, Sisattanak District, Vientiane, Lao PDR. Telephone:+856-21-261251, Fax: +856-21-261252

[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.

Fig. 3: Progress Curves (All Construction Works)

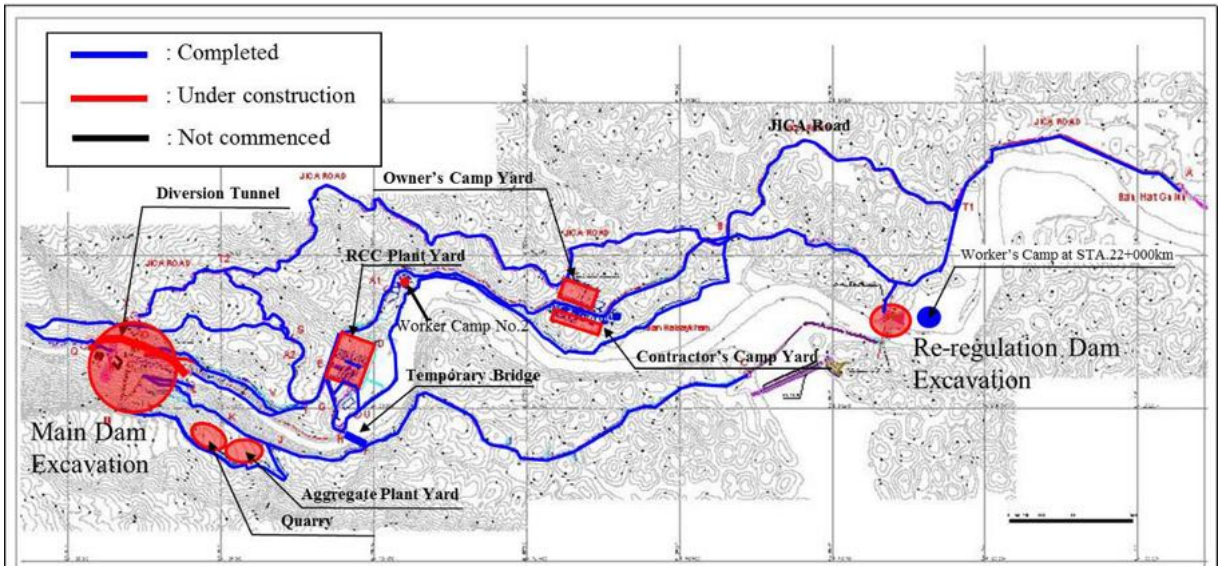


	Planned	Actual
Civil	28.1%	36.3%
E&M	12.0%	12.0%
Metal	0.0%	11.9%
TL	19.3%	4.4%

2.1 ACCESS ROADS

Access road construction works are completed as shown in Fig. 4 below. Road maintenance is being carried out efficiently and effectively as is possible in the wet season and the repairs to the damage caused by the 50-year rain-event at the beginning of August 2015 are almost completed.

Fig. 2: Internal Dam Construction Access Roads



2.2 MAIN QUARRY

The removal of overburden continues 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

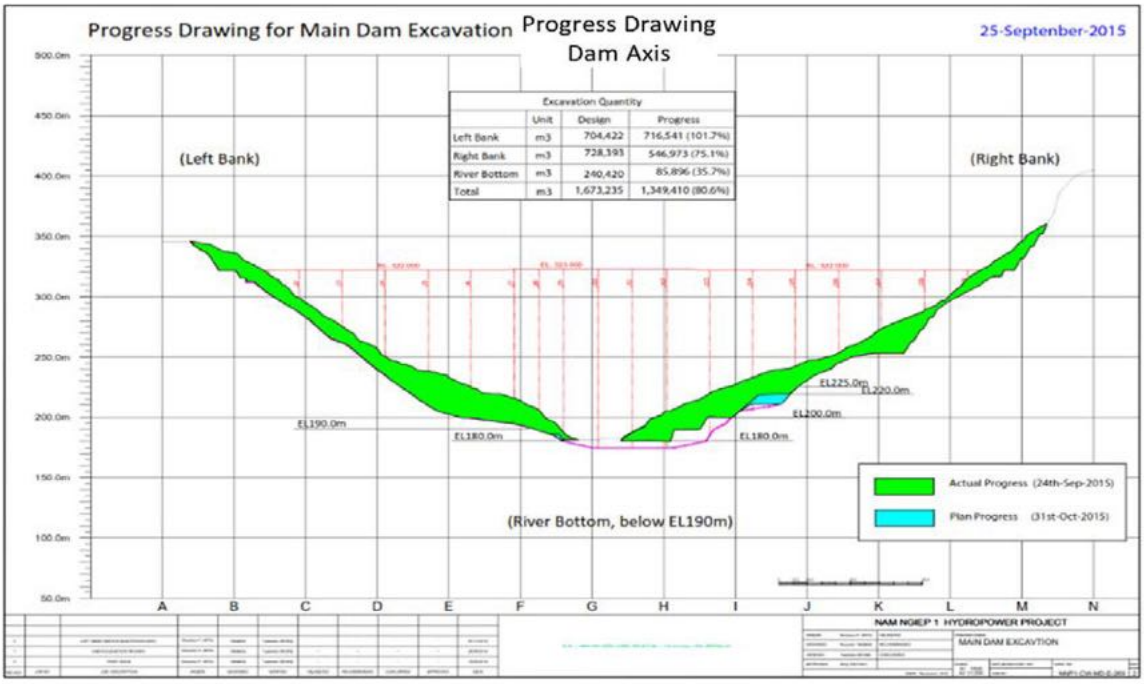
management is considered necessary. The Contractor submitted a Detailed Work Program and SS-ESMMP for the construction and operation of the Main Quarry on 30 October 2014 which was approved by the EMO on 3 December 2014. This document describes the technical requirements for the construction and operations of the quarry as well proposed measures to address 18 environmental aspects including noise, water quality, and topsoil. A draft Quarry Decommissioning Plan will be provided in the First Quarter of 2016.

2.3 MAIN DAM EXCAVATIONS

After starting the main dam excavation works in October 2014 on the left bank, by the end of September 2015 the excavation on both the left and the right banks has reached El. 180m as shown in Fig. 5. The dam excavation works will continue during the coming months. Excavated volumes are predicted to be greater than expected due weak layers of rock being encountered in the dam foundation and additional budget will be taken from the geotechnical contingency. The increase in volume of excavation is estimated to be 0.15 million cubic metres (Mm^3) or about 10%.

The limb grouting tunnel invert works at the left bank was completed and tunnel excavation work was started in September 2015. Fig. 5 below presents progresses of the main dam excavation works. The green section is the area of materials already removed by the end of September 2015 and the blue section is the proposed area of over-burden to be removed in October 2015. Riverbed excavations will be undertaken in November 2015 once the river is diverted through the tunnel.

Fig. 5: Progress Drawing of Main Dam Excavation by September 2015



2.4 RIVER DIVERSION TUNNEL

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 preparation works for river diversion are underway with stop-log demolition at tunnel inlet started at the end of this month together with reduction in the height of the cofferdam at the outlet.

2.5 RE-REGULATING DAM

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. 146.7m 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. The progress of structural concrete works is shown in Fig. 6 below. The concrete volume placed already is 12,427 m^3 being 56% of the estimated total of 22,123 m^3 for the powerhouse. The powerhouse concreting has advanced well to the point where delivery of the draft tube liner from the manufacturer in China is now awaited with installation anticipated to start in November 2015.

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 wet season.

Fig. 3: Current Status of Re-regulating Dam Works as at 30 September 2015

2.6 CAMPS

(a) Owner's Base Camp: Building construction work was substantially complete at the end of July 2015 with all buildings since handed over with punch list work remaining following inspection. Completion of external works remains.

(b) Contractor's Camp:	Major building construction work was completed in May 2015 when the Civil Works Contractor took occupation of its offices and accommodation.
(c) Other Contractors' Camp	This was started in late July 2015 and is expected to be handed over for occupation by the Electrical and Mechanical and Hydro-Mechanical Contractors in November 2015.
(d) Workers' Camps:	Contractor's Workers' Camps for the Electrical and Mechanical Contractor, the Hydro-mechanical Contractor and the Bridge Contractor for the Huay Soup Resettlement Infrastructure are under planning. Upgrading of the TCM Camp waste water system was completed in March 2015. That for other workers' camps have been reviewed by an external consultant and the necessary changes have been proposed and will be implemented, beginning in October 2015.

The WWTS designs for all camps were assessed by Pacific Aquatech Pty Ltd., a Thai based environmental engineering company experienced in waste water treatment system design. In September 2015, a final report on the recommended design changes for these camps was provided to NNP1PC.

2.7 HOAUY SOUP RESETTLEMENT AREA IEE AND INRMP

A working draft of the IEE report of the Houay Soup Resettlement Site was provided to the NNP1PC on 28 August 2015. The draft Integrated Natural Resources Management Plan or INRMP, which is part of the IEE, was submitted to the NNP1PC on 12 August 2015. In addition, by the close of August 2015, all consultations with Project Affected People (PAP) and GOL counterparts about the IEE were concluded and summarized in a Public Consultation Disclosure Plan (PCDP). The final draft Houay Soup IEE and INRMP will be submitted to ADB in October 2015. Final lender approved reports are expected in November 2015.

2.8 230KV TRANSMISSION LINE

NNP1PC will connect its 230kV transmission line to the Nabong Substation. For this to occur it requires an upgrade of:

1. 230kV switch-yard to be installed within the confines of the existing compound; and
2. Construction of a 500kV switch-yard in a nearby lot to transfer both Nam Ngum 2 and NNP1 electricity to Thailand via an existing 500 kV transmission line. NNP1PC understands that these upgrades will start in 2016.

2.9 115KV TRANSMISSION LINE IEE DUE DILIGENCE ASSESSMENT

The EDL will build and operate the 40 km of 115kV transmission line connecting the 18 MW power station at the re-regulating dam with the Pakxan Substation. An initial environmental examination (IEE) of the 115kV transmission line is being prepared by the construction

contractor, Dongfang Company. In August 2015, the EMO made a contact with EDL to prepare the environmental and social Due Diligence Assessment (DDA). In September, the NNP1PC was advised that key EDL staff were unavailable to meet until mid-October 2015.

The next meeting between key stakeholders will be held on Friday 30 October 2015.

2.10 NABONG SUBSTATION UPGRADE DUE DILIGENCE ASSESSMENT

NNP1PC is undertaking an environmental and social Due Diligence Assessment (DDA) of the Nabong Substation upgrade. This is essentially a review of the environmental and social impact mitigation measures proposed by EDL in the IEE of 2007. Initial discussions were made with the Department of Energy Business (Ministry of Energy and Mines) and EDL to initiate the process. A Draft Nabong Substation Upgrade Due Diligence Assessment is being prepared by the EMO and will be submitted to the ADB for review and comments in October 2015.

3. ENVIRONMENTAL MANAGEMENT MONITORING

3.1 CONTRACTOR SS-ESMMPS

Monitoring of construction activities is critical to identify potential or actual non-compliance issues that require corrective actions. Under the NNP1's ESMMP-CP, the Contractor is required to develop and implement the Site Specific Environmental and Social Management and Monitoring Plans (SS-ESMMPs). The contractor shall submit each SS-ESMMPs to the Environmental and Social Division (ESD) for review and approval prior to commencement of the respective construction works. The ESD will determine if sufficient preparation and planning are made into managing anticipated environmental and social impacts of each construction site. Generally, two SS-ESMMPs are required for each site: 1) vegetation clearance and earthworks, and 2) main body construction.

The NNP1PC will submit a copy of the approved SS-ESMMP to the Environmental Management Unit (EMU) of MONRE.

Once construction commences, the ESD inspects and assesses the compliance to approved mitigation measures described in the SS-ESMMPs

During the months of July to September 2015, the EMO received five (5) Site Specific (SS-ESMMPs) as listed below. After reviewing, it was deemed that these plans did not meet minimum safeguard requirements and were returned to the Contractor for further revision.

1. Obayashi Corporation - Primary Upstream and Downstream Coffer Dams;
2. Obayashi Corporation - Secondary Upstream and Downstream Coffer Dams;
3. IHI Infrastructure Systems (IHI) - Field Shop (stockyard) and Camp;
4. Geological Investigation for the Houay Soup Resettlement Area Bridge Construction;
5. State Enterprise Communication Construction (SECC) Worker Camp (Houay Soup Access Bridge).

More details on these SS-ESMMPs can be found in Appendix 1.

3.2 COMPLIANCE MONITORING AND MANAGEMENT

3.2.1 ENVIRONMENTAL INCIDENT REPORT

On 30 July 2015 at 7.00 a.m., prolonged heavy rain triggered slope collapse (100m^3) which damaged a part of the Turbid Water Treatment Plant, specifically the pipes that connect chemical tanks to the filtration system at the Outlet Diversion Tunnel site (see Photo 1 and 2). The broken pipes caused an uncontrolled leakage of 150 litres of Sulfuric Acid- H_2SO_4 at 25% dilution (i.e. 75% water) and polymer into the local environment. No injuries were recorded.

As soon as the site was safe to access, at 9.00 a.m., water samples from the nearby pools and the tunnel site were tested by the main Contractor. These were found to have a normal range of pH. Spills were contained to local areas with some over flow into the tunnel excavation site that was inundated by floodwaters at the time. Two EMO Compliance Officers were deployed to assist the contractor and to independently evaluate the situation. Environmental Monitoring Team was deployed to Hat Gnuin village to sample the Nam Ngiep located downstream of the incident site for pH and to monitor if there were fish kills. It was found that the pH level was normal and that no fish kills were occurred.

At the time of the deployment the actual volume of leaked acid and polymer could not be verified. No delay of construction schedule resulted from this incident, but tunnel flooding delayed works for several weeks. After carrying out the initial responses and assessments, the main contractor removed overburden from the treatment plant and started repair.

The diversion tunnel construction is expected to be concluded in October 2015, with river diversion then taking place. Since the occurrence of landslides that put the turbid water treatment system out of service in August 2015, the Contractor has continued to use the sediment ponds to remove excessive sediment, and manually add sulphuric acid (H_2SO_4) to bring pH levels of the effluent water into an acceptable range prior to discharge (Photo 3 and 4 below). The Contractor also reported daily to the EMO on the pH and turbidity levels of effluent discharged. The volume of sulphuric acid applied and the total discharge volumes are also reported (Photo 5).

It was agreed that since there is less than four weeks of construction activities remaining at the site and if the current manual treatment remains effective, then repairing and re-commissioning of turbid water treatment system is not warranted. The manual treatment of effluent will continue until the completion of the diversion tunnel construction works.

Photo 1 and 2: Landslides and Treatment Pond Pipes (Second picture on the left in blue) Relative to the Tunnel

Photo 3: Manual Application of Sulphuric Acid (H_2SO_4) at the Diversion Tunnel Sediment Ponds

Photo 4: Manual Monitoring of pH and Turbidity at the Diversion Tunnel Sediment Ponds

Photo 5: An Example of the Daily Turbid Water Treatment System Report Provided by the Contractor, Right Tunnel

Nam Ngiep 1 Hydropower Project

Obayashi Corporation

Date : 30 Sep 2015

Daily Record of Manual Operator for Turbid Water Treatment

Location: Diversion Tunnel - Outlet Facility

Project / Place to be used : Nam Ngiep 1 Hydropower Project / River Diversion Tunnel

Sub-Contractor	Main Contractor		The Owner	
QC Engineer	Site Engineer	Site Manager	Witness by	Approved by
SidthiSay				

Time	AM					PM										AM						Remarks
	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	
Working																									
Trouble,Repair																									
Not used																									
Pressing																									

1. Water Measurement and Consumption of Chemical

Record of Water Quality and Water Flow						
Time	Item	PH	Turbidity (NTU)	Temp. (°C)	Water Flow (m3/hour)	
9:00	Raw	10.32	521	27.1	115	
	Treated	7.54	241	27.2	-	
12:00	Raw	10.21	450	28.5	115	
	Treated	7.67	298	28.7	-	
15:00	Raw	9.97	748	28.2	115	
	Treated	7.38	217	28.4	-	
18:00	Raw	9.85	352	26.5	115	
	Treated	7.23	186	26.5	-	

2. Quantity of H_2SO_4 to be added to Turbid Water

- Considering the Requirement in Lao PDR (Range of pH: 6-9), Volume of H2SO4 to be added to the Turbid Water will be as following Table:

N=pH	V (L/hr)		
	Case-1	Case-2	Case-3
11.0	3.64	7.28	5.98
10.5	1.13	2.25	1.85
10	0.33	0.66	0.54
9.5	0.08	0.16	0.13

- Note:

Case-1: Using 1 nos of 6" submersible pump

Case-2: Using 2 nos of 6" submersible pump

Case-3: Using 1 nos of 6" and 1 nos of 4" submersible pump

- Inspection:

H_2SO_4 using: 210 Kgs (Case-3)

3. Illustration:

Fig. 1

Fig. 2

Fig. 3

Daily Report

Tunnel

3.2.2 RESULTS OF NON-COMPLIANCE MONITORING

Over the reporting period of July to September 2015, a total of 62 new non-compliances including one NCR were issued. This compares to 67 in the last quarter. A total of 51 Observations of Non-Compliances (ONCs) and 3 NCRs Levels1 were resolved in this Quarter. Carrying over into the Fourth Quarter (October-December 2015) are 23 ONCs, 1 NCR Leve1 and 1 NCR Level2.

Fig. 4: Non-Compliance Matters Issued Monthly from January to September 2015

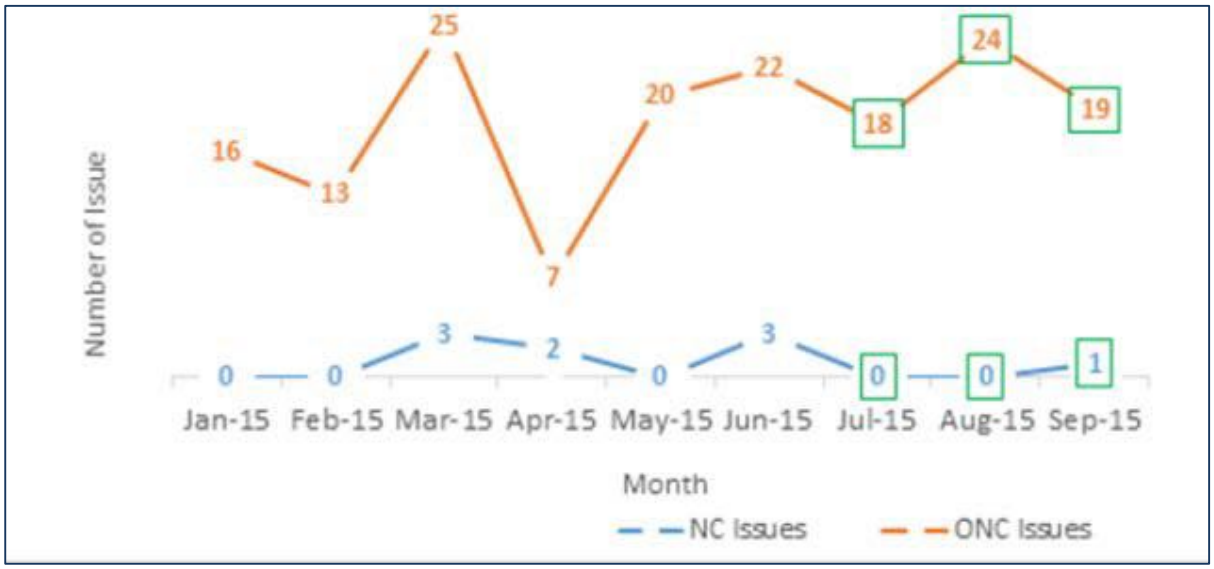


Table 1: Summary of Key Non-Compliances in the Third Quarter 2015

Non-Compliance Category	ONC	NCR1	NCR2	NCR3	
Hazardous Waste Management including minor oil spills at workshops, material storage and handling (disposal and/or storage)	17	1			
WWTS Function and Management	10	2			
Solid Waste Management	15	1			
Spoil Disposal Management	5				
Construction Site Effluent Discharge (rainy season incidences)	6				
Surface Water Drainage Management	11				
Erosion and Sediment Control	6		1		
Other (livestock entering the site)	3				
SUB-TOTAL	**73**	**4**	**1**	**0**	
GRAND-TOTAL	**78**				
Closed / Resolved	**54**				
Pending issues carried over to next quarter	**24**				

The NCR Level2 was related to soil stabilization work below the Access Road T11 which resulted in the sediments entering the Nam Ngiep. Final designs for the site were currently being developed as part of the NCR Corrective Action Plan. The NCR will be closed on completion of this implementation. This applies also to the NCR1, which relates to the required upgrade of the Sinohydro camp WWTS. The WWTS of all camps are being appraised for upgrade (as of October). More details can be found in the Appendix 2: Cumulative Environmental Corrective Actions for the Third Quarter.

The inability of camps' wastewater treatment systems (WWTS), particularly grey water treatment systems, to effectively contain and process effluents, remains an ongoing concern.

Physical site constraints (available area and topography), lack of thorough planning prior to camp establishment, and inadequate system maintenance are all contributing factors to ineffective processing. All camps' WWTSs are now the subject of external independent expert assessment. A draft report was issued in June and comments were provided back to the consultants. Upgrades of the systems are scheduled in the Third Quarter of 2015 after the completion of the review.

3.3 WASTE MANAGEMENT

3.3.1 LANDFILL MANAGEMENT

With approximately 2200 workers on site, the project generates about 117 m^3 of uncompressed solid waste each month. Each cubic meter of solid wastes is approximately 200 kg, but this increases to 500 kg when compressed. This will occur after the transfer to the completed landfill. Originally two temporary pits (each of approximately 300 m^3 capacity) were installed at the landfill site in March 2015 by the Civil Work Contractor (see Photo 6 and 7 below). Once a permanent landfill construction is completed, wastes in these pits will be exhumed and placed in the properly designed landfill. At the end of September four temporary pits were opened at the landfill site.

Photo 6: First Two Temporary Waste Pits

Photo 7: The Fourth Waste Pit

On 22 June 2015, the NNP1 commissioned the services of two external consultants to review the current designs of the camps' WWTS, and the Project landfill. A final landfill design was submitted by these consultants in July 2015 with a construction expected to commence in the Fourth Quarter of 2015.

The EMO continues to monitor conditions at the landfill site, participate in the review of the consultants' report and encourage completion of the facility in the shortest possible time. By October 2015 the Contractor will submit a proposal for the construction of the landfill based on the approved design.

Finding options for other types of waste disposal is ongoing. Recently, an alternative disposal option was found for used fluorescent bulbs. Purchasing equipment for the disposal of used fluorescent bulbs has been made and delivery is underway.

3.3.2 ANIMAL FODDER (PIG FEED) COLLECTION PROGRAM

A food waste collection programme has been developed with villagers at Ban Hatsaykham and NNP1PC sub-contractors to collect high quality food wastes that can be used as pig feed. According to the landfill specialist up to 50% of solid wastes that end up in the landfill is food wastes. Saving food wastes will also reduce the land required for landfill. It also brings economic benefits to villagers as farm animals are reared on good quality food, increasing sale price and animal health.

In July 2015 the EMO conducted a survey to obtain feedback from the villagers who collect food wastes from the project about general progresses and whether there are issues regarding the food waste collection. Most villagers were satisfied with the programme and would like to have it continued. They commented that animals were gaining weight and had improved condition.

Photo 8: Waste Management Team Interviewed Participating Villagers

Photo 9: Waste Management Team Monitored Food Waste from the Camps

The Waste Management Team also continued to monitor safety procedures used by villagers to access the site for food waste collection and monitored food waste collection practices at the villagers' households to ensure that villagers who collect the food scraps comply with food waste collection procedures.

Photo 10: Personal Protective Equipment Worn by Villagers

3.3.3 HAZARDOUS WASTE MANAGEMENT

3.3.3.1 Hazardous Materials Inventory

From July to September 2015, the NNP1PC, Contractor and sub-contractors conducted a hazardous materials inventory for all main construction sites, engineering workshops and sub-contractors' camps. In addition, hazardous materials were audited jointly with the Contractor and sub-contractors at the high risk areas namely PKC Camp, Songda Camp, RT Camp, Songda workshop, CVC plant, TCM Camp, Sinohydro Camp, Sinohydro fuel storage area and Sinohydro explosive storage area. The audit involved an inspection of storage and disposal areas, checking adequacy and accuracy of hazardous material documentation, and also evaluation of general management procedures and training (including emergency response, hazardous materials handling, safety and refuelling area). Findings from the hazardous material inventory are presented in Appendix 3.

3.3.3.2 Hazardous Materials Management Audit

During July to September, the NNP1PC EMO conducted a Joint Hazardous Material Management Audit together with TD, OC (the main Contractor) and sub-contractors. The following locations were inspected: PKC Camp, Songda Camp, RT Camp, Songda workshop, CVC plant, TCM Camp, Sinohydro Camp, Sinohydro fuel storage area and Sinohydro explosive storage area.

It was observed that the conditions for the hazardous material management have been further improved from the last three months as highlighted below:

- Song Da 5 Workshop: procedures for emergency response were posted within premises at this camp; labels which describe the types and volumes of hazardous materials, hazards for users and MSDS were provided;
- Sino Hydro Camp and Sino Hydro fuel stations: an oil trap was installed; hazardous materials are properly labelled; safe storage areas for contaminated materials used in spill response were provided; and
- TCM Camp: hazardous material management and spill response training for staff was provided.

However, improvements of hazardous material management are still required at many other sites including RT workshop, V&K Camp, Song Da workshop and Songda CVC Plant. The EMO has requested that the Contractor provide relevant training for staff and corrective actions at storage facilities.

Results of the hazardous material audit are presented in Appendix 4.

3.3.4 SELLING OF WASTE MATERIALS

During July to September 2015, the Contractor sold several waste types from the construction sites to Khunmixay Factory for processing. The EMO monitored the collection process to ensure that the Khunmixay Factory implemented all waste collection process in accordance with the procedures and in a proper manner. These included transferring of waste into the

truck, transporting of waste by the truck, cleaning up of oil spill on the ground and storing of the project waste at the factory. The table of waste selling list by the Contractor is presented in table 2 below.

Table 2: Hazardous Waste Selling by the Contractor from July to September 2015

No.	Date	Types of Waste	Unit	Site Name			Total
				PKC Camp	RT	Song Da CVC plant	
1	04/07/2015	Empty used oil drums	Drum (200 Litres)	-	5	-	5
2		Used oil	Litres	-	51	-	51
3		Used tyres	Piece	-	7	-	7
4		Used batteries	unit	-	12	-	12
5		Plastic bottles	kg	-	250	-	250
6	09/07/2015	Scrap metal	kg	3,000	-	7,500	10,500

Photo 11: Scrap Metal from Song Da 5 Workshop

Photo 12: Plastic Bottles Being Transported from the RT Workshop

Photo 83: Recyclables from the RT Camp

Photo 94: Tyres from the RT Camp

3.3.5 COMMUNITY WASTE MANAGEMENT

On 24 July 2015 the Community Recyclable Bank Program was officially launched at Ban Hat Gnuin. The Community Recycle Bank Program is part of an integrated waste management plan for the NNP1PC hydropower project. The Community Recycle Bank recycles waste materials for cash that until now have been regarded by villagers as solid waste (rubbish). Cans, paper and bottles can be collected and stored at the Recycle Bank, and then sold to merchants. The Community Recyclable Bank will provide a cleaner and healthier environment, and build a clean and hygienic village. It will reduce the amount of waste sent to the landfill, and generate profit for village development programs.

The NNP1PC provides support to the program by the following means:

- Construct the storage building at Ban Hat Gnuin (completed);
- Provide budget (revolving fund) support to operate the Community Recycle Bank program (implemented);
- Train teachers at Ban Hat Gnuin Elementary School and the committee to have the capacity to operate the Recycle Bank by themselves, with NNP1PC progressively phasing out the involvement;
- NNP1 coordinates with recycling factories and vendors to collect and purchase the recyclable waste (implemented);
- Villager training on recyclable material collection, handling, storage and transportation (ongoing).

The EMO continued to provide administration and management support to villagers on the Community Recycle Bank at Ban Hat Gnuin. Currently, 122 members have transferred their recyclables to the Bank, including 86 villagers and 36 students from the elementary school in Ban Hat Gnuin (Photo 15-16 below). Appendix 5 summarizes the amount of waste traded in the Third Quarter of 2015.

Photo15: Local Villages Trade Recyclables at the Recycle Bank

Photo16: Received Aluminium Cans

3.3.6 TRAINING

Waste management training for villagers at three villages (Ban Hat Gniun, Ban Hatsaykham, and Ban Thaheua) was undertaken during 1 and 2 September 2015 (Photos 17-20). This training was focused on the waste separation procedures and how to clean recyclables prior

to selling them to the Community Recycle Bank. Purchasing procedures of recyclables from the villagers was also conducted after the training.

Photo 107: Waste Management Training at Ban Hat Nguin

Photo 18: Waste Management Training at Ban Hatsaykham

Photo 119: Waste Management Training at Ban Thaheua

Photo 20: Waste Management Training at Ban Thaheua

3.4 ENVIRONMENTAL MONITORING

The following section presents the results of environmental monitoring between July and September 2015. Environmental monitoring was undertaken for the following aspects:

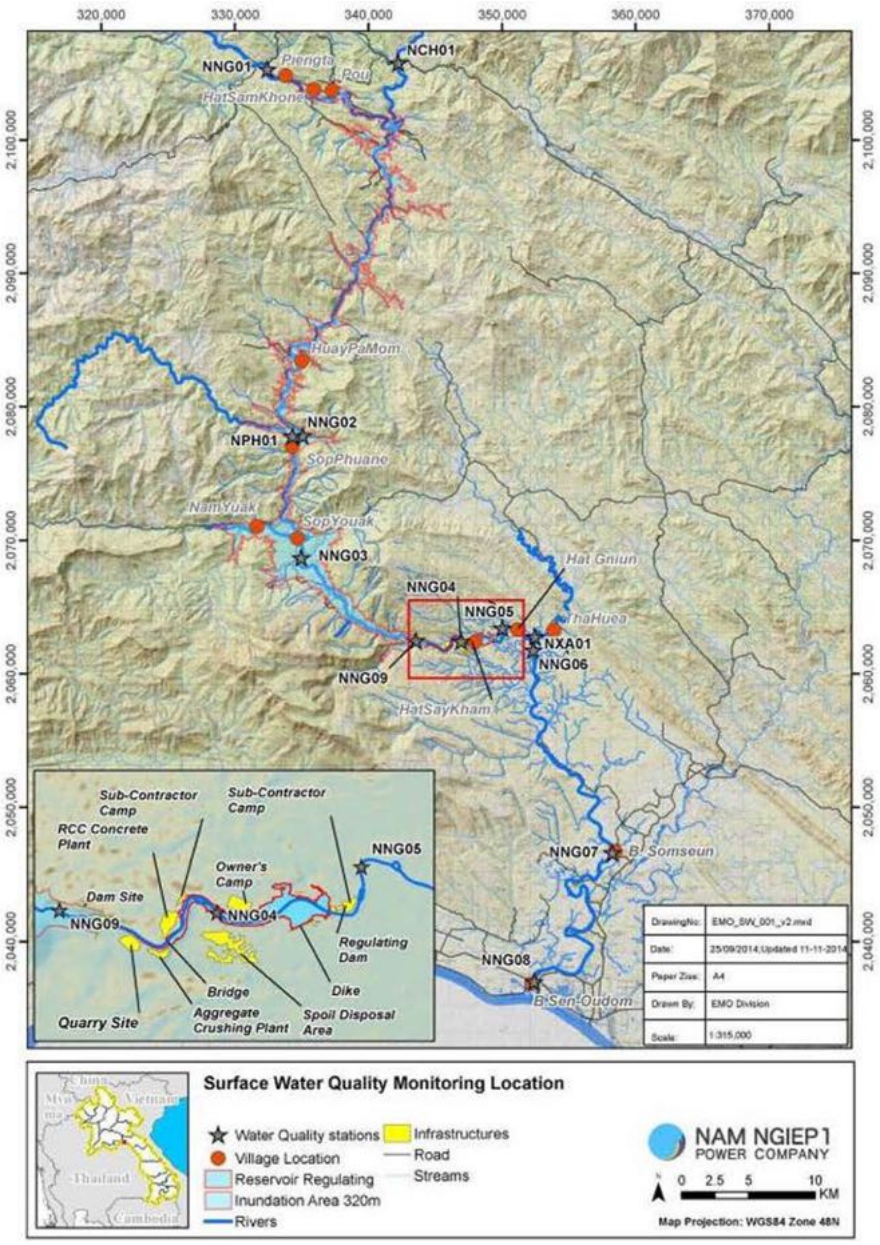
- Surface Water (river) quality monitoring;
- Groundwater (village's wells);
- Effluent discharge;
- Construction Area Discharge;
- Gravity Fed Water Supply;
- Air quality (Dust emission); and
- Ambient noise.

The monitoring results are compared against the 2009 National Environmental Standards. For the purposes of simplified reporting, this Section focuses on monitoring results that do not meet the Standards. Appendix 7 of this report contains graphs of all key parameters since the beginning of water quality monitoring in September 2014.

3.4.1 SURFACE WATER (RIVER) QUALITY

Water quality monitoring is conducted at 13 stations in the Nam Ngiep 1 watershed area: i) 6 stations located in the upstream of the Main Dam, which includes 4 stations along the upper Nam Ngiep River (station NNG09 is a control station for the surface water quality monitoring), a station at lower Nam Phouan and a station at lower Nam Chian and; ii) 7 stations located in the downstream of the Main Dam which include 5 stations along lower Nam Ngiep (stations NNG04 and NNG05 are stations which indicating the impacts from the project activities), a station at lower Nam Xao and a station at lower Nam Houay Soup (See Fig.5 below).

Fig. 5: Surface Water Quality Monitoring Location



Note: This map excludes the Houay Soup sampling site

Description of each monitoring point and surface water quality monitoring parameters can be found in the Appendix 6. Three of 13 surface water quality stations were cancelled for the missions in August and early September 2015 due to sites access restriction.

During the Third Quarter of 2015, the ambient surface water parameters that exceeded the Lao National Environmental Standard (Surface Water Quality Guideline) included pH, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Total Coliforms and Fecal Coliforms as described in details below.

3.4.1.1 pH

The recorded pH level of 10.08 in August 2015 was higher than the National Surface Water Quality Standard of between 5.0 to 9.0 for the site of Nam Xao upstream Nam Ngiep confluence (NXA01). The sources of this high pH value is unknown, however, it is believed to not relate to NNP1 project activities. However, the pH values in the Nam Ngiep are still within the standard range.

Table 3: Surface Water pH Results from July to September 2015

	River Name	Nam Ngiep									Nam Chiane	Nam Phouan	Nam Xao	Houay Soup
	Station	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Month-Year	Guideline													
Jul-15	5.0 - 9.0	7.66	7.37	7.32	7.78	7.07	7.43	7.53	7.45	7.25	7.12	7.78	7.34	6.34
Jul-15	5.0 - 9.0	7.56	7.98	7.88	7.55	7.79	7.85	7.96	6.87	6.98	6.8	8.67	7.62	6.26
Aug-15	5.0 - 9.0	8.03	-	-	8.27	8.64	8.38	8.93	8.02	8.13	7.65	-	10.08	7.85
Aug-15	5.0 - 9.0	7.74	-	-	7.26	7.9	7.92	7.78	7.58	7.37	8.0	-	7.91	5.92
Sept-15	5.0 - 9.0	7.83	-	-	7.04	7.89	8.21	8.33	7.34	7.26	7.61	-	7.95	7.51

3.4.1.2 Chemical Oxygen Demand (COD)

The Chemical Oxygen Demand (COD) is a measurement of the concentration of substances in water than can be oxidized most of which will be organic matter. The higher the COD reading, the greater the concentration of organic matter.

During July to September, most of COD results for the entire sampling sites were higher than the National Surface Water Quality Standard set at less than 5.0 mg/l. The highest COD level is 41.8 mg/l for the site of Nam Ngiep at Ban Somsuen (NNG07) in July 2015. This high COD may be related to the local activities especially the run-off from livestock farms and discharges from construction and camp sites.

Table 4: Surface Water COD Results for July to September 2015

	River Name	Nam Ngiep									Nam Chiane	Nam Phouan	Nam Xao	Houay Soup
	Station	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Month-Year	Guideline (mg/l)													
Jul-15	<5.0	7.5	19.6	17	18	16.6	18.4	17.8	41.8	19.8	8.2	37.4	13.8	34.8
Aug-15	<5.0	ND	-	-	5	ND	5	11	8.2	ND	ND	-	7.4	ND
Sept-15	<5.0	8.1	-	-	5.3	6.7	7.1	9.3	5.9	ND	ND	-	9.5	7.3

3.4.1.3 Biochemical Oxygen Demand (BOD5)

Biochemical Oxygen Demand (BOD) measures the amount of oxygen consumed by micro-organisms in decomposing organic matter in the river. BOD directly affects the amount of dissolved oxygen available in rivers. The greater the BOD, the more rapidly oxygen is depleted in a water body, resulting in less oxygen being available to aquatic biota.

During July to September of 2015, most of the BOD results were higher than the National Surface Water Quality Standard at the Nam Ngiep upstream stations (NNG02, NNG03 and NNG09), the lowest Nam Ngiep station (NNG08) and lower Nam Phouan (NPH01) in July 2015. In addition, the BOD result was slightly over the National Surface Water Quality Standard (<1.5 mg/l) at lowest Nam Ngiep station (NNG08) with a measured value of 1.5 mg/l in September 2015. Most of the stations with elevated levels of BOD are located upstream of the NNP1 activities. Therefore, it indicate background surface water quality that may involve contributions from various sources that are not related to NNP1 activities.

Table 5: Results of Surface Water BOD from July to September 2015

	River Name	Nam Ngiep									Nam Chiane	Nam Phouan	Nam Xao	Houay Soup
	Station	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Month-Year	Guideline (mg/l)													
Jul-15	<1.5	ND	3.6	3.9	1.6	1.4	1.1	1.0	1.1	1.5	ND	2.7	1.4	1.0
Aug-15	<1.5	ND	-	-	ND	ND	ND	ND	ND	ND	ND	-	ND	ND
Sept-15	<1.5	ND	-	-	1.1	ND	ND	ND	1.1	1.5	ND	-	1	ND

3.4.1.4 Fecal and Total Coliforms

In July, the Total and Fecal Coliforms were found to be higher than the National Standard for most upstream and downstream sampling stations, most likely because of rain mobilizing land-based pollutants. The spike of Total Coliforms was recorded for the site of downstream Regulating Dam and camps (NNG05) in August with a value of 54,000 MPN/100ml. Nonetheless, the Faecal Coliforms measured at this site was 240 MPN/100ml which is complied with the National Standard (1,000 MPN/100ml). In addition, the total coliforms at the lowest Nam Ngiep station (NNG08) and Nam Xao were significantly higher than the National Surface Water Quality Standard in September 2015 with measured values of 24,000 MPN/100ml and 16,000 MPN/100ml respectively. These were unlikely to be resulted from the project activities.

Table 6: Surface Water Faecal and Total Coliforms from July to September 2015

	River Name	Nam Ngiep									Nam Chiane	Nam Phouan	Nam Xao	Houay Soup
	Station	NNG01	NNG02	NNG03	NNG09	NNG04	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
Month-Year	Guideline													
Jul-15	*	2,200	16,000	17,000	5,400	5,400	16,000	5,400	9,200	920	280	17,000	9,200	3,500
Aug-15	*	3,500	-	-	4,900	14,000	54,000	4,900	35,000	2,400	2,200	-	1,300	11,000
Sept-15	*	4,900	-	-	3,500	1,600	350	2,200	1,600	24,000	1,300	-	16,000	1,600
Jul-15	**	940	2,400	2,400	5,400	540	1,600	3,500	1,100	920	470	1,100	2,400	2,400
Aug-15	**	920	-	-	1,600	700	240	700	920	350	1,600	-	1,100	350
Sept-15	**	700	-	-	350	280	170	2200	920	24,000	330	-	16,000	490

Note: *Total Coliforms of less than 5,000 MPN/100ml and, ** refers to the Fecal Coliforms of less than 1,000 MPN/100ml

3.4.2 EFFLUENT DISCHARGE QUALITY MONITORING

The EMO is required to monitor water quality of all effluents being discharged into the environment from work related sites including workers' camps. When no discharge is observed, such as the case where effluent is being held in tanks, no monitoring is conducted. During the Third Quarter of 2015, two camps were discharging effluents- Right Tunnel (RT) and Obayashi camps. The effluent monitoring at Obayashi camp has been conducted since August 2015. The results of those that exceeded the standards are presented below.

Table 7: Results of Effluent Discharge Monitoring from July to September 2015

Month/Year	Parameter (Unit)	Site Name	Obayashi Camp	RT Camp	TCM Camp	Sino Hydro Camp
		Station	EF02	EF05	EF03	EF06
		Lao National Environmental Guideline				
Jul-15	TSS (mg/l)	<50	Not Started	36.4		
Aug-15	TSS (mg/l)	<50	51.2	18.5		
Sept-15	TSS (mg/l)	<50	33.9	37.2		
Jul-15	BOD (mg/l)	<30	Not Started	26.8		

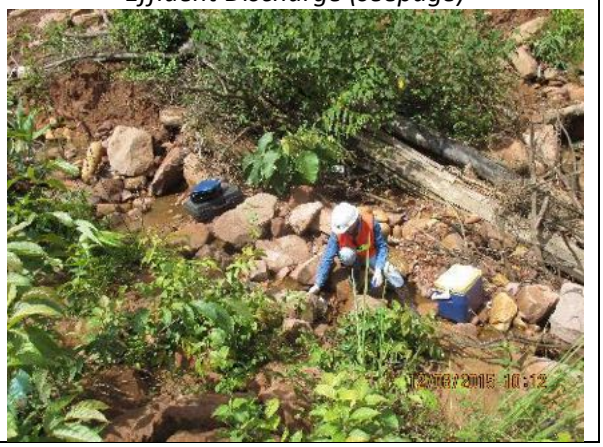
Month/Year	Parameter (Unit)	Site Name	Obayashi Camp	RT Camp	TCM Camp	Sino Hydro Camp
		Station	EF02	EF05	EF03	EF06
		Lao National Environmental Guideline				
Aug-15	BOD (mg/l)	<30	96.3	17.4	No discharges during the quarter	
Sept-15	BOD (mg/l)	<30	73.4	24.6		
Jul-15	COD (mg/l)	<125	Not Started	61.8		
Aug-15	COD (mg/l)	<125	175	53.2		
Sept-15	COD (mg/l)	<125	200	79.4		
Jul-15	NH3-N (mg/l)	<10	Not Started	6		
Aug-15	NH3-N (mg/l)	<10	27	6		
Sept-15	NH3-N (mg/l)	<10	27	5		
Jul-15	Total coliform (100MPN/100ml)	<400	Not Started	160,000		
Aug-15	Total coliform (100MPN/100ml)	<400	160,000	22,000		
Sept-15	Total coliform (100MPN/100ml)	<400	160,000	160,000		
Jul-15	Fecal coliform (100MPN/100mL)	Not Available (N/A)	Not Started	160,000		
Aug-15	Fecal coliform (100MPN/100ml)	Not Available (N/A)	160,000	22,000		
Sept-15	Fecal coliform (100MPN/100ml)	Not Available (N/A)	160,000	54,000		

RT Camp (EF05): It was found that Fecal and Total Coliforms exceeded the National Standard for the Third Quarter. The estimated volume being discharged was approximately 100 m^3 per day. The wastewater separation system (kitchen wastewater and general wastewater) of the RT and improvement of an aeration system at wastewater treatment pond are significant factors to improve the effluent discharge from this camp.

However, the monthly site inspection at this camp found that seepage from the system continues to be a problem and additional improvements to the system have been requested to the sub-contractor. Thus, all camps' WWTS were assessed by an independent consultant-Pacific Aquatech Pty. Ltd., a Thai based environmental engineering company experienced in WWTS design. In September 2015, a final report on the recommended design changes for the camps was provided to NNP1PC. A joint internal review of these recommendations will be carried out in October to agree on the next steps.

Photo 21: Right Tunnel Camp's Grey Water Treatment Pond

Photo 122: Location of the Right Tunnel Camp Effluent Discharge (seepage)



Obayashi Camp (EF02): It was found that the Total Suspended Solids (TSS), BOD, COD, Ammonia-Nitrogen, Faecal Coliforms and Total Coliforms were above the prescribed National Standard for the Third Quarter. Total discharge volume was approximately 200 m^3/day.

Photo 23: Obayashi Grey Water Treatment System Discharge Location

For more information on the corrective actions, refer to a section on Results of Non-Compliance Management in Appendix 2.

3.4.3 GROUNDWATER QUALITY MONITORING

Three boreholes were installed by the NNP1PC at Ban Hatsaykham for domestic consumption purposes, water quality has been regularly monitored for these boreholes. There was also a pre-existing well at Ban Hat Gnuin, where water quality was also monitored until July 2015 and water samples were collected about 1 m below the well's surface water. These samples were tested against twenty two (22) parameters which include the following:

1. pH
2. Sat. DO (%)
3. DO (mg/l)
4. Conductivity (µs/cm)
5. TDS (mg/l)
6. Temperature
7. Turbidity (NTU)
8. Arsenic (mg/l)

9. Cadmium (mg/l)
10. Calcium (mg/l)
11. Iron (mg/l)
12. Magnesium (mg/l)
13. Manganese (mg/l)
14. Potassium (mg/l)
15. Sodium (mg/l)
16. Fluoride (mg/l)
17. Nitrate (mg/l)
18. Nitrite (mg/l)
19. Total Hardness (mg/l)
20. Total Coliforms (MPN/100ml)
21. Fecal Coliform (MPN/100ml)
22. E. coli (MPN/100ml)

Table 8: Results of Groundwater Quality from July to September 2015

Month-Year	Parameter	Site Name	Ban Hatsaykham			Ban Hat Gniun
		Station	GHSK01	GHSK02	GHSK03	GHGN01
		Guideline				
Jul-15	pH	6.5 -9.2	6.06	6.2	7.24	5.87
Aug-15	pH	6.5 -9.2	6.99	N/A	6.15	N/A
Sept-15	pH	6.5 -9.2	6.1	6.21	5.71	N/A
Jul-15	Fecal Coliform (MPN/100ml)	0	0	0	0	2,400
Aug-15	Fecal Coliform (MPN/100ml)	0	0	N/A	0	N/A
Sept-15	Fecal Coliform (MPN/100ml)	0	0	0	0	N/A
Jul-15	E.Coli (MPN/100ml)	0	0	0	0	2,400
Aug-15	E.Coli (MPN/100ml)	0	0	N/A	0	N/A
Sept-15	E.Coli (MPN/100ml)	0	0	0	0	N/A

Note: Sampling could not be conducted in one well (GHSK02) in August at Ban Hatsaykham due to a faulty pump and sampling at Ban Hat Gniun's well (GHGN01) was stopped from August 2015-

Water quality parameters in the three wells of Ban Hatsaykham complied with the National Environmental Standard except pH which was slightly below the Standard range (Table 9 above). In this instance, the low pH was possibly dictated by local geology as the all previous pH readings have been similar. The pH values observed are not considered to be a cause for health impacts on consumers, but it may cause odor and affect the taste of water.

For Ban Hat Gnuin's well (GHGN01), it was found that the pH, Faecal Coliforms and E. Coli bacteria were above the applicable National Standard in July 2015. This bacteria contamination is likely to be a result of local septic tank seepage into the ground water, coupled with soil infiltration of surface contaminants during raining events. The well owner confirmed that this well is used for washing and bathing purposes only. Therefore, the monitoring program for this well has stopped since August 2015 and no results were available for August and September.

3.4.4 Construction Area Discharge Water Monitoring

Over the reporting period, four construction sites were discharging effluents into the natural environment- CVC Plant site, RCC Plant site, Regulation Dam and Diversion Tunnel Outlet. These sites produce potentially large volumes of water both underground and/or trapped surface water. Discharging the stored water, after processing, is necessary for the purposes of maintaining a dry construction area.

The Regulation Dam and Diversion Tunnel Outlet operate for 2x10 hour shifts per day and for six days a week, but the requirement to treat these sites' waste water is 24 hours a day, seven days a week. An effluent filtration system that controls the level of pH and removes some TSS is now operating at both sites. The trapped effluent water is tanked and then pumped to a series of sediment ponds to settle sediments and other particulate matters before pumping into the filtration system. Sediment 'cake' is disposed of at the Spoil Area 6. Once the water

is filtered and treated to meet the required Standard, it is discharged directly into the Nam Ngiep. Due to the landslide occurred at the end of July 2015, the filtration plant at the Diversion tunnel was broken and out of use since then. However, Sulfuric Acid (H_2SO4) was manually added to the sediment ponds as a temporary method for pH adjustment.

For the CVC Plant site, a water treatment system was installed to control the level of pH of the wastewater discharged from the concrete plant washing activities and also included a sediment pond to minimize Total Suspended Solids prior to discharging into Nam Ngiep.

There is only a sediment pond to settle the sediment from the RCC plant site. The CVC and RCC plant sites were monitored since August 2015.

A total of nine (9) parameters were tested at these sites: pH, Saturated DO (%), DO (mg/l), Conductivity (µs/cm), TDS (mg/l), Temperature, Turbidity (NTU), TSS (mg/l), Oil & Grease (mg/l).

Key results of the construction area discharge monitoring are described below. Parameters that are above the prescribed Standards are highlighted in yellow (Table 9):

- **Diversion Tunnel Outlet (DS01):** the pH, TSS, oil and grease results exceeded the National Effluent Discharge Standard during August and September 2015 (Table 9 below). The oil and grease was generated from tunneling equipment and heavy vehicle traffic from within the tunnel. The surface water fed by the rainfall and groundwater from excavations has generated about 12,000 m3/day. Not having the turbid water filtration plant, taken offline in on the 30th July due to a landslide, has affected the sites ability to efficiently process water before discharge. The site since this time, has relied on the sole use of sediment ponds and the manual application of H2SO4 at to treat effluent discharge. The Contractor was requested to increase the pond system volume capacity, which was adopted.
- **CVC Plant Site (DS03):** the pH and TSS results exceeded the National Effluent Discharge Standard during September 2015. The monthly site inspection confirmed that the capacity of existing sediment pond and wastewater treatment system is inadequate for treating the TSS and pH level during heavy rain. Estimated discharge volume was 500 m3/day of which a greater proportion was rain fed surface runoff. The sediment pond system volume was increased as well as surface water drainage systems upgraded.
- **Regulation Dam (DS08):** the pH recorded of 9.84 was slightly higher than the National Effluent Discharge Standard during August 2015 (Table 9). Approximate discharge volume was 1,000 m3/day.
- **RCC Plant Site (DS09):** the TSS was found to be higher than the National Standard during August and September 2015. The monthly site inspection confirmed that the capacity of the existing sediment pond for the site was inadequate to settle the sediment loads during the rainy season. Approximate discharge volume was 2,000 m3/day. In order to control and minimize the amount of the TSS being released from this site, the size of the sediment pond must be expanded to allow sufficient time for the TSS to settle. The sediment pond system volume was increased as well as surface water drainage systems.

Table 9: Results of the Construction Area Discharge Monitoring from July to September 2015

Month/Year	Parameter (Unit)	Site Name	Diversion Tunnel Outlet	CVC Plant Site	Regulating Dam	RCC Plant Site
		Station	DS01	DS03	DS08	DS09
		Guideline				
Jul-15	pH	6.0 -9.0	8.56	No Discharge	7.95	No Discharge
Aug-15	pH	6.0 -9.0	10.04	7.57	9.84	8.99
Aug-15	pH	6.0 -9.0	No Discharge	No Discharge	8.29	7.9
Sept-15	pH	6.0 -9.0	8.45	9.3	7.79	7.47
Sept-15	pH	6.0 -9.0	No Discharge	No Discharge	7.15	6.92
Jul-15	TSS (mg/l)	<50	ND	No Discharge	12.2	No Discharge
Aug-15	TSS (mg/l)	<50	2,719	41.1	15.1	408
Sept-15	TSS (mg/l)	<50	1,488	900	45.1	1,002
Sept-15	TSS (mg/l)	<50	No Discharge	No Discharge	48.2	930
Jul-15	Oil &Grease (mg/l)	<10	ND	No Discharge	ND	No Discharge
Aug-15	Oil &Grease (mg/l)	<10	28	ND	ND	ND
Sept-15	Oil &Grease (mg/l)	<10	4	ND	ND	ND
Sept-15	Oil &Grease (mg/l)	<10	No Discharge	ND	ND	ND

Note: ND means "Not Detected"

3.4.5 GRAVITY FED WATER SUPPLY (GFWS) MONITORING

The GFWS's surface water monitoring was carried out by the EMO in July 2015. This was aimed to collect the baseline information on the stream that will be used to supply water to the Project affected villages of Hat Gniun, Thaheau and Houay Soup using the GFWS. The results will be shared with villagers to advise them on the necessary precaution measures for water consumption. Monitoring locations are shown in the following table.

Table 10: Baseline Water Quality Results of the GFWS's Surface Water

	Site Name	Water Intake for Resettlement Area (HouaySoup Gnai Stream)	Water Intake for Ban Hat Gniun (Houay Phou Gnai)	Water Intake for Ban Thahuea (Houay Hinlap)
	Station code	RHSP01	WHGN01	WTHH01
	Date	01/07/15	09/07/15	09/07/15
Parameters	**Guideline**			
pH	**6.5-8.5**	5.79	8.14	8.79
Color (Pt-Co)	**<5**	20	20	20
Fecal Coliforms (MPN/100ml)	**0**	0	>23	>23
E. Coli (MPN/100ml)	**0**	0	>23	>23

Note: The laboratory tests have some limits regarding the drinking water quality analysis. The reporting procedure employed presents results for bacteria up to a maximum of 23 MPN/100ml. Bacteria counts that are greater than this value are not provided in the above table.

- The GFWS for Resettlement Area (Houay Soup Gnai Stream): most parameters met the National Surface Water Quality Standard, except pH and color.
- The GFWS for Ban HatGniun (Houay Phou Gnai Stream): the color, Fecal Coliform and E. Coli bacteria are above the prescribed National Surface Water Quality Standard.
- The GFWS for Ban Thahuea (Houay Hinlap): the pH, color, Faecal Coliform and E. Coli bacteria are found to be higher than the National Standard.

3.4.6 Air Quality (Dust) Monitoring

The dust emission monitoring was carried out for 72 consecutive hours in targeted villages by starting the monitoring on the weekend to obtain a record of at least 20 hours of ambient conditions. During the Third Quarter of 2015, dust emission monitoring was conducted in Ban Hatsaykham, Ban Hat Gniun and Ban Thaheua. All village recordings were within the Lao National Environmental Standard for Air Quality of 0.12 mg/m^3. The dust emission monitoring result average in 24 hours during the Quarter are summarized in the Table 11 below:

Table 11: Air Quality Monitoring Results from July to September 2015

Ban Hatsaykham - Dust Emission Average in 24 h – July 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	12/07/201512:49:30	13/07/201512:49:30	14/07/201512:49:30
End Time	13/07/201512:49:30	14/07/201512:49:30	15/07/201512:49:30
Average Data Record in 24h	0.0246	0.0389	0.0305
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Hatsaykham - Dust Emission Average in 24 h – August 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	23/08/201511:59:32	24/08/201511:59:32	25/08/201511:59:32
End Time	24/08/201511:59:32	25/08/201511:59:32	26/08/201511:59:32
Average Data Record in 24h	0.0268	0.0244	0.0162
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Hatsaykham - Dust Emission Average in 24 h – September 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	06/09/201511:07:32	07/09/201511:07:32	08/09/201511:07:32
End Time	07/09/201511:07:32	08/09/201511:07:32	09/09/201511:07:32
Average Data Record in 24h	0.0337	0.0342	0.0231
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Hat Gniun - Dust Emission Average in 24 h – July 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	26/07/201513:26:30	27/07/201513:26:30	28/07/201513:26:30
End Time	27/07/201513:26:30	28/07/201513:26:30	29/07/201513:26:00
Average Data Record in 24h	0.0140	0.0238	0.0179
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Hat Gniun - Dust Emission Average in 24 h – August 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours

Start Time	16/08/201510:16:30	17/08/201510:16:30	18/08/201510:24:00
End Time	17/08/201510:16:30	17/08/201518:31:00	19/08/201510:24:31
Average Data Record in 24h	0.0214	0.0248	0.0154
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Hat Gniun - Dust Emission Average in 24 h – September 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	13/09/201514:22:32	14/09/201514:22:32	15/09/201514:23:02
End Time	14/09/201514:22:32	15/09/201514:23:02	16/09/201514:22:02
Average Data Record in 24h	0.0074	0.0118	0.0023
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Thaheua - Dust Emission Average in 24 h – July 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	05/07/201509:52:30	06/07/201509:52:30	07/07/201509:52:30
End Time	06/07/201509:52:30	07/07/201509:52:30	08/07/201509:52:30
Average Data Record in 24h	0.0318	0.0256	0.0197
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Thaheua - Dust Emission Average in 24 h – August 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	09/08/201512:31:30	10/08/201512:31:30	11/08/201512:31:30
End Time	10/08/201512:31:30	11/08/201512:31:30	11/08/201519:18:30
Average Data Record in 24h	0.0504	0.0334	0.0379
Guideline Average in 24h	***0.12***	***0.12***	***0.12***
Ban Thaheua - Dust Emission Average in 24 h – September 2015			
Period	00-24 Hours	24-48 Hours	48-72 Hours
Start Time	20/09/201510:56:32	21/09/201510:56:32	22/09/201510:56:32
End Time	21/09/201510:56:32	22/09/201510:56:32	23/09/201510:56:32
Data Record Average in 24h	0.0309	0.0233	0.0242
Guideline Average in 24h	***0.12***	***0.12***	***0.12***

3.4.7 NOISE MONITORING

The noise monitoring was carried out from 10.30 am for 72 consecutive hours (both day and night time) in selected villages by starting the monitoring on a non-working day (Sunday), to obtain a record of at least 20 hours of ambient conditions. In the Third Quarter, it was conducted in Ban Hatsaykham, Ban Hat Gniun and Ban Thaheua. The recorded values were measured against the Lao National Environment Standard 2009 and for the period from 06:00 to 22:00 o'clock when construction activities are expected to influence village noise levels. The results revealed that all village recordings were within the allowable maximum value of 115 dB(A) but the recorded average for Ban Thaheua was slightly higher than the allowable value of 55 dB(A) as summarized in Table 12 below. The sources of noise nuisance could be the music from the local people' houses that are located nearby the station during the daytime as well as the vehicle movement.

Table 12: Noise monitoring results for July to September 2015

Parameter (Unit) - Month	Site Name		
	Ban Hatsaykham	Ban Hat Gnuin	Ban Thaheua
Standard Maximum		***115***	
Recorded Maximum [dB(A)] in July 15	82.5	85.3	87.9
Recorded Maximum [dB(A)] in Aug 15	86.4	80.7	88.2
Recorded Maximum [dB(A)] in Sept15	79.1	80.0	83.6
Standard Average for Residential Area from 6:00-22:00		***55***	
Recorded Average [dB (A)] – July 15	53.4	54.3	55.3
Recorded Average [dB (A)] – Aug 15	50.2	47.3	55.1
Recorded Average [dB (A)] – Sept 15	48.8	54.9	54.9

3.4.8 VIBRATION

Lao PDR does not have a recommended guideline for vibration. Structural damage from road construction activity (e.g. vibratory rollers) and ancillary activity (e.g. blasting at the quarries) is unlikely given the distance from public infrastructure to the construction areas.

3.5 WATERSHED AND BIODIVERSITY MANAGEMENT

3.5.1 WATERSHED MANAGEMENT

3.5.1.1 Watershed Management Plan

An operational guideline that was produced in late June 2015 was viewed positively by ADB Consultant as a good progress towards WMP development.

In July 2015, the EMO conducted key informant interview targeting relevant decision makers in the watershed areas. The interview aimed to understand their perceptions, applicable legal framework and options for the use and management of natural resources within their administrative political jurisdiction. This information will be incorporated in designing management arrangements, strategies, and resource counterparting mechanisms in the WMP. There were 17 key government officers from the PONRE, DONRE, and relevant district offices within the NNP1 watershed area engaged in this interview. In August 2015, the Consultant team also progressed with data analysis of the overall Project relevant information and documentation including the outcomes from latest field observation conducted by NNP1 EMO team from March-June 2015.

In September 2015, NNP1PC EMO and Consultant team as well as the ADB Consultant organised in-house workshops/consultative meeting regarding the results of site visits within the watershed area to: (a) validate the findings from data analysis ; (b) discuss revised watershed definition and watershed action plan, budget scheme, priority activities to be commenced by GOL and initial outline of the WMP; (c) comment on the key informant interview to capture the vision and long term plan within the watershed area that will be presented in a workshop planned in November 2015. The NNP1PC EMO also shared the update in Lao PDR on the recent Minister's Order on the establishment of a National Level Watershed Management Committee exclusively for hydropower projects under the Ministry

of Natural Resources and Environment (MONRE) in August 2015. The NNP1PC hopes that this Committee can also provide strategic guidance on the management of the whole Nam Ngiep watershed area with the involvement of three provinces (Xiengkhouang, Xaysomboun and Bolikhamxay) and other hydropower project developers.

NNP1PC Fishery Consultant also continues with the development of an Integrated Fishery Management Plan (IFMP). This Consultant had a consultative discussion with NNP1PC EMO in July 2015 on the detailed activities of the IFMP development including some site visits, review relevant Project information for the fishery management, outline of the IFMP as well as future collaboration with the Watershed Consultant to link the IFMP with the WMP. The Consultant planned to deliver the initial draft IFMP in October 2015.

3.5.1.2 Watershed Working Plan

The NNP1 EMO in close assistance from the ADB Consultant concluded the revision of Watershed Working Plan (WWP) as per provided recommendations during the ADB joined mission in May 2015. It is understood that this revised WWP shall be referred to and incorporated by the Watershed Consultant in the NNP1PC WMP. It is also understood by the ADB Consultant that the NNP1PC EMO and GOL have strategized the progress to deliver the NNP1PC WMP by having priority activities commenced by the GOL within a period of 5 months (November 2015 to March 2016). These priority activities were discussed and planned in reference to the revised WWP. During September 2015 workshop, the ADB consultant recommended to have more detailed explanations on the key indicators of achievement and budget allocation before they are proposed to NNP1PC for Watershed Management Fund utilization. In this regard, NNP1PC continues assisting the NNP1PC Watershed Management Committee to refine the proposal which is expected to be finalised in October 2015.

3.5.2 BIODIVERSITY MANAGEMENT

3.5.2.1 Biodiversity Baseline Survey

The progress of survey works including the result of camera trapping was shared during the missions of NNP1PC Biodiversity Advisory Committee (BAC) and ADB Biodiversity Consultant in July 2015. It was recommended that the camera trap record was extended until mid of September 2015 to ensure a longer observation of certain species.

In compliance with the NNP1PC Project milestones, the BAC and ADB have acknowledged the submission of the first draft report on 1 August 2015 whilst additional review and comments on the report are being provided. The revised version was circulated on 15 September 2015 with the final comments received from BAC members on the GIS landscape/habitat assessment. The overall revision was acknowledged by ADB and the submission of the final report was made on 30 September 2015. The improvement of GIS landscape/habitat assessment section can be completed afterward with the acceptance from BAC.

This biodiversity baseline survey report will be referred to as a key document for the development of a Biodiversity Management Sub-Plan (BMSP) attached to the NNP1PC WMP. The NNP1 EMO also progressed with the procurement of a Biodiversity Consultant (firm) in

August 2015. The interested consulting companies were evaluated by NNP1PC EMO and BAC as underqualified principally for CV profile of the proposed specialists/experts. It was then recommended by BAC to continue hiring the current Biodiversity Survey Consultant whom already familiar with the Project area and Lao context as an assurance of the quality of work. The work is expected to be in parallel with the NNP1 WMP development and to be coordinated with NNP1 Watershed Consultant.

3.5.2.2 Biodiversity Offset Management Plan

The identification of the biodiversity offset site is ongoing. The NNP1PC, ADB Biodiversity Consultant, and BAC members had a consultation workshop with PONRE of Xaysomboun and Bolikhamxay in regards to the concept of biodiversity offset and the information on proposed offset sites within the Provincial administrative area. It was recommended by BAC members that the ground truth survey is commenced as an initial assessment of biodiversity values within the proposed sites. This ground truth survey is expected to start in October 2015 for around 2 months. The outcomes will serve as a key reference for making decisions on the offset site selection through a consensus building workshop planned in January 2016.

The NNP1PC EMO has progressed with preparation works including the administrative procedures to access the sites and procurement of Consultant to conduct the survey work. NNP1PC also followed up with BAC recommendations similarly to BMSP Consultant procurement progress.

3.6 BIOMASS CLEARANCE

In July 2015, NNP1PC finalized the development of a Biomass Removal Plan (BRP) which incorporates a modeling scenario using a MONRE's tool called BioREM. The final BRP was approved by MONRE on 29 July 2015 which was later submitted to the ADB on 31 July 2015, meeting the milestone date of BRP submission. The ADB issued an official acknowledgement for receiving the plan and advised the NNP1PC to disclose the BRP in the company website. This has been completed and available in English at http://namngiep1.com/downloads/biomass-removal-plan-brp/. In addition, the NNP1PC is in the progress of translating the BRP document into Lao version according to the recommendation from MONRE. This work is being carried out by a Consultant.

Following the approval of the BRP, the NNP1PC progressed with the procurement of: a) a Biomass Clearance Contractor; b) a Consultant to develop SS-ESMMP for biomass clearance work; c) a UXO survey and clearance Contractor. The NNP1PC was able to execute contractual agreement with the Biomass Clearance Contractor on 29 September 2015 which was later submitted to the ADB and Lenders on 30 September 2015. The NNP1PC is in the process of finalizing the procurement of the Consultant for SS-ESMMP development and the UXO Contractor. The contracts are expected to be signed by early October 2015. A kick off meeting with the Biomass Contractor is planned in October to discuss detailed working plan followed by a technical training to comply with developed SS-ESMMP in early of November 2015. It is also understood that the assurance of occupational health and safety of clearance workers from UXO risk will be based on the UXO survey and clearance services.

4. OTHER SUPPORT PROGRAMS

4.1 INTEGRATED SPATIAL PLANNING PROGRAM

The NNP1PC EMO continues to follow up with both MONRE DEQP and Xaysomboun Province for ISP program. It was confirmed to NNP1PC that the DEQP has prepared and discussed the training program for Xaysomboun ISP technical committee which is planned to commence in October 2015.

4.2 HOUAY NGUA PROVINCIAL PROTECTED AREA CONSERVATION MANAGEMENT PROGRAM

On 23 July 2015, a meeting was held between NNP1PC, PONRE Bolikhamxay and EPF regarding the use of the EPF's resource to support the management of Houay Ngua Provincial Protected Area (PPA) located in Nam Ngiep watershed area downstream the NNP1 dam. The NNP1PC conveyed the concern of IAP members on the status of the Houay Ngoua PPA which, in the opinion of the IAP, is degraded and no systematic management in place. However, Bolikhamxay PONRE is confident that the revised institutional arrangement for Houay Ngoua PPA management plus the financial support from the EPF will be able to improve the situation. In addition, it is understood by all parties that the EPF will strictly implement a performance based evaluation in accordance with EPF procedures.

4.3 ENVIRONMENTAL PROTECTION FUND (EPF)

NNP1PC followed up on the issue of channeling the NNP1 financial contribution to EFP to eligible Project provinces of Bolikhamxay and Xaysomboun. It was discussed and decided by EPF and the two provinces that part of the NNP1PC first payment of USD 180,000 shouldbe allocated for biodiversity related protection and conservation management activities in Xaysomboun and Bolikhamxay provinces in the amount of USD 50,000 and USD 80,000 respectively.

Bolikhamxay province has proposed to utilize the EPF funds to support the management of Houay Ngua Provincial Protected Area (PPA) whilst the Xaysomboun provincial plan will be discussed later on with the EPF. Both provinces acknowledged that the utilization of the EPF funds shall follow the EPF procedures and the NNP1PC will continue to provide assistances to both provinces in this regard.

5 OCCUPATIONAL HEALTH & SAFETY OF CONSTRUCTION WORKERS

5.1 SAFETY ORGANISATION

Since issuance of the Notice to Proceed in October 2014 to the Civil Contractor, safety has been monitored and managed by one safety officer employed by NNP1, another by the Contractor and one for each subcontractor. They report to senior management within their organisations and in the case of the Contractor and Subcontractors to their respective Project Managers. The Contractor has further strengthened its safety team in the period by the

appointment of a third experienced safety specialist, another Philippine national, who has previous experience on other Obayashi international projects. The philosophy of the Project is that every site engineer and site manager is a safety officer.

During the second quarter, the Owner lost its Safety Officer in an unfortunate and tragic fatal traffic accident off-site, after work, on the way home. A replacement Safety Officer was recruited and two experienced construction engineers co-opted to strengthen the Owner's safety team. The Owner's Manager (ex-EGATi) responsible for Safety was changed in the second quarter and a new experienced (Philippino) Deputy Manager arrives in early October 2015. The Owner's Safety team will then total 5 persons, excluding input from experienced senior management.

The Civil Contractor has 4 safety specialists in a health, safety and environmental team comprising of seven persons. The combined total of 9 persons from Owner and Contractor who are directly concerned with safety are from 4 different nationalities and 6 have previous international experience of construction of large hydropower projects.

5.2 SAFETY TRAINING

All the training that the Safety Officers of the Owner and Contractor carried out in the period July to September 2015 is provided in the Contractor's Monthly Progress Reports and is summarised in Table 13 below. This includes all training by external and internal trainers and toolbox talks given by Owner, Contractor or Subcontractor personnel. For example, in July 2015, the total number of training courses held in the period is 39 and the total number of workers receiving training according to their needs is 1,743.

Table 13: Safety Training for the Reporting Period from July to September 2015

Month & Year	Total Number of Training Courses held in each month	Total Number of Workers Receiving Training in Each Month According to Their Needs	Subject Matter of Training Courses Variously Attended According to the Needs of Workers
July, 2015	39	1,743	Induction, general, electrical safety, confined space working, housekeeping, wet, slippery and unstable surfaces, landslides and rock falls, safety committee (9 topics).
August, 2015	47	1,848	Induction, landslide and rock falls, driving, safety intervention, regulations and instructions, working at height, safety committee (7 topics).

September, 2015	50	1,692	Induction, general, awards and penalties, landslide and rock fall (4 topics).

5.3 SAFETY CLASSIFICATION AND STATISTICS

Incidents are classified into six categories in accordance with international convention. These categories are:

		Cum. Total	2015 Q3 Total
LTI	Lost Time Incident	9	2
RI	Recoverable Injury	3	0
NM	Near Miss (Reported)	9	2
PD	Property Damage	1	0
FI	Fire Incident	3	0
MVI	Motor Vehicle Incident	23	1
	Total	**48**	**5**

The Table indicates the distribution by category of the number of incidents both in total since February 2014, and in the Third Quarter of 2015.

The Project continues to focus on identifying risk by regular inspection, training and warning to avoid risk and in this has good cooperation between the Owner, the Civil Contractor and its Subcontractors.

5.4 REPORTING TO THE LENDERS, LTA AND OTHERS ON SAFETY INCIDENTS AND ACCIDENTS

The total 48 incidents recorded to 30 September 2015 as above. No serious injuries were sustained in the period. The NNP1PC includes data and statistics on safety incidents in their Monthly Progress Report to its shareholders, Lenders and their Technical Advisors.

6 APPENDICES: ENVIRONMENTAL MONITORING RESULTS

APPENDIX 1: STATUS OF SS-ESMMPS REVIEW AND APPROVAL DURING JULY TO SEPTEMBER, 2015

No	Site name	List of ESMMP and SS-ESMMP	Sub-Contractor	Approval Status by EMO/NNP1PC (date)	Detail Site Information	Monthly Construction & Operation Status
Electrical and Mechanical Works						
1	Main Dam and Re-regulating Dam	SS-ESMMP for Field Shop and Camp	IHI	NNP1 Objection 17 Sept 2015		Works not commenced
Construction Sites						
2	Cofferdam	SS-ESMMP for Secondary Upstream and Downstream Cofferdam	Song Da 5	Being reviewed by NNP1 (Sept 2015)		Document under revision. No construction started.
3	Cofferdam	SS-ESMMP for Primary Upstream and Downstream Cofferdam	Song Da 5	Objection on 27 August 2014	For diverting the river into the inlet-outlet diversion tunnel	Document under revision. No construction started.
Houay Soup Residential Area						
4	Bridge Construction	SS-ESMMP of Geological Investigation for HSRA's Bridge Construction	State Enterprise of Communication	Being reviewed by NNP1PC (Sept 2015)		Works not commenced

			and Construction (SECC)			
5	Camp Construction for bridge construction	SS-ESMMP of SECC Worker Camp	SECC	Being reviewed by NNP1PC (Sept 2015)		Works not commenced
Village Social Development Programs						
6	Drainage preparation at village boundary	Gravity Fed Water Supply system for Hat Nguin host village	Thanxay Co.,Ltd	Minor works. Routine inspections to follow construction.	To supply the gravity water to the local community at Hat Nguin village	Under construction

APPENDIX 2: ENVIRONMENTAL MONITORING CORRECTIVE ACTIONS FOR JULY TO SEPTEMBER 2015

Issue ID	Inspection Date	Site Name	Issue/ Description	Action Required / Recommendation	Deadline	Latest Follow up dated	Final Status
ON-0012	20.01.2015	Songda Camp N#1	1. Grey water in the sediment pond caused un-pleasant odour which was risky if discharge (high bacteria).	(i) The imported bio-chemical substance by the sub-contractor to be mixed with the grey water needs EMO's approval prior to using. (ii) The Contractor and sub-contractor is required to prepare a plan on how to deal with the issue	3/02/15	11/08/15	Resolved
ON-0028	17.02.2015	RT Camp	The temporary sediment retention ponds which contain the camp site's grey water and storm run-off, have accumulated and leaked into the environment/natural water. The result of waste water discharge monitoring in December 2014 and January	The Contractor is required to submit a detailed waste water treatment plan including sufficient information on the operation prior to implementing. In addition, it needs to consider: (i) Reviewing the operation and maintenance activities to	30/03/16	22/09/15	Open

			2015 found that the Total Coliforms detected was significantly higher than the National Standard (i.e. 9200MPN/100ml and >160,000 MPN/100ml for Total Coliforms and 160,000MPN/100ml for Faecal Coliforms). These indicated continuous contamination of the surface water (Nam Ngiep) with high bacteria.	understand what is missing and/or necessary to be added/improved. (ii) Calculating the flow rate and evaluating pollutant load which can be used to support a more appropriate wastewater treatment system re-design. (iii) Designing an appropriate and effective treatment system for long term operation in order to reduce the pollution loads into the natural waterways and comply with the National Environmental Standard for effluent discharge.			
NC-0005	10.04.2015	Sino hydro camp	**Sino Hydro Camp (EF06):** BOD, COD, Ammonia-nitrogen (NH3-N), Faecal Coliforms and Total Coliforms exceeded the National Standard for samples collected in February and March 2015 as below: 1. COD = 127mg/l on 09 February 2015 and 150mg/l on 06 March 2015. 2. BOD = 59.2mg/l on 09	1. Stop discharging from pipe close to the road P1 and find an alternative solution and also redesign current layout of the camp to improve drainage system. 2. The Contractor shall propose an improved waste water treatment system.	30/12/2015	29/12/15	Resolved

			February 2015 and 78.2mg/l on 06 March 2015. 3. Ammonia-nitrogen (NH3N) = 16mg/l on 09 February 2015 and 17mg/l on 06 March 2015. 4. Total Coliforms = 160,000 MPN/100ml on 09 February 2015. 5. Faecal Coliforms = 160,000 MPN/100ml on 09 February 2015. During the February and March monthly water quality monitoring at Sino Hydro camp site.				
ON-0066	05.05.2015	Contractor camp	Full/unused septic tank of temporary toilets.	Emptied the septic tank and dispose of the sewage at a designated disposal area (No.6) to prevent over flow to other areas. Another option could be disposing of sewage onsite by using lime to decrease bacteria and then backfill the septic tank.	19/05/15	28/07/15	Resolved
ON-0072	08.05.2015	RT Camp	The grey water in the sediment pond was directly pumped into the Nam Ngiep. The EMO monitoring team has previously tested the leaked water from the sediment pond and it was	The Contractor is required to not discharging into the environment without prior water testing to confirm that the released water is	8/05/2015	14/07/2015	Resolved

			found that the bacteria presence was much higher than the National Standard. In addition, the EMO was previously informed that the sub-contractor has been applying chlorine for a couple of weeks. Without water testing, the discharged wastewater has a high potential of containing bacteria and/or residual chlorine.	complied with the Project requirements. This waste water should be emptied and disposed of at a safe location such as spoil disposal area (i.e. digging a hole to empty and backfill properly). The EMO should be notified and informed the exact location.			
ON-0085	02.06.2015	Songda camp N#2	The wastewater treatment system does not follow the proposed design.	The Contractor is required to: i. follow the proposed plan submitted on 31 Mar 2015; ii. fix the drainage system and the sediment pond where the drains for surface water run-off and grey water from bathroom and kitchen are separated.	30/3/2016	22/09/15	Open
ON-0087	02.06.2015	V&K Camp	The camp has insufficient facilities for the long-term operation. There is an evidence of grey water being released from the septic tank into the open ditch. This is observed to be non-compliant according to	The Contractor shall: i. Improve the submitted Plan dated 31 Mar 2015 which EMO has provided comments and recommendations. ii. Install the waste water treatment system following	30/3/2016	22/09/15	Open

			the Project's environmental requirements.	the improved system under the EMO's recommendations.			
ON-0090	02.06.2015	Owner Base Camp	No new major environmental issue identified during the inspection. However, a few issues below are still needed to be solved including: 1. Pathways over the site drainage. Surface water drains in the area where toilets were under construction. 2. Building (accommodation) conditions of the camp were inadequate to prevent rain, dust and other environmental nuisance from impacting on residents (as well as limiting their privacy). Accommodation cladding was poorly constructed with a mix of materials such as waste wood, plastic and zinc sheets and cardboard. 3. Cooking on open charcoal and wood stoves was common practice in the accommodation quarters of the camp. Many of the quarters did not have adequate fire protection such	1. Continue to improve surface drainage around toilet and wash area to allow the free flow of water from the area; 2. Internal flooring of the accommodation camps needs to be improved. 3. Install adequate pathways between the quarters and to the facilities, particular around shower areas and toilets. 4. Improve the condition of the accommodation walls by using more permanent materials. Removing plastic sheets, cardboard and waste timber and replacing with proper wooden materials. 5. Inspect the hazardous condition from camp fire use, and install fire extinguishers at all accommodation quarters irrespective of size. Also safety check for	16/06/15	28/07/15	Resolved

			as fire extinguishers. 4. No lighting facilities for the toilet and shower area. This created an unsafe environment at night.	electrical connections and power board usage. 6. Ensure that sufficient night light was provided for the toilet and shower areas;			
ON-0091	16.06.2015	Songda workshop	Poor drainage system, no spillage protection facilities (bund area) and oil trap to prevent the hydrocarbon spill.	The Contractor is required to increase the bunding area and install an oil trap to avoid used oil overflow.	30/06/15	14/07/15	Resolved
ON-0092	16.06.2015	Songda workshop	Lacking of oil spill clean-up equipment/materials. Used oil and hydrocarbon spills were covered with soil and sand and left behind without cleaning up around the workshop.	The contractor should monitor and take appropriate actions in order to ensure that spillages are cleaned up and stored properly.	16/06/15	14/07/15	Resolved
ON-0098	30.06.2015	Songda camp N#1	Bunding is inadequate at the hazardous material storage area.	It is recommended that a concrete bund (suggest a minimum of 20cm high) is constructed at the door of the mentioned space.	30/06/15	14/07/15	Resolved
ON-0099	30.06.2015	RT camp	1) Hydraulic hoses were mixed with scrap metals and other wastes in the drums. 2) Used battery acid bottles were	The Contractor is required to ensure that: - Hazardous materials and non-hazardous materials are	30/06/15	14/07/15	Resolved

			disposed/ scattered on the ground behind the workshop without proper storage. 3) The Sika Sikunit being poured directly onto the ground.	stored separately (scrap metals, hoses and oil filters) - Close and store used containers /drums to the designated bunding area and; - Move used battery acid bottles to the designated hazardous material storage area; - Clean up Sika Sikunit and ensure that no more materials are discarded into the environment.			
ON-0100	30.06.2015	Songda Camp N#2	Food waste and general domestic waste are mixed and stored away from a designated waste storage facility.	Provide proper waste station with concrete platform, roofing and bunding. Separate waste according to their types.	14/07/15	28/07/15	Resolved
ON-0101	30.06.2015	Songda Camp N#2	Local cattle took bath in the grey waste water pond.	The Contractor needs to take an appropriate action to prevent animals/livestock from accessing the camp by installing fences where appropriate.	14/07/15	14/07/15	Resolved
ON-0102	30.06.2015	Sino Hydro Camp	1. Open pits and drains do not have safety barricades. 2. No Separation of scrap metal	The Contractor is required to: 1. Commence every shift with a Tool Box meeting and	28/07/15	11/08/15	Resolved

			and shards which were left scattering around the construction areas. 3. No delineation between walk-ways and work areas. Workers had to step over or around scattered materials. 4. No designated safety setback area for power tools. 5. Welding apparatus not properly stored. 6. No waste collection for offcuts from power tool stand.	discuss safety and environmental issues. A registration of attendees must be kept. 2. Routinely clean all work areas which is recommended after every shift. 3. Install safety barricades around all open pits and drains. 4. Remove all unused scrap metal from the work area. Separate and store in a designated area for later collection/disposal. 5. Place designated walkways throughout the site. (This may require a site plan.) The designated walkways must NOT be obstructed. 6. Place a safety setback from power tools. The setback must NOT be obstructed. 7. Improve the house keeping of welding equipment and ensure proper storage when not in used. 8. Remove all used paint drums etc. to a designated hazardous storage area.			

				No materials shall be sprayed on the ground surface. Instead, steel bar shall be placed away from the ground prior to spraying. 9. Aggregates to be placed at the site at the earliest possible time.			
ON-0103	30.06.2015	Diversion Tunnel	Contaminated concrete water from shotcrete activities was pumped into the sediment ponds and discharged without prior treatment and water testing. The left over concrete was poured directly into Nam Ngiep's bank.	The Contractor is required to: 1. Stop discharging contaminated (cement) water directly into the environment. All contaminated water must be treated through the site filtration system prior to discharging. 2. Concrete waste has to be discarded only at designated spoil areas.	14/07/15	14/07/15	Resolved
NC-0007	30.06.2015	Owner Base Camp	Food waste, recyclables and general domestic waste were mixed. Separation of these materials and storage was not implemented. No centralized waste collection facility was provided.	No SS-ESMMP has been provided by the contractor for the PAKC camp. The Contractor is required to take the following actions: • Provide a properly constructed service area for waste collection away from residential quarters.	30/06/15	28/07/15	Resolved

				• Provide routine waste collection and removal off-site. • Ensure that waste is separated properly according waste types. • Provide training on waste separation and management (contact the NNP1 Waste Management team for technical assistance if required).			
NC-0008	30.06.2015	Owner base camp	the grey water from the septic tank were released directly into the environment without prior treatment.	The Contractor is required to: • Block pipes that directly discharge effluent from the amenities block to the environment that bypass the sediment pond. • Improve side drains of the amenities blocks to direct all effluent to the sediment pond. • Provide NNP1PC of the status of effluent tank levels.	30/06/15	28/07/15	Resolved
NC-0009	30.06.2015	Sino Hydro Camp	The conveyor assembly yard at the Sino Hydro Camp was found to have the following issues:	1. All hazardous waste should be collected and stored in designated facility for collection.	30/06/15	11/08/15	Resolved

			• Soil contamination from spray painting on the conveyor structure. • Left over paint was collected in ponded water around the site. • Steel residues and offcuts from cutting were discarded on the ground. • Left over paint waste was thrown over the embankment outside the camp boundary. • Used paint tins were not properly disposed. • Construction waste was scattered across the site. • General site untidiness.	2. All steel waste is to be captured and stored appropriately. 3. Conveyor frame is to be elevated off the ground before spraying. 4. Contaminated soil is to be removed and disposed of in a designated Spoil Area 5. Regular general site clean-up is required.			
ON-0104	14.07.2015	Songda workshop	Hydrocarbons (fuel and similar products) were spilled . Soil was used to absorb the contaminants and contain the affected area but the material was not cleaned up.	The contractor is required to monitor and take an appropriate action to ensure that any spills on site are cleaned up immediately, with contaminated material disposed of according to NNP1 requirements.	28/07/15	28/07/15	Resolved
ON-0105	14.07.2015	P2	Sediment has accumulated in the road side drain of Road P2. This can be mobilized during	The Contractor is required to immediately remove built-up sediment in the drainage along the Road P2.	28/07/15	11/08/15	Resolved

			rain events and carried to the Nam Ngiep.				
ON-0106	14.07.2015	T11	Lack of sediment pond maintenance causing thesediment to accumulateand fill up the ponds along the roads T11.	The Contractor is required to immediately clean-up the sediment in the temporary sediment pond along the Road T11. In addition,routine inspections should be undertaken and sediment ponds emptied when capacity exceeds 60%.	28/07/15	11/08/15	Resolved
ON-0107	14.07.2015	Songda camp N#2	The outlet pipe of the oil-trap at the kitchen does not contain a screen cover that filters food waste and oil before passing through the grey water filtration system.	Install oil and food waste filters over the tank's outlet pipe. Routinely clean up and maintain the tank (oil trap) to allow water to flow freely through the filtration system.	28/07/15	28/07/15	Resolved
ON-0108	14.07.2015	RT Camp	Inadequate bunding at the door space of the hazardous material storage shed. .	The Contractor is required to increase the bund wall for at least 10 cm thick at the mentioned door space.	28/07/2015	28/07/2015	Resolved
ON-0109	14.07.2015	RT Camp	There is inadequate bunding at the door space of the hazardous material storage shed.	The Contractor shall increase the bunding thickness for at least 10 cm at the door space.	28/07/15	28/07/15	Resolved

ON-0110	14.07.2015	TCM Camp	Untreated water containing food waste and oil film from the kitchen were directly discharged into the outside drain for rain water runoff	The Contractor shall stop direct discharging of kitchen waste water in to the runoff drains. Routinely inspect and clean the grey water filtration system, oil and food waste traps.	28/07/15	28/07/15	Resolved
ON-0111	28.07.2015	Songda batching plant	Bunding of the hazardous material storage shed was not completely enclosed and a floor release valve has not been installed.	The Contractor shall seal-off bunding and install a floor valve.	11/08/15	11/08/15	Resolved
ON-0112	28.07.2015	Songda batching plant	Improper hazardous material storage conditions on site. Hazardous material is stored directly on the ground and without cover. No spillage protection facilities provided.	The Contractor is required to install a roof to prevent the rain and/or remove the fuel drums to the designated hazardous storage area.	11/08/15	11/08/15	Resolved
ON-0113	28.07.2015	CVC Plant Yard	A hazardous material storage shed was provided for the site but impermeable floor space was not provided. A number of drums were sitting on the ground outside the shed exposing to the weather.	The storage area must be appropriately designed and include bunding, a floor valve and associated warning signs.	11/08/15	11/08/15	Resolved

ON-0114	28.07.2015	CVC Plant Yard	A diesel generator doesn't have adequate hazardous material containment facilities such as roofing and bunding.	The Contractor is required to install concrete bunding and roofing for the diesel generator.	11/08/15	11/08/15	Resolved
ON-0115	28.07.2015	CVC Plant Yard	There was stagnant water at the CVC plant loading area due to improper site drainage.	The Contractor is required to improve site drainage system, use aggregate to level areas, and allow surface water flow to the designated drain. It also needs to routinely clean accumulated sediment in the drains.	11/08/15	11/08/15	Resolved
ON-0116	28.07.2015	CVC Plant Yard	The capacity of the effluent treatment ponds was too small to contain effluent water from the CVC Plant site. Increasing the pond bunding would provide greater capacity.	The Contractor shall increase the bunding height about 40 cm more from the existing bund level. It is also required to check the overall filtration system capacity.	11/08/15	11/08/15	Resolved
ON-0117	28.07.2015	Songda camp N#2	The riverside embankment of Song Da Camp is suffering from slippage (slump). Surface water is percolating through cracks in the bank profile.	With assistance from the owner, the sub-contractor is required to monitor the rate of bank slippage.	11/08/15	11/08/15	Resolved
ON-0118	28.07.2015	V&K Camp	The cement mixer truck has discarded waste concrete in the Camp yard.	The contractor needs to clean-up the discarded concrete waste and dispose at a designated disposal area.	11/08/15	11/08/15	Resolved

ON-0119	28.07.2015	V&K Camp	There is an inadequate spill response and pollution control at the hazardous materials storage shed.	The contractor needs to clean up all hydrocarbon escaped from the shed, and provide spill response equipment.	11/08/15	11/08/15	Resolved
ON-0120	28.07.2015	RT camp	Poor vehicle maintenance and cleaning caused engine oil to spill on the groundfrom vehicles in the parking area of the camp. This can lead to contamination of the nearby Nam Ngiep.	The contractor needs to immediately clean up the oil film, and The contractor is to provide Oil Spill Kit and ensure all vehicles are washed down regularly in an area that has oil trap facilities, such as the workshop.	11/08/2015	11/08/2015	Resolved
ON-0121	28.07.2015	RCC Plant	The sedimentation structure has failed at the outlet.	Repair the sediment pond and strengthen the outlet as part of the improvments.	11/08/2015	8/09/2015	Resolved
ON-0122	11.08.2015	Contractor camp	The spill protection facilities are inadequately provided at the generator storage area. Some hydrocarbon spills were found on the ground from refilling activities. These have not been cleaned-up.	No site's SS-ESMMP was submitted and approved. The contractor is required to provide oil traps and roof to protect the generator from the rain hydrocarbon and prevent hydrocarbons being washed to the open drain.	25/08/2015	8/09/2015	Resolved
ON-0123	11.08.2015	Contractor camp	Oil traps at the kitchen have not been adequately cleaned and maintained. These have resulted in grease accumulation	The Contractor is required to routinely maintain and clean the systems to ensure operational effectiveness. The Contractor is required to	25/08/15	8/09/15	Resolved

			and solidification in the oil traps.	submit the MSDS of the chemical to be used in breaking the grease to the EMO for approval before it is applied.			
ON-0124	11.08.2015	Owner base camp	The grey water leaked from underground septic tanks causing bad odour. This suggests that the tank systems are possibly full or damaged.	The Contractor needs to identify the cause of the leak and fix the system accordingly. The contractor is also required to update EMO from time to time regarding the status of the tank at the site. If the tank is full, the Contractor is required to implement owners' approved emergency wastewater disposal guideline and procedure. Full disclosure of this procedure is necessary at least 24hrs in advance.	25/08/15		Resolved
ON-0125	11.08.2015	Owner base camp	Camp solid waste has been discarded around the open ditch and bathing area.	The Contractor is required to: 1. Collect all discarded solid waste as well as separating and disposing them at the designated waste station. 2. Maintain routine monitoring of their sub-contractor's residential area to ensure that the best	25/08/15		Resolved

				environmental practices are being implemented.			
ON-0126	11.08.2015	RT Camp	Waste water has leaked from underground septic tanks which suggests that the systems are full or damaged.	The contractor needs to identify the cause of the leak, and fix the system accordingly. It is also required to provide a status of each tank at the site. If the tank is full, the contractor is to implement owners approved emergency wastewater disposal guideline and procedure. Full disclosure of this procedure is necessary at least 24hrs in advance.	14/08/15		Resolved
ON-0127	11.08.2015	RT Camp	The oil filter trap at the workshop did not operate effectively. Each tank contained very similar levels of oil instead of being progressively diluted/separated. Highly turbid and oil laden water was also being directly discharged from the site at the time of the inspection	The Contractor is required to check the drainage pipes that connect with oil traps and clean them regularly to ensure functionality. System upgrade may be required.	14/08/15	25.08. 15	Resolved

ON-0128	11.08.2015	RT Camp	Kitchen oil traps were not adequately maintained and cleaned. Food waste and grease from the kitchen were contaminating the areas near the trap causing by system overflow.	The Contractor is required to: 1. Clean all grease and food waste from oil traps and properly dispose of at the designated disposal area. Regularly clean and maintain the kitchen oil traps as required to prevent system failure or overflow.	14/08/15	8/09/15	Resolved
ON-0129	11.08.2015	V&K Camp	The same septic tank is used for toilet and kitchen wastes. This overflowed to an adjacent open ditch via open pipes.	The Contractor is required to remove/block the pipes to ensure that the system is closed to contain sewage from leaking. The Contractors is required to advise the Owner on the tank status. If the tank is about 60% to 80% full, the system will need to be emptied according to NNP1 requirements. All efforts must be made to avoid uncontrolled overflow of the system.	25/08/15		Resolved
ON-0130	11.08.2015	V&K Camp	There is no proper waste management facilities at the site. Waste is stored in black plastic bags which can be easily spilt by miss handling or torn by marauding wildlife.	Provide sufficient number of waste bins for the site, which must also include recycle bins. Bins have the same specifications in all camps. Implement separation and recycling program.	25/08/15		Resolved

ON-0131	11.08.2015	V&K Camp	The hazardous material storage facility has insufficient capacity to store the material.	The Contractor is required to increase the holding capacity of the hazardous material storage accordingly. Otherwise, drums have to be relocated to an alternative site for storage. All storage areas are required to have bunding to 120% capacity of the total volume being stored, and abide by the Owner hazardous material management protocols and procedures.	25/08/15		Resolved
ON-0132	11.08.2015	Spoil Disposal N#3	The installed drainage pipe has insufficient capacity to drain storm water runoff during the heavy rain events. Storm water runoff flashes over the spoil area and transports sediment off-site.	The Contractor shall install adequate drainage and sediment ponds at the spoil area boundary.	30/12/15	22.09. 15	Open
ON-0133	11.08.2015	Spoil Disposal N#2	Storm water runoff flew over the spoil area and transported sediment off-site.	The Contractor shall install adequate drainage and sediment ponds at the spoil area boundary to settle sediments prior to flowing off-site.	30/12/15	22/09/15	Open

ON-0134	11.08.2015	Diversion Tunnel	On the 30th July 2015, heavy rains caused a landslide at the Tunnel Outlet which damaged the turbid water filtration system. The contractor built sediment ponds to treat the excavated water prior to discharge to the Nam Ngiep, but they do not appear to have been used in the process.	The contractor is required to use the sediment ponds prior to discharge and monitor any discharge water from the site according to the owner's requirements. The turbid water filtration system shall be repaired as soon as possible The NNP1PC shall receive the results of tested effluent discharge from the site.	30/11/15	22.09. 15	Open
ON-0135	11.08.2015	Sino hydro camp	Grey water was found to leak from underground septic tanks which suggested that the systems were full or damaged.	The contractor needs to identify the cause of the leakage, and fix the system accordingly. It is also requested to provide a status of each tank. If the tank is full, the Contractor is require to implement owners' approved emergency wastewater disposal guideline and procedure. Full disclosure of this procedure is necessary at least 24hrs in advance.	14/08/15	8/09/15	Resolved
ON-0136	11.08.2015	CVC Plant Yard	Construction waste materials were discarded next to a wastewater treatment pond, rendering the system	The Contractor is required to clean the area and remove waste to the designated area. The water treatment system is	14/08/15	8/09/15	Resolved

			ineffective resulting in turbid water not being processed.	to be repaired and operated accordingly.			
ON-0137	11.08.2015	Aggregate Plant	Recent heavy rains triggered land erosion of the embankment below the plant yard.	The Contractor shall re-stabilise the site and dig drainage canals to divert surface water flow and contact with unstable area. Sediment ponds shall be built to trap and settle sediment before it enters drainage lines.	25/08/15	25/08/15	Resolved
ON-0138	11.08.2015	T08	Heavy rains triggered land erosion at various sites around the Project including spoil disposal sites.	The Contractor is required to stabilise the site and dig drainage canals to divert surface water flow and contact with unstable area. Sediment ponds shall be built to trap and settle sediment before it enters drainage lines.	11/08/15	25.08/15	Resolved
ON-0139	11.08.2015	Landfill area	Wooden scraps were disposed in the landfill pit. This material shall be burnt separately. Other recyclable materials (bottles, paper etc.) were also disposed in the landfill.	The Contractor needs to ensure that waste is segregated properly according to their types.	11/08/15	25/08/15	Resolved

ON-0140	25.08.2015	Main dam	Runoff laden sediment from nearby work areas (which also contain a concrete mix) is being carried along the road side drain of T4A without the benefit of sediment trapping ponds.	1. Sediment traps/ponds are to be installed and maintained along the T4A area. 2. Work areas are to be routinely cleaned to avoid construction related sediments entering drain systems.	8/09/15	8/09/15	Resolved
ON-0141	25.08.2015	Main dam	The existing sediment pond/trap that is intended to settle the sediment, oil and concrete mix from the Limb Grouting Tunnel (left bank) in construction effluent, is not sufficient in size causing overflowing.	1. The contractor is required to install an appropriate size of sedimentation pond, based on estimated construction effluent discharge, and remove built up deposits when the pond is about 60% to 80% full. 2. All effluent discharges from the tunnel works are to be treated through sedimentation pond system. 3. The contractor is to provide a Corrective Action Plan report outlining the new design and management of the sediment system.	8/09/15	8/09/15	Resolved

ON-0142	25.08.2015	Diversion Tunnel	There is accumulated sediment in first pond of the Turbid Water Treatment ponds. The pond is nearing full and requires emptying.	The contractor is required to empty the ponds when they are about 60% to 80% full and dispose sludge at a designated disposal area.	8/09/15	8/09/15	Resolved
ON-0143	25.08.2015	Diversion Tunnel	Sulphuric Acid (H2SO4) drums (27x20 litres) were not stored according to hazardous material storage requirements.	The Contractor is required to provide a hazardous material storage facility that is secure in accordance with HazMat requirements. It is also required to place all full and used containers inside the facility.	8/09/15	8/09/15	Resolved
ON-0144	25.08.2015	Former TCM Crushing plant	The former TCM Crushing Plant area is being used as a top soil disposal area but no sediment and erosion control systems were installed. Vehicle operation and worker safety concerns were also observed at the site including a lack of site barricades and warning signs installed to inform vehicle operators and workers on the edge of the cliff and risks of falling.	1. The Contractor is required to remove the stockpile to a designated area that has adequate soil erosion control structure in place. 2. The Contractor is required to install barricades and warning signs to inform vehicle operators and workers on the edge of the cliff and risks of falling.	8/09/15	8/09/15	Resolved
ON-0145	25.08.2015	Songda batching plant	Excess spoil material is being deposited near the site embankment which has	The Contractor is required to: a) cease dumping of spoil materials near the Nam Ngiep	8/09/15	8/09/15	Resolved

			inadequate mitigations to control soil erosion.	embankment ; b) stablise or remove dumped material; install adequate erosion and sedimentation mitigations at the site.			
NC-0010	03.09.2015	T11	1) RoadT10 has been affected by recent heavy rains causing landslide that closed the road. The contractor has made attempts to reopen the road by excavating into the hillside along its length, and placing spoil material over the embankment. The embankment is over 35 degrees in slope, and the Nam Ngiep River is approximately 30 m directly below the works; 2) This materials being stored is readily mobilized and transported to the Nam Ngiep, exacerbating turbidity and TSS levels of the River; 3) Erosion and sediment control structures and best practices are not being applied at the site.	1. The Contractor is required to minimize the sediments entering the Nam Ngiep as much as possible; 2. For the future excavations, the Contractor is required to remove all excess spoil materials and dispose at a designated Spoil Disposal Area and provide a corrective action plan in order to ensure best environmental practice is being implemented on site.	30/01/16	22/09/15	Open
ON-0146	08.09.2015	Songda batching plant	Sediment has accumulated in the surface water drain	The Contractor is required to routinely clear sediment from the drain and dispose of	22.09. 15	22.09.2015	Resolved

			reducing its volumetric capacity and risking localized flooding.	material at a designated Spoil Disposal Area.			
ON-0147	08.09.2015	RT Camp	Bunding wall at the fuel storage facility was damaged. This needs a repair in order to accommodate the required 120% capacity (BAT defined in the project's ESMMP).	The Contractor shall repair the damaged bundling wall.	22.09. 15	22.09. 15	Resolved
ON-0148	08.09.2015	RT Camp	Oil spills have occurred in the used drum holding bay within the hazardous material storage shed. Contaminated soil was disposed of near the shed, and not held in a storage container for processing.	The Contractor is required to clean up the used oil and keep the material in the hazardous storage area for later processing	30.11. 15	22.09. 15	Open
ON-0149	08.09.2015	TCM Camp	Solid waste at the TCM camp was not properly separated or stored at the site. This risks causing local contamination and disease.	The contractor shall ensure that solid waste is segregated according to the waste type, including material for recycling; is properly housed/contained to prevent disease and environmental contamination. The waste is to be routinely collected so that it does not accumulate, and disposed of at the project Landfill site.	22.09.15	22.09.15	Resolved
ON-0150	08.09.2015	Songda Camp N#1	The drying pond of the grey WWTS leaked into the road side	The Contractor is required to fix and close the wastewater	30.10. 15	22.09. 15	Open

			drain contaminating the local environment, and potentially creating a disease vector.	discharge point as well as monitoring the system regularly.			
ON-0151	22.09.2015	Songda Camp N#1	The cattle barricade around the camp effluent sediment pond is damaged, allowing cattle access to wallow in the pond.	The Contractor is required to repair the barricade and fix the bank of the pond.	30.10. 15	22.09.15	Open
ON-0152	22.09.2015	Songda Camp N#1	Waste was not disposed of at the designated areas, separated, and mixed with construction and recyclables.	The sub-contractor is required to clean-up the waste, and segregate recyclables before disposal. The construction waste shall be transported and disposed of at a designated disposal area.	06.10.2015		Open
ON-0153	22.09.2015	TCM Camp	A truck load of construction waste was disposed behind TCM camp, a few meters away from the Nam Ngiep.	Contractor shall investigate which of OC's sub-contractor had disposed the construction waste at that location; Contractor shall remove and dispose those waste to the disposal area.	06.10. 15		Open
ON-0154	22.09.2015	TCM Camp	Poor housekeeping was observed at the camp. Waste from the camp has been discarded to the environment impacting on biodiversity values, and on the local amenity.	The Contractor shall routinely collect wastes from the camp area and nearby and transport to a designated waste disposal area.	06/10/15		Open

ON-0155	22.09.2015	TCM Camp	The cattle barricade around the camp effluent sediment pond is damaged, allowing cattle access to wallow in the pond.	The contractor shall repair the barricade.	06/10/15		Open
ON-0156	22.09.2015	Main dam	The generators at the left bank Limb Grouting Tunnel do not have roofs or bunding to contain oil/fuel leaks.	The Contractor is required to: 1. install a bund area, and add roofing materials to prevent the rain water from flowing inside the storage area; 2. clean-up the contaminated sediment / soil and keep it in designated storage area for processing.	06/10/15		Open
ON-0157	22.09.2015	RT industrial area	Construction waste were improperly stored behind the RT workshop.	The Contractor shall clean-up and segregate the construction waste such as wood, scrap metal, concrete waste and other things. Wood can be burnt on site, and concrete waste disposed of at a designated disposal area.	06/10/15		Open
ON-0158	22.09.2015	Songda workshop	Construction wastes were found to mix with other types of wastes (wood, recyclables, etc.)	The contractor shall clean-up and segregate the construction waste such as wood, scrap metal, concrete waste and others. Wood/timber can be burnt on site, and concrete waste should be disposed of at a designated disposal area.	06.10. 15		Open

				In addition, a sign board and barricade shall be installed at that holding site;			
ON-0159	22.09.2015	Songda workshop	Improper waste management at the workshop area. Hazardous waste was mixed with general solid waste.	The Contractor is required to: 1. segregate the waste according to their type and store in bins for each specified type; 2. provide waste bins with appropriate labels for each waste type. 3. transfer hazardous waste and recyclables offsite and process them by Owner approved vendors. General solid waste is disposed of the NNP1 landfill.	06.10.15		Open
ON-0160	22.09.2015	Aggregate Plant	Sediment has accumulated in the surface water drain reducing its volumetric capacity and risking localized flooding, causing increased sediment load of the drainage lines, and impact on water quality of the Nam Ngiep.	The Contractor shall clean up the sediment and dispose at the disposal area. The pond is to be routinely emptied when it is between 60% and 80% full.	06.10. 15		Open

ON-0161	22.09.2015	RT Camp	Oil and sediment laden water drained into the oil traps without separation which indicated an improperly functioning system.	The Contractor shall: 1. routinely check the drainage pipe of the trap to ensure no blockage; 2. undertake all necessary repairs of the trap to improve system functionality.	06.10. 15		Open
ON-0162	22.09.2015	RT camp	Sediment has accumulated in the surface water drain reducing its volumetric capacity. The waste water from the drain spilled outside and entered the Nam Ngiep.	The Contractor is required to routinely clear sediment from the drain and dispose of this material at a designated disposal area.	06.10. 15		Open
ON-0163	22.09.2015	RT camp	Effluent was discharged from a full underground septic tank.	The Contractor has to fix the leaked septic tank as well as empty the tank according to the agreed Owner procedures for Emergency Disposal.	06.10. 15		Open
ON-0164	22.09.2015	IHI & Mitsubishi camp	The construction site has no means to retain sediment on site.	The Contractor is required to apply necessary mitigation measures to reduce the sediment being transported offsite. This can include silt fencing, site drainage and sediment ponds.	06.10. 15		Open

APPENDIX 3: HAZARDOUS MATERIALS AUDIT RESULTS FOR JULY TO SEPTEMBER 2015

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		**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**
Storage area																												
1	Floor of storage area is impervious	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
2	Fully bunded with capacity >120% of combined container capacity	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	NR	√	√	√	√	√	√	√	√
3	Bunds in adequate condition	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	NR	√	√	√	√	√	X	X	X
4	Closed storage protected from rainfall and flood level	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
5	Storage area is well ventilated	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	√	√	√
6	Oil trap linked to the storage area	√	√	√	√	√	√	√	√	√	X	X	X	√	√	√	NA	NA	NA	NR	√	√	√	√	√	NA	NA	NA
7	Located not close to camp, office and watercourse	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
8	Storage has the fence and lock	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X	√	√	√	√	√	√	√	√	√	X	X	X
9	Incompatible hazardous materials and chemicals stored separately	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
10	Explosives stored in underground facilities or in appropriate bunding	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11	Explosive storage facilities are locked and access is restricted	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Containers																												
12	Containers leak-proof and in good condition	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

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		**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**
13	Metallic (Iron) containers without corrosion (rust)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
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	√	√	√	√	√	√	√	√	√	√	X	√	√	X	√	√	√	√	√	√	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	√	√	√	X	√	√	√	√	√	√	√	√	√	√	√	X	√	√	NA	NA	NA	√	√	√	X	X	X
Safety																												
23	Fire fighting equipment available and controlled	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X

	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	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**	**7**	**8**	**9**
24	Fire fighting equipment is sited appropriately for ease of access	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	X	X
25	Staff wear PPE on site	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
26	Staff trained for HazMat handling and spill response	√	√	√	√	√	√	X	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Spill response																												
27	Spill response kits readily available with adequate supply	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	NR	NR	NR	√	√	√	X	X	X
28	Safe storage is provided for contaminated materials after spill response	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X	√	√	X	√	√	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	X	X

Note: √ = Yes
X = No
NA= Not available
NR= Not required
= Corrective action not provided
= Corrective action provided

APPENDIX 4: HAZARDOUS WASTE INVENTORY APRIL TO JUNE 2015

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		
		7	8	9	7	8	9	7	8	9	7	8	9	7	8	9	7	8	9	7	8	9	7	8	9	7	8	9	7	8	9
1	Used oil /	29 d	31d	32d	11co	11 co	11co	3d	3d, 3sd	3d	2d, 1sd	15 d	17 d	1d, 3sd	0	0	1sd	0	0	0	0	0	1 sd	0	0	0	0	0	35d, 6sd, 11c	49d, 3sd, 11c	52d, 11co
2	Used oil mixed with water	0	0	0	0	0	0	0	0	0	2d	5d	8d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2d	5d	8d
3	Empty used oil drum/container	10 d	8d	9d	1d, 14s	4sd,	5sd,	2d,5sd	1d	7d, 6sd	27 d	3d	12 d	8d, 1sd	2d	0	4sd	26sd	1d, 11s	10sd	0	0	6d, 1c	16 d,	14 d	0	0	1d	54d, 34s	30d, 31s	44d, 22sd
4	Used oil filters	29 u	32u	35u	0	0	0	0	0	0	6d	8d	9d	6u	8u	8u	0	9u	9u	0	0	0	0	0	0	15 u	15u	16 u	6d, 50u	8d, 64u	9d, 68u
5	Contaminated soil, sawdust and concrete	5b	6b	8b	0	0	0	0	0	0	1b	15 b	20 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6b	21b	28b
6	Contaminated textile and materials	1b	2b	3b	0	0	0	0	0	0	2b	2b	3b	1b	1b	1b	0	1b	1b	1b	0	0	0	0	0	0	0	0	5b	6b	8b
7	Contaminated used rubber (hydraulic) hose	1sd	2sd	3sd	0	0	0	0	0	0	9d	12 d	13 d	0	0	0	0	0	0	0	0	0	0	0	0	1sd	0	0	9d, 2sd	12d, 2sd	13d, 3sd
8	Contaminated grease	1d	1d	1d	0	0	0	1d	0	0	0	1d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2d	2d	1d
9	Empty contaminated	1d	1d	1d	0	0	0	0	0	0	0	0	1d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1d	1d	2d
10	Used tire	12	129	135	0	0	0	0	0	0	2u	20	30	15	15	13	5u	8u	8u	1u	0	0	42	45	45	2u	2u	2u	328	219	231
11	Empty used chemical drum/container	0	0	0	0	0	0	0	0	0	1d	1d	1d	0	0	0	14 d	75 d	80 d	22 d	30 d	4 d	0	0	0	4d	0	3d	41d	106 d	88d
12	Acid and caustic cleaners	7bo	15bo	18bo	0	0	0	0	0	0	20 0b	20 0b	22 0b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	207 bo	215 bo	238 bo
13	Empty paint and spray cans	0	0	0	3ca	3ca	3ca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34 ca	1ca	1ca	0	0	0	37ca	4ca	4ca

14	Used battery	2u	4u	2u	0	0	0	0	0	0	0	6u	8u	0	0	0	0	0	0	0	0	0	0	0	0	0	2u	10u	10u

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

APPENDIX 5: AMOUNT OF WASTES SOLD IN THE THIRD QUARTER

No	Date	Types of waste					
		Plastic	Aluminum/tin cans	Paper/ cardboard	Iron scrap	Glass scrap	Hazardous waste
		Quantity (kg)					
1	24/07/2015	9.5	4.0	-	1.0	11.0	1.0
2	30/07/2015	59.5	26.0	10.0	37.0	244.0	1.0
3	06/08/2015	63.5	27.0	-	165.5	219.5	0.5
4	12/08/2015	62.5	62.3	44.0	110.7	245.0	3.0
5	19/08/2015	76.0	87.5	48.0	112.5	217.0	1.0
6	01/09/2015	66.5	14.8	38.0	81.0	109.0	2.0
7	02/09/2015	365.5	22.0	308.0	248.5	245.5	3.0
8	09/09/2015	14.5	5.3	93.0	189.8	20.0	-
9	16/09/2015	28.0	9.0	10.0	-	55.0	-
10	23/09/2015	22.0	6.0	170.0	-	-	-
11	30/09/2015	47.0	11.3	15.0	-	43.0	-
Total		**814.5**	**275.2**	**736.0**	**946.0**	**1409.0**	**11.5**

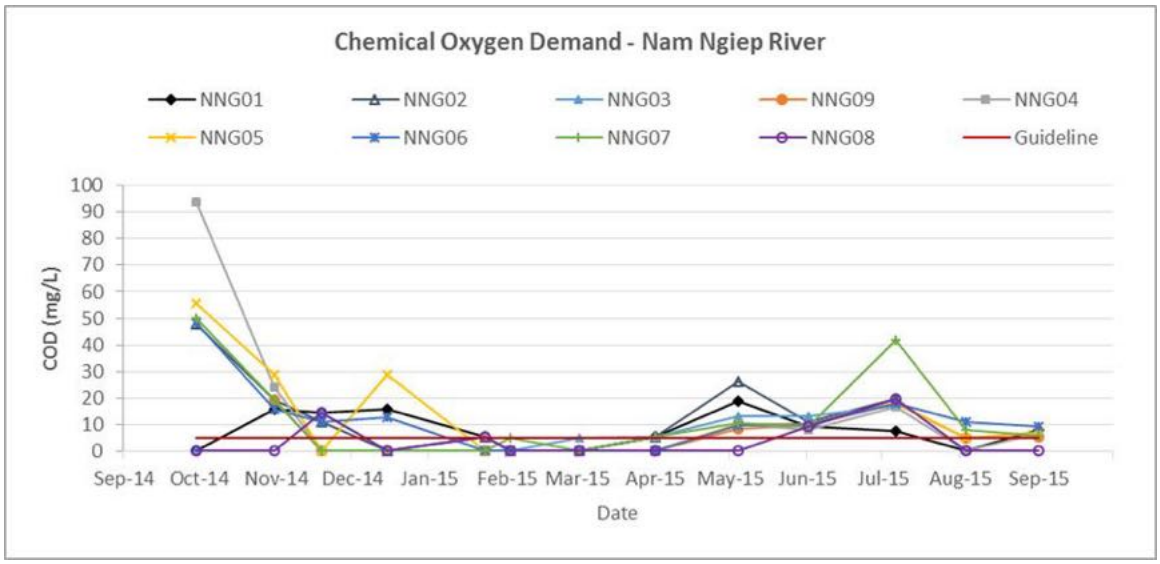
APPENDIX 6: SURFACE WATER QUALITY MONITORING CODE AND LOCATIONS

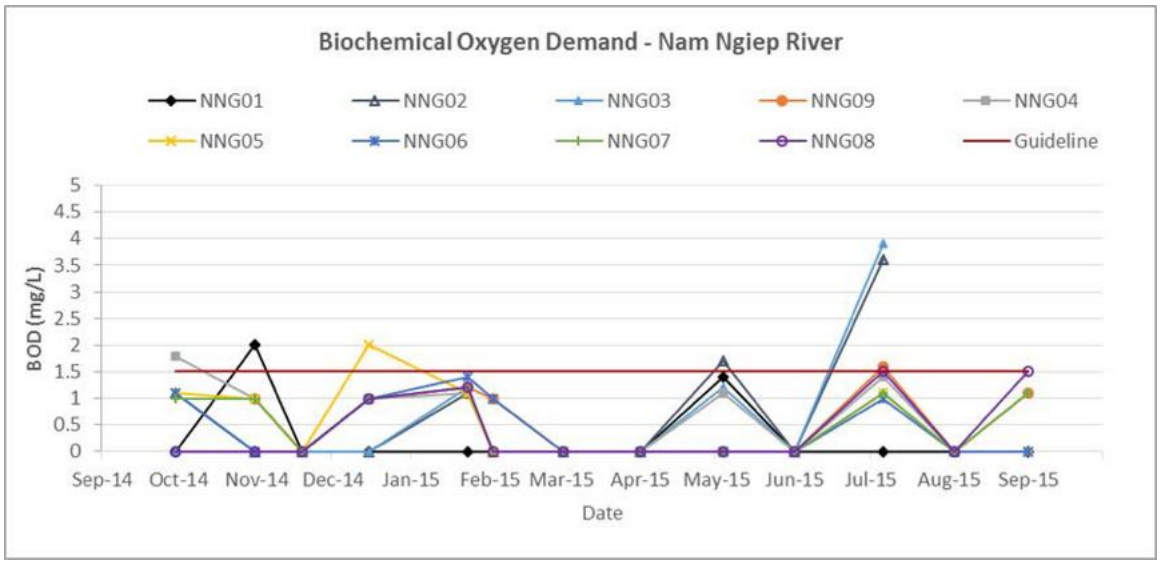
Site Code	Location station
NNG01	Nam Ngiep Upstream of Ban Phiengta
NNG02	Nam Ngiep Upstream of Nam Phouan Confluence
NNG03	Nam Ngiep Downstream of Ban Sop-Yuak
NNG09	Nam Ngiep Upstream Main Dam
NNG04	Nam Ngiep Downstream RT Camp
NNG05	Nam Ngiep Upstream of Ban Hat Gniun
NNG06	Nam Ngiep Downstream of Nam Xao Confluence
NNG07	Nam Ngiep at Ban Somsuen
NNG08	Nam Ngiep at the Bridge of Road 13
NCH01	Nam Chiane at the Bridge of Road 1D
NPH01	Nam Phouan Upstream of Nam Ngiep Confluence
NXA01	Nam Xao Upstream of Nam Ngiep Confluence

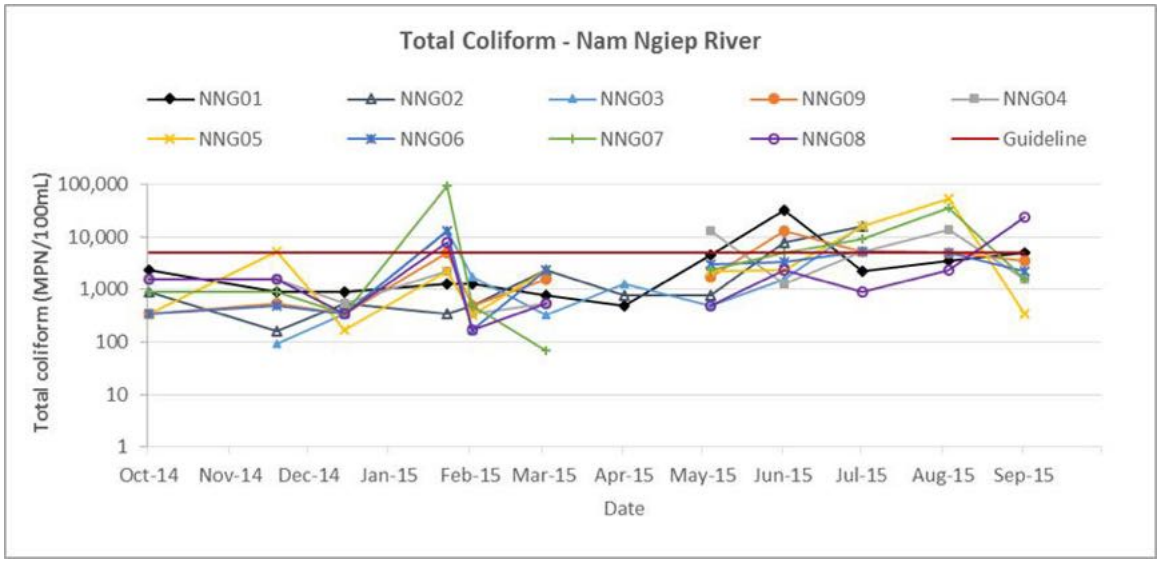
Note: The lower Houay Soup was introduced to routine surface water quality monitoring from June 2015

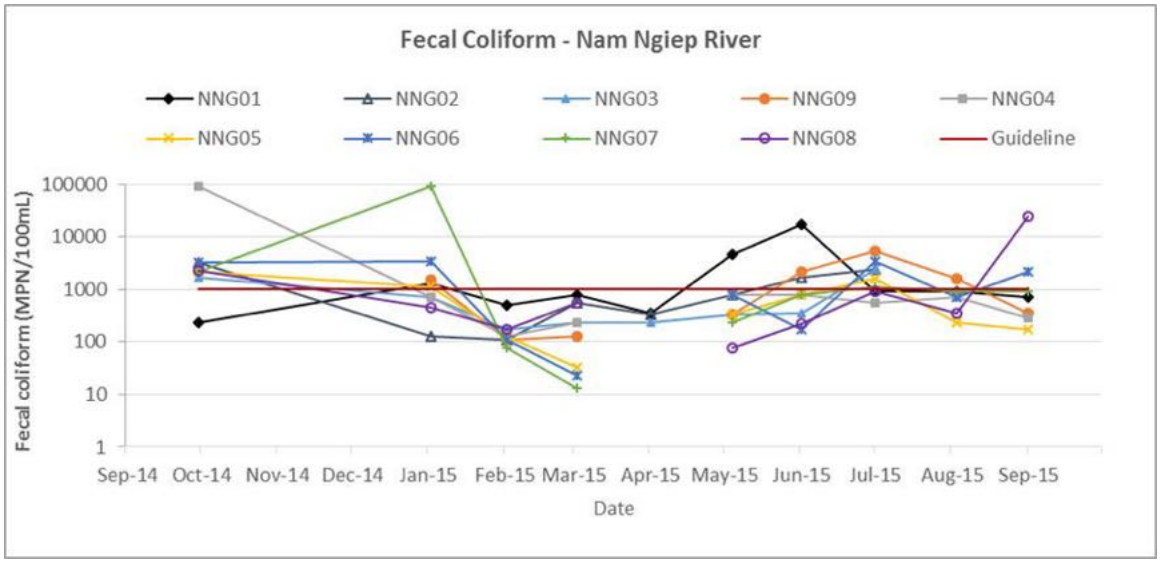
APPENDIX 7: KEY TRENDS OF WATER QUALITY MONITORING FROM SEPTEMBER 2014 TO END OF SEPTEMBER 2015 (ONLY PARAMETERS THAT EXCEEDED GUIDELINE STANDARDS)

Nam Ngiep Surface Water main channel

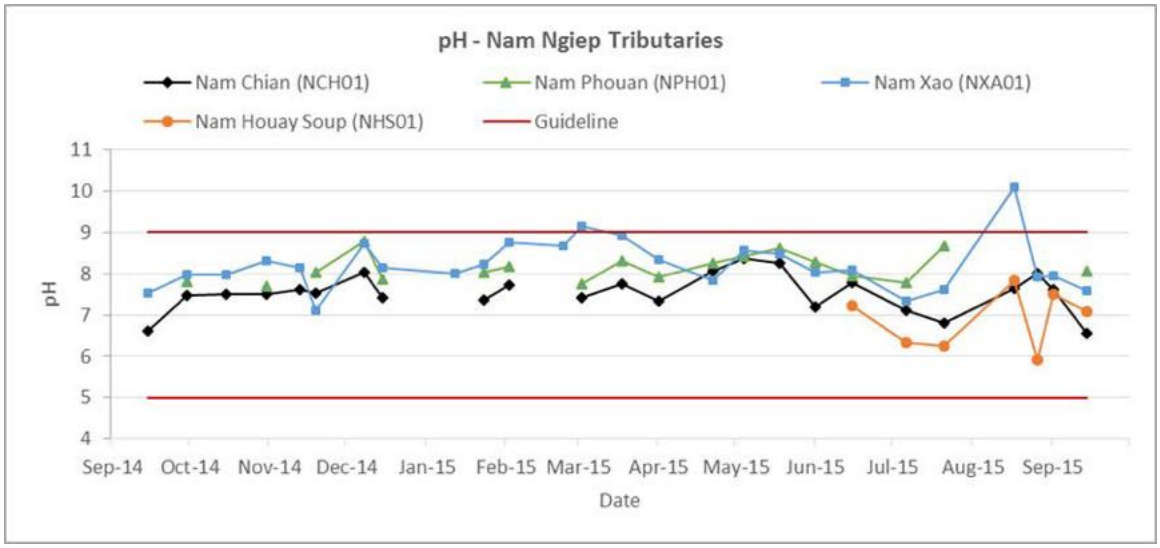


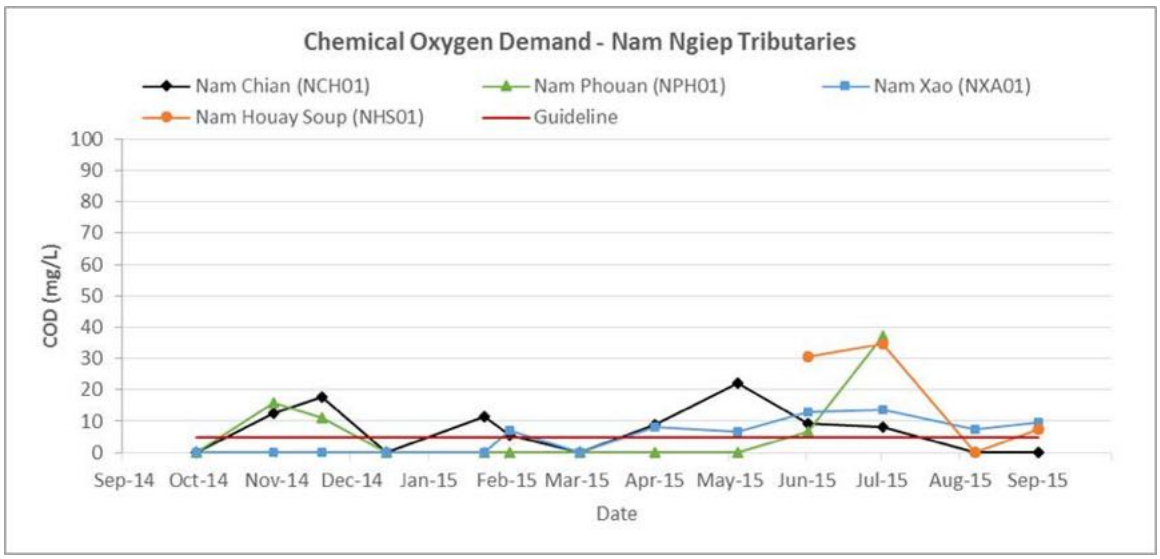


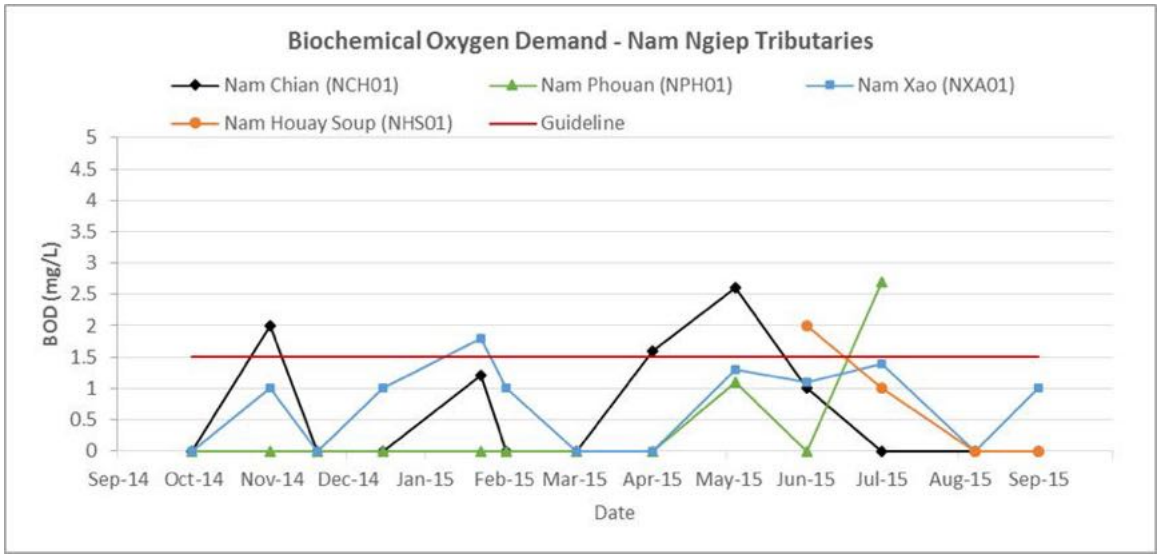

Total Coliform - Nam Ngiep River
NNG01
NNG02
NNG03
NNG09
NNG04
NNG05
NNG06
NNG07
NNG08
Guideline
Total coliform (MPN/100mL)
100,000
10,000
1,000
100
10
1
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Date

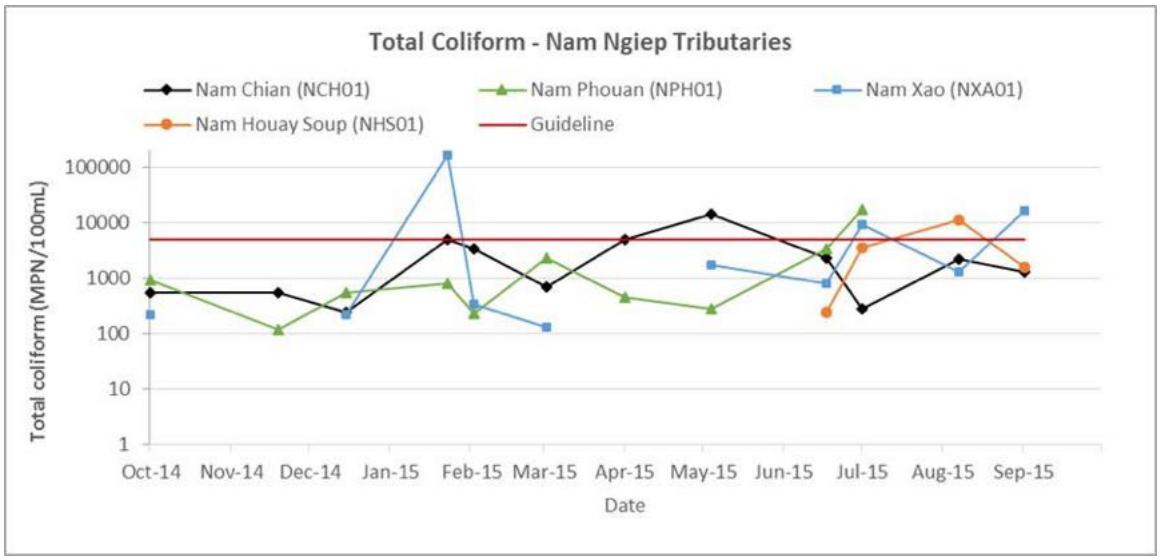

Fecal Coliform - Nam Ngiep River
NNG01
NNG02
NNG03
NNG09
NNG04
NNG05
NNG06
NNG07
NNG08
Guideline
Fecal coliform (MPN/100mL)
100000
10000
1000
100
10
1
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Date

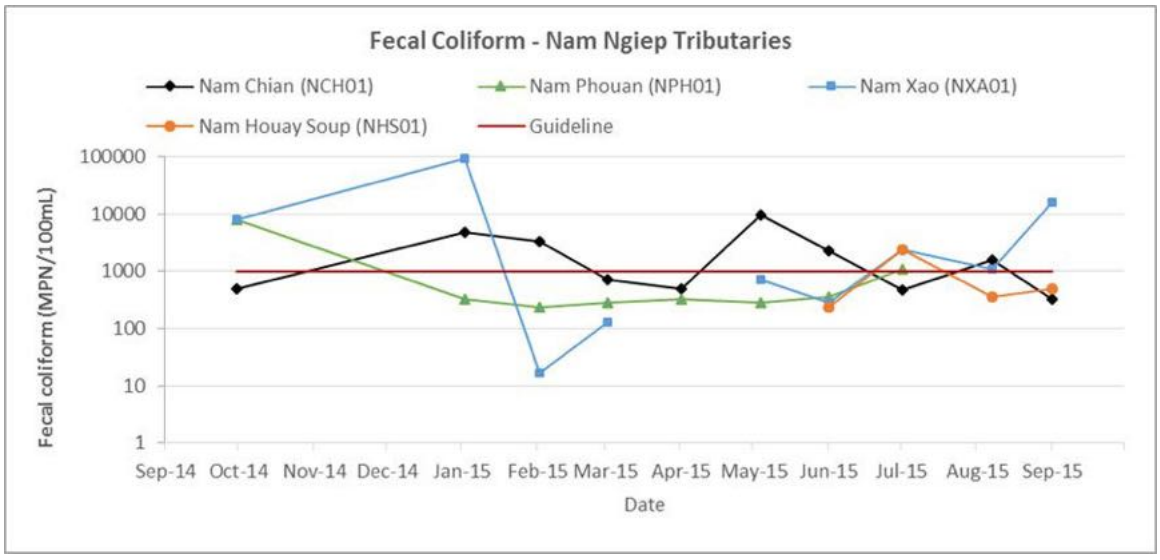
Key water quality parameters for the Nam Ngiep tributaries: Nam Chian, Nam Phouan, Nam Xao, Nam Houay Soup



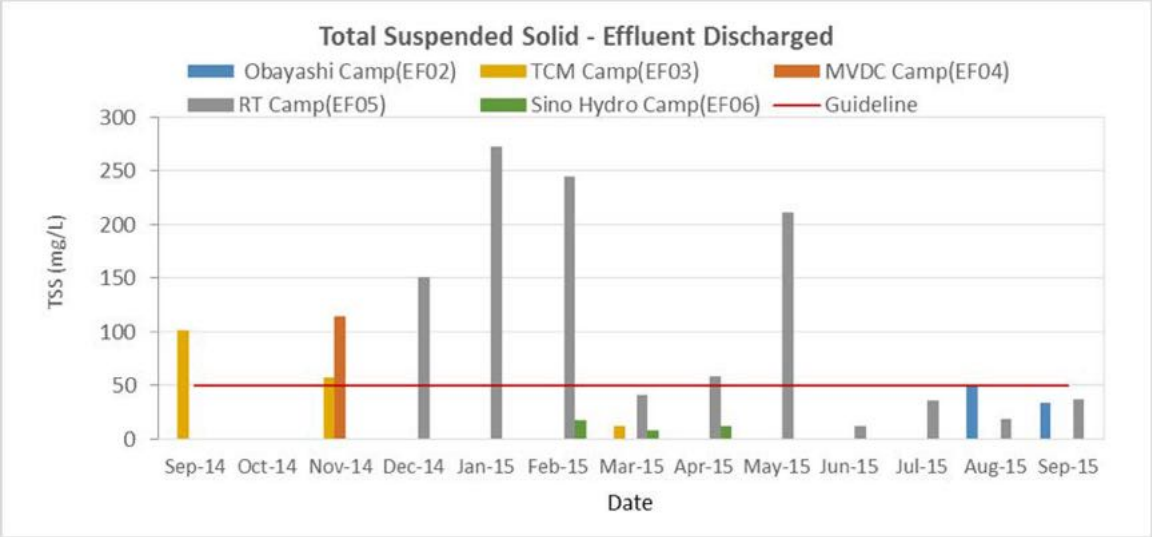


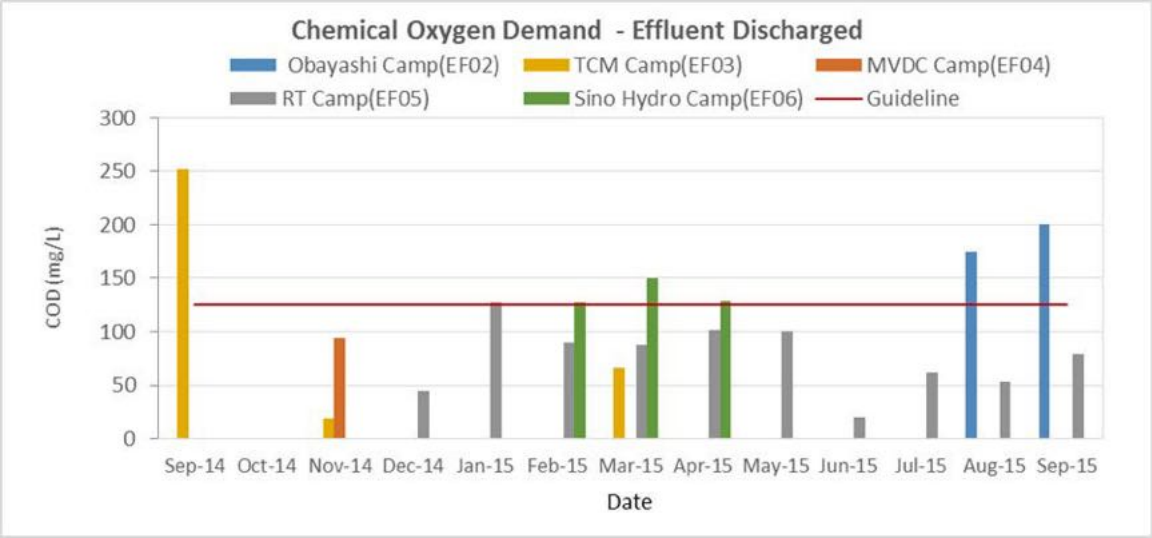

Biochemical Oxygen Demand - Nam Ngiep Tributaries
Nam Chian (NCH01)
Nam Phouan (NPH01)
Nam Xao (NXA01)
Nam Houay Soup (NHS01)
Guideline
BOD (mg/L)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Sep-14 Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15
Date

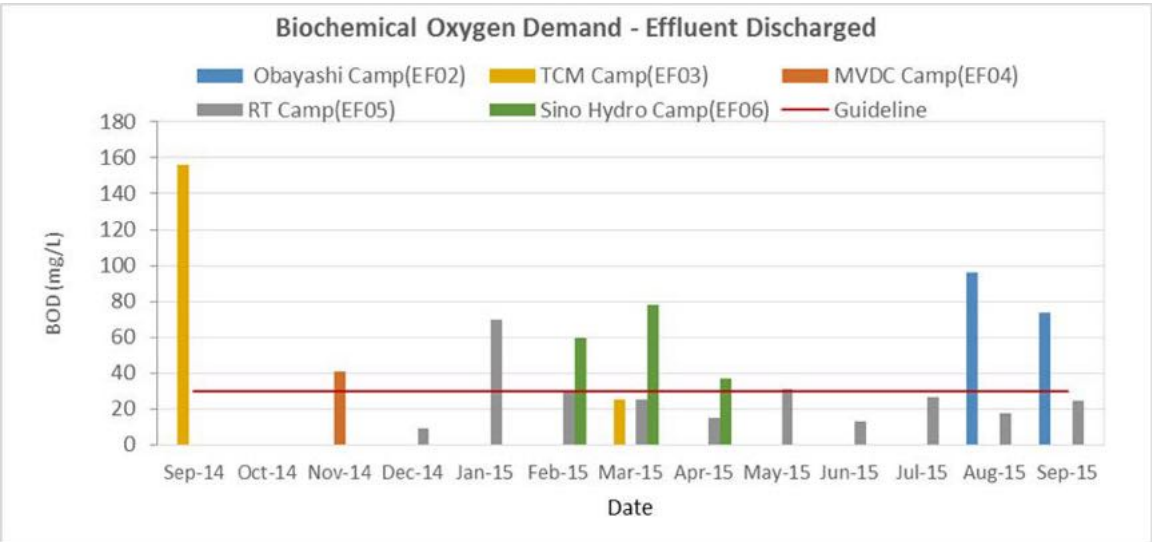

Total Coliform - Nam Ngiep Tributaries
Nam Chian (NCH01)
Nam Phouan (NPH01)
Nam Xao (NXA01)
Nam Houay Soup (NHS01)
Guideline
Total coliform (MPN/100mL)
100000
10000
1000
100
10
1
Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15
Date

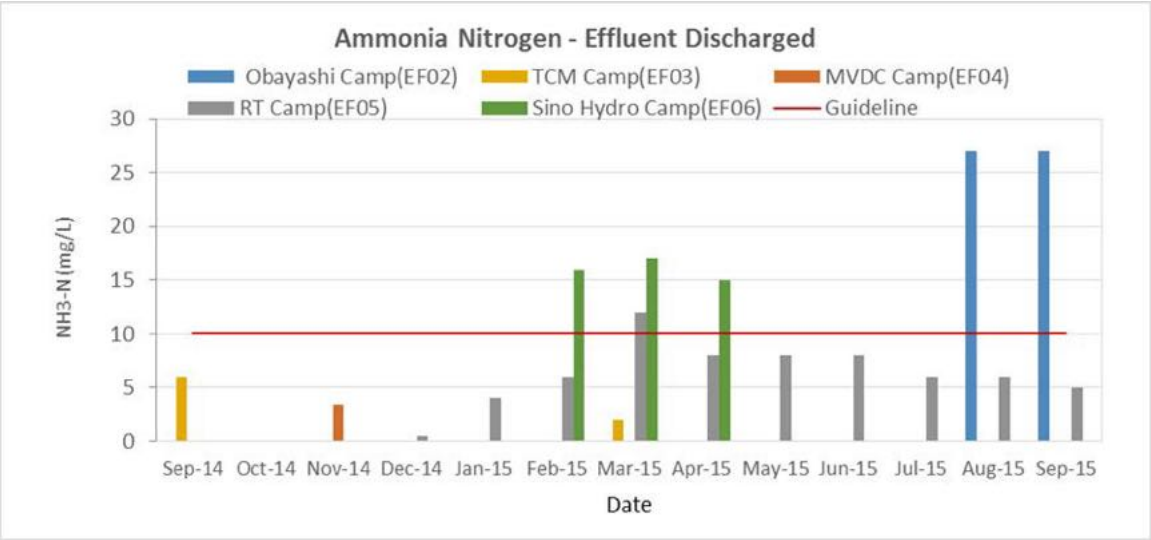

Fecal Coliform - Nam Ngiep Tributaries
Nam Chian (NCH01)
Nam Phouan (NPH01)
Nam Xao (NXA01)
Nam Houay Soup (NHS01)
Guideline
Fecal coliform (MPN/100mL)
100000
10000
1000
100
10
1
Sep-14 Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15
Date

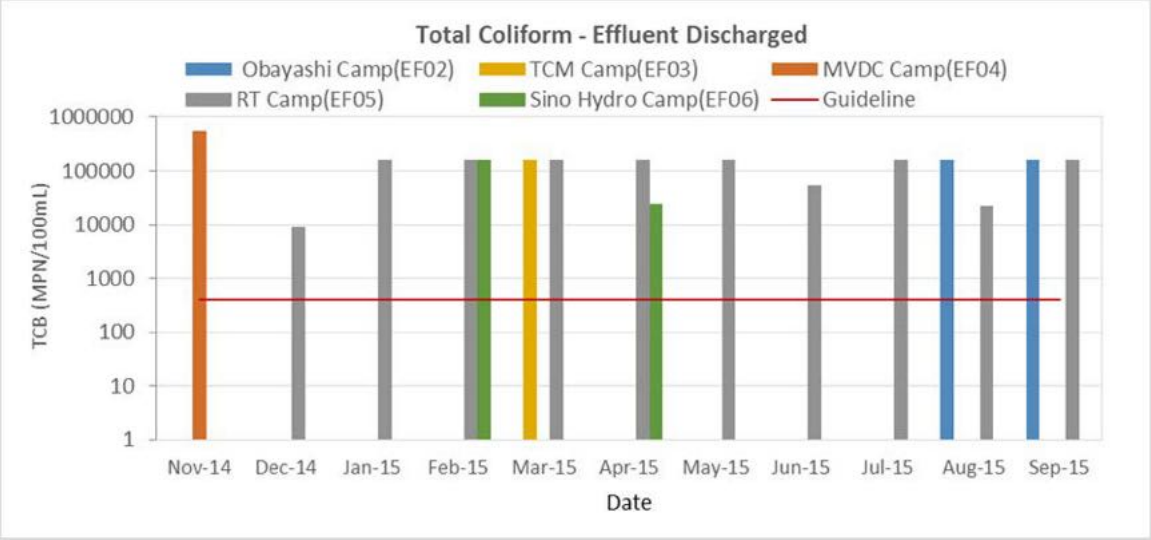
Camp Effluent Water Discharge Trends



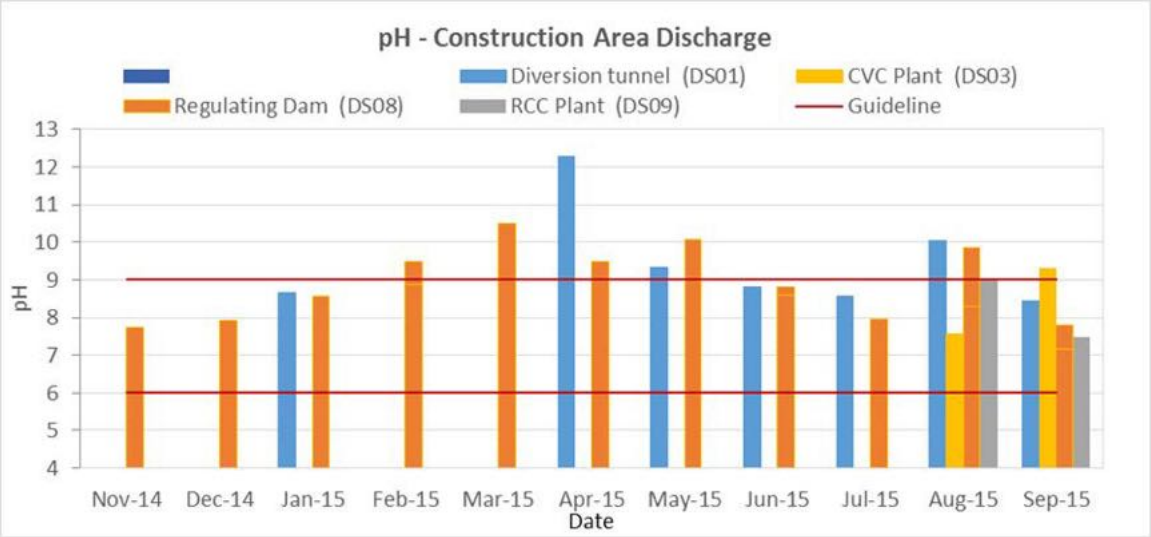


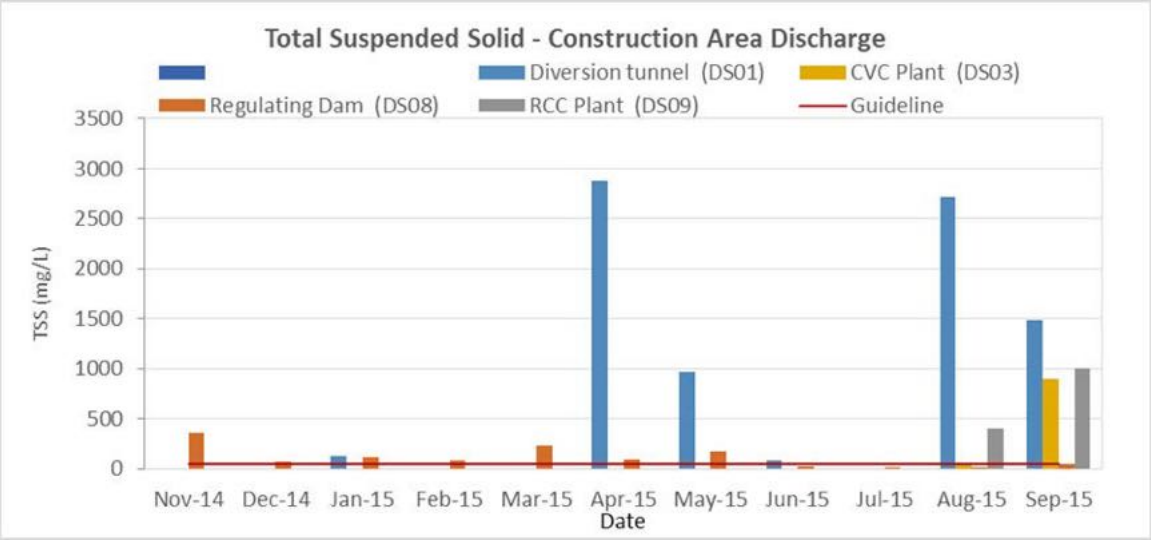


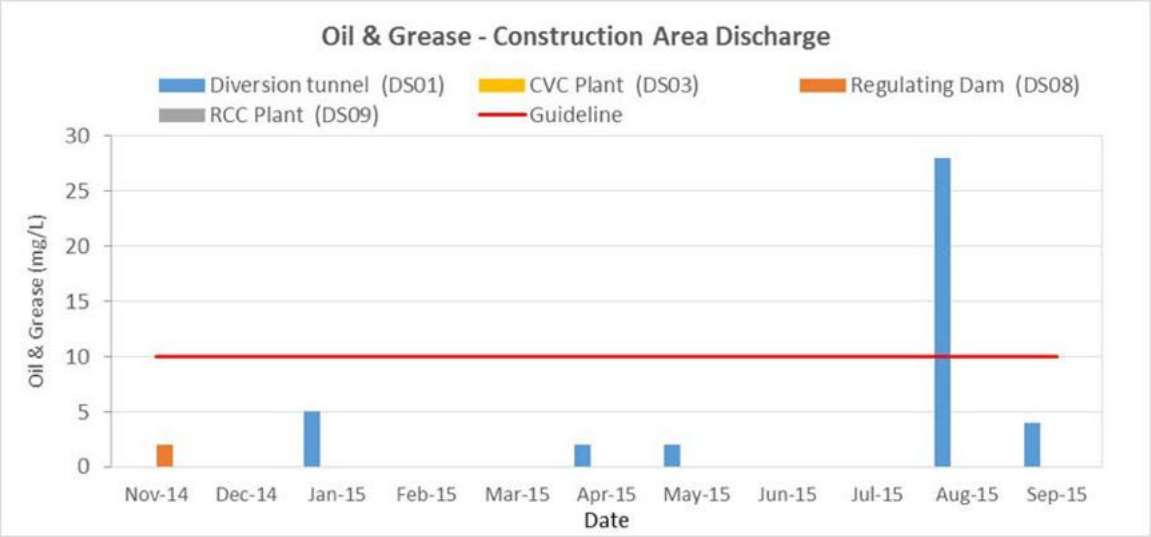

Ammonia Nitrogen - Effluent Discharged
Obayashi Camp(EF02)
TCM Camp(EF03)
MVDC Camp(EF04)
RT Camp(EF05)
Sino Hydro Camp(EF06)
Guideline
NH3-N (mg/L)
30
25
20
15
10
5
0
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Date


Total Coliform - Effluent Discharged
Obayashi Camp(EF02)
TCM Camp(EF03)
MVDC Camp(EF04)
RT Camp(EF05)
Sino Hydro Camp(EF06)
Guideline
TCB (MPN/100mL)
1000000
100000
10000
1000
100
10
1
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Date

Construction Area Discharge Water Quality






Oil & Grease - Construction Area Discharge
Diversion tunnel (DS01)
CVC Plant (DS03)
Regulating Dam (DS08)
RCC Plant (DS09)
Guideline
Oil & Grease (mg/L)
30
25
20
15
10
5
0
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Date